



TEAMCENTER

Structure Management on Rich Client — Usage

Teamcenter 2412

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1. Getting started with Structure Manager

Getting started with Structure Manager

Structure Manager allows you to create generic product structures that can be configured to show the product structure at a particular time or for a certain unit, for example:

- The current production design of the product
- The product structure that was effective on a certain date
- A particular customer variant

By creating a single generic structure that can be configured according to a particular user's needs, you avoid duplicating assembly structures, with all the associated problems of maintenance, redundant information, and complexity of searches.

Structure Manager displays your product structure in a multilevel indented list format, making it easy to browse. This list is similar to the bill of materials (BOM) that engineering organizations use to list manufacturing information.

Structure Manager interoperates with other applications that define or use the product structure, including Platform Designer, Design Context, Multi-Structure Manager, Manufacturing Process Planner, and Part Planner.

Structure Manager interface

Structure Manager interface

The left-hand navigation bar of Structure Manager contains:

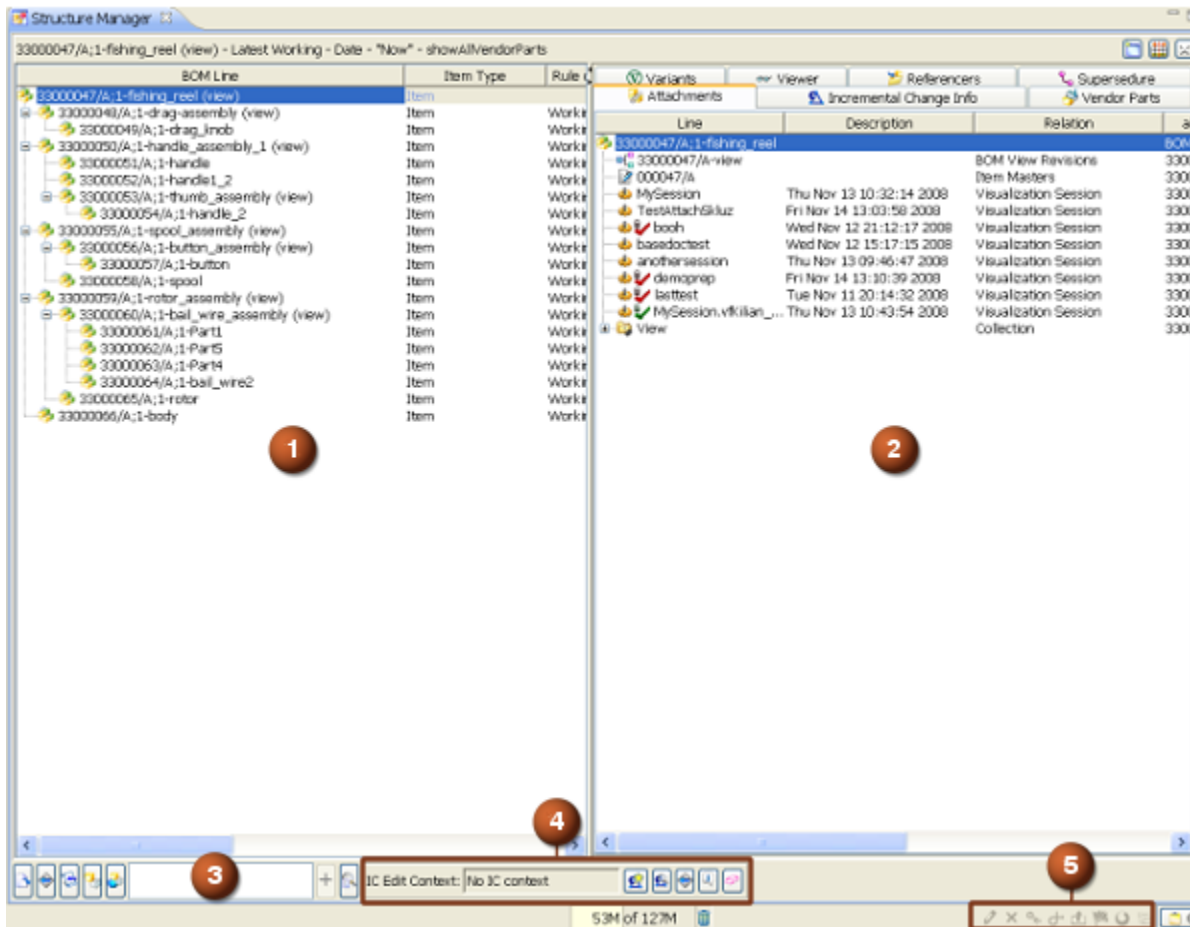
- The standard **Search** and **Quick Links** features provided with all rich client applications. Click **MyView/Markup** to view any BOM markups on the currently selected line.

- **Open Items**

Provides a list of currently open BOM windows or structures. Click an entry in the list to select and make it active.

- **History**

Provides a list of BOM windows or structures that you have recently opened. Click an entry in the list to select and make it active.



1	Structure navigation tree	Allows you to navigate the product structure, expanding or collapsing nodes to view the appropriate data. The images in the tree indicate the purpose of each node.
2	Data panes	The properties columns to the right of the identifier can be tailored to your needs.
3	Search area	Allow you to view data about the selected line. To display a different data pane, click its tab .
4	Incremental change management area	Allows you to search for a structure and configure it with commonly used data.
5	Status icons	Shows the current incremental change (if one is applied) and allows you to manage the incremental change data .
		Show the current status of the selected line.

Structure Manager uses the Teamcenter rich client interface. This allows you to open a Structure Manager view in My Teamcenter. One limitation of opening a view in My Teamcenter in this way is encountered when you open more than one structure and Teamcenter opens the root items in the **Open**

Item pane. Opening an item in this panel does not change the structure displayed in the view but instead opens the item in My Teamcenter.

Not all of the following menu commands and buttons may be visible on your system, as the administrator can hide or reveal only those commands and buttons that are appropriate for your site.

If the *Embedded Software Solutions* are installed on your system, you will see the **Embedded Software Explorer**, **Signal Manager**, and **Connection Manager** commands.

Structure Manager menus

File menu

Command	Description
New→Item	Creates a new item, functionality, or document.
New→BOM View Revision	Creates a new BOM view revision for the selected line.
New→Workflow Process	Creates a new change process for the selected structure.
New→Part	Creates a new part.
New→Design	Creates a new design, that is, a CAD representation of a part or assembly.
New→Snapshot	Creates a new snapshot of the selected structure.
New→Item Element	Creates a new item element (GDE) and associates it with the selected line.
New→Connection	Creates a new revisable connection (for example, connection or datum point) or non-revisable (Tc Link) connection. To associate the connection with the connected objects, select the connection and objects, and then choose Edit→Connect .
New→Manufacturing Feature	Creates a new manufacturing feature, for example, a weld point.
New→Interface Definition	Creates a new interface (for example, connection or network port) and associates it with the selected line.
New→Process Variable	Creates a new process variable.
New→Signal	Creates a new electrical signal.
New→Item From Template	Creates a new item or item revision from a predefined template.
New→Folder	Creates a graphical representation of an aggregation of objects.
New→Dataset	Creates a Teamcenter data object used to manage data files created by other software applications. Each dataset can manage

Command	Description
	multiple operating system files, and each dataset references a dataset tool object and a dataset business object.
New→Form	Creates a data object used to display product information (properties) in a predefined template. Forms can be used to create an electronic facsimile of a hard copy form.
New→URL	Creates a data object used to access a Web resource. The URL (uniform resource locator) is an address that is used as a link to access a Web resource within Teamcenter or in a separate browser.
New→Data Requirement Item	Allows you to create a data requirement item (DRI) if you are working with contract data.
New→Parameter Management→Parameter Definition	Allow you to use the Calibration and Configuration Data Management (CCDM) solution to create and manage embedded software calibration and configuration parameter data. CCDM is a separately licensed solution that must be installed to expose these commands.
New→Parameter Management→Parameter Definition Group	
New→Software Design Component	
Open (Ctrl+O)	Opens the selected structure.
Open in NX	Sends PLM XML data representing the geometry of the selected assembly to NX.
Open in Lifecycle Visualization	Loads DirectModel datasets for the selected lines and displays them in standalone Lifecycle Visualization.
Save (Ctrl+S)	Saves changes made in Structure Manager. For example, you must explicitly save any new BOM lines or variants. If there are unsaved changes, the title pane of the Structure Manager window and the tooltip for any open pane are shown in bold with an asterisk * appended to the name. When you save the changes, the bold highlight and the asterisk are removed.
Save As→Item (Revision)	Depending on the currently selected line, creates a new item or new item revision from the selected line.
Save As→BOMView (Revision)	If a view is currently selected, creates a new structure view of an item from the view in the selected line. If an item is currently selected, creates a new BOM view revision of the selected item.

Command	Description
Save Session	Saves the current Teamcenter session, including the top-level item revision, the effective revision rules, and the state of the viewer pane. Note: By default, this menu entry is hidden. To make it visible, you must set the enableSessionFile entry in your customer.properties file to true. If this file does not already exist, you must create it.
Open Session	Opens a previously saved Teamcenter session.
Revise	Revises the selected item.
Duplicate	Clones the selected structure or assembly. The selected line and everything below it will be copied into the new (cloned) structure. Datasets and attachments may be copied to the new (cloned) structure, depending on Business Modeler IDE deep copy rules. CAD-specific attachments and relationships may be copied depending on options you selected and the closure rules configured for the CAD integration. For example, part family members may be replicated in the new (cloned) structure. Note: This command is unavailable if you select an architecture object type or subtype, for example, architecture breakdown element (ABE). However, you can duplicate any custom object types that your administrator creates.
Close	Closes the currently displayed structure.
Print	Views, prints, or saves information about the currently selected structure.
Print...	Views, prints or saves properties, textual information, graphics or information associated with the selected item.
Exit	Ends your Structure Manager session.

Note:

By default, the **Open in NX** and **Open in Lifecycle Visualization** commands and the corresponding buttons on the toolbar may be hidden. To show these commands and buttons, you

must set the **TC_show_open_in_NX_button** and **TC_show_open_in_vmu_button** preferences, respectively, to **ON**.

Edit menu

Command	Description
Cut (Ctrl+X)	Marks the selected lines for removal and copy their contents to the clipboard. Cut lines are only removed once they are pasted elsewhere in the product structure.
Copy (Ctrl+C)	Copies the selected lines to the clipboard.
Copy Append	Copies the selected data object to the clipboard with the intention of appending it to the destination object.
Paste (Ctrl+V)	Pastes item revisions from the clipboard as components of the selected lines.
Paste Substitute	Pastes item revisions from the clipboard as substitutes for the selected (assembly) lines.
Paste Special	Pastes components on the clipboard to the selected assembly (line). Depending on the contents of the clipboard, this command may move a cut and pending line or lines to another location in the product structure. You can also move lines by drag-and-drop methods or with the Windows shortcut commands.
Add	Adds components to the selected assembly (line) by typing in an item identifier.
Revert Edit	Cancels any pending additions or removals of the selected lines. It also cancels any pending property edits.
	Note: Certain edits are committed immediately to the database and cannot be reverted. Such edits are not displayed in red strike-through text. You can also revert edits by right-clicking the affected line and choosing Revert Edit.
Revert All	Cancels all pending additions or removals of lines anywhere in the structure. It also cancels any pending property edits.

Command	Description
	Note: Certain edits are committed immediately to the database and cannot be reverted. Such edits are not displayed in red strike-through text.
Split Occurrence	Divides an assembly or part represented by the selected line into two lines, and splits the quantity between them.
Insert Level	Creates a new item and insert it as a branch of the selected line.
Replace	Replaces the selected line with the item revision or item element on the clipboard.
Replace...	Allows you to browse for an item revision to replace the selected line.
Change To Replace	Changes separate deletion and addition actions to a single replacement action.
Remove (Ctrl+R)	Removes the selected lines from the product structure. Any child branches of the removed line are moved up to the next level. Data including occurrences notes and absolute occurrences attached to the removed line are lost.
Delete	Deletes a single item or an item and all its children. Optionally, you can also remove any associated referenced objects. This command <i>permanently</i> removes any selected item from the structure <i>and</i> the database.
Properties on Relation	Allows you to edit the properties of the object represented by the selected line.
User Setting	Changes your group, role, or volume assignments and your application logging and journaling options.
Options	Changes your user interface settings that affect all applications, not only Structure Manager.
Guided Component Search	Searches for matching components within an assembly. This search allows you to choose from a list of only those classified workspace objects that fit into the first component of your search. You must first configure it in the Classification Admin application.
Variant Condition	Creates a variant condition on the selected line.

Command	Description
	Note: If you use Command Suppression to hide this menu command, you cannot edit the Variant Condition property.
Toggle Precise/Imprecise	Changes the precision of the selected assembly (line).
Show/Hide Superseded Revisions	Shows or hides all revisions in the selected structure that are superseded by a later revision. This command is applicable only if the BOM view revision and current revision rule are precise.
Select Below→All Lines	Selects all lines below the currently selected line.
Select Below→Lowest Lines	Selects only the lowest lines below the currently selected line.
Toggle in Context Mode	Enables or disables editing in context mode, allowing creation of absolute occurrences for the selected assembly.
Remove Design from Product	Removes a CAD design from an installation assembly attached to an architecture breakdown element. This command is used when your site utilizes Platform Designer.
Replace Design in Product	Removes a CAD design in an installation assembly attached to an architecture breakdown element with another CAD design. This command is used when your site utilizes Platform Designer.
Replace Part in Product	Replaces a part (an ERP part) in an architecture breakdown element. This command is used when your site utilizes Platform Designer.

View menu

Command	Description
Refresh Window	Synchronizes the currently displayed product structure with the database. The displayed structure refreshes with changes that have been made in other sessions and saved since you loaded the currently displayed product structure.
Embedded Software Explorer	Allows you to view binary software information in the same way as you view data about hard parts.
	Note: The Embedded Software Solutions (ESS) menu commands must be exposed using Command Suppression.

Command	Description
Signal Explorer	Allows you to view signals in an electromechanical structure. You can view the source, target, transmitter, process variable, signal of process variable, redundant signal, transmitted signal, and received signal associated with the selected lines, as applicable.
Show Connected Lines	Shows or hides all lines that are connected by the selected connection.
Implemented By→Show Implemented By	Shows all lines that implement the selected line.
Implemented By→Show Implements	Shows all lines that the selected line implements.
Realized By→Show Realized By	Shows all lines that realize the selected line.
Realized By→Show Realizes	Shows all lines that the selected line realizes.
Expand	Expands the substructure immediately below the selected lines.
Expand Below	Expands the complete substructure below the selected lines.
Expand Below...	Expands the substructure below the selected lines to a user-selected level. You can also collapse an expanded substructure when you choose this command (hide certain child lines).
Collapse Below	Collapses the complete substructure below the selected lines (hide all child lines).
Pack	Packs the selected lines so that all lines with the same item revision and find number are displayed as a single line. The actual quantity of lines is appended to the node.
Unpack	Unpacks the selected packed lines so that they are displayed as separate lines, one for each occurrence.
Pack All	Packs all packable lines in the displayed structure.
Unpack All	Unpacks all lines in the displayed structure.
Show Unconfigured Variants	Shows or hides unconfigured variant components. Disabled if the PSEEnableFilteringUnconfigdDueToClassicVariantsPref preference is set to True .
Show Unconfigured By Occurrence Effectivity	Shows or hides components that are not configured when using occurrence effectivity.
Show Unconfigured Changes	Shows or hides unconfigured incremental changes.

Command	Description
Show Part Solutions	Shows or hides part solutions. Part solutions are available if your site uses Platform Designer.
Show Suppressed Occurrences	Shows or hides suppressed occurrences.
Enable Classic Variant Configure to Load	Hides or shows components that are not configured by the selected variant rule. Enabled if the PSEnableFilteringUnconfigdDueToClassicVariantsPref preference is set to True .
Properties	Allows you to view all properties of the selected line. You can edit those properties to which you have permission.
Notes	Allows you to view, and edit if permitted, all occurrence notes for the selected line.
Audit→View Audit Logs	Shows the audit file for the selected structure or assembly. This menu command is seen when the TC_audit_manager preference value is ON and the TC_audit_manager_version preference value is 2 .
Show/Hide Data Panel	Shows or hides the data pane containing, for example, variant data, Referencers information, or the embedded viewer. Note: The data pane is displayed by default if the PSEShowDataPanelDefault preference is set to true. It opens to the tab that was last active in your previous session.
Show/Hide Search Panel	Shows or hides the Structure Manager search pane.
Show/Hide Search Result Panel	Shows or hides the Structure Manager search results pane.
Show/Hide Superseded Revisions	Shows or hides the supersedure revisions of the selected part or assembly.
Show GCS Connection Points	Shows or hides all connection points defined for guided component searches (GCSs). GCSs are defined in the Classification Admin application.

Tools menu

Command	Description
Check-In/Out→Check Out	Checks a selected component out of the database.
Check-In/Out→Check In	Checks a selected component into the database.

Command	Description
Check-In/Out→Cancel Checkout	Cancels a request checkout action.
Check-In/Out→Transfer Checkout	Transfers a selected, checked-out component to another user.
Check-In/Out→Notification List	Allows you to view or edit the list of users who are informed if the selected component is checked in or checked out.
Check-In/Out→Check Out History	Allows you to view the history of checkout actions for the selected component.
ID Display Rule→View/Set Current	Allows you to view the ID display rule currently applied to the selected structure or set a different ID display rule.
ID Display Rule→Modify Current	Modifies the ID display rule currently applied to the selected structure.
ID Display Rule→Create/Edit	Creates a new ID display rule or modify an existing ID rule.
Process and Change Selector	Attaches the selected structure to a Workflow process or change.
Embedded Software Manager	Allows you to manage binary software in the same way as you manage hard parts.
Note: The Embedded Software Solutions (ESS) menu commands must be exposed using Command Suppression.	
Signal Manager→Associate Signal To	Allows you to associate a signal line in an electromechanical structure to another line as a source, target, transmitter, process variable, or redundant signal.
Signal Manager→Remove Signal Association	Removes the association between the selected signal line in an electromechanical structure and another line.
Connection Manager→Connect	Connects two selected lines with a revisable or non-revisable connection.
Connection Manager→Disconnect	Disconnects the currently selected line with a revisable or non revisable connection to another line.
Implemented By→Create Implemented By	Creates Implemented By relationships between the selected line and another line.
Implemented By→Remove Implemented By	Removes Implemented By relationships between the selected line and another line.
Realized By→Create Realized By	Creates Realized By relationships between the selected line and another line.

Command	Description
Realized By→Remove Realized By	Removes Realized By relationships between the selected line and another line.
Fix In-Structure Associations→Current Level	Allows you to identify and remove any invalid associations that were created when the structure was manually edited. This command fixes all invalid associations with the selected line.
Fix In-Structure Associations→All Levels	Allows you to identify and remove any invalid associations that were created when the structure was manually edited. This command fixes all invalid associations with the selected line and all lines below it.
Project→Assign	Assigns the selected structure to a predefined project.
Project→Remove	Removes the selected structure from a project to which it is assigned.
License→Attach	Attaches an ADA license to the selected workspace object.
License→Detach	Detaches the ADA license from the selected workspace object.
View/Set Closure Rule for Expansion	Allows you to view the available closure rules and select a rule to limit structure expansions.
Trace Link→Traceability	Generates a traceability report for the selected structure.
Revision Rule→View/Set Current	Allows you to view or set the revision rule for the currently displayed structure.
Revision Rule→Set Date/Unit/End Item	Sets the date, unit number, or end item to configure the structure, if the current rule allows.
Revision Rule→Set Override Folder	Sets an override folder to override item revisions that would otherwise be selected by other criteria.
Revision Rule→Modify Current	Modifies the current revision rule and apply the modified rule to the current structure. You can save the change if you have write access to the original rule.
Revision Rule→Create/Edit	Creates or edits a revision rule.
Effectivity→Occurrence Effectivity→View, Edit and Create	Allows you to view, edit, or create occurrence date effectivity data for the occurrence of the selected line. You must have the appropriate permissions to create or edit effectivity data.
Effectivity→Occurrence Effectivity→Create on Multiple BOM Lines	Allows you to create occurrence date effectivity data on multiple BOM lines. You must have the appropriate permissions to create or edit effectivity data.
Effectivity→Occurrence Effectivity→Calculate Unit Net Effectivity	Allows you to display the occurrence effectivity, unit net effectivity, and unit net EOC information of the selected line.

Command	Description
Effectivity→Revision Effectivity	Allows you to view, edit, create, or copy effectivity data for the item revision of the selected line. You must have the appropriate permissions to create or edit effectivity data.
Effectivity→Effectivity Mapping	Allows you to view, edit, create, or copy effectivity mapping for an end item. Effectivity mappings are needed if you implement nested effectivity.
Variants→Configure Variants	Allows you to configure or edit a variant structure for the selected top-level module.
Variants→Only Configure Root	Allows you to set to on to only display options for the top-level module, regardless of the line selected. Set to off to configure the structure for a lower level module.
Variants→Search...	Searches for an existing variant item.
Variants→Count Modules	Counts the modules defined for the selected variant structure.
Variants→Unlink Variant Item	Unlinks a variant item from the generic module item to make changes.
Variants→Update Variant Item	If you make structural changes to a generic item and create a new item revision, Teamcenter does not automatically propagate such changes to each associated variant item. Choose this option to make such changes manually.
Set/Unset Global Option Item	Allows you to identify the selected item or item revision as a product item with which global options are associated.
Incremental Change→Create Context	Allows you to create an new incremental change. Note: This command is visible only if your administrator sets the MoveICCreationToMenu preference to True. If it is not visible, use the Create IC Object  button on the incremental change toolbar to create a new incremental change.
Incremental Change→Add	Retrospectively creates an add change and attaches it to the active incremental change.
Incremental Change→Remove	Retrospectively creates a remove change and attaches it to the active incremental change.
Incremental Change→Delete on Object	Establishes a delete change to the attachment.

Command	Description
Incremental Change→Create on Object	Establishes a create change to the attachment.
Incremental Change→Remove Change	Removes (undoes) changes on the active incremental change.
Incremental Change→Incremental Change Baseline	Revises the parent assembly to create an incremental change baseline.
Incremental Change→Split	Splits some of the changes from the active incremental change into another existing incremental change.
Incremental Change→Intent	Allows you to create a new intent for which the incremental change is valid. An intent represents an alternate solution.
Incremental Change→Display icons	Customizes how incremental change icons are displayed and the contexts in which you want to see icons.
Arrangements→View/Set	Allows you to view and set the current NX arrangements.
Unattached Lines→Clear All	Allows you to clear all the unattached lines in the results of an appearances search.
Unattached Lines→Clear Selected	Allows you to clear the currently selected unattached lines in the results of an appearances search.
Unattached Lines→Show Parent	Allows you to find the parent of an unattached line in the results of an appearances search.
Unattached Lines→Attach	Allows you to reattach unattached lines in the results of an appearances search.
All History Lines→Clear All	Clears all history lines in the results of an appearances search.
All History Lines→Clear Selected	Clears selected history lines in the results of an appearances search.
Validation→Run Validations	Validates attributes of a selected item revision, using third-party software applications, according to criteria set by the system administrator.
Validation→View Results	Allows you to view the results of previous validations.
Import→Remote	Imports a structure from a remote site in a Multi-Site Collaboration environment.
Import→Software Parameters	Allows you to import software parameter data in PLM XML format.
Export→Objects	Allows you to export the selected workspace objects through a predefined application interface (AI).

Command	Description
Export→To PLMXML	Export the selected structure and its attachments in PLM XML format to a selected export directory. You must choose the appropriate transfer mode for the destination system and selected structure. If you export a structure in which substitute components are defined, the substitutes are also exported. You can export structure changes tracked by incremental changes in PLM XML format. You can specify a suitable closure rule.
Export→To Briefcase	Allows you to export a configured product structure in TC XML format. You must choose the appropriate transfer mode for the destination system and selected structure. You can export structure changes tracked by incremental changes in TC XML format. If you track changes with incremental changes, you can optionally export only changes to the configured assembly. Only those objects directly or indirectly affected by incremental changes configured on the structure are exported in full, and other objects are exported as stubs. You can export a structure that is configured with modular variants to TC XML format.
Export→Objects to Excel	Exports the selected structure lines to an Excel spreadsheet.
Export→Objects to Word	Exports the selected structure lines to a Microsoft Word document.
Export→Configured NX Assembly	Exports a product structure that is configured with revision rules and variants to NX in native format. This command is visible only if your administrator sets the TC_ExportConfigUGNXAssembly preference to TRUE and NX is installed on the client machine.
Export→Software Parameters	Allows you to export software parameter data in PLM XML format.
Stock Selection Rule	Allows you to choose the rule that selects stock material. Typically used in aerospace and defense environments.
Send Data To	Sends selected data to another application or external program. Your Teamcenter administrator uses the Business Modeler IDE application to create new application interface types associated with a specific application. Each of these types are available in the Send Data To dialog box.
Send Additional Data To	Sends additional data to a running session of the application launched using the Send Data To menu command.
Vendor Part Selection Rule	Allows you to apply a predefined vendor parts selection rule to the structure.

Command	Description
BOM Grading→Run	Allows you to grade or validate the product structure or subassemblies against predefined criteria .
BOM Grading→Show Results	Allows you to view grading results for the select product structure or subassembly.
Request Substance Compliance Check	Allows you to request a material substance declaration (MSD) from the supplier of vendor parts for the selected line and its children.
Initiate Substance Compliance Check	Runs a compliance check of the selected part or assembly against selected regulations.
Apply Exemptions	Allows you to approve the exemption of a part from a selected regulation.
Initiate Compliance Results Validation	Allows you to invalidate all substance compliance results that are qualified for invalidation because of expired exemptions.
Baseline	Allows you to copy and save your work in progress (WIP) item revisions . During the development of a product design, you may need to share such copies of your working design with other users at the same or different sites. You can also save your design for future reference.
Validate Occurrences	Allows you to validate that a selected line and (optionally) any child lines meet the business rules defined by your administrator for structure edits.
Manage Global Alternates	Allows you to define global alternates and a preferred alternate for the selected component.
Compare...	Compares two product structures (or different revisions of the same structure) in separate windows.
Clear Compare	Clears the results of comparing two product structures.
Graphical BOM Compare	Compares two revisions of a part or assembly and examine the difference in the Viewer pane. You cannot use this command to compare multilevel structures.
Intermediate Data Capture	Saves the current structure configuration in PLM XML format on your system for later retrieval or transfer. An Intermediate Data Capture (IDC) is a PLM XML file that contains the definitions of all the objects in the captured structure.
Markup→Markup Mode	Turns markup mode on or off.
Markup→Show Markup View	If the selected line has an associated markup, allows you to view its properties.

Command	Description
Markup→Delete Markup (this level)	Deletes the active markup for the selected line.
Markup→Apply Markup (this level)	Applies uncommitted changes in the markup associated with the current line. Any markups associated with lines below the current selection are not committed.
Markup→Apply Markup (all levels)	Applies uncommitted changes in the markup to the structure, starting from the top line.
Markup→Validate Access to Apply Markups (all levels)	Identifies if you have the necessary write access to the BOM view revision (BVR) to commit changes in a markup associated with any line below the structure's top line.
Site Check In/Out→Check Out to Site	If you are working with Multi-Site Collaboration, allows you to check out the selected object to a chosen site.
Site Check In/Out→Check in from Site	If you are working with Multi-Site Collaboration, allows you to check in the selected object from a chosen site.
Roll up Report→Create	Allows you to create a rollup report .
Roll up Report→View	Allows you to view a rollup report .
Roll up Report→Templates	Allows you to manage templates for a rollup report .

Note:

You may see additional commands in this menu if optional features are installed at your site. For example, if you install Teamcenter Integration for NX, an **Export NX Assembly** command is available. Similarly, some commands are hidden unless a preference setting is changed. For information about any additional commands, see the documentation for the optional feature or contact your Teamcenter administrator.

Graphics menu

Note:

The **Graphics** menu appears when you click the **Graphics** tab.

Command	Description
Selection→Select All	Selects all the objects displayed in the viewer.
Selection→Select None	Unselects any objects currently selected in the viewer.
Selection→Reverse Selection	Selects all objects not selected in the viewer, while simultaneously unselecting any objects currently selected in the viewer.

Command	Description
Selection→Expand to Selected	Expands the assembly tree until the part selected in the viewer is displayed in the tree.
Visibility→View Selected	Blanks and unblanks objects loaded in the viewer. Note: The term <i>loaded</i> refers to an object whose JT file has been loaded in the viewer. A loaded object may or may not be visible, depending on whether it has been blanked or unblanked.
Visibility→Blank Selected	Makes any objects selected in the viewer invisible.
Visibility→Blank All	Makes all objects in the viewer invisible.
Visibility→Unblank All	Makes all objects loaded in the viewer visible.
Visibility→Reverse Blank All	Makes any currently visible objects invisible, while simultaneously making visible any loaded objects which are currently invisible.
Visibility→Unload Selected	Unloads any objects selected in the viewer.
Edit Color/Translucency	Modifies the color, transparency, and shine of selected objects in the viewer. These settings only apply to the currently loaded objects. The next time the edited object is loaded, the settings revert to the default color and translucency.
Insert	Allows you to insert JT, stereolithography (.stl) and VRML (.wrl) files as reference graphics.
Insert→Insert from File	Inserts a reference graphic from the operating system, using the Open by Name dialog box.
Insert→Insert from Clipboard	Inserts a reference graphics object from the clipboard. Note: Only item revisions (not items) can be displayed as reference graphics.
Views→Views Control...	Creates, edits and displays standard views, using the Rotate and Standard Views dialog boxes.
Draw Children	Displays the components of a subassembly. You can also access this command if you right-click in the product structure.

Command	Description
Show Subcomponents	Breaks down solids in the corresponding monolithic JT files and make the subcomponents independently controllable. This function is only available for only leaf and unpacked structure line nodes.
Hide Subcomponents	Removes all merged subcomponents and the one-level tree from the tree. You can load or unload the monolithic JT file related to this structure line node in the normal way.
Export 3D File	Exports the current visible objects to a STEP or VRML file.
Transformation→ Temporary Transformation	Generates an exploded view for use in technical illustrations.
Transformation→ Persistent Transformation	Modifies the physical location of a part (or set of parts) in an owning assembly.
Replace JT File	Replaces the JT file that represents an item revision. You can choose a replacement file from one of the JT files associated with the current structure line item.
Clearance→ Preferences	Allows you to set the clearance calculator, define the parameters of the clearance calculation, and indicate how the results should be displayed.
Clearance→Toggle Results Window	Allows you to change the clearance results that are displayed.
Performance	Sets rendering, culling and general performance preferences.
Preferences	Sets clearance analysis and general viewer preferences.

Structure line context menu

Note:

The structure line context menu appears when you right-click one or more structure lines.

Command	Description
Open BOM View	Displays a list of other BOM views in which you can open the selected data. If the line has no BOM views, this command appears as No BOM View to open .
Guided Component Search	Searches for matching components within an assembly. This search allows you to choose from a list of only those classified workspace objects that fit into the first component of your search. You must first configure it in the Classification Admin application.

Command	Description
Properties on Relation	Allows you to edit the properties of the object represented by the selected line.
Cut	Cuts the selected lines from the structure and places them on the clipboard.
Copy	Copies the selected lines in the structure and places them on the clipboard.
Paste	Pastes the components from the clipboard as children of the currently selected (assembly) line in the structure or into NX.
Revert Edit	Undoes the last manual edit of the selected line.
Paste Property	Allows you to paste a property value from the clipboard into one or more structure lines.
Set In Context	Allows you to edit the properties of an occurrence in the context of a selected line, that is, to create an absolute occurrence.
Remove In Context Override	Removes override data from an absolute occurrence without entering replacement data.
Show/Hide In Context BOM line	Shows or hides the line that is the context of a particular in context edit.
Expand	Expands the substructure immediately below the selected lines.
Expand Below	Expands the complete substructure below the selected lines.
Expand Below...	Expands the substructure below the selected lines to a user-selected level. You can also collapse an expanded substructure when you choose this option (hide certain child lines).
Expand to Type	Expands the complete substructure below the selected lines until a specified type is encountered.
Unload Below	Unloads all lines below the selected line to free memory.
Collapse Below	Collapses the complete substructure below the selected lines (hide all child lines).
Generate Report	Generates a report on the selected object. You can choose the reporting tool and formatting options.
Send an Instant Message to Owning User	Allows you to initiate communication with the user who owns the item or item revision represented by the selected line. The Microsoft Office Communicator integration must be installed on your system.
Open With	Opens selected data in a rich client view.
Send To	Sends selected data to another application or an external program. Your Teamcenter administrator uses the Business Modeler IDE application

Command	Description
	to create new application interface types associated with a specific application. Each of these types are available in the Send Data To dialog box.
Check In/Out	Checks out the object represented by the selected line if it is not already checked out or checks in the object represented by the selected line if it is checked out.
Refresh	Synchronizes the currently displayed product structure with the database. The displayed structure refreshes with changes that have been made in other sessions and saved since you loaded the currently displayed product structure.
Properties	Allows you to view all properties of the selected line. You can edit those properties to which you have permission.
Access	Shows any access rule restrictions on the selected line.
Project→Assign	Assigns the selected structure to a predefined project.
Project→Remove	Removes the selected structure from a project to which it is assigned.
License→Attach	Attaches an ADA license to the selected workspace object.
License→Detach	Detaches the ADA license from the selected workspace object.
Multi-site Synchronization	Allows you to synchronize a selected object, component or assembly with the remote site in a Multi-Site Collaboration environment. It is only necessary to synchronize structures if the Sync State property shows the structure or a component is superseded or out of date.
Add To Favorites	Allows you to add the selected structure to your list of frequently used objects.
Update Suppressed	Updates any suppressed occurrences attached to the current line.
Remove Design from Product	Removes the selected design from the product structure. It is used when your site utilizes Platform Designer.
Search Reference Designators	Allows you to search for reference designator values; this search allows you to specify wildcards.
Show Markup View	If the selected line has an associated markup, allows you to view its properties.
Delete Markup (this level)	Deletes the active markup for the selected line.
Apply Markup (this level)	Applies uncommitted changes in the markup associated with the current line. Any markups associated with line below the current selection are not committed.

Command	Description
Disconnect	Disconnects the currently selected line with a revisable or nonrevisable connection to another line.
Connect	Connects the currently selected line to another line with a revisable or non-revisable connection.

Structure Manager buttons and icons

You can add buttons that are not displayed on the main toolbar by right-clicking the toolbar, choosing **Customize**, and selecting the buttons you want to add. Once you have added buttons to the toolbars, they are displayed in future sessions. Consider adding buttons that:

- You use frequently.
- Provide a shortcut to menu commands that are not primary selections, for example, **Tools→Revision Rule→Set Date/Unit/End Item**.
- Show current status, for example, incremental change configuration options.

Button	Purpose
These standard buttons are located on the main toolbar at the top of the product structure pane.	
	Soft abort If enabled, allows you to terminate the current operation without closing Structure Manager or losing data.
	Cut Cuts the selected lines from the structure and places them on the clipboard.
	Copy Copies the selected lines in the structure and places them on the clipboard.
	Paste Pastes the components from the clipboard as children of the currently selected (assembly) line in the structure or into NX.
	Delete Deletes a single item or an item and its children from the structure. Optionally, you can also remove any associated referenced objects. This command <i>permanently</i> removes any selected item from the structure <i>and</i> from the database also.
	Save Saves changes you made to the structure since it was last saved.
	Split occurrence Splits a line that represents several occurrences into two branches. The new branch and the original (changed) branch initially have the same notes, variant conditions,

Button	Purpose
	and other data, but you can subsequently modify them independently.
	Open Opens the selected structure line in a new window.
	Signal Creates a new message or signal.
	Remove Removes the selected lines from the structure completely and does <i>not</i> place them on the clipboard.
	Revert marked pending edits Cancels any pending additions or removals of the selected lines. It also cancels any pending property edits. Note: This button is visible only if you select the Display Markups for pending edits option on the Product Structure tab of the Options pane, and then restart Structure Manager. To display the Options pane, choose the Edit→Options command. Certain edits are committed immediately to the database and cannot be reverted. Such edits are not displayed in red strike-through text.
	Revert all Cancels all pending additions or removals of lines anywhere in the structure. It also cancels any pending property edits. Note: This button is visible only if you select the Display Markups for pending edits option on the Product Structure tab of the Options pane, and then restart Structure Manager. To display the Options pane, choose the Edit→Options command. Certain edits are committed immediately to the database and cannot be reverted. Such edits are not displayed in red strike-through text.
	Remove design from product Removes the selected design from the product structure. This command is used when your site utilizes Platform Designer.

Button		Purpose
	Replace design in product	Replaces the selected design in the product structure with another design. This command is used when your site utilizes Platform Designer.
	Replace part in product	Replaces the selected part in the product structure with another part. This command is used when your site utilizes Platform Designer.
	Edit the variant condition	Allows you to view or edit the variant condition on the selected lines.
	Change to replace	Changes separate deletion and addition actions to a single replacement action.
	Pack selected line	Packs the selected lines so that all lines with the same item revision and find number are displayed as a single line. The actual quantity of lines appended to the node.
	Unpack selected line	Unpacks the selected packed lines so that they are displayed as separate lines, one for each occurrence.
	View properties	Shows the properties of the selected line.
	Add/edit note	Adds or edits the occurrence notes of the selected line.
	Show connected lines	Displays all lines that are connected by the selected connection.
	View/set revision rule	Allows you to view or set the revision rule on the current line.
	Save, set and load variant option values	Allows you to view, set, save, and load the variant option values for the selected line.
	View or change active arrangement	Allows you to view or change the active arrangement for the root assembly.
	Objects to Word	Opens the selected document in Microsoft Word.
	Open in NX	Starts NX and displays the selected assembly structure. This action sends PLM XML data representing the geometry of the selected assembly to NX.
	Open in Lifecycle Visualization	Starts Lifecycle Visualization and displays the selected assembly structure.
	Show/hide data pane	Displays the data pane that contains the Attachments , Graphics , Incremental Change Info , Variants , Referencers , Parts , and Supersedure tabs and panes.

Button

Purpose

Note:

The data pane is displayed by default if the **PSEShowDataPanelDefault** preference is set to **true**. It opens to the tab that was last active in your previous session.

	Graphical compare	Opens the Graphical Compare dialog box and allows you to visually compare two revisions of the same structure.
	Show/hide search results	Allows you to show or hide the Structure Manager Search Results pane.
	Search	Allows you to search the product structure for a particular component or subassembly. Results are displayed in the Structure Manager Search Results pane.
	Move to first revision	Jumps to the earliest revision of the selected component or subassembly.
	Move to previous revision	Jumps to the preceding revision of the selected component or subassembly.
	Move to next revision	Jumps to the succeeding revision of the selected component or subassembly.
	Move to last revision	Jumps to the final revision of the selected component or subassembly.
	Markup mode	Enables or disables markup mode.
	Markup view	Opens or closes the Markup view.
	Add signals from library	Allows you to add a signal or other object from the data dictionary to the structure.
	Navigation pane	Opens the navigation pane.
	Create note	Displays the New Item wizard, allowing you to create a new standard note or custom note.
	Add classified component	Allows you to use the guided component search to add a classified component to the structure.
	View/set closure rule	Allows you to view available closure rules and then set a closure rule to limit structure expansions.

The following buttons are displayed at the bottom left corner of the product structure navigation tree pane.

Button		Purpose
	Open by name	Browses for and opens a specific structure by name.
	Most recently used (MRU) list	Shows a list of your most recently accessed structures. If you select an entry from the list, Structure Manager loads the structure into the structure pane. You can configure the number of entries shown in the MRU list by right-clicking the button and moving the slider to the desired number.
	Most recently used (MRU) revision rules list	Selects a revision rule to apply to the current product structure from a list of the rules you have used recently. You can configure the number of entries shown in the MRU by right-clicking the button and moving the slider to the desired number.
	Find components in display	Searches for matching lines (components) in the displayed product structure by entering an expression. You can search with any combination of the available properties.
	List substitute components	Adds or removes substitute components or set the preferred substitute. This button is enabled if the selected line may have substitutes; otherwise, it is disabled.
	Manage global alternates	Shows a list of the global alternates available for the selected line. You can add alternates and select a preferred alternate. The preferred global alternate is indicated by a check mark.
	Quick add	Adds a new component to the selected assembly by entering the item identifier of the new component.

The following icons are displayed at the bottom right corner of the product structure pane and show the current status of the selected line.



Shows if you have write access permissions for the selected line.



Shows if you have delete access permissions for the selected line.



Shows if you have access permissions to change the selected line.



Shows if the item revision represented by the line is currently in a workflow process.

Button	Purpose
	Shows if the item revision represented by the line is currently checked in or checked out.
	Shows if the item revision represented by the line is currently released.
	Shows if the item represented by the line is currently published.
	Shows if the item or revision represented by the line is currently classified.
	Shows if the item or revision represented by the line is currently archived.

Structure Manager tabs

Click , or choose **View→Show/Hide Data Panel** to display the data pane which contains these tabs.

Tab	Description
Attachments	Allows you to select and view attachments to the selected line, for example, a dataset or form. The visibility of this tab is controlled by the setting of the BOM_Display_Attachments_Panel preference.
Graphics	Displays an image of the selected line or lines, if a DirectModel dataset is available.
Incremental Change Info	Allows you to add, edit, or remove incremental changes for the selected line. The visibility of this tab is controlled by the setting of the Incremental_Change_Management preference.
Referencers	Allows you to perform a where-used or where-referenced search for the selected item revision. The visibility of this tab is controlled by the setting of the BOM_Display_Referencer_Panel preference.
Supersedure	Displays supersedure information for the selected item revision.

Tab	Description
	The visibility of this tab is controlled by the ECM_SET_GENEOLGY preference.
Variability	Allows you to assign variability to a product context for use in Platform Designer. The visibility of this tab is controlled by the PSM_global_option_item_ids preference.
Variants	Displays variant data such as options, option defaults, and rule checks. Variant conditions are displayed in the Properties pane. The visibility of this tab is controlled by the BOM_Display_Variant_Super_Panel preference.
Vendor Parts	Allows you to view and select from the vendor parts associated with the selected item revision. This tab is available only if the optional vendor management solution is installed; consequently, the VendorManagement_feature_installed preference is set.

Structure Manager structure tree images

The images in the product structure navigation tree indicate the purpose of each node. Descriptions of images specific to certain functionality are provided with the relevant procedures.

Image	Meaning
	Item
	Item revision (structure line or BOM line)
	Item element (general design element)
	Form
	Dataset
	BOM view
	Part
	Assembly with a monolithic JT

Image	Meaning
	Design
	Alternate ID
	Document
	Document revision
	DirectModel dataset
	UGMaster dataset
	UGPart dataset
	UGScenario
	Variant item
	Variant item revision
	Incremental change removed
	Incremental change added
	Separate incremental changes removed and added
	Absolute occurrence override removed by incremental change
	Absolute occurrence override added by incremental change
	Absolute occurrence overrides removed and added by separate incremental changes
	In scope for creation of absolute occurrences
	Absolute occurrence created
	Added structure line
	Removed structure line
	Replaced structure line

Image	Meaning
	Structure line has unreadable children
	Structure line is a variant module
	Component has alternates
	Component has substitutes
	Component has variants
	Process
	Process revision
	Process variable
	Snapshot
	PS connection
	PS connection revision
	PS signal
	PS signal revision
	Allocation
	Allocation map
	Allocation map revision
...	When displayed in the structure tree after a search, this icon indicates the line has hidden children. Click this box to load and view the hidden children.
	Remote part
	Line of assembly
	Tracelink

What are perspectives and views?

Within the rich client user interface, application functionality is provided in *perspectives* and *views*.

View The basic display component that displays related information in a UI window.

Perspective A collection of one or more views and their layout.

Some applications use a perspective with multiple views to arrange how functionality is presented. Other applications use a perspective with a single view.

You can use the **HiddenPerspectives** preference to prevent the display of some Teamcenter perspectives in the rich client.

If your site has online help installed, you can access the application and view help from the rich client **Help** menu.

Basic concepts

Basic concepts

Engineers group parts into assemblies to allow reuse of the same assemblies elsewhere in the product or in other products. An assembly can contain components that are piece parts or assemblies. In this way, you can model a complete product structure as a hierarchy of single-level assemblies.

Teamcenter supports two methods of modeling parts. You can create an item that represents the part and CAD design simultaneously, which is the method familiar to former users of Teamcenter Engineering Process Management. You can also create parts and designs separately, then link (publish) parts and designs when they are ready to release.

You can view previously created graphics that represent all or part of the structure, allowing easy visual identification of a component in the structure.

Structure Manager allows you to create assemblies that are one of the following:

- Precise

A precise assembly references a specific revision of each component.

- Imprecise

In an imprecise assembly, the revision configured in the Structure Manager window is determined by the revision rule currently in force.

You can define sophisticated revision rules to configure the structure in different ways. For example, you can use **revision configuration** based on the release status of each item revision. This allows you to configure the structure according to its effective date or unit number, or the date released.

To take full advantage of Structure Manager, you should be familiar with the Teamcenter elements that are used to define and present product structure, the basic process of creating product structure, and how item revisions relate to how you manage default and multiple product views.

Product structure elements

The following elements may be included in a product structure that you manage in Structure Manager.

Note:

The terms *component*, *line*, and *occurrence* are used commonly. All these terms refer to the single-level link between an assembly and a component. Information typically associated with the link includes find numbers and notes for assembly (such as torque setting and lubrication notes). Data used for configuration may also be stored on an occurrence (for example, variant condition).

Element	Purpose
Aggregate occurrence	A single occurrence representing multiple usages of the same component item by setting the quantity attribute. Use an aggregate occurrence where separate occurrences are not required to distinguish individual usages (for example, rivets).
Assembly	A single-level assembly with no hierarchy, as distinct from a multilevel product structure. Assembly data is stored in a BOM view revision.
BOM view revision	A workspace object that stores the single-level assembly structure of an item revision, that is, occurrences. Access may be controlled on the structure (BOM view revision) independently of other data. BOM view revisions are only meaningful in the context of the item revisions for which they are created.
Component	A node in a structure—a child in a single-level parent-child relationship. When you add components, you create an occurrence for each component added. Contrast with <i>instance</i>—a child in a multilevel parent-child relationship.

Note:

Do not confuse a component in Teamcenter with a component in NX. In Teamcenter, a component is a single-level assembly-child relationship (a relative occurrence).

Element	Purpose
Configuration rule	A rule that configures the structure. There are two kinds of configuration rules: revision rules and variant rules .
Custom note	Provides additional information about an item or item revision. A custom note contains unique information about the part or document. Compare with <i>standard note</i> .
DirectModel dataset	A dataset containing a JT (visualization) file. Files of this format can be generated by NX and other applications.
Default view type	Teamcenter applies a default global view type where possible, for example, when opening an item revision. Use of a default view type avoids the need for a user to choose between multiple views. The default view type is set by the PSE_default_view_type preference.
Design	The CAD design solution that implements a business part. Each part may be implemented by one or more CAD designs. Likewise, a CAD design may implement more than one part. Certain parts do not require a design solution, for example, paint and glue.
Find number	A number that identifies individual occurrences (or groups of occurrences) within a single-level assembly. Components are ordered by find number within an assembly.
	Note: By default, occurrences are populated with numeric find numbers. However, they may contain any text string. Teamcenter ignores nonnumeric values when ordering components in the assembly.
Line	A line in the product structure and all the attributes associated with it. A line represents a single occurrence in the structure. When you click a line, you select all the properties associated with the line, including both occurrence and item properties.
	Note: In Structure Manager, you can edit appropriate properties of the selected line, for example, the item revision or note.
Note (occurrence note)	Assembly related textual data that is associated with an occurrence. Contrast with <i>standard note</i> and <i>custom note</i> .
Note type (occurrence note)	The system administrator creates different occurrence note types. Users can then specify values for the different note types where required.
Occurrence	(Sometimes called relative occurrence.) A hierarchical structure relationship between the immediate parent assembly and its child

Element	Purpose
	component item (in an imprecise assembly) or item revision (in a precise assembly). You can use a find number to identify an occurrence, but this number may not be unique. Data can be stored on the occurrence, including occurrence notes and transforms.
Part	A business object that is represented by an item in the product structure. Each part may have one or more <i>CAD designs</i> associated with it. The part is managed by the company's part releasing system; it is typically revised and releases separately from the associated design.
Piece part	A part with no structure (no associated BOM view revision). This is sometimes referred to as a detail part.
Product structure	The whole multilevel product structure, as distinct from a single-level assembly (which is sometimes referred to as a BOM view revision or BVR).
Standard note	Provides additional information about an item or item revision. A standard note typically contains information provided by a standards organization and can be attached to multiple parts or documents. Compare with <i>custom note</i> .
Substitute	A particular occurrence may have substitute components that are interchangeable for that specific occurrence. One is the preferred substitute, and Teamcenter shows it in the structure. If these substitute parts are intended as manufacturing substitutes, you can manufacture an assembly using any of the substitutes.
View type	An attribute of a BOM view revision that specifies its intended usage, for example, design or manufacture. The administrator may define any number of view types. A chain of BOM view revisions of the same type are anchored by a BOM view of the corresponding view type. An item revision may contain only one BOM view revision for each view type. The view type distinguishes one BOM view revision from another BOM view revision of the same item revision.

Creating product structure

Creating product structure

You create a product structure that represents the design and configuration of your product.

In Structure Manager, you create a product structure, sometimes called a bill of materials (BOM). Teamcenter allows you to view an indented listing of the assemblies and piece parts that comprise the product structure; the indenting allows you to interpret the relationship between the assemblies and piece parts. An assembly has structure of its own; a piece part has no structure.

In My Teamcenter, you can attach CAD files, specification documents or other information to the top-level assembly (the product itself), or to any of the assemblies or piece parts.

You can also attach item elements (sometimes called general design elements or GDEs) to items in the product structure. They represent *features* that are not parts of the physical structure but are associated with it or implemented by it, for example, weld points or ports for connectors. They are stored as occurrence relations.

You can build, view, and manipulate the product structure in Teamcenter, or you can import it from an MCAD system such as NX.

You can include 3D visualization data as **Direct Model** dataset objects within an item revision. Users can then view these images in the embedded viewer in Structure Manager.

Understanding items

The term *item* generically describes all types of items that exist in Teamcenter. To effectively manage many types of item, you should create specific types of item appropriate to your business.

You should also distinguish between the item and its associated item revisions, as follows:

- Item

An item commonly represents manufactured product such as parts, assemblies, end items, and tools. It is an abstract container that holds item revisions and general documents that apply to the product, rather than to a particular revision. You cannot build or test an item.

- Item revision

An item revision represents a physical entity and is a unique, specific revision of a previously created item. It may have associated CAD models, drawings or specifications that are applicable only to this revision. You can release an item revision with a workflow or through change management. This action applies a **Released** status to the item revision, preventing further edits and allowing Teamcenter to maintain product history.

Users can search for an item if they do not know the applicable item revision; all available item revisions are grouped below the item. When the relevant item revision is identified, you can retrieve CAD files and other file representations of part data including 2D or 3D images of drawings or models. If you search for an assembly, you can also view the structure of the product.

Working with items

Items are the fundamental objects used to manage information in Teamcenter. They represent parts and other objects that you want to manage with a life cycle. Items generally represent data that is configuration controlled by revisioning. Items collect a variety of different types of business data, for example, CAD files for parts, document files such as specifications, reports, and forms for metadata. All such data is related to the item by appropriate relationships.

Each item has at least one item revision.

Each item has a label containing two pieces of information:

- Item identifier

An identifier for the item. No two items can have the same item ID. An item ID may be the part number or the document number of the object it represents.

In a standard environment, each item has a single, unique identifier. However, in a multifield keys environment, the administrator may combine a domain name (business object type) and one or more of the object's properties to construct the identifier. For example, in the **Part**{item_id} key, **Part** is the domain. In this environment, the item ID may not be unique and the system may present you with a list of possible items if you specify a nonunique item ID.

- Item name

A short description that is usually a logical name such as **Bolt**, **Bracket**, or the title of a document.

Navigating the structure

Navigating the structure

Structure Manager provides several methods that assist you in navigating the product structure and finding items.

Where used

A *where used* search allows you to find all parent assemblies in which a part is used, navigating up the structure. You can set the search depth as follows:

- One level

Reports immediate parent assemblies only.

- All levels

Reports all assemblies up to the top-level product.

Note:

If you request a search of all levels of a large structure, Structure Manager displays a confirmation message indicating that the search may take a long time to complete. Click **Yes** to initiate the search. The maximum number of lines displayed in the search results is set in the **TC_ImpactAnalysis_Display_Limit** preference.

- Top level

Reports final products only.

The search results may be displayed or stored as a report.

Compare

You can compare two structures to view and reconcile the differences between structures. The comparison is performed on the *as-expanded* structure and you can choose the areas of the structure to compare. You can set the revision rule and variant rule separately for each structure, allowing different configurations to be compared. The comparison identifies quantity and revision differences in three modes:

- Single level

Compares only the first levels of the product structures.

- Multilevel

Performs a single-level comparison at the top level, and then invokes further single level comparisons on any subassemblies that match between the two product structures. This process is repeated successively down the product structure.

- Lowest level only

Compares only the lowest level items of the product structures, ignoring all intermediate assemblies. This is useful for checking that piece parts are consistent.

The results are displayed in a dialog box that steps you through each difference. You can also print the results to a report.

You can also perform the comparison graphically in the embedded viewer, which is a useful tool for designers. In this case, the components present in one structure but not the other are highlighted in separate colors and can be isolated from the other common parts, allowing easy visualization of the changes. You can also perform this comparison on different revisions of piece parts to highlight geometry changes.

You can also include multi-field key information in the comparison, if it exists. Multi-field key information may be defined to distinguish between items with the same identifier, which would otherwise give incorrect results in the comparison.

The Multi-Structure Manager application allow you to compare two views of the same product structure to identify differences. For example, you may want to compare two revisions of the same structure or the design and manufacturing views of the same structure. Any anomalies found during the comparison are reported, although an imbalance between the two structures may not necessarily indicate a problem with either of the structures. The following anomalies are reported:

- Lines in the source structure that are not consumed in the target.
- Each time a line is consumed more than once.

You can run an analysis manually or in batch mode. You can also run it with or without variant options applied.

Find in structure

You can search for components in the structure by any of their properties, for example, item ID, name, attributes on the item revision master form, and occurrence note attributes. You can build a query with as many expressions as necessary, giving a flexible way to find components in large structures. This search works on the expanded state of the structure.

Nonspatial searches

You can search a structure by organizational attributes, rather than performing spatial searches. Searches can be made against one or more such attributes, for example, partition identifier, logical position, usage address, and absolute occurrence identifier. You do not need to configure appearances to run this type of search.

Fast searches

Teamcenter provides a quick spatial search mechanism that allows you to query a given configuration of the product structure to locate parts in a particular area of the product. Spatial searches are primarily useful for large products containing thousands of structure lines.

You can specify the area to search by entering spatial coordinates in the search dialog window or by dragging a search box on the viewer pane. The search results are displayed as a list of items or item revisions in the specified area. Spatial searches may be combined with Classification searches, saved queries, and filters to refine the search results.

The quick spatial search does not require you to maintain data caches. However, Teamcenter supports appearance searches and quick part locator (QPL) searches if you maintain secondary data caches for use with those mechanisms.

Understanding BOM view revisions, view types, and multiple views

Understanding BOM view revisions, view types, and multiple views

A *BOM view revision* is a Teamcenter workspace object that contains the single-level structure of an item revision. You can see BOM view revisions attached to the item revision by the **BOMView revision** relation. BOM view revisions are visible in other Teamcenter applications and allow you to easily distinguish different view types. Teamcenter processes BOM view revisions in a similar way to items.

You can apply protection to BOM view revisions independently of other data. You can also release a BOM view revision independently of the related item revision or other associated data.

Teamcenter **automatically creates** BOM view revisions when you initially create the product structure in Structure Manager; it is not necessarily to manually create BOM view revisions. However, you can **manually create** BOM view revisions if you create multiple views in the structure.

Note:

The creation of multiple views is discouraged for new Teamcenter deployments but continues to be supported for existing customers with successful deployments. Several possible alternatives to multiple views are available and require less maintenance of data.

BOM view revisions are only meaningful in the context of the item revision in which they are created. You can paste references to BOM view revisions into a regular folder, for example, to collect together objects to submit to a release. However, you cannot copy references of BOM view revisions into other item revisions.

Cutting, deleting, or removing a BOM view revision is not done regularly, and may be disabled completely at your site if the **BVRManagement** preference is set to **false**.

The *view type* is an attribute of a BOM view revision that indicates its purpose, for example, design or manufacturing. It allows you to distinguish one BOM view revision to be distinguished from another BOM view revision in the same item revision.

The view type of a BOM view revision in a parent assembly is not dynamically configured in the same way as revisions. You must specify the view type when you add the component to the assembly, for example, adding a specific (nonconfigurable) view of the component. If the component has multiple views, you can change the view type referenced by the parent assembly, but must have write access to the parent assembly to complete this edit operation.

The administrator defines a set of view types for each site using the Business Modeler IDE. Any number of view types can be defined, but most sites only require a single view type for product structure synchronization with Structure Manager.

You can use a **Bought In** view type to model a view that has no components. This may be useful when an assembly designed in one organization should be treated as a piece part in the parent assembly of a different structure.

Setting the default view type

This option sets the default view type Teamcenter uses when multiple views are present and there is ambiguity, for example, when opening Structure Manager or pasting in an assembly.

Typically, your administrator sets a default view type for all users at the site, for example, **Design**. However, this setting is most appropriately defined in conjunction with each user's role. For example, users with the role of production engineer can define their default view type as **Manufacture**; users with the role of designer can define their default view type as **Design**.

- Corresponding preference name: **PSE_default_view_type**

- Default setting: **view**

In general, few assemblies require multiple views and Teamcenter does not expect users to select a view type when they work with single view assemblies. To ensure single view assemblies are managed correctly, you, as an administrator, can define a default view type for all users at the site, for example, **Design**. However, this setting is most appropriately defined in conjunction with each user's role. For example, users with the role of production engineer can define their default view type as **Manufacture**; users with the role of designer can define their default view type as **Design**.

You set the default view type in the **PSE_default_view_type** preference.

If an assembly has multiple view types and it is added as an occurrence of another structure, a view type may be specified for the occurrence. If no view type is specified for the occurrence, the system chooses the oldest view type.

Teamcenter uses the following rules to determine whether to use a default view type.

- If there is only one view type available, Teamcenter uses this view type.
- If there are multiple view types available, Teamcenter:
 - Uses the same view as the parent assembly, for example, when creating a structure.
 - Use the default view type if possible.

Consider setting the default view type in **Role** preference files, for example, so that the preference file for the **Designer** role has the default view type of **Design**, and the preference file for the **Manufacturing Engineer** role has the default view type of **Manufacture**. You can set the default view type option in any of the other preference files—**User**, **Group**, or **Site**.

Set access control on view types

You can use Access Manager to create rules that control write access to the different view types, preventing users from inadvertently editing the structure when manipulating multiple views. For example, production engineers creating manufacturing views should not have write access to design view types. This would prevent production engineers from unintentionally cutting components from the design view when copying components from the design view to create the associated manufacturing view.

Understanding precise and imprecise assemblies

Imprecise assemblies are dynamic structures of items. An imprecise assembly has links (occurrences) to items of its components.

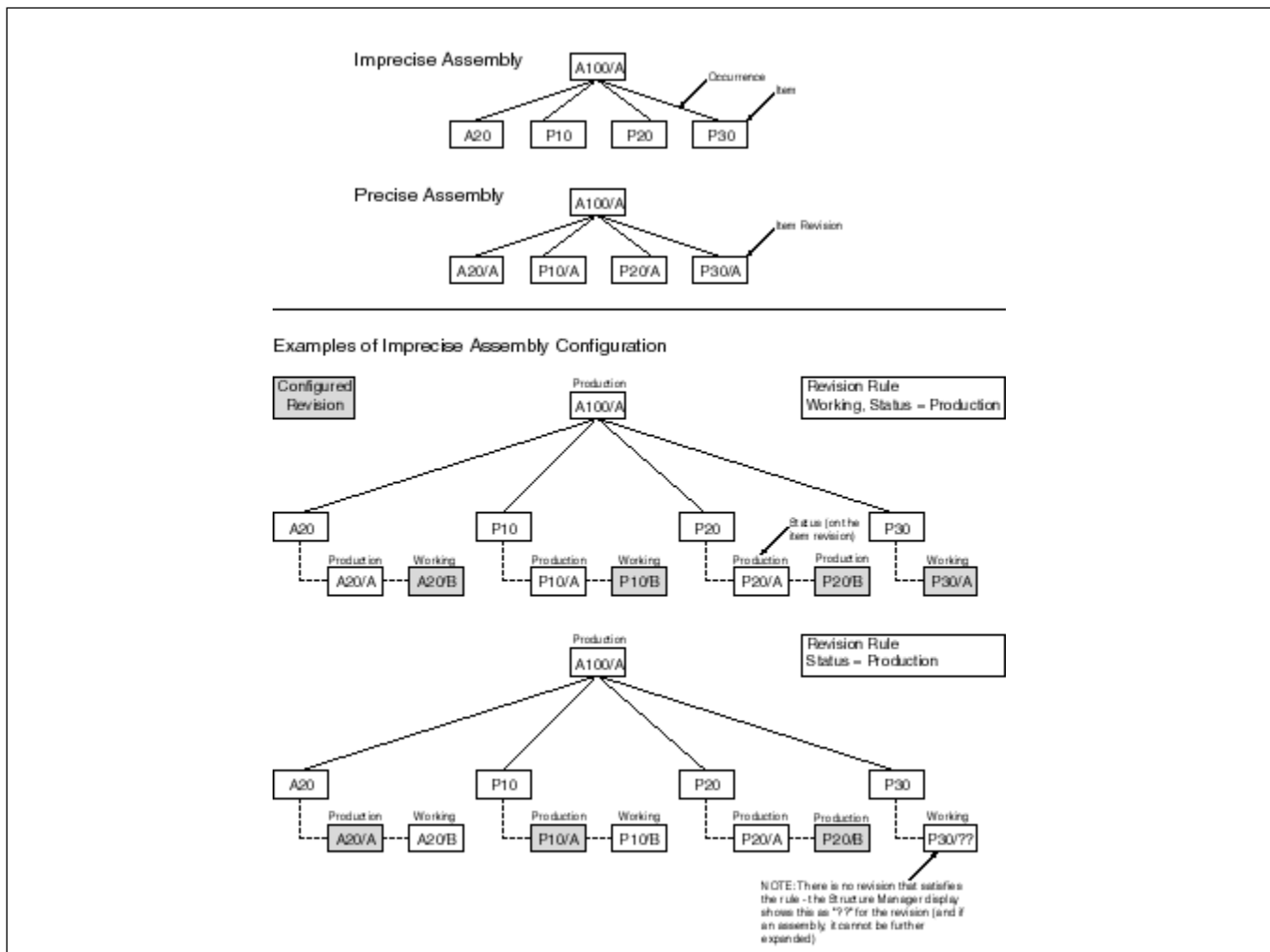
Imprecise assemblies allow you to see the product structure (bill of materials) configured with the relevant item revisions, according to the revision rule you choose for the window. For example, you may want to configure the product structure with revisions that are released for production or,

alternatively, with the latest working revision of components. All users look at the same underlying product structure, but view different configurations in different circumstances according to the revision rule to suit particular needs. Teamcenter automatically reconfigures an imprecise structure when new parts are released or created, or other changes are made. Consequently, it is not necessary to make a copy of the structure and manually update it if you make changes.

Precise assemblies are fixed structures of specific item revisions. A precise assembly has links (occurrences) to item revisions of its components. When you modify a component to a new revision, you must manually update the assembly by removing the old revision of the component and adding the new revision.

You configure the precise references with a **revision rule** containing a **precise** rule entry. However, you can dynamically configure a precise assembly (treated it as imprecise) by applying a revision rule that does not contain the precise rule entry, or has the entry at a lower precedence. Precise assemblies are useful in situations where you must control the configuration very carefully, for example, in aerospace environments.

When the parent assemblies are released and can no longer be modified, any change may result in significant *revision ripple*. If you incorporate new revisions of piece parts, every parent assembly to the top of the structure must also be revised. However, you can group changes into batches to minimize this effect.



Item revision configuration

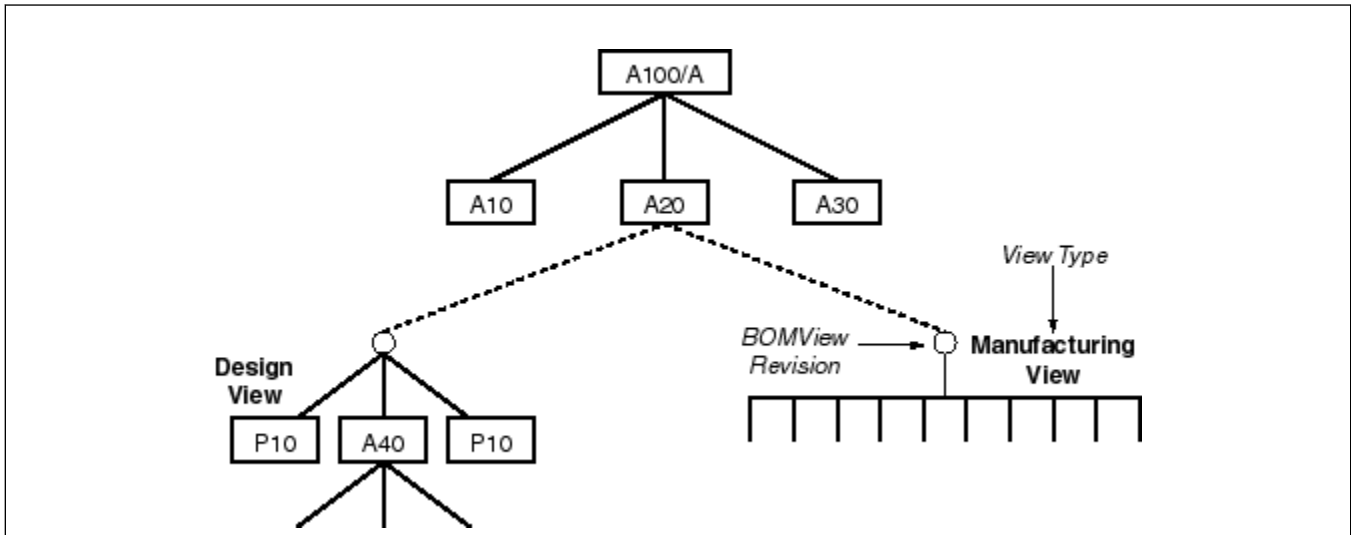
You can change a BOM view revision from precise to imprecise if you have write access to the BOM view revision. This operation causes all the occurrences of that BOM view revision (for example, all of the components for that assembly, everywhere it occurs) to be changed. When you toggle an assembly from imprecise to precise, the precise occurrences reference the item revision that was configured. When you change precise BOM view revisions to imprecise, the Structure Manager window's revision rule is applied to determine the revision of the item for each component in the BOM view revision that should display.

Creating multiple views

Different users within an organization often need to view the structure of a product in different ways. For example, a designer may require a structure hierarchy that is organized by functional subsystem, while a manufacturing engineer may require a structure that reflects the manufacturing assembly process, to allow a better interface to an ERP system. These structures contain the same set of piece parts and represent the same overall physical part. It may therefore be possible to model the structures as different, independently modifiable views of the same assembly. The multiple views functionality allows you to model such structures in this way.

Note:

The creation of multiple views is discouraged for new Teamcenter deployments but continues to be supported for existing customers with successful deployments. Several possible alternatives to multiple views are available and require less maintenance of data.



Multiple views

You can also use multiple views if the different structures do not reference the same set of piece parts, for example, to model a spares structure that is derived from a design structure.

You can also create multiple views to exchange data with ERP systems, particularly if there are several manufacturing sites.

The structures in the different view types are independent of each other—changes in one view type do not affect any others. If you intend to keep multiple views synchronized, you must do this manually using data generated by the **Compare** feature. You can apply access rights separately to each view type.

Similarly, you can submit each view separately to a release procedure. Typically, you employ a formal release process (for example, a change management procedure) to approve multiple views as consistent and valid before they are released and locked against change.

Note:

Teamcenter does not attach any semantic significance to specific view types. However, it is good practice for the name of each view type to reflect its function or purpose.

Locating multiple views in the product structure

Multiple views generally only occur at a high level in the structure of a complete product, for example, for assemblies representing major modules. The lower level assemblies typically only have a single view, for example, for design or manufacture.

Teamcenter allows a parent assembly with a BOM view revision of a **manufacture** type to refer to components with a BOM view revision of a different type (for example, **design**). This may be useful if the structures differ at a high level, but share the same structure at a lower level.

What effectivity schemes are available?

You can configure structures using one of these effectivity schemes:

- Revision effectivity

You configure the product structure for a particular date or unit (serial) number by applying a revision rule. You can also specify a range of dates or unit numbers. Teamcenter shows the revision of each item that is in effect for the specified date, unit number, or range. Revision effectivity is frequently used by automotive manufacturers.

- Occurrence (structure) effectivity

You configure the product structure in a similar way to revision effectivity, but Teamcenter shows the actual occurrences that are in effect. Occurrence effectivity is frequently used by manufacturers of military and aerospace products.

Basic tasks

Task	Overview
Browse product structure	You can view the assembly structure of a product, navigate around the structure, and find components in the structure. From any point in the structure, you can access the associated data, for example, datasets.
Visualize product structure	You can display a graphical representation of the product, if the relevant DirectModel dataset image is associated with the product structure. Selecting a component in the viewer highlights the component in the product structure and vice versa.
Build and edit structure	You can create and modify product structure using Cut, Copy, Paste, and Remove commands. You can specify related information, such as torque settings, for any component.
Make where-used searches	A <i>where-used</i> search reports all assemblies in which a part is used. Perform this search in the Referencers pane.

Task	Overview
Compare product structures	You can compare two Structure Manager structures, each configured as required, to highlight any changes.
Use item revision configuration	You can set a revision rule that determines the revision of each component that Teamcenter configures. This allows you to configure a structure as it was or will be on a particular date, for example, by utilizing effectivity data on each item revision (release status).
Configure variant products and Configure modular variant products	You can set a variant rule to determine which variant components are configured in the structure. Teamcenter references variant data you create on the structure to determine the appropriate variant components.
Open a structure in NX or Teamcenter lifecycle visualization	You can load a complete product structure or selected components from the structure, into NX directly from Structure Manager, if you have installed Teamcenter Integration for NX. Teamcenter Integration for NX allows you to make changes to the assembly structure in NX and synchronizes the changes into the Teamcenter database. Note: You can also manage product structures created in other CAD packages, if you have installed the appropriate integration software.

2. Configuring Structure Manager

Configuring Structure Manager

Set your user preferences by choosing the **Edit→Options** menu command and selecting the appropriate preference.

Setting your local user preferences

Setting your local user preferences

You can set the local user preferences by choosing the **Edit→Options** menu command or other command where described. These preferences (options) configure the user interface and certain default functions to suit your requirements. They are stored in your personal preference file in the Teamcenter database. In addition, the system administrator sets site and group preferences that configure other user options to the same values for all users.

Note:

It is not necessary to add or set every user preference manually. Teamcenter creates or sets some preferences automatically when you perform certain actions or use specific features. If it is not necessary to set a preference manually, this information is included in the preference description in the **Options** dialog box.

Set the default view type

This option sets the default view type Teamcenter uses when multiple views are present and there is ambiguity, for example, when opening Structure Manager or pasting in an assembly.

Typically, your administrator sets a default view type for all users at the site, for example, **Design**. However, this setting is most appropriately defined in conjunction with each user's role. For example, users with the role of production engineer can define their default view type as **Manufacture**; users with the role of designer can define their default view type as **Design**.

- Corresponding preference name: **PSE_default_view_type**
- Default setting: **view**

Setting the default revision rule

This option sets the default revision rule Teamcenter uses when opening a new product structure window. Your site or group administrator may set a default value that you can change for your current session.

- Corresponding preference name: **TC_config_rule_name**
- Default setting: **Latest Working**

Overriding the default revision rule

When a product structure is opened in Structure Manager, the default revision rule specified by the **TC_config_rule_name** preference is used to configure the product structure.

If a user overrides the revision rule, any new structure opened following the override is governed by the value set for the **PSM_set_default_rev_rule** preference. Valid values are:

- **false**: The user defined (override) revision rule is applied while opening structure. This is the default behavior.
- **true**: The default revision rule set by the **TC_config_rule_name** preference is applied while opening the structure.

Packing the Structure Manager display by default

This option sets how the structure is displayed if there are a number of components with the same item revision. You can choose to show the structure as one line or with one line for each component.

This option applies in two circumstances:

- When a structure is first created, for example, the components are added.
- When the assembly that contains the components is first expanded.

You may explicitly change how a particular set of item revisions are **packed or unpacked** by choosing the **View→Pack** and **View→Unpack** menu commands. This selection applies only for the duration of the session.

- Corresponding preference name: **PSEAutoPackPref**. Accepts a logical **0** or **1** as a value.
- Default setting: **1** (pack identical occurrences on a single structure line).

Allowing searches of remote sites

If you work in a Multi-Site Collaboration environment, assemblies and components can be mastered at a site other than the one where you work. The **Allow Structure Manager to perform search using Appearance Search Engine at remote sites** option allows Teamcenter to search data at remote sites as well as data at your site. The default setting is off.

Note:

If you enable searching of remote sites, results may be returned more slowly than if you search only your local site.

Enabling markups

This option allows you to mark proposed changes on the product structure or an assembly, and then save the markup as a persistent workspace object. The default setting is off.

Setting BOM view precision

This option sets whether BOM view revisions are created as precise or imprecise. This option accepts the values **Precise** and **Imprecise**.

- Corresponding preference name: **TC_BOM_Precision_Preference**
- Default setting: **Imprecise**

Note:

This preference is not applied if you create a BVR in the context of a top-level assembly. In this case, the default precision of the new BVR is inherited from the top-level assembly.

Setting the visibility of unconfigured variants

This preference sets whether unconfigured variant components are hidden or displayed by default. You can change this setting by choosing the **View→Show Unconfigured Variants** menu command.

- Preference name: **PSEShowUnconfigdVarPref**. Set to **false** for hidden or **true** for displayed.
- Default setting: **true**

Setting the visibility of unconfigured occurrences

This preference sets whether unconfigured occurrences are hidden or displayed by default. You can change this setting by choosing the **View→Show Unconfigured By Occurrence Effectivity** menu command.

- Preference name: **PSEShowUnconfigdEffPref**. Set to **false** for hidden or **true** for displayed.
- Default setting: **true**

Setting the color of precise and imprecise assemblies

This preference determines the colors in which precise and imprecise assembly lines are displayed. By default, both preferences have site protection scope so they must be set by your administrator. There is no corresponding user option.

- Preference name: **PSEPreciseColorPref**. Set to the color value for the display of precise lines.
- Preference name: **PSEImpreciseColorPref**. Set to the color value for the display of imprecise lines, for example, **#FFFFFF** for white.

The default colors are green and gray, respectively.

Setting the visibility of information center elements

You can independently turn on or off the **Where Used**, **Where Referenced**, **Child CountAccess**, and **State** elements in the information center at the bottom right corner of the Structure Manager window.

To change the current settings, right-click in the information center. Teamcenter shows a dialog box containing a check box that allows you to show or hide each of the elements.

Configure the structure line title format

1. Add the structure (BOM) line title column to the list of displayed columns in Structure Manager, by choosing **View→Properties** and selecting it from the list of available columns.

Initially, the **BOM Line Title** column displays the same information displayed in the Structure Manager tree (**BOM Line**).

2. Choose **Edit→Options**.

Teamcenter displays the **Options** dialog box.

3. Click the **Product Structure** node in the **Options** tree.

Teamcenter displays the options in the right pane of the window.

4. From the **BOM Line Title format for Items of type** list, choose the item type for which you are defining the structure (BOM) line title format.

5. Enter a combination of fixed text and other structure line properties in the text field, for example:

```
$bl_item_item_id, with name $bl_item_object_name of type
$bl_item_object_type
and find number $bl_find_no
```


Note:

If you enter an invalid property name, for example, **\$my_missing_property**, Teamcenter does not display an error; rather it displays the text without the dollar sign (\$).

The **\$string** entries are structure line property names that act as substitution points when populating the cells in the Structure Manager columns. Property names are listed in the **bom_attr.h** file.

6. Click **OK**.

Teamcenter closes the **Options** dialog box.

7. Refresh the Structure Manager window to apply the title format change.

Setting the viewer memory allocation and Java heap size

The viewer memory allocation can affect the display of large product structures. If it is set too low, the Teamcenter session may be terminated when viewing a large structure. To set the viewer memory allocation, right-click in the viewer and choose **Performance→Edit→Memory**. If the memory allocation is exceeded, the viewer unloads parts to make room for new parts.

If you are visualizing large structures of 18,000 or more lines, increase the maximum Java heap size to 1,024 Mbytes.

For more information, see the Java documentation.

Enable variability using Product Configurator

To enable variability by using Product Configurator, your administrator must install the **Product Configurator Support for Structure Manager** feature on the Enterprise tier and the Client tier.

Additionally, set the **PSM_enable_product_configurator** user preference to **true**. By default, the value of this preference is **true**. However, depending on whether the product configurator variability must be used or not, change the value to **true** or **false**.

Note:

Every time you change the value of this preference, you must restart Structure Manager.

When you associate a configurator context to an item with or without classic or modular variability and then create a BOM window, the effective configurator context for the BOM window is as follows:

Preference value	Association of configurator context	Default configurator context	Mode	Effective configurator context
true	None	None	Product Configurator	None
true	None	Yes	Product Configurator	Default configurator context
true	Yes	None	Product Configurator	Configurator context attached
true	Yes	Yes	Product Configurator	Configurator context attached
false	None	None	Classic	Not applicable
false	None	Yes	Product Configurator	Default configurator context
false	Yes	None	Product Configurator	Configurator context attached
false	Yes	Yes	Product Configurator	Configurator context attached

Note:

Any configuration is not supported if the **Cfg0UseRuleForContentConfigure** preference is enabled and classic variant conditions are not migrated to Product Configurator. You can disable this preference or migrate all the variant conditions of the structure to Product Configurator.

Every time you change the value of this preference, you must restart Teamcenter.

3. Browsing product structure

Browsing product structure

You can **create a product structure** by importing product data from NX or by building the structure manually. Before you begin to build the product structure, you must understand how to interpret the product structure display. You should know how to browse the product structure to see the structure of a product, navigate around the structure, and find components in the structure, as described next.

To find the top-level assembly or product structure line, you can **search** in My Teamcenter to find it in the database.

You can access the data associated with any point in the structure, for instance, the item revisions and datasets.

Caution:

Certain other applications including Manufacturing Process Planner and Multi-Structure Manager automatically save structures that you browse in Structure Manager. To avoid inconsistent data, Siemens Digital Industries Software recommends that you close all other applications when you work in Structure Manager.

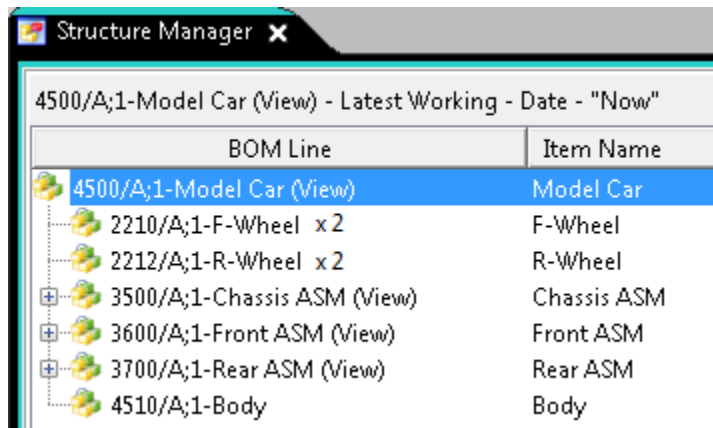
Note:

In earlier versions of Teamcenter, unattached BOM lines could be shown in the results of appearance searches. The visibility of unattached lines was determined by the **APPR_no_unattached_line** preference. From Teamcenter 10 onward, Structure Manager maps all BOM lines in the results to the correct BOM window, and no unattached lines are shown.

Viewing the structure

To display the components of a structure, expand the line corresponding to the structure in the structure tree. You can do this by double-clicking the node corresponding to the line, or by clicking the + (plus) sign.

The following figure shows a simplified product structure.



The structure is displayed in an indented format that indicates the relationship between its components.

- Each component (node) in the tree lists several properties which may include:

- Item ID and name

Depending on your company's data, an item may represent a part or assembly, a CAD design, or both. For example, **2212/B;1-R-Wheel** in the example is an item.

- Item revision

If no configured revision is found in a precise structure, Teamcenter displays **???** for the revision. If this is an assembly, it cannot be expanded.

- Item type

- Quantity

This is the total quantity represented by the line, which is greater than one if the line is packed or represents an aggregate occurrence. If any of the values are **As Required**, the quantity is shown as **A/R**.

- View type for assemblies

- Other **properties** configured for your site or you have added to the display.

- Assembly nodes have a + (plus) or – (minus) icon:

- + (plus) indicates the structure is not expanded.

Double-click the node, click the + icon or choose **View→Expand Below** to expand the structure

- (minus) indicates the structure is expanded.

Double-click the node, click the – icon or choose **View→Collapse Below** to collapse the structure.

- Nodes with alternate components have a  icon.
- Nodes with substitute components have a  icon.
- Nodes that are variant components have a  icon.
- Nodes that are non-geometric assemblies have a  icon.
- Nodes that are non-geometric components have a  icon.

By default, the first level of the structure does not automatically expand when opened, as this may cause a performance problem with very large and very flat structures. To expand the structure automatically, your administrator sets the **PSE_expand_on_open** preference to **1** or undefined.

If lower levels of the structure are initially hidden, the hidden lines are represented by a ... icon and you can click this icon to reveal them.

Teamcenter also colors certain lines in the product structure to indicate a particular status, as follows:

- Imprecise assemblies

The structure line appears in gray.

- Precise assemblies

The structure line appears in green.

- Substitute occurrence

The structure line appears in blue.

- Added occurrence after structure comparison

The structure line appears in red.

- Changed occurrence after structure comparison

The structure line appears in orange.

Note:

All colors are defaults and may be changed by editing the relevant preference.

You can attach datasets, documents or forms to a line in the structure. To view the contents of any attachment, select the line and click the **Attachments** pane. Attachments made in a specific context are visible only when you select the relevant absolute occurrence. You can use incremental changes to track edits to forms or documents.

The information center at the bottom right corner of the application window contains icons that indicate **Where Used**, **Where Referenced**, **Child Count**, **Object Access**, and **Object State**. You can turn off these functions by right-clicking with the cursor over the information center. Turning off these functions improves display performance when expanding an assembly or selecting a line.

Note:

Once you have expanded the structure under the top line, you cannot set a new top line in the same window. Open the new top line in a separate window before expanding it.

Viewing product structure properties

Viewing product structure properties

A line in the product structure includes multiple **properties**, including:

- Item properties
- Item revision properties
- BOM view revision properties
- Occurrence properties

The use of an item revision in the context of its parent assembly.

- Display properties

Properties calculated to show the state of some other property.

View properties of the product structure

Right-click a line to view its current **properties**.

Insert or remove a property column

You can add a new column to the structure tree from a list of Structure Manager properties:

1. Right-click any column header and Teamcenter displays a shortcut menu.

2. Choose **Insert Column** from the shortcut menu and Teamcenter displays the **Change Columns** dialog box.
3. In the **Change Columns** dialog box, highlight the required properties and click **Add** to transfer these properties to the right-hand pane.

Note:

The dialog box only shows columns that are not already included in the structure tree.

4. Click **Apply** to add these properties as new columns.

To remove a column, right-click in the column and choose **Remove this column** from the shortcut menu.

Note:

All the columns that are displayed in the Structure Manager are managed by the following preferences:

- **PSEDisplayNameWithTypeColumnsShownPref**
- **PortalPSEColumnsShownPref**
- **PortalPSEColumnWidthsPref**

Whenever you insert or remove a column, these preferences are automatically updated. These preferences are system-generated and shouldn't be modified by a user directly.

Setting find numbers

Teamcenter assigns a unique find number to each line in the product structure. They provide an additional identifier or label for organizing the items in a single-level structure relationship.

- When you add an item to the product structure, the line receives the next available find number in the defined sequence.

By default, the numbers are assigned in increments of 10 — that is, if the previous line added was assigned a find number of 20, Teamcenter assigns a find number of 30 to the next line added.

- Depending on your CAD environment, each find number may map to a callout number or a line number in the CAD design. If the find number is linked to the callout, changes of quantity made in the CAD design may directly update the quantity shown in the product structure.

- If appropriate, you can rearrange the structure in find numbers by clicking the **Find Number** column header. This rearrangement persists for future Structure Manager sessions, until you make another selection.

By default, when you pack the product structure, Teamcenter packs by find number, item ID, and variant condition. This allows you to pack two or more occurrences of the same item, if each occurrence has the same find number, item ID, and variant condition. To pack structure lines, they must all have the same occurrence effectivity object or objects; that is, they must have shared effectivity; it is not sufficient for the lines to only have the same effectivity ranges.

You can define if occurrences are **packed** on your workstation by changing the **PSEAutoPackPref** preference. Your site may also customize Teamcenter behavior so that the structure is packed by criteria other than find number.

The highest find number supported by Teamcenter is 9999999999.

Open a structure

Open a structure

You can open a structure by any of the following methods:

- **Click the Open by Name button** 

Use this method to open an existing structure.

- Enter strings for the ID or the name of the items you want to open.
- Double-click the item you want to open.

Note:

If the item has several revisions, the window's current revision rule determines the revision opened. If you want to open a specific revision, locate the revision in another application and open it by sending it to Structure Manager or by dragging-and-dropping.

- **Click the MRU (Most Recently Used) button** 

This button opens any of the last four top-level structures you opened. This list is saved across sessions, and is an easy way to reopen structures you were previously working on. Click the item revision you want to open.

Note:

You can configure the number of entries shown in the MRU list by right-clicking the button and moving the slider to the desired number.

- **Use the clipboard**

This is useful for opening multiple structures from another application, for example, My Teamcenter, as follows:

1. Copy the items or item revisions to the clipboard in the other application, then go to Structure Manager.
2. Click the **Clipboard** button  to display the copied objects and choose the items or item revisions you want to open in Structure Manager.
3. Repeat the previous step as necessary. You can only open one item or item revision at a time.

- **Open from another application using the Send To command**

This method is useful if you have a reference to the required top-level structure (which may be an item, item revision, BOM view or BOM view revision), in another application.

1. Place the cursor over the object you want to open in the other application.
2. Right-click the object to display the structure line shortcut menu and choose **Send To**.

Teamcenter displays a list of the destination applications (for example, Multi-Structure Manager and My Teamcenter).

3. Click the desired application.

If the object is an item or BOM view, Teamcenter typically uses the default revision rule to determine the revision opened, as follows.

- When you send a structure to Structure Manager from My Teamcenter, Teamcenter opens Structure Manager, loads the structure, and then applies the default revision rule.
- If an empty Structure Manager window is already open, Teamcenter loads the structure into it, and then applies the default revision rule.
- However, if a Structure Manager window is already open and contains a configured structure, Teamcenter loads the structure into it, and then applies the revision rule used to configure the previously-displayed structure.

- In Teamcenter Rich Client, when you open **Structure Manager**, a **Structure Manager** view is displayed by default. However, if you close this view, Teamcenter does not open another **Structure Manager** view. Therefore, to perform any operation, such as dragging an item, you need to reopen the **Structure Manager** view by selecting **Window > Show View > Structure Manager**.

If the item has a revision rule applied with **Has Occurrence Type (MEAssemble)**, then you must select the item revision and choose **Send To > Structure Manager**. If you select the item and choose **Send To > Structure Manager**, the system displays an error saying that there is *No Configured Revision*.

- **Choose the File→Open command**

This is useful for opening a new Structure Manager window on a subassembly. Select the line for which you want to open a new window and choose **File→Open**.

- **Drag and drop**

Drag the line representing the structure from another application such as My Teamcenter and drop it into the empty navigation tree pane.

- **Click a link**

Click a link in the **Open Items**, **History**, or **Favorites** sections of the navigation pane.

If the current Structure Manager window already contains an opened structure, all of these methods create a new Structure Manager window.

You can open two structures side-by-side by clicking the **Split Window** button . When you do this, Structure Manager associates the structures for the current session. You cannot then open another structure into the current split window configuration or open one of the previously open structures in a different unsplit window. To achieve these results, you must first unsplit the window by clicking  again or close the structures.

To reduce the amount of time-consuming database interaction required to view a product structure, the components of an assembly are not loaded from the database until you expand the assembly. The first expansion may be slow, but subsequent expansion and contractions do not require data from the database and are therefore faster.

When you have two structures open in the same window and try to close the window, Teamcenter displays a confirmation dialog requesting confirmation. For example, this occurs if you try to close the window in Structure Manager and NX is using the same window.

Managing multiple views

If multiple views exist and you do not select a specific view, Teamcenter determines the object to display according to the following rules:

- If the item revision has no BOM view revisions, it opens the object as a component.
- If the item revision has exactly one BOM view revision, it opens the BOM view revision.
- If the item revision has a BOM view revision of your default view type, it opens that BOM view revision.

If none of the rules match, Teamcenter uses the default view type.

Display previously loaded product structure

Click the appropriate link in the **History** section of the navigation pane to redisplay a recently loaded structure.

Expanding or collapsing an assembly

Expanding or collapsing an assembly

When working on a structure, it may be convenient to load the entire assembly structure or a major section of it at the same time. Any further expansion or collapsing of the structure is faster, since this only requires a change to the display of the structure, not a full reload.

Expand an assembly

Choose **View→Expand Below...** to expand all nodes below the currently selected node or nodes. Teamcenter displays the **Expand to level** dialog box, allowing you to enter the desired number of levels to which you want to expand the structure.

The structure expands to the piece parts, where appropriate. Teamcenter loads any necessary components from the database.

Note:

If you try to expand the structure by fewer levels than the existing expansion, the display does not change unless you select the **Collapse to level** check box in the dialog box.

If you try to expand a large assembly, Structure Manager displays an **Expanding the tree may take a long time. Do you want to continue?** message. Click **Yes** to continue with the expansion.

If expansion of selected BOM line types is restricted by a **closure rule**, Structure Manager displays a **Cannot expand BOM line** message.

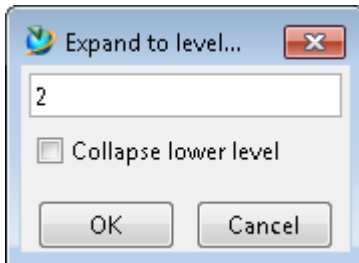
Collapse an assembly

Collapse an expanded assembly in one of two ways:

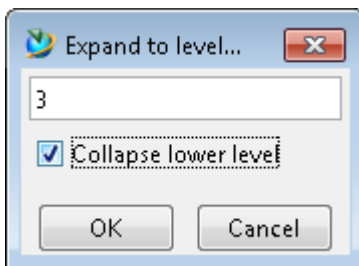
Select the expanded node and choose **View→Collapse Below**.

Or

1. Select the expanded node and choose **View→Expand Below....** Teamcenter displays the **Expand to level** dialog box.



2. Enter the level to which you want to collapse the assembly, select **Collapse lower level** and click **OK**.



For example, if the assembly is expanded to five levels and you enter **3**, Teamcenter collapses the assembly to three levels.

Unload lines

If you encounter memory problems when expanding a structure, you can unload selected lines to free memory manually.

1. Right-click the line below which you want to unload lines (for example, a subassembly) and choose **Unload Below**.

Teamcenter displays the **Unload Below** dialog box.

2. Click **Yes** to continue.

Teamcenter unloads all the lines below the current selection from the current session.

Controlling structure expansion using closure rules

Sometimes, you may want to control expansion of certain structure lines. For example, if a line has a monolithic JT file attached to it, you may not want to expand the subassembly below it. Similarly, you may not want to expand an assembly if it is not assigned to the current project.

Closure rules define rules of structure expansion. Using closure rules, you can reduce potentially time-consuming expansions. Some examples of closure rule applications are:

- Expose or hide structure occurrences
- Skip or remove structure occurrences
- Allow or restrict expansion of sub-assemblies

You can apply one of the existing closure rules or your administrator can create closure rules.

Closure rule comprise five fields: primary object selector, secondary object selector, relation selector, action, and an optional conditional clause. For details about each component of a closure rule, view [Syntax for closure rules](#).

Once the closure rule is created, administrator must add it to the **ClosureRulesForBomExpansion** preference to make it available for the users.

The following two examples explain how closure rules can be used to control structure expansion:

Example 1: Closure rule with Process action type

This example shows how application of the **BOMExpand-FindNumber** closure rule impacts a product structure.

This closure rule is created with the following values:

Primary Object Class Type	Primary Object	Secondary Object Class Type	Secondary Object	Relation Type	Relation Property Or Object	Action Type	Conditional Clause
CLASS	BOMLine	CLASS	BOMLine	PROPERTY	bl_child_lines	PROCESS	SECONDARY.bl_sequence_no==\$var

When this closure rule is applied, it restricts the expansion of those BOMLines, which have a child BOMLine with the user-specified **Find No**.

1. Consider the following structure. Note that only **body** subassembly has child components with **Find No = 20**.

Structure Manager

029255/A;1-model_car_ - Latest Working - Date - "Now" - Recovered Session

BOM Line /	Item ...	Ite...	Find No.	Un...	Reference D...
029255/A;1-model_car_	Item				
029256/A;1-engine_assy	Item	20		ea...	
029261/A;1-block assy	Item	10		ea...	
029264/A;1-piston	Item	30		ea...	
029265/A;1-piston rings	Item	30		ea...	
029262/A;1-fuel injection	Item	10		ea...	
029257/A;1-body	Item	20		ea...	
029266/A;1-front_left_door	Item	30		ea...	
029267/A;1-front_right_door	Item	30		ea...	
029268/A;1-Rear_left_door	Item	20		ea...	
029269/A;1-Rear_right_door	Item	20		ea...	
029258/A;1-front wheel assy	Item	20		ea...	
029259/A;1-rear wheel assy	Item	40		ea...	

2. The structure is initially in collapsed form. The header shows that no closure rule is applied.

Structure Manager

029255/A;1-model_car_ - Latest Working - Date - "Now" - Recovered Session

BOM Line /	Item ...	Ite...	Find No.	Un...	Reference D...
029255/A;1-model_car_	Item				
029256/A;1-engine_assy	Item	20		ea...	
029257/A;1-body	Item	20		ea...	
029258/A;1-front wheel assy	Item	20		ea...	
029259/A;1-rear wheel assy	Item	40		ea...	
029260/A;1-chasis	Item	50		ea...	

3. When the user applies the closure rule with **Find No = 20**, the structure remains in the same state after the **Process** action. The header is updated to show that **BOMExpand-FindNumber** closure rule is applied.

Structure Manager

029255/A;1-model_car_ - Latest Working - Date - "Now" - BOMExpand-Findnumber -

BOM Line /	Item ...	Ite...	Find No.	Un...	Reference D...
029255/A;1-model_car_	Item				
029256/A;1-engine_assy	Item	20		ea...	
029257/A;1-body	Item	20		ea...	
029258/A;1-front wheel assy	Item	20		ea...	
029259/A;1-rear wheel assy	Item	40		ea...	
029260/A;1-chasis	Item	50		ea...	

4. If the user tries to expand the **body** subassembly, which has child components with **Find No = 20**, the closure rule does not allow the expansion and a message is shown.

Structure Manager

029255/A;1-model_car_ - Latest Working - Date - "Now" - BOMExpand-Findnumber -

BOM Line /	Item ...	Ite...	Find No.	Un...	Reference D...
029255/A;1-model_car_	Item				
029256/A;1-engine_assy	Item	20		ea...	
029261/A;1-block assy	Item	10		ea...	
029262/A;1-fuel injection	Item	10		ea...	
029257/A;1-body	Item	20		ea...	
029258/A;1-front wheel assy	Item	20		ea...	
029259/A;1-rear wheel assy	Item	40		ea...	

Cannot expand BOM Line

BOM Line expansion is skipped by Closure Rule.
You may perform expansion after unsetting the Closure Rule from View/Set Closure Rule for Expansion dialog.

OK

5. However, the user can expand the engine assembly node, which does not have a child component with **Find No=20**.

029255/A;1-model_car_ - Latest Working - Date - "Now" - BOMExpand-Findnumber

BOM Line /	Item ...	Item ...	Find No.	Un...	Reference D...	
029255/A;1-model_car_	Item					
029256/A;1-engine_assy	Item	20		ea...		
029261/A;1-block assy	Item	10		ea...		
029262/A;1-fuel injection	Item	10		ea...		
029257/A;1-body	Item	20		ea...		
029258/A;1-front wheel assy	Item	20		ea...		
029259/A;1-rear wheel assy	Item	40		ea...		
029260/A;1-chasis	Item	50		ea...		

Example 2: Closure rule with Skip action type

This example shows how application of the **BOMExpand-FindNumber-skip** closure rule impacts a product structure.

In this closure rule, the **Action Type** value is **Skip**. All other values remain same as in the earlier example.

Primary Object Class Type	Primary Object	Secondary Object Class Type	Secondary Object	Relation Type	Relation Property Or Object	Action Type	Conditional Clause
CLASS	BOMLine	CLASS	BOMLine	PROPERTY	bl_child_lines	SKIP	SECONDARY.bl_sequence_no==\$var

- Initially the subassembly is in the expanded form with no closure rule applied. Note that **body** subassembly has child components with **Find No = 20**.

* 029255/A;1-model_car_ - Latest Working - Date - "Now"					
BOM Line	Item ...	Ite...	Find No.	Un...	Reference D...
029255/A;1-model_car_	Item				
029256/A;1-engine_assy	Item	20		ea...	
029261/A;1-block assy	Item	10		ea...	
029264/A;1-piston	Item	30		ea...	
029265/A;1-piston rings	Item	30		ea...	
029262/A;1-fuel injection	Item	10		ea...	
029257/A;1-body	Item	20		ea...	
029266/A;1-front_left_door	Item	20		ea...	
029267/A;1-front_right_door	Item	20		ea...	
029268/A;1-Rear_left_door	Item	20		ea...	
029269/A;1-Rear_right_door	Item	20		ea...	
029258/A;1-front wheel assy	Item	20		ea...	
029259/A;1-rear wheel assy	Item	40		ea...	
029260/A;1-chasis	Item	50		ea...	

2. When the **BOMExpand-FindNumber-skip** closure rule is applied, with user entered **Find No=20**, the **Body** subassembly is skipped and removed from the structure as it contains child components with **Find No =20**. However, the **engine_assy** is not removed as it does not contain any child component with **Find No=20**.

* 029255/A;1-model_car_ - Latest Working - Date - "Now" - BOMExpand-Findnumber-skip						
BOM Line	Item ...	Ite...	Find No.	Un...	Reference D...	All Not
029255/A;1-model_car_	Item					
029256/A;1-engine_assy	Item	20		ea...		
029261/A;1-block assy	Item	10		ea...		
029264/A;1-piston	Item	30		ea...		
029265/A;1-piston rings	Item	30		ea...		
029262/A;1-fuel injection	Item	10		ea...		
029258/A;1-front wheel assy	Item	20		ea...		
029259/A;1-rear wheel assy	Item	40		ea...		
029260/A;1-chasis	Item	50		ea...		

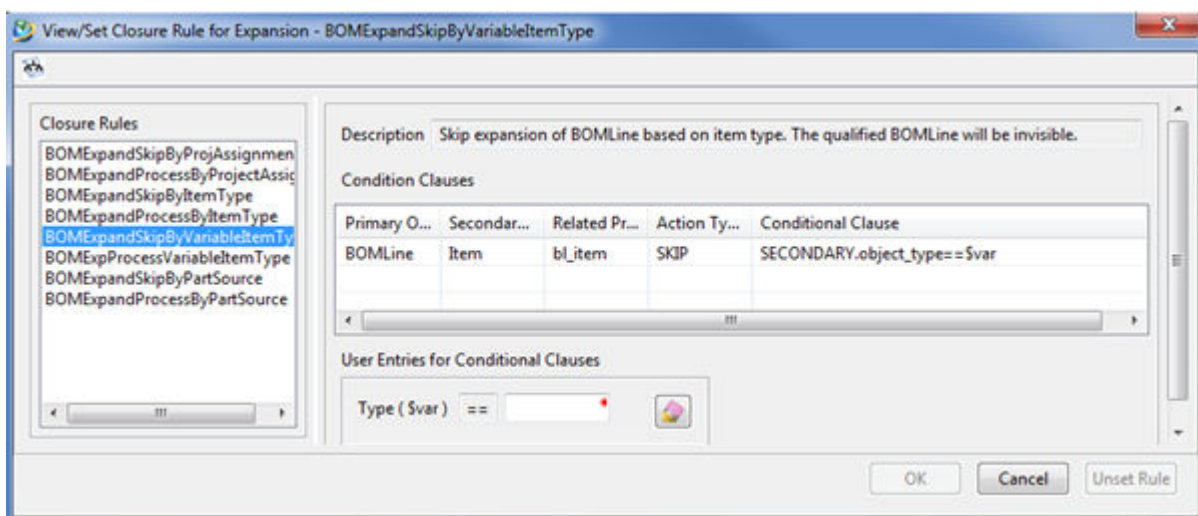
Set or unset a closure rule

You can limit the expansion of the structure using site-specific criteria to reduce potentially time-consuming expansions. For example, if a line has a monolithic JT file attached to it, you may not want to expand the subassembly below it. Similarly, you may not want to expand an assembly if it is not assigned to the current project. The site administrator specifies the available rules in the **ClosureRulesForBomExpansion** preference.

Select a closure rule before expanding the structure:

1. Choose **Tools→View/Set Closure Rule for Expansion**.

Teamcenter displays the **View/Set Closure Rule for Expansion** dialog box.



Note:

If the closure rules differ from those shown, the site administrator must edit the **ClosureRulesForBomExpansion** preference.

2. Select the required closure rule in the **Rules** list, and then enter any filter attributes necessary for the selected rule. In the example shown, you must specify at least one project identifier.

Note:

In a conditional clause, evaluation of the left-hand expression must give primitive data types such as string or integer. If the related property is a typed reference, untyped reference, relation, or external references, the left-hand expression must evaluate to a primitive data type that uses the property of the object. You must use the property of the object, rather than the object itself. For example, instead of using **PRIMARY.bl_uom=="kg"** in a condition

clause, you should traverse from **BOMLine** to **UnitOfMeasure** using **bl_uom** and then use a icon property of **UnitOfMeasure**.

Primary object class	Primary object	Secondary object class	Secondary object	Relation type	Related property	Action type	Conditional clause
CLASS	BOMLine	CLASS	UnitOfMeasure	Property	bl_uom	Skip	SECONDARY.symbol ==\$var

Note:
Line breaks are not supported in closure rules with variables.

3. After you enter the attributes, click **OK** to set the closure rule.

Teamcenter applies the closure rule to all future structure expansions until you unset it or set another rule.

Note:
You can set the **SkipClosureRuleEquivalent** user preference to determine whether the closure rule is re-evaluated if you reapply it in the same session and the referenced property has changed.

To unset the closure rule, select it in the **Rules** list and then click **Unset Rule**.

Tip:
You can see the name of the current closure rule in the title bar of the structure window. It is shown after the revision rule and variant rule names, if any. Unsetting the closure rule clears the closure rule name from the title bar.
If the action type in the closure rule is **SKIP**, lines meeting the criteria do not appear. If the action type is **PROCESS**, qualified lines appear but are not expanded (they show a + icon). To expand such a line, unset the closure rule from the window and then repeat the expansion of the subassembly.

Sorting the structure tree

You can sort the product structure tree on the value of a column in the tree table, by clicking the header of the selected column. Teamcenter resorts each level of the table accorded to the values displayed in the selected column within an assembly level.

- The first time you click a column, the tree is sorted in ascending order; each subsequent time you click the column header, the tree table is re-sorted in descending, unsorted, and then ascending order.

- An arrow appears in the column header to indicate the column according to which the tree is sorted.

The direction of the arrow indicates if it is sorted in ascending, descending or unsorted order.

Note:

Once you sort the tree according to a column value, it remains sorted, even if you add structure lines. If you paste a line into a sorted tree, the newly pasted line appears at its correct (sorted) location within the tree.

Note:

If the properties you want to sort by are not available, you can insert the necessary columns in the table. For example, you may want to sort by item master form attributes, item revision form attributes and mapped attributes for appearances. To add a column, right-click the column header, choose **Insert Column** and choose the appropriate property from the selection list.

Select structure lines

Use the **Edit→Select Below** menu command to make multiline selections in a structure. There are two types of multiline selections:

- **Lowest Lines**

Use this option for:

- Initial setup of one view from an existing view, for example, setting up a manufacturing view from the design view. This allows you to reference the same components but with different intermediate levels of structure.
- Selective opening of assembly data in NX by passing only the required component references.

If you open a configured variant assembly in NX, you open all of its components whether Teamcenter configures them or not. A **Lowest Lines** selection allows you to configure the variants and hide unconfigured occurrences. You can then select the occurrences that remain configured and open them in NX.

Note:

The term *lowest level* corresponds with its usage in the **Compare** feature. As in structure comparison, your selection of **All Lines** or **Lowest Level** applies to the currently configured structure and expanded in the product structure window.

- **All Lines**

Allows you to take a snapshot of the structure by copying references to each revision in that structure to an override folder. You can attach this folder to and release it with the top level assembly. You can use this folder as an override list to reload the exact configuration of all component revisions in the product when it was released.

Note:

You can automate this functionality using the **snapshots** feature.

Packing or unpacking structure lines

Packing or unpacking structure lines

Grouping multiple identical components in one level of an assembly is known as *packing*. You can pack components if they satisfy all of the following requirements:

- They have the same item revision.
- They have the same find number.
- None have **variant conditions** or they all have the same variant condition.

For example, if a bicycle designer is working on a wheel hub design, it is time-consuming to negotiate 50 individual spokes within the wheel assembly, if each spoke is identical except for its position. All that is necessary is a **Spoke x 50** entry.

Note:

A customizer can use an ITK function to register a different algorithm for packing criteria.

Restrictions on packed lines

The following restrictions apply to all lines in the structure that are packed:

- You cannot edit the **Quantity** value.
- If any of the packed lines have notes, the notes are replaced by the text **Packed Notes**. If none of the packed lines has notes, the notes are blank. In both cases, you cannot edit the notes.
- Item and item revision attributes such as part name, weight, and cost remain visible and can be edited if you have the appropriate permissions.
- You can modify the find number. Any such modification applies to each line in the structure and is visible if the structure is unpacked.

- If any of the packed lines has a substitute, the packed line shows **Packed Substitutes** in the **Substitute** column. The pack count includes the substitutes.

Pack structure lines

To pack lines in the structure that meet the packing criteria, select any one of the lines and choose **Pack** in the **View** menu. Alternatively, you can click the **Pack** button in the toolbar.

In the case of the bicycle example, this action collapses the 50 lines in the product structure into one line representing all spokes and indicated by the  image. A **x 50** property is appended in the node of the single line and the **Quantity** box shows the value **50**. Teamcenter shows a **Y** character in the **Packed** column, if that column is displayed.

Note:

Teamcenter makes no distinction made between the sum of a number of separate occurrences or an **aggregate occurrence** displayed in the **Node** column or the **Quantity** column. However, the **Pack Count** column shows the number of lines that have been packed.

Unpack structure lines

To unpack lines in the structure, right-click the single packed line and choose the **Unpack** menu command, or press the CTRL+N keys. The packed line separates into individual structure lines, each with its own set of attributes. You can edit these individual attributes.

By default, all components are initially packed to save space.

You can change this behavior by editing the **Pack by Default preference**.

Pack all or unpack all lines

Choose **Pack All** or **Unpack All** from the **View** menu to pack or unpack all lines in the currently selected window, if the necessary packing conditions are met.

Note:

- **Unpack All** unpacks all packed lines in the currently expanded structure.
- **Unpack All** does not unpack or expand lines in unexpanded structure.
- After selecting **Unpack All**, the unpacked lines are in an unexpanded state.

Packing or unpacking lines with reference designators

You can pack or unpack product structure lines that include reference designators. For example, if you pack eight occurrences of the same part with different reference designators, the **Ref Designator** property column shows a concatenated set of reference designators, for example, **C1, C5-7, C10, C14-16**. You cannot edit the reference designators of packed lines.

Note:

There are additional rules that determine general packing rules, as described previously. This preference only controls reference designator packing.

You can also unpack packed lines that include concatenated reference designators. Each unpacked line shows a single reference designator, for example, **C1**.

Teamcenter validates the correct reference designator format. All reference designators must be in the format *prefix number*, where *prefix* is a string of one or more uppercase letters and *number* is an integer.

You can search for reference designator values. As with other product structures searches, this is a wildcard search; if you search for **C1**, the system actually searches for ***C1***. You can also include reference designators in structure comparisons.

You can specify the reference designator values in the International Organization for Standardization (ISO) and in the American Society of Mechanical Engineers (ASME) formats. In the ASME format, the reference designator value is in the capital letter followed by a number and suffix letter. For example, **S1A**.

Creating aggregate occurrences and defining quantity

Creating aggregate occurrences and defining quantity

Creating aggregate occurrence is a technique that allows you to define a single occurrence to represent a number of components, for example, 50 cable ties. Using aggregate occurrences reduces the amount of data stored in the database and the size of the displayed structure.

You can only create an aggregate occurrence from components with no units of measure and not from components that require a quantity value, for example, 1.5 liters of oil. Structure Manager does not differentiate between these component types and a numerical value is shown in the **Quantity** column in each case.

Note:

Aggregate occurrences cannot have separate attributes such as notes or positional information associated with any individual component. If this is necessary, use individual occurrences and pack the lines to simplify the display.

Create an aggregate occurrence

Create an aggregate occurrence by entering a value for the **Quantity** attribute in one of the following ways:

- Edit the **Quantity Per Occurrence** box in the **Add or Paste** dialog box when you add the component.
- Edit the **Quantity** attribute in place. You cannot do this if the line in the structure is packed.
- Edit the **Quantity** box in the **View Properties** dialog box.

Note:

If you do not specify a quantity value, the occurrence represents a single component and the **Quantity** column is blank. By default, the **Quantity Per Occurrence** box is blank and this implies a value of 1.

Convert an aggregate occurrence to individual components

To convert from an aggregate occurrence to individual occurrences (for example, an aggregate occurrence of 100 bolts to 100 individual bolts), modify the **Quantity** value of the aggregate occurrence to **1**. Then, copy the line and use the **Paste** command as necessary to create the remaining individual occurrences.

Finding a component by property

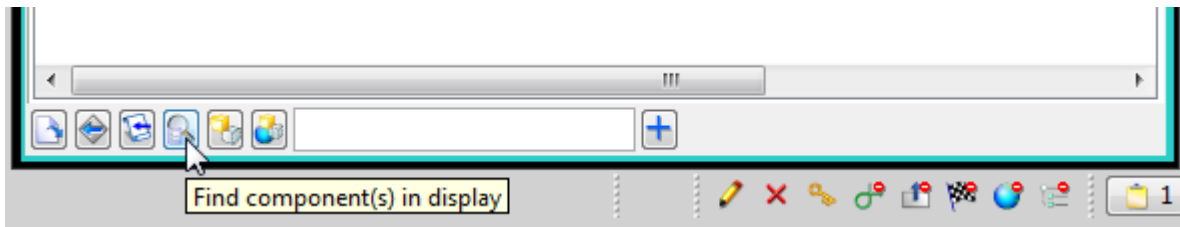
Finding a component by property

You can search the displayed product structure to find one or more specified components.

This capability is useful if you are not familiar with the structure and want to navigate quickly to a particular component. You can construct a search expression from any combination of the properties displayed in the columns in the product structure tree.

Find components by property

1. Load the structure you want to search. You can optionally expand the structure now or wait until the results appear. (If you search a collapsed structure, Teamcenter partially expands the result lines, but you can manually expand them to see the full structure.)
2. Click **Find component(s) in display**  at the lower left of the Structure Manager window.



Teamcenter displays the **Find in Display** dialog box. As the name suggests, the *Find in Display* functionality finds within what is displayed on the screen in Rich Client.

Example:

Consider that you are working on packed lines. For an individual packed line, a specific value (for a property) is associated with it. In the **All Notes** field, this information is displayed as **Property Name: Value**. However, when you pack the lines, only the value **Packed Notes** is displayed in the **All Notes** field.

Now, if you search for the value of the packed master line from the packed notes list, you cannot find it because it is displayed as **Packed Notes**. However, if you search for the second, third, or later values from the packed notes list, you can find those values. This is because, for the *packed master line*, the display value is not the value of the line itself, but it is **Packed Notes**. Instead, if you search for the value *Packed Notes*, you can find it, because this is the display value. A packed master line represents a collection of individual lines and the packed master line has a special display value. Individual lines may have different display values.

Also, if the individual lines have different note types, the *note value* is not displayed in the **All Notes** field. Only the *note types* are displayed as **Property Name 1, Property Name 2, ...**. **All Notes** is a summary of all individual notes and its packed master line has a special display value.

Thus, it is recommended to first unpack all the lines and then perform a search.

The search starts at the top-level item in the structure, not at the currently selected line. You do not select an assembly in which to look for the component. If you want to restrict the search to a particular assembly, open the subassembly in a new Structure Manager window by selecting it and choosing **File→Open**. Alternatively, you can collapse all other assemblies except the one you want to search.

3. Double-click the **Property Name** text box to select a property from the list of available columns.
4. Double-click the = box to select a different operator.

You can use the following relational operators to define string property searches.

Relational operator	Definition
= or ==	Equal to
>	Greater than
<	Less than
>=	Greater than or equal to
<=	Less than or equal to
!=	Not equal to
-	Range
	OR
""	Exact string
&	AND

- Click the **Searching Value** text box and type the value you want to search for.

Partial matches are selected for string properties. Wildcards are not supported, and the search is not case sensitive.

- Add further clauses to the search condition by clicking **+**.

You can also double-click **AND** to change it to **OR**.

- If necessary, reorder clauses by clicking **▲** and **▼**.

You can also use the following shortcut keys to perform an action.

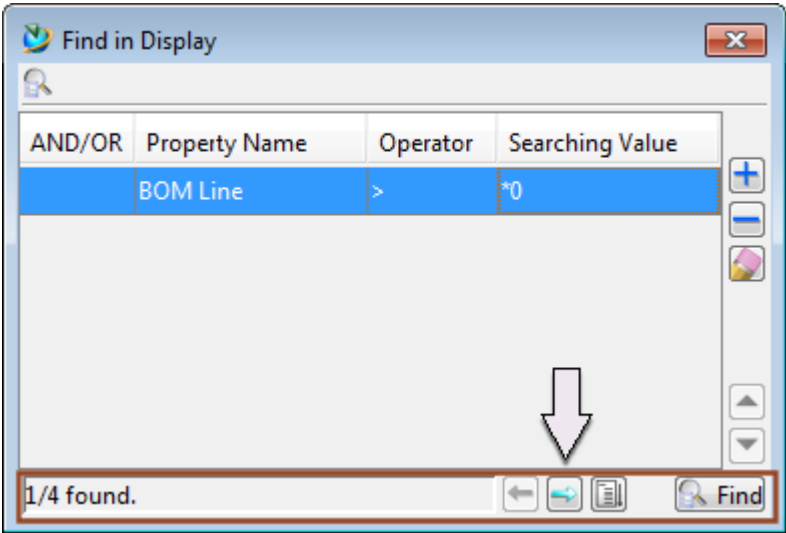
These shortcut keys	Perform the following action
Ctrl + N	Add a new condition.
Ctrl + R	Remove the selected conditions.
Ctrl + ↑	Move up the selected condition.
Ctrl + ↓	Move down the selected condition.
Ctrl + C	Clear the all condition.
Ctrl + →	Select the next result line.
Ctrl + ←	Select the previous result line.
Ctrl + A	Select all result lines.

These shortcut keys	Perform the following action
Enter	Start the search.
Tab	Insert a new condition row.

8. When the search condition definition is complete, click **Find** .

Teamcenter highlights the first line it finds that matches the search condition, and the **Find** dialog box shows a count of the total number of matching lines found.

9. Click **Find next one**  and **Find previous one**  to step through the matching lines one at a time. Alternatively, you can click **Load All**  to select all matching lines at once.



Guided component search overview

Guided component search overview

Using a guided component search (GCS) accelerates the search for matching components within an assembly. This search allows you to choose from a list of only those classified workspace objects that *fit* into the selected components from which you are initiating the search. Whether a component fits into something else could be based on physical criteria or on other criteria that you decide (for example, Material A can only be used with Material B). To use this search, you must first configure it in the Classification Admin application.

The guided component search uses the following criteria to determine if a component matches another:

- If the connection type of each component is the same.

- If components fit into each other. All components in the GCS are assigned a physical shape—plug, socket, or neutral. For the search to find a match, the matching component must always have the opposite shape to the initial component. In other words, a plug component requires a socket component and vice versa, or a neutral component requires another neutral component.
- The attribute values of the components must fulfill the matching criteria set in the Classification Admin application.

Display connection point information in the hierarchy tree

To display or hide the connection point information, in the **View** menu, choose **Show/Hide GCS Connection Points**.

Run the guided component search

When running the guided component search, there are two types of search that you can use.

- You have a component and want to build onto this component in one direction only.
- You have a component with multiple connection points and want to fulfill these simultaneously.

To perform this type of search, all connection points must have the same shape, same connection type, and same parent component.

1. Select the desired connection point of the component in the assembly structure for which you want to find a matching component.
2. Right-click and choose **Guided Component Search**, or click the **Guided Component Search** button  on the toolbar.

The system displays the Classification Search Dialog, but only with components containing connection points that match the connection point selected in the assembly structure. The displayed hierarchy contains only the classes and parent classes of these components.

3. Search the hierarchy and select the desired component.

You can narrow the search by entering search criteria in the **Search** pane.

The system adds the component to the structure.

Removing a component

When you remove a component that satisfies one more multiple connection points from a resource assembly using the **Cut** or **Remove** command, Teamcenter updates the previously satisfied connection points and removes the connection information from the connection points.

Make product structure searches

You can search the product structure as follows:

- You can search large products with a combination of spatial and attribute criteria. Teamcenter displays the results of the search in a dialog window and the embedded viewer.

To initiate a **spatial search**, select the structure line to search from and click the **Search** button .

Teamcenter displays the **Spatial Search Criteria** dialog box for you to define the search parameters. Alternatively, you can drag a search box of the appropriate dimensions on the embedded viewer.

- For smaller products, you can make nonspatial searches for components using item attributes, Classification parameters, reference designators, or occurrence notes.

To initiate a nonspatial search, click the **Search** button .

Teamcenter displays the **Nonspatial Search Criteria** dialog box for you to define the search parameters.

Tip:

If your site uses alternate IDs, you can search with them instead of item IDs or item revision IDs. To view the alternate IDs in the structure tree, add the **bl_item_altid_list** **property**.

Printing structure information

There are several options to extract printed or textual information from a structure including:

- **Print** allows you to print information about the structure below the currently selected line.
- **Print...** allows you to print object properties and application information.
- **Print Table** allows you to print product structure information in tabular format.

Print structure information

To print information about the structure below a line, select the line in the product structure tree and choose **File→Print**. Teamcenter opens the **Print** dialog box, showing how the output will be formatted. The structure below the selected line, if currently expanded, is shown and text information is obtained from the left-most (indented tree) column.

Select the appropriate box at the top right of the dialog box for HTML or text format.

Click the **Format** button  at the top right of the dialog box to print or hide the title text and revision rule label.

Click **Print** . If you select text format, print output is sent to the default printer. If you select HTML format, the output is displayed in your default Web browser. Alternatively, you can click **Save**  to open a dialog box in which you can specify a directory and name for the output text or HTML file.

Print property information

Print property information

To print property information, select a line in Structure Manager and choose **File→Print....** Teamcenter opens the **Print...** dialog box with the following options:

- **Object Properties**
- **Contents**
- **Application (HTML/Text)**
- **Application (Graphics)**

Print object properties

Choose the **Object Properties** command and click **OK**. Teamcenter opens a dialog box containing the selected line's properties and their values in tabular form. You can select HTML or text format.

If you select text format, click  to specify a delimiter string to separate the property name and value. Select the **Column Alignment** check box to pad the text with spaces and line up the entries up in vertical columns.

You can also click **Format**  at the top right of the dialog box to print or hide the title text.

Click **Print** . If you select text format, print output is sent to the default printer. If you select HTML format, the output is displayed in your default Web browser. Alternatively, you can click **Save**  to open a dialog box in which you can specify a directory and name for the output text or HTML file.

Print contents

To print the contents of the structure, choose the **Contents** command and click **OK**. The print format is the same as obtained with the **Print** command.

Print application (HTML/text) information

To print application textual information, choose the **Application (HTML/Text)** command and click **OK**. Teamcenter displays a dialog box containing the entire contents of the Structure Manager window, as currently expanded. The data is displayed in tabular form and includes every displayed column. You can select **HTML** or **Text** format.

If you select text format, click **Format**  and Teamcenter allows you to do the following:

- Specify **Delimiter** characters.
- Turn **Column Alignment** on or off. When it is turned on, each property value is padded with spaces. The output is formatted in columns whose width reflects that set for the corresponding columns in the structure tree.
- Turn **Auto Indent** on or off. When it is turned on, the printed format uses leading spaces to reproduce the indentation of successive levels of structure.
- Turn **Show +/-** on or off. When it is turned on, appropriate lines are prefixed with + and – characters to identify collapsed and expanded assemblies, respectively.

You can also click **Format**  at the top right of the dialog box to turn on or off the title text.

Click **Print** . If you select text format, print output is sent to the default printer. If you select HTML format, the output is displayed in your default Web browser. Alternatively, you can click **Save**  to open a dialog box in which you can specify a directory and name for the output text or HTML file.

Note:

If you turn off **Column Alignment**, **Auto Indent**, and **Show +/-** and set the delimiter to a comma (,). Teamcenter generates a comma-separated output file that can be opened in a spreadsheet application.

Print application (graphics) information

To print application graphics information, click the **Application (Graphics)** command, then click **OK**. Teamcenter sends a graphical image of the structure as expanded in the current Structure Manager window to the default printer.

Print table

To print structure information in tabular format, right-click the column headings in the product structure display. Teamcenter displays a shortcut menu including a **Print Table** command and **HTML/Text** and

Graphics commands. These menu commands provide an alternate to the **Print application (HTML/text) information** and **Print application (graphics) information** procedures, respectively.

Viewing standard notes and custom notes

Viewing standard notes and custom notes

Teamcenter allows you to attach notes to items or item revisions. These notes contain additional documentation about parts or documents. For example, a note may contain the following instructions:

Round all sharp corners to [Radius: 0.01, 0.02, 0.03] inch
and heat-treat to [Temperature: 100,120,130] degrees Fahrenheit

The following types of note are available:

- Standard note

Contains information established by a standards engineering organization. It conforms to the design practices of a program or project, is stored in a library, and is available to all participating engineers. A standard note is sometimes called a *parametric requirement*.

- Custom note

Contains information that is unique to an individual part or document. It is not stored in a library. Your administrator can create custom notes in the Business Modeler IDE.

Note:

Do not confuse standard notes and custom notes attached to items or item revisions with *occurrence notes*.

View note

1. Select a product structure line that represents an item or item revision.
2. Click the **Show/Hide Data Panel**  button on the toolbar.

Teamcenter displays the data pane.

3. On the data pane, click the **Attachments** tab.

Teamcenter displays any **standard notes or custom notes** attached to the selected line, allowing you to view their content or properties.

Opening a structure in NX or Teamcenter lifecycle visualization

Opening a structure in NX or Teamcenter lifecycle visualization

You can open the structure you have displayed in **NX** or **Teamcenter lifecycle visualization**.

Open a structure in NX

You can load the structure into NX to work on the design in one of two ways:

- Push the structure from Structure Manager into NX. You can load (push) as many structures as necessary from Structure Manager into a single existing NX session.
- Pull the structure into NX from Teamcenter.

Transfer configured structures to and from NX

Transfer configured structures to and from NX

You can configure a product structure with revision rules and variants, and then export the configured structure to NX in native format. To do this, select the top-level line of the assembly and choose the **Tools→Export Configured NX Assembly** menu command.

Teamcenter displays the **Export Configured UGNX Assembly** dialog box, which allows you to choose the export directory and the naming format.

Note:

This menu command is visible only if your administrator sets the **TC_ExportConfigUGNXAssembly** preference to **TRUE** and NX is installed on the client machine. The administrator must also enable the **NxClone** translator.

You can also push or pull variant structures between Structure Manager and NX.

Push a variant structure from Structure Manager to NX

When a variant rule is in force, you may display a subset of the product structure in Structure Manager, for example, when the **View→Show Unconfigured Variants** option is set to off. To ensure you see only the configured components in NX:

1. Expand the whole structure in Structure Manager by choosing **View→Expand Below**.
2. Choose **Edit→Select Below→Lowest Lines** to select the lowest level of the structure.

Note:

If you select the top-level assembly and click **Open in NX**, all components are loaded, not just the configured ones. This applies to *any* assemblies lower down the structure that are not expanded.

By default, the **Open in NX** button and menu command are not visible in Structure Manager. Your administrator must set the **TC_show_open_in_NX_button** preference to **on** to make them visible.

3. In NX, click **Open** on the toolbar or choose **File→Open**. Browse to the required structure.

The Assembly Navigator in NX displays all components in the assembly; unconfigured components are shown as *not loaded*. The Assembly Navigator cannot distinguish between unconfigured components and those that are manually loaded by pushing them from Structure Manager.

Pull a variant structure from NX to Structure Manager

Pull a variant structure from NX to Structure Manager

NX can access variant rules saved in Teamcenter. In the **Load Options** dialog box, you can select a saved variant rule attached to the top-level item revision of the product structure. Once loaded, you can configure the structure by applying one or more saved variant rules using the **Assemblies→Variant Configurations...** menu command. (Unlike Teamcenter, NX can apply more than one variant rule to a structure.) If you do not apply a variant rule, all components are loaded into NX.

For additional information, see the Teamcenter Integration for NX documentation.

Using the Assembly Navigator

When variant rules are set in NX, the Assembly Navigator suppresses any unconfigured components, so they are not visible in the Assembly Navigator or other NX applications.

Adding components in NX

When variant rules are not set in NX, you can add components in NX by pasting it into the product structure; the component has no variant data and thus is always configured. You can later define a variant condition for the added components in Structure Manager. You cannot add components to a configured structure, you must first unset any variant rules applied.

Open a structure in Lifecycle Visualization

You can load the structure into Lifecycle Visualization to view the structure with the full Lifecycle Visualization functionality. You can also view the structure in the embedded viewer in the data pane.

When you load configured variant structures into Lifecycle Visualization, graphics (not parts) are displayed for the selected lines.

1. In Structure Manager, expand the whole structure by choosing **View→Expand Below**.
2. Choose **Edit→Select Below→Lowest Lines** to select the lowest level of the structure.

Note:

If you select the top-level assembly and click **Open in Lifecycle Visualization**, the graphics of all components are loaded, not only the configured ones. This applies to *any* assemblies lower down the structure that are not expanded.

By default, the **Open in Lifecycle Visualization** button and menu command are not visible in Structure Manager. Your administrator must set the **TC_show_open_in_vmu_button** preference to **on** to make them visible.

3. Click **Open in Lifecycle Visualization** on the toolbar or choose **File→Open in Lifecycle Visualization**.

The Lifecycle Visualization application launches and displays the structure in a similar way to the Structure Manager structure view. Check boxes allow you to turn on and off the graphics display for individual lines.

Note:

If you right-click a line that has a JT file attached to it and choose **Show JT Attributes**, Teamcenter displays the attributes of the JT file. You can display JT properties for an assembly or a component.

Interpreting transform data

Teamcenter uses occurrence transformation data to position components in an assembly. It creates transformation data for each component in an assembly. When a Teamcenter assembly is opened in an integrated CAD system, the CAD system interprets the transformation data to reconstruct the assembly.

Teamcenter stores transformations in a matrix in eXT format in the following format:

```
{ R00 R10 R20 P0 R01 R11 R21 P1 R02 R12 R22 P2 T0 T1 T2 S }
```

The components of this matrix are:

- A general rotation submatrix, comprising an x-axis (R00, R01, R02), a y-axis (R10, R11, R12), and a z-axis (R20, R21, R22).
- A perspective (P0, P1, P2).
- A translation (T0, T1, T2)

- A scaling factor (S).

Note:

Not all of these components are used by every external CAD system that stores data in Teamcenter. For example, NX only uses rigid body transforms and therefore does not use perspective. The three elements representing perspective are always set to **0.0** by Teamcenter Integration for NX. Also, Teamcenter Integration for NX always sets the scaling factor to **1.0**. The transform values set by different external CAD systems are not compatible or interchangeable.

You can view and change the transformation associated with a component in the **Absolute Transformation Matrix** **property columns**. In particular, you can add one or more of the following property columns to view transformations:

- **bl_plmxml_occ_xform**

Shows the PLM XML transformation matrix value assigned to a part occurrence in the product structure.

- **bl_plmxml_abs_xform**

Shows a run-time, rolled-up PLM XML transformation matrix value assigned to a part occurrence in the product structure. The rolled-up transformation value is calculated by adding the relative transformation matrices of all the occurrence parent parts in the product structure. This property can also override a transformation matrix value if you are making in-context edits.

- **bl_occ_xform_matrix**

Shows the non-PLM XML transformation matrix value assigned to a part occurrence in the product structure. This property value is available if you work with older versions of NX. When you open an assembly in NX, it looks for PLM XML transformation data in the **bl_plmxml_occ_xform** property in Teamcenter when needed. If PLM XML transformation data is not available, NX looks for legacy transformation data in the **bl_occ_xform_matrix** property and converts it internally.

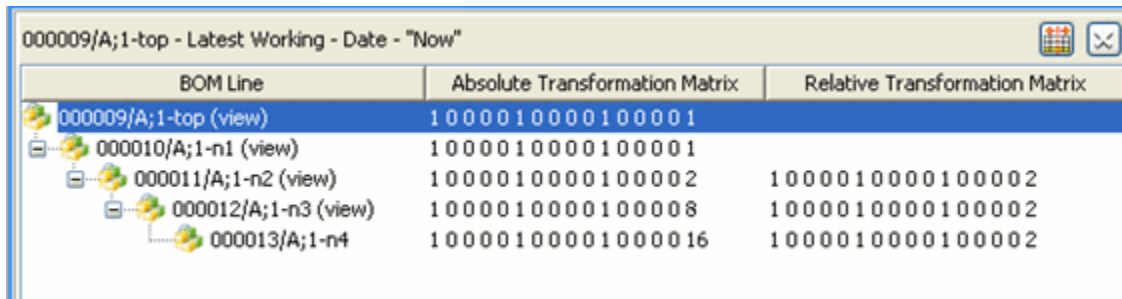
For more information about how NX converts legacy transformations, see the *Teamcenter Integration Customer Defaults* section of the Teamcenter Integration for NX documentation.

- **bl_abs_xform_matrix**

Shows a run-time, rolled-up non-PLM XML transformation matrix value assigned to a part occurrence in the product structure. The rolled-up transformation value is calculated by adding the relative transformation matrices of all the occurrence parent parts in the product structure. This property can also override a transformation matrix value if you are making in-context edits.

The following example shows a structure that has just relative transformation matrices assigned to it. Structure Manager fills the absolute transformation matrix fields when it rolls up the relative transformation matrices of the structure. In this example, **000010/A;1-n1** does not have a relative

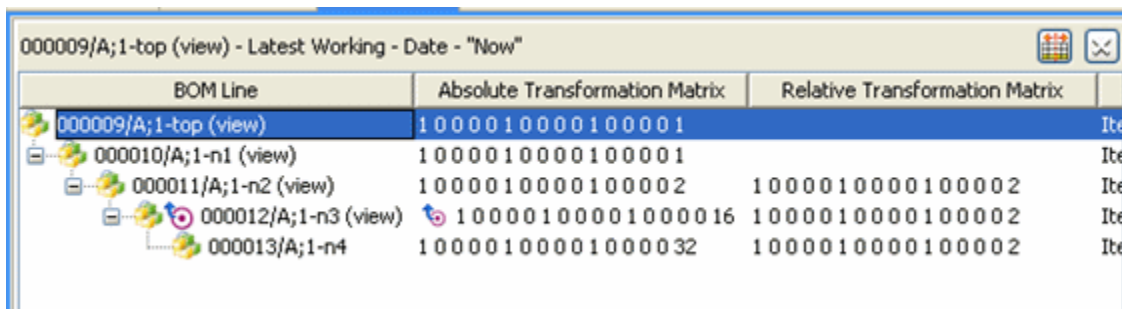
transformation matrix assigned to it. If Structure Manager encounters an unassigned matrix, it inserts an identity matrix in the **Absolute Transformation Matrix** column when rolling the matrix values.



BOM Line	Absolute Transformation Matrix	Relative Transformation Matrix
000009/A;1-top (view)	1 0 0 0 0 1 0 0 0 0 1 0 0 0 0 1	
000010/A;1-n1 (view)	1 0 0 0 0 1 0 0 0 0 1 0 0 0 0 1	
000011/A;1-n2 (view)	1 0 0 0 0 1 0 0 0 0 1 0 0 0 0 2	1 0 0 0 0 1 0 0 0 0 1 0 0 0 0 2
000012/A;1-n3 (view)	1 0 0 0 0 1 0 0 0 0 1 0 0 0 0 8	1 0 0 0 0 1 0 0 0 0 1 0 0 0 0 2
000013/A;1-n4	1 0 0 0 0 1 0 0 0 0 1 0 0 0 0 16	1 0 0 0 0 1 0 0 0 0 1 0 0 0 0 2

Example of product structure with relative transformation matrixes

The following example shows a structure that has relative transformation matrixes assigned to it and also one absolute transformation matrix in the context of **000009/A;1-top**. If appropriate, you can make in-context values to the absolute transformation matrix value. When you do this, a target icon appears next to the transformation value in the **Absolute Transformation Matrix** column. In-context transformation values override the relative transformation values when Structure Manager rolls up the transformation values in the **Absolute Transformation Matrix** column.



BOM Line	Absolute Transformation Matrix	Relative Transformation Matrix
000009/A;1-top (view)	1 0 0 0 0 1 0 0 0 0 1 0 0 0 0 1	
000010/A;1-n1 (view)	1 0 0 0 0 1 0 0 0 0 1 0 0 0 0 1	
000011/A;1-n2 (view)	1 0 0 0 0 1 0 0 0 0 1 0 0 0 0 2	1 0 0 0 0 1 0 0 0 0 1 0 0 0 0 2
000012/A;1-n3 (view)	1 0 0 0 0 1 0 0 0 0 1 0 0 0 0 16	1 0 0 0 0 1 0 0 0 0 1 0 0 0 0 2
000013/A;1-n4	1 0 0 0 0 1 0 0 0 0 1 0 0 0 0 32	1 0 0 0 0 1 0 0 0 0 1 0 0 0 0 2

Example of product structure with relative and absolute transformation matrixes

Teamcenter and Teamcenter Integration for NX transformation data is written in PLM XML format and uses meters as the unit of measure. In earlier Teamcenter products, transform data was written in millimeters and inches. Do not combine legacy and current transform measurements rather update legacy transform data as described in the NX documentation.

You can use the **PS_convert_legacy_transform_to_plmxml** user preference to enable the display of legacy transforms in a PLM XML format.

Communicating with the owning user

If you work in a collaborative environment where several users own assemblies or components in a design, you may want to communicate with the user who owns a particular assembly or component. If the Microsoft Office Communicator integration is installed on your system, you can right-click the line that represents the assembly or component, and then choose **Send an Instant Message to**

Owning User. Teamcenter displays a Communicator window, allowing you to begin an instant message conversation with the owner.

Viewing remote components

Viewing remote components

If you import assembly items to a remote site from the master Multi-Site Collaboration site, the component items of the assembly are not imported, only the BOM view revision. Consequently, when you load the BVR in Structure Manager, the components are not loaded because they are not available locally.

You can, however, view these items as *assembly replicas* containing remote components. Replicas and out-of-date replicas may be identified by site defined colors, for example, red for out-of-date replicas. The remote components are displayed as stub references in the structure lines of such unavailable remote components that are not available at the local site. If the owning user excludes certain objects from the replica of a remotely owned item, Teamcenter creates an *augmented stub* at the replica site. If you are authorized to view these stubbed objects, the augmented stub is visible with the ID, name, type, and description attributes shown.

When you open an assembly containing remote components, Structure Manager loads the assembly with the available components and shows the stub references for the structure lines of the remote components. If any of the remote components are not yet replicated locally, Structure Manager may prompt if you want to import these components or imports them without user intervention, depending on the setting of the **PSE_prompt_for_remote_import** preference.

Note:

These lines may represent remote part family members or other remote components. All remote components are displayed in the same manner.

Import remote components associated with stub references

Choose **Tools→Import Remote**. Teamcenter obtains the data from either the Object Directory Services (ODS) or the owning site of the assembly.

Importing part families

In the case of part family member components, Teamcenter obtains the part family member replicas if the master part family members are not available. The part family member replica is imported from the master site of the assembly.

When importing remote part family members:

- If the **Import Distributed Components** option is not set and the master site of the assembly owns the part family members, the members are imported.

- If the **Import Distributed Components** option is not set and the master site of the assembly does not own the part family members, the members are imported. Teamcenter imports the part family replica and not the master copy. The master part family members must exist at the owning site.
- If the **Import Distributed Components** option is set and a site owns and contains the part family members locally, the members are imported. Teamcenter imports the master part family members present at the owning site.
- If the **Import Distributed Components** option is set and if the part family members do not exist locally at a site that owns them, the members are imported. Teamcenter imports the part family member replica and not the master copy.

Synchronize assembly replicas

You can request that Teamcenter compares the assembly replicas at your site with the remote sites owning them, allowing you to visually ascertain if your replicas match the masters at the remote sites and (if appropriate) demand synchronization. This process may take several minutes to complete, depending on the size of the assembly and the location of the master site.

To determine the need for synchronization, right-click a structure line, and choose one of the following commands:

- **Multi-Site Synchronization→Object**

Choose this command to determine the synchronization state of a selected object, such as a dataset or form. You can also request synchronization of items or item revisions, but the synchronization state of any attached objects is not displayed. Teamcenter displays the synchronization status of the object, which may be one of the following values:

- **Blank**

The replica object is up-to-date.

- **Up to date per hub**

The replica is up to date according to hub data.

- **Out of date**

The last modified date of the master is later than the last modified date of the replica.

- **Replica has later date**

The last modified date of the object at your site is later than the last modified date of the object at the master. This occurs if you check out the object.

- **Not configured revision**

The configured revision of your replica is not configured at the owning site. For example, the latest revision is superseded at the owning site, but this is not replicated at your site.

- **Unknown**

The owning site is unavailable.

- **Multi-Site Synchronization→Component**

Choose this command to determine the synchronization state of a selected component revision and all objects associated with it, including BVRs and attachments. This check identifies if the component has been replicated at your site and also if the replica is up-to-date. If the replica is outdated, you can request synchronization and visually verify if the synchronization process succeeded.

Teamcenter displays the **Synchronization** dialog box, which allows you to set the following options to configure the synchronization process.

- **Sync Options**

Choose **Perform Sync** or **Perform Sync In Background** to immediately initiate the synchronization process. Teamcenter sends a request to the site owning the selected component to determine the revision to synchronize, based on your revision rule selection. It determines the outdated objects and initiates a remote import of modified versions, depending on your settings in the **Import/Export Preferences** dialog box.

Note:

Bulk data files are always included in the synchronization and the latest dataset version is imported.

Choose the **Report Only** option to display a results folder containing the component and associated objects. The properties of each object are shown from the viewpoint of your site. To ascertain the status of each object, view the **Sync State** box, which contains one of the following values:

- **Blank**

The object is up-to-date.

- **Up to date per hub**

The replica is up to date according to hub data.

- **Out of date**

The last modified date of the master is later than the last modified date of the replica.

- **Replica has later date**

The last modified date of the object at your site is later than the last modified date of the object at the master. This occurs if you check out the object.

- **Not replicated by local site**

There is no replica of the object at your site.

- **No configured revision**

The owning site has a different configured revision of the object to the revision at your site.

- **Not replicated**

A new attachment is added at the owning site, but it is not replicated at your site.

- **Unknown**

The owning site is unavailable.

You can synchronize a single object by selecting it in the report and choosing **Tools→Import→Remote**. Teamcenter displays the **Import/Export** dialog box, allowing you to set the parameters of the remote import action. When synchronization is complete, Teamcenter refreshes the report with the latest status.

- **Revision Rule**

Select the required revision rule from the list of revision rules available at your site. If you select an item revision, the list displays **Selected Revision** and the configured item revision is synchronized; you cannot set another revision rule.

Note:

Your administrator can set the **TC_sync_revision_rules** preference to permit you to select only certain revision rules, not all rules available at the site.

- **Session Options**

Choose **Generate Failure Report** to write a failures report if you choose the **Perform Sync** or **Perform Sync In Background** option. This option is disabled if you choose the **Report-Only** synchronization option.

- **General Workspace Object Options**

Choose **Exclude Folder Contents** and **Exclude Export Protected Objects** to exclude these objects from the synchronization process.

- **Save Options as Default**

Choose this option to save the selected options as your default for subsequent synchronization or remote import actions.

- **Advanced – Relations to Include and Exclude**

Choose this option to include and exclude certain object relations from the synchronization process.

- **Multi-Site Synchronization→Assembly**

Choose this command to determine the synchronization state of an entire assembly. If it is outdated, you can request synchronization of individual components or the entire assembly, and visually verify if the synchronization process succeeded. This check identifies if the component has been replicated at your site and also if the replica is up-to-date.

Teamcenter displays the **Synchronization** dialog box, which allows you to set the following options to configure the synchronization process.

- **Sync Options**

Choose **Perform Sync** or **Perform Sync In Background** to immediately initiate the synchronization process. Teamcenter sends a request to the site owning the selected assembly to determine the revision to synchronize, based on your revision rule selection. It determines the outdated objects and initiates a remote import of modified versions, depending on your settings in the **Import/Export Preferences** dialog box.

Note:

Bulk data files are always included in the synchronization and the latest dataset version is imported.

Choose the **Report Only** option to display a results folder containing the assembly expanded to the maximum level. The report shows components up to the highest level that is outdated within a branch. Consequently, branches may be expanded to different levels. To determine this status, Teamcenter compares the dates of the last modification of the master and the replica.

To ascertain the status of each component, view the **Sync State** box, which contains one of the following values:

- **Blank**

The component is up-to-date.

- **Up to date per hub**

The replica is up to date according to hub data.

- **Out of date**

The last modified date of the master is later than the last modified date of the replica.

- **Replica has later date**

The last modified date of the component at your site is later than the last modified date of the component at the master. This occurs if you check out the component.

- **Not replicated by local site**

There is no replica of the component at your site.

- **No configured revision**

The owning site has a different configured revision of the component to the revision at your site.

■ **Not replicated**

A new attachment is added at the owning site, but it is not replicated at your site.

■ **Unknown.** The owning site is unavailable.

You can synchronize an assembly or a single component by selecting it in the report and choosing **Tools→Import→Remote**. Teamcenter displays the **Import/Export** dialog box, allowing you to set the parameters of the remote import action. When synchronization is complete, Teamcenter refreshes the report with the latest status.

- **Revision Rule**

Select the required revision rule from the list of revision rules available at your site. If you select an item revision, the list displays **Selected Revision** and the configured item revision is synchronized; you cannot set another revision rule.

Note:

Your administrator can set the **TC_sync_revision_rules** preference to permit you to select only certain revision rules, not all rules available at the site.

- **Session Options**

Choose **Generate Failure Report** to write a failures report if you choose the **Perform Sync** or **Perform Sync In Background** option. This option is disabled if you choose the **Report-Only** synchronization option.

- **General Workspace Object Options**

Choose **Exclude Folder Contents** and **Exclude Export Protected Objects** to exclude these objects from the synchronization process.

- **Assembly Options**

By default, the **Include Entire BOM** option is automatically chosen. If you only want to synchronize some of the structure to reduce synchronization time, clear this option.

Choose a value in the **Maximum Level** list that represents the maximum depth in the assembly that Teamcenter traverses when you choose the **Report Only** option. If blank, Teamcenter traverses the entire assembly until it detects an outdated component or leaf node. If set to **1**, Teamcenter synchronizes only the selected item revision.

- **Save Options as Default**

Choose this option to save the selected options as your default for subsequent synchronization or remote import actions.

- **Advanced – Relations to Include and Exclude**

Choose this option to include and exclude certain object relations from the synchronization process.

Show connections

You can display the objects connected by the **Connected_To** relationship to:

- View the names of the connected objects directly from the structure line.
- Display the absolute path name for the connected objects.
- Display the objects connected to a given connection.

View the objects connected by a given connection in one of the following ways:

- Select and right-click the connection and Teamcenter displays a shortcut menu. Choose the **Show Connected Lines** menu command to highlight the connected objects.
- Select the connection and choose **View→Show Connected Lines** to highlight the connected objects.
- Select the connection and click the  button to highlight the connected objects.

View welds and datum points

If your NX design includes welds or datum points, they are exported to Teamcenter if you export the design through Teamcenter Integration for NX.

Structure Manager shows welds and datum points as child lines within the product structure, one line for each weld or datum point. The child lines are grouped under the parent line that represents the part or assembly with which the weld or datum point is associated.

If a JT file is attached to the child line, you see the welds and datum points in Teamcenter lifecycle visualization or the embedded viewer as follows:

- Welds are displayed with an appropriate representation depending on their type.
- Datum points are displayed as spheres.

Use the **Attachments** tab in Structure Manager to view the feature form that lists the attributes of welds or datum points.

4. Building and editing product structure

Building and editing product structure

You can create the product structure manually in Teamcenter, you can import it from your CAD system, or you can clone an existing structure to use as the basis of a new structure. When you import a structure, Teamcenter keeps the structure synchronized with any changes to the native CAD design. After you create the structure, you modify it as necessary to reflect any changes to the product design.

You check out an item revision to make changes and check it in again when the changes are complete. You may also cancel the checkout of an item revision, even if it is open in a structure editor. This action causes the changes made to the item revision and to its first-level structure to be lost. If the item revision is open in a structure editor window, you must refresh the full window refresh to restore absolute occurrence data for any lines edited in context of the item revision.

While working in Structure Manager, follow these recommendations:

- Certain other applications including Manufacturing Process Planner and Multi-Structure Manager automatically save structures that you edit in Structure Manager. To avoid inconsistent data, Siemens Digital Industries Software recommends that you close all other applications when you work in Structure Manager.
- Siemens Digital Industries Software recommends you do not use the **Cancel Checkout** command on item revisions that contain changes tracked by incremental change. This action causes permanent loss of incremental changes that are tracking structure edits.
- If there are expanded structures, do not switch roles without saving and closing the applications. This may result in a slow performance on the expanded structure. This applies to other structure applications also.

Cloning a structure

Cloning a structure

You can clone (duplicate) an existing product structure to create a new structure.

Note:

The cloning process is intended to support CAD structure duplication and not all data on the structure is cloned. Some exceptions to the cloning process are noted below.

You can clone the entire product structure from the top level down or a selected subassembly. It is not necessary to open the CAD tool when creating the new (cloned) assembly.

The cloning operation uses Business Modeler IDE deep copy rules to determine how datasets and attachments are copied. It also uses the Business Modeler IDE **StructureCloneTransferModes** global constant to determine how CAD-specific attachments and relationships are copied.

When you open the new (cloned) structure, you can edit or update any of the items, item revisions, datasets, and attachments without affecting the original structure.

The cloning process does not support occurrence effectivity and any configuration of the structure with occurrence effectivity does not carry forward to the clone.

Likewise, the cloning process does not support variants and any variants on the structure do not carry forward to the clone.

The user who performs the cloning action owns the copy. Any elements of the original structure that were referenced, rather than copied, remained owned by their original owner. Access rights and ACL rules on structure lines are *not* carried forward from the original structure to the new (cloned) structure.

If you do not have access rights to a substructure in the original structure, you cannot duplicate that substructure and Teamcenter instead references the existing substructure.

If the original structure was shared by Multi-Site Collaboration, the new (cloned) structure does not inherit its permissions. It is a new structure and is therefore owned by the site where it was created.

The cloning operation assumes only one BVR type is associated with the item revision that represents the product structure or assembly. If you assigned more than one BVR type to the item revision, the system only processes the first BVR type it obtains from the item revision. It copies any other BVRs, but the children of those BVRs are not duplicated.

Clone (duplicate) a structure

1. If you are using a CAD tool, verify that your administrator has set the **StructureCloneTransferModes** global constant to the name of the transfer mode for your CAD integration.
2. Open the structure in Structure Manager and configure it as appropriate. Cloning a precise structure creates a precise copy; likewise, cloning an imprecise structure creates an imprecise copy.
3. Select the top line of the structure or a subassembly in the structure. The selected line and everything below it will be copied into the new (cloned) structure.
4. Choose **File>Duplicate**.

Structure Manager displays the **Duplicate** dialog box. You can use the + and - buttons to expand or collapse the structure tree that is displayed in the dialog box.

5. Select or clear the check box at the left-hand end of each line in the structure to copy or reference that line in the new (cloned) structure.

6. Select one or more of the check boxes on the left-hand side of the **Duplicate** dialog box to determine how the clone should be created:

Display check boxes

Drawings From All Revisions

If selected, all item revisions with drawings that are related to the structure are shown. Drawings under the same item revision as their solid models are implicitly included and are not displayed again in the dialog box.

Required Dependencies

If selected, only the item revisions necessary to open the structure or assembly in the CAD tool are shown.

All Dependencies

If selected, all related item revisions are shown.

Part Families check boxes

Masters

If selected, part family masters defined in Classification are shown. If an original item revision is a part family master, the cloned item revision is also a part family master.

Members

If selected, part family members defined in Classification are shown. If an original item revision is a part family member that is selected for cloning, the cloned item revision is also a part family member.

Click the **Update Display** button to refresh the structure display if you change these check boxes.

Rename CAD Files check box

If checked, the CAD integration renames all CAD files when you open the clone in the CAD tool. If you choose to rename CAD files, a *deep clone* is created; that is, all CAD datasets and their named references are copied.

New Item ID by Selection check boxes

Click the **Apply** button to update the structure display if you change the default mapping.

Assign New IDs

If selected, you can specify the naming pattern of duplicated items that are included in the clone. The new identifiers are not applied until you create the clone.

Prefix

Allows you to define a prefix to the original ID of each duplicated item that is included in the clone, for example, **NEW_**.

Suffix	Allows you to define a suffix after the original ID of each duplicated item that is included in the clone.
Replace With	Allows you to replace a specified substring in the original item ID with another defined string in the duplicated item name.

Naming check boxes

Click the **Apply** button to update the structure display if you change the default mapping.

Assign New IDs	If selected, you can modify the naming pattern of original items before they are included in the clone.
Prefix	Allows you to define a prefix for the original item ID before it is included in the clone.
Suffix	Allows you to define a suffix after the original item ID before it is included in the clone.
Replace With	Allows you to replace a specified substring in the original item ID with another defined string before the clone is created.

Note:

If you try to define a naming pattern that does not conform with the naming rules defined in Business Modeler IDE, Teamcenter displays an error message.

Note:

By default, if you use multifield keys, you can only duplicate structures in the **Item** domain. If you use another domain, you must enter a full multifield key string for the new item ID. For example:

- If you created a domain called **TestName{item_id,object_name}**, enter the following multifield key string for the new item ID:

```
##MFK##,=item_id=000020,object_name=example1
```

Teamcenter creates an item that has an ID of **000020** and a name of **example1**.

- If you created a domain called **TestType{item_id,object_type}**, enter the following multifield key string for the new item ID:


```
##MFK##,=item_id=000020,object_type=Document
```

Teamcenter creates an item that has an ID of **000020** and a name of **Document**.

7. Select a folder to hold the clone structure or clear the existing selection in the **Copy Results To** box.

Note:

If this box is empty, Teamcenter does not add the new cloned root item revision to any folder.

8. Click **OK** to create the clone structure.

Structure Manager displays the **Duplicate Results** dialog box and saves the top item of the new (cloned) structure to the clipboard and copies it to the **NewStuff** folder when it is complete. The dialog box also states if Teamcenter could not duplicate any items in the original structure, it referenced them instead.

Create an item from a template

Over time, you may design standard products or generic structures that can be reused in similar products. Using templates provides a way to reuse these standard designs as you create new structures for similar products. A template may be created from an actual in-use product, or you may create a generic structure explicitly for use as a template.

1. Ensure that the necessary **Product.Template** preferences are defined. These preferences contain the rules that determine how the related objects in the template are mapped to the objects in the new item—each object may be cloned (copied), referenced, or ignored. Items created from a template are typically product or subassembly structures.
2. Choose **File→New→Item from Template**. It is not necessary to load a structure or template into the current window.

Teamcenter displays the **New Item** dialog box.

3. To create the new item from a template, click the **Choose Template** tab, enter the name of the structure top line to clone in the **Template ID** box. Alternatively, you can browse to the template structure you require or to another product structure to clone.

In the lower pane of the tab, Teamcenter populates the item identifier, revision and name of the new item. The item identifier is assigned sequentially and you cannot change the displayed value.

4. Click the **Configuration** tab and select the cloning rule to apply from the **Cloning Rule** list. If required, you can also change the revision rule on this tab.

- Click **OK** or **Apply** to create the new product from the template you choose. The new top level is not loaded into the window and, if you want to verify that it was created correctly, you must search for it.

Creating a new BOM view revision

Creating a new BOM view revision

When you add a component to an assembly, you are creating an occurrence of that item or item revision in the assembly, which is stored on the BOM view revision (BVR). This occurrence is displayed as a BOM line. A BVR is a single-level structure that contains occurrences of its immediate children. A multilevel structure is built up from many single line BVRs.

Any modification to a product structure (including changing any of the occurrence attributes or adding a substitute) causes a change to the BVR of the parent assembly. If no BVR exists in the parent assembly, Teamcenter creates one automatically. When BVRs are automatically created in this way, they may be precise or imprecise according to your specified options; by default, imprecise BVRs are created.

You can also create a new BOM view revision manually.

Create a new BOM view revision automatically

If there is no BOM view revision in an assembly item revision when you add the first component, Teamcenter automatically creates one. It sets the precision (precise/imprecise) of the BOM view revision as follows:

- If the item revision is a component, the precision is that of the parent assembly in the current window.
- If the item revision is at the top-level of the structure, the precision is set according to your default BOM view precision option.

Create a new BOM view revision manually

When required, Teamcenter automatically creates BOM view revisions. You can also create BOM view revisions manually with Structure Manager or My Teamcenter (which allows you to set the view type). To create a new BOM view revision, you must have write access to the original BOM view.

To create a BOM view revision and associate it with the selected item revision, choose **File→New→BOMView (Revision)**. You cannot edit the item identifier and item revision of the owning item; you can only confirm the correct item revision is selected.

Setting the view type

When creating a new BOM view revision manually, you specify a view type that is not already created for the item. You select the view type from a list of values defined by the Teamcenter administrator in the Business Modeler IDE.

Teamcenter attempts to provide an appropriate default view type, according to the following rules:

- If there is only a single view type defined for your site, it uses the defined view type.
- If there is only one view type not used by the existing BOM view revisions of the item revision, it uses the undefined view type.
- If your default view type is not used by the existing BOM view revisions of the item revision, it uses your default view type.

If Teamcenter cannot determine the view type, you must enter a value manually.

Note:

If the new structure is similar to an existing one, consider choosing the **Save As→BOMView Revision** menu command to make a copy of the BOM view revision and edit the copy structure.

When you save a structure with a different name using the **Save As** command, the workspace objects it comprises are renamed, including the item identifier, the revision identifier, and any variant rule.

Note:

Teamcenter derives the names of BOM views and BOM view revisions from the identifiers of the owning item or item revision with the view type appending.

Using Save As to save a BOM view revision

Using Save As to save a BOM view revision

In most cases, you do not explicitly save a BOM view with the **Save As** command because Teamcenter automatically copies the BOM view revision whenever you choose the **Save As** command for an item revision. However, you may sometimes want to save the BOM view with a different type, for example, if you create a BOM view revision of another view type or copy a structure to another item.

When you save a structure with the **Save As** command, the workspace objects it comprises are renamed, including the item identifier, the revision identifier, and any variant rule.

If you select an item revision with multiple views (rather than a BOM view revision) and choose this command, Teamcenter makes a copy of each view type.

Create a new BOM view revision from an existing BOM view revision

1. Select the line containing the BOM view revision in the product structure tree.
2. Choose **File→Save As→BOM View Revision**.

Teamcenter displays the **Save BOM View Revision As** dialog box.

3. Specify a view type that is not already been created for the item. You select the view type from a list of values defined by the administrator.

The precision of the BOM view revision is the same as the BOM view revision you copied. If you want to change the precision, choose **Edit→Toggle Precise/Imprecise**.

To add a similar structure to another item revision, choose the **File→Save As→BOM View Revision** menu command to create a new BOM view revision in a different item. Specify the target item identifier and revision in the **Item** and **Revision** boxes of the dialog box. This action copies the occurrence attributes, including the find number, notes, quantity, substitutes, and variant conditions into the new BOM view revision.

Note:

Variant conditions are copied if you use modular variants but not if you use classic variants.

Saving and refreshing the product structure

Saving and refreshing the product structure

You must explicitly save any changes you make to the product structure because Structure Manager does not save them automatically. For example, you must explicitly save any new BOM lines or variants. If you try to exit from Structure Manager and there are unsaved changes, the system prompts you to save them. If you have more than one window open, you must individually save changes in each window.

If there are unsaved changes, the title pane of the Structure Manager window and the tooltip for any open pane are shown in bold with an asterisk * appended to the name. When you save the changes, the bold highlight and the asterisk are removed. The titles of windows with no changes are always shown in normal font with no asterisk, allowing you to easily identify those windows that have changes.

Save changes in Structure Manager

Save changes in Structure Manager

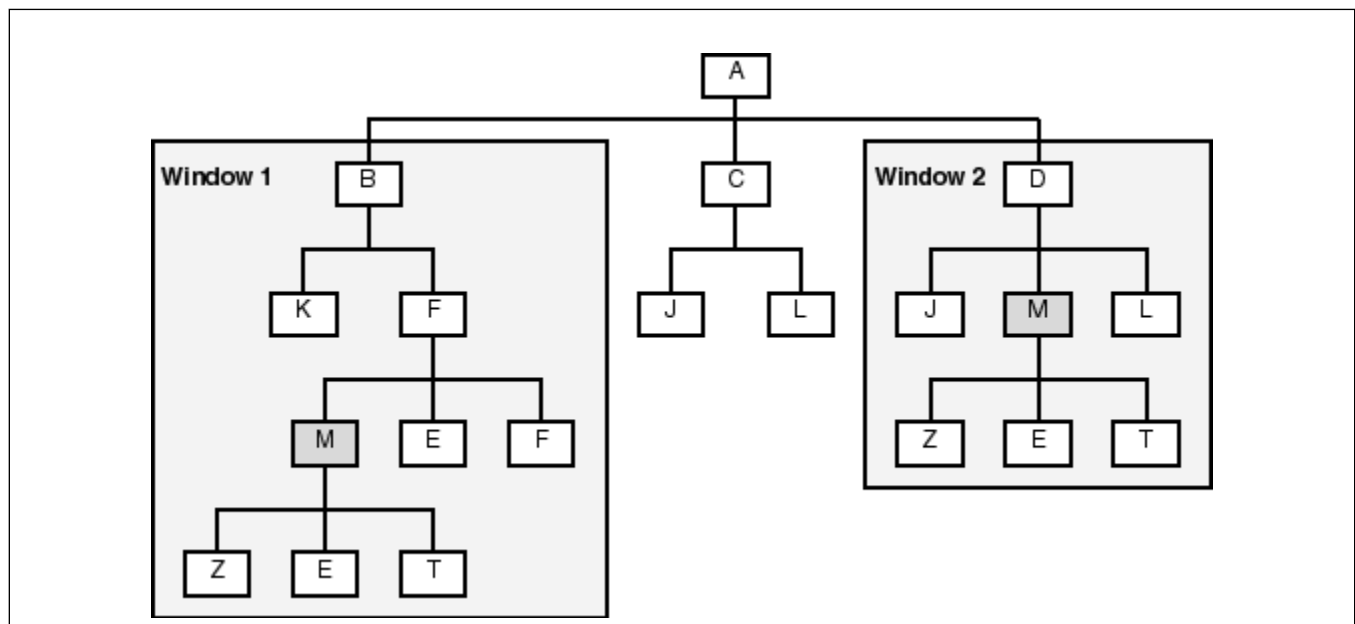
Choose the **File→Save Structure Manager** menu command to save all the changes made in the currently displayed structure window. Changes to the structure result in a modification to BOM view revisions, for example, adding or removing components, or changing occurrence attributes such as

notes and find numbers. Teamcenter prevents you accidentally closing a structure window without saving changes.

Saving or discarding changes with multiple windows

You can open multiple windows by using the split window button .

- If you make structure changes, only those changes made in the window where you choose the **Save** command are saved. If you create additional windows and open structures in those windows, changes made in the other windows are not saved.
- If you want to save changes made in other windows, you must explicitly choose the **Save** command in the window in which the structure changes were made.



Example of saving in multiple windows

- In window 1, remove E from M. This also causes E to be removed from M in window 2.
- In window 2, remove L from D and change a note on J. Add a note to Z in M and this change is also seen in window 1.
- In window 1, save the product structure. This action saves changes to assembly M but not D.

Note:

Changes are saved, regardless of where they are made. Therefore, the changes made in window 2 to M are also saved. The save action in window 1 thus causes a partial save of the changes made in window 2, on those assemblies that are also seen in window 1.

- In window 2, save the product structure. This action saves changes to assembly D.

Discarding changes when the structure is open in multiple windows

If the same structure is open in multiple windows then the modifications to the structure in one window are replicated to the other windows. Even if the user explicitly chooses to discard the modifications while closing a window, the modifications are not discarded from the other open windows. To discard the changes, all instances of the structure in all open windows must be closed without saving the changes. Only when the last window is closed without saving, the pending BOM modifications are discarded.

Close the product structure window

If unsaved changes are made in a product structure window and you choose the **File→Close** menu command, Teamcenter displays the **Close Application - Save Modifications** dialog box.

The unsaved modifications are listed and you can select the check box next to each modification to save it.

- Click **OK** to save all selected changes and close the dialog box. Updates to unselected changes are discarded.
- Click **Cancel** to return to the Structure Manager session without saving changes.

Refresh the Structure Manager window and resynchronize to database

Structure changes you make are propagated across all product structure windows in a particular session. However, changes are not propagated across sessions.

Choose **View→Refresh Window** to resynchronize the current window to the database. This action picks up changes made in other sessions and saved since you loaded the product structure. This function does not cause your own changes to be saved or lost.

Note:

Teamcenter does not permit other users to change any BOM view revision that you are editing. The BOM view revision is locked by the first person to make a change, whether this is adding or removing a component or modifying any of the occurrence attributes of any of the components.

Adding components to the product structure

Adding components to the product structure

There are four ways you can add components to the product structure:

- *Copying and pasting objects*

Allows you to copy references to existing items, parts, and designs.

- *Use quick add*

Allows you to add new components by typing in the item, part, and design identifiers.

- *Add a component to an assembly*

Allows you to enter the item identifier by specifying (for example) the number of components to add.

- *Create a new item or item revisions*

Allows you to use a top-down approach by simultaneously modeling structure and creating new items, parts, and designs.

If you manage parts and CAD designs separately, you must align the CAD designs and the BOM at an appropriate time.

If another user is editing a single level assembly within the product structure, Teamcenter prevents you making changes until the other user has saved their changes. A warning message identifies the other user working on the assembly. This safeguard does not prevent you making changes to other assemblies that are *not* being worked on.

Optionally, Teamcenter can validate the structure by verifying that you add only appropriate child items and item elements (GDEs). If you attempt to make an invalid addition, Teamcenter displays an error message stating that you cannot add the selected child item to the current parent item. To enable validation, your Teamcenter administrator sets the **TCEnforceSingleType** and **TCAllowedChildTypes_Item Type/GDE Type** preferences.

The **TCAllowedChildTypes_Item Type/GDE Type** preference allows Structure Manager to validate occurrence creation between parent and child, by defining what type of child is valid for each type of parent. However, if the preference value is changed after occurrences are created, those occurrences may no longer be valid afterwards but Structure Manager does not invalidate those existing occurrences. If you subsequently perform a **SaveAs**, **Revise** or similar action, Structure Manager copies those existing occurrences without validating them against the latest preference values. Consequently occurrences that are not valid for the new preference values are still created without error.

Note:

If you try to add an incompatible part type to the product structure, Teamcenter displays an error message. For example, you cannot add a manufacturer part to the product structure in Structure Manager.

Copying and pasting objects

Copying and pasting objects

The Teamcenter clipboard is shared by all applications and by NX. Consequently, for example, objects you place on the clipboard by copying them in My Teamcenter may subsequently be pasted into the product structure in Structure Manager.

You can also edit the product structure with the **Remove**, **Copy**, **Paste**, and **Paste Special** commands.

When you paste an item or item revision from the clipboard, Teamcenter creates corresponding components in the selected assembly in the product structure. Structure Manager allows you to paste items and item revisions (including parts, designs, and their revisions), structure lines, and item elements; other objects are ignored if you attempt to paste them.

If you cut and paste structure lines, the pending lines are removed from the clipboard after you choose **Paste** or **Paste Special**. If the cut lines are in the same structure as the target, Teamcenter performs a move action, rather than a cut and paste action.

If your administrator has defined mandatory properties for the type of object you are creating, Teamcenter displays the **Properties** dialog box, which allows you to define attribute values for the objects. To modify the properties of an existing object, choose **Edit→Properties On Relations**.

If the component you are adding to the structure contains unsatisfied connection points, Teamcenter checks if any of the other components in the structure also contain unsatisfied connection points and offers to connect them. Use a **guided component search (GCS)** to accelerate the search for matching components within an assembly.

Copy and paste an item or item revision

1. Select and copy the item or item revision (including parts, designs, and their revisions) from elsewhere in the product structure displayed in Structure Manager or from another application such as My Teamcenter. You can copy the item or item revision by clicking **Copy** , choosing **Edit→Copy**, or pressing the Ctrl+C keys. This action places the item or item revision on the clipboard.
2. In Structure Manager, select the assembly into which you want to add the component.

3. Paste the item or item revision by clicking **Paste** , choosing **Edit→Paste** or pressing the Ctrl+V keys.

Pasting does not remove the object from the clipboard. Therefore, you can click **Paste**  again to add another line of the same item revision to the assembly. Another **Copy** operation replaces the previous clipboard contents with the new object.

Caution:

After creating an architecture breakdown structure in Platform Designer and sending it to Structure Manager, do not copy and paste or drag and drop architecture elements in the same window. It can lead to data corruption in Platform Designer. If you inadvertently perform one of these actions, delete the resulting line using the **Remove Design from Product** button.

Copy and paste using the structure line shortcut menu

If you right-click a line in the product structure, Teamcenter displays the structure line shortcut menu is displayed, allowing you to:

- Choose the **Copy** command to copy the line to the clipboard. This is the same action as pressing the Ctrl+C shortcut keys, choosing **Edit→Copy**, or clicking **Copy**  on the toolbar.
- Choose the **Paste** command to paste the contents of the clipboard as components of the line. This is the same action as pressing the Ctrl+V shortcut keys, choosing **Edit→Paste**, or clicking **Paste**  on the toolbar.
- Choose the **Properties** command to view the properties of the line. This is the same action as choosing **View→Properties** or clicking **Properties**  on the toolbar.

Note:

You do not need to explicitly select the line before right-clicking it.

Copying and pasting occurrence attributes of components

When you copy a component from an assembly and then paste it elsewhere:

- The occurrence attributes (for example, the quantity and any notes) are also copied and pasted.
- The find number is not copied.

Teamcenter automatically generates the find number according to the position of the component in the target assembly.

- If the component has an associated substitute list, this is also copied and pasted.

If you paste the component into My Teamcenter, rather than Structure Manager, Teamcenter pastes the lines as individual item revisions.

Note:

You cannot view occurrence attributes such as quantity or notes in My Teamcenter.

Teamcenter does not copy variant conditions with components. You must **copy variant conditions** separately.

Use quick add

Often it is more convenient to insert the component by typing its identifier instead of pasting it from the clipboard. To do this:

1. Select the assembly into which you want to add the component.
2. Click the text box in the lower left of the Structure Manager application window.
3. Enter the component ID and click .

You can only use Quick Add for adding existing items. To create a new item and add it to the structure, choose **File→New→Item**.

Add a component to an assembly

You may want to specify additional data about the use of a component as you add it to the structure, for example, a quantity or find number. You can do this by choosing the **Add...** command to insert a new component.

1. Select the assembly to which you want to add the component.
2. Choose **Edit→Add...** and Teamcenter displays the **Add** dialog box.

Use the upper pane of the dialog box to specify the component to add and the view type, if multiple views exist. Use the lower pane of the dialog box to specify the occurrence information.

3. Complete the dialog box as follows:
 - Enter the component item identifier directly, or search for the item by its identifier or name. You cannot enter the item name, but Teamcenter displays the name as confirmation that you entered the required identifier.
 - Optionally, specify the revision according to its precision, as follows.

- If the parent assembly BOM view revision is imprecise, the **Revision** box is disabled and you cannot specify a revision.

Note:

When the component is added to the structure and displayed in Structure Manager, the actual revision is determined by the revision (configuration) rule. If there is not a revision that satisfies the revision rule, the revision is shown as **???**.

- If the parent assembly BOM view revision is precise, you are creating a precise occurrence. The **Revision** box is enabled and you can specify a revision.
- Choose **Component** or **Selected Assembly**. You can also define substitute components.
- Set the view type if there are multiple views of the component; you do not want the default view type. You can select another view type from the list of views created for the component.
- Specify any of the following occurrence attributes:

- **Number of Occurrences**

Specify the number of lines to add to the structure. The default selection is **1**.

- **Quantity Per Occurrence**

Specify the quantity associated with each line in the structure.

- If the item has a unit of measure defined, the units are displayed next to the **Quantity per Occurrence** box and you can enter a fractional value (for example, 1.5). If the units are displayed as **Each**, the box shows the number of parts and you must enter a whole number.
- If the quantity box is blank, the default value is **1** for items that have no unit of measure or **0** for items with a unit of measure. These values are used in quantity rollups, for example, when lines in the structure are packed.

Note:

You can enter the string **A/R** or **a** to specify a quantity value of **As Required**.

- **Find Number**

Edit the find number if necessary.

Note:

Find numbers are automatically generated according to the scheme defined for your site with the **PS_new_seqno_mode** preference. The default scheme increments the find number by 10 as each new component is added. However, after the find number crosses the value 2147483647, for every new line added, the find number starts from 8 and is incremented by 1 instead of 10.

4. If you specified an item ID that is shared by multiple objects, Teamcenter displays the **Select Unique Item** dialog box.

Select the object you require from the list.

Teamcenter returns to the **Add** dialog box.

5. Click **OK** or **Apply** to add the component to the assembly.

Paste a component

You can specify additional data about the use of a component as you add it to the structure, for example, a quantity or find number.

Choose the **Paste Special** command to insert an existing component that you copied to the clipboard into the structure. Unlike **Add...**, Teamcenter prepopulates the **Component ID (Revision)** and **Name** boxes of the **Paste Special** dialog box with item or item revision information from the clipboard.

Copy multiple views

If you copy an item revision with more than one view type from another rich client application and paste it into the structure in Structure Manager, Teamcenter uses the following rules to determine the view type to which the new occurrence refers.

- If a specific view type is copied from the other application, Teamcenter uses the same view.
- If no view type is copied, Teamcenter displays a list of all the available view types for that item.

Use the **Paste Special** or **Add...** menu command or the **Replace** command when copying an item revision with multiple views. This allows you to specify the required view type manually. If you paste the item revision directly and none of the items view types match the default view type, Teamcenter displays an error message but attempts to complete the paste operation.

If you copy a line from the structure in Structure Manager that represents a specific BOM view revision and paste it into another structure in Structure Manager, the new occurrence references the same BOM view revision as you copied.

Create a new item or item revisions

You can create an item revision and structure it as an assembly, by adding new components one item or part at one time. This technique is useful when doing top-down modeling. You must have write access to the BOM view revision to create the new item revision.

1. Select the parent assembly in the product structure tree.
2. Choose **File→New→Item** or **File→New→Part**.

Note:

If 4th Generation Product Master is installed, then instead of **Part**, **Legacy Part** is displayed on the user interface.

Teamcenter performs the same checks as described for **the Add... command** and displays the **Create Item** or **Create Part** dialog box.

3. Enter the necessary parameters in the dialog box and click **OK**.

Teamcenter creates the new item or part (or its revision) and adds it as a component of the selected assembly.

Note:

If you add parts or part assemblies to an assembly, you can subsequently publish links to the associated CAD designs. This step is not necessary if you add items or item revisions, as you can attach CAD designs directly.

Restructuring and editing the product structure

Restructuring and editing the product structure

You can restructure a representation, including a BOM view, occurrence group, structure context, or composition. You must revise a frozen product structure before restructuring. Restructuring edits the product structure in downstream views (for example, manufacturing) while preserving the derived occurrence structure and data related to specific occurrences of parts and assemblies. Restructuring is disabled for product structures that contain CAD designs because it can make the CAD data invalid.

During restructuring operations, Teamcenter maintains the integrity of incremental changes, classic or modular variants, and structure relationships. Teamcenter displays warnings when it encounters absolute occurrences attributes and data.

If you have edits pending to a product structure, you must save the edits before you open the structure in another application.

In addition to restructuring, you can edit individual properties on any line, subject to the following limitations:

- Restructuring is not permitted on lines that have pending edits.
- Property edits are associated with a relative occurrence and are marked as pending until they are saved to the database.
- Property edits are highlighted only if you use the column editor. If you use other methods of changing properties (for example, the **Properties** dialog box), these edits are not visually highlighted in the properties table. However, Teamcenter still retains the details of such edits until you save or revert them.
- Use the **PS_structure_change_condition** preference to specify actions as structure edits. For example, by default, changing a reference designator is not considered as a structure edit, but you can add this action to the preference. NX requires reference designator changes to be considered as structure edits.
- If any note in the list of notes is edited, the **All Notes** field shows a ... icon with a red strike-through. It does not show the exact original value.
- Edits to the absolute or relative transformation matrix are not highlighted.
- You cannot edit the first property column (**BOM Line**).
- If you cut more than one BOM line to the clipboard and then modify the BOM lines on the clipboard, this action changes the ownership of the remaining BOM lines. For example, if you cut two BOM lines and then remove one of these lines from the clipboard, the status of the remaining line changes from *pending cut* to *pending copy*. If you want to modify the BOM lines that are the subject of a cut action, repeat the cut action on the required BOM lines, rather than modifying the contents of the clipboard.
- If you remove a line that contains one or more unsaved changes to its substructure, the system does not automatically save those changes.
- By default, if you cut or copy a line and then paste it to a new location, incremental change elements (ICEs) are not copied. This may necessitate significant manual recreation of data if you are cutting or copying many lines together. To automatically copy ICEs, the administrator must set two Business Modeler IDE constants:

- **Fnd0EnableIceCarryOver** business object constant

When moving, copying, or assigning a line from one location to another, this constant determines if the ICEs are carried forward. You must set this constant to **true** on both the source location's parent and the target location's parent.

- **Fnd0AttrICEsToExclude** property constant

Defines the occurrence attributes that Teamcenter does not copy to the target location for occurrence attribute changes.

These settings apply to in-context changes made to structure lines, their attachments, and their occurrence attributes.

Note:

Restructuring primitive actions include:

- Removing a level (removing a line and keeping child lines)
- Inserting a level (including pasting a line as a parent of selected lines)
- Moving a line to a new location (for example, cut and paste actions)
- Splitting an occurrence
- Replacing data in context

Only the last two actions make copies of the absolute occurrence data; the other actions share the existing absolute occurrence data.

In certain cases, restructuring may cause valid reports of broken links, as shown in the following examples:

Example 1:

```

A
+-----B
      +-----C (APN1 in context of A)
            +-----D
  
```

If you remove level C, the structure becomes:

```

A
+-----B
      +-----D
  
```

The link to C is lost. This is correctly reported as a broken link.

Example 2:

```

A
+-----E
+-----B
  
```

```

+-----C
+-----D(APN1 in context of B)

```

If you move **D** to **E**, it is outside of the context of **B** and **APN1** is lost. This is correctly reported as a broken link.

Example 3:

```

A
+-----B
|       +-----C
|       +-----D(APN2 in context of A)
+-----B
|       +-----C
|       +-----D(APN1 in context of A)
+-----D
+-----D

```

If you move **C** to **D**, the system cannot determine which **D** to move the APN to without user interaction. It skips the APN and logs an error message.

Example 4:

```

A
+-----B
+-----C
+-----D(APN1 in context of B)

```

If you remove level **B**, it becomes:

```

A
+-----C
+-----D

```

The link to **D** is lost. This is correctly reported as a broken link.

Insert a level in the structure

You can create an item and insert it in the current structure as a new level below the selected line. The number of relative occurrences of the children is preserved. If you select more than one line, they must share the same parent.

1. Select the parent line of the new level and choose **Edit→Insert Level**.

Teamcenter displays the **Insert Level** dialog box.

2. Enter the item identifier and other attributes of the new item. If the inserted item is new, you must insert it with a quantity of **1**.
3. On completion, click **OK** or **Apply**.

Teamcenter creates the new item and inserts it as a new level. The selected branches become children of the inserted level, while the inserted level becomes a branch of the original parent. All existing variant conditions, notes, absolute occurrences, and other data is moved down with the selected branches. The default quantity of the new level is **1**, meaning that no quantity change occurs.

Note:

In most cases, associations between objects (such as **Connected To** relations) are correctly maintained or are reassociated. However, after editing a Mechatronics structure, always choose the **Fix In-Structure Associations** command to identify any invalid associations.

You cannot insert a level if the selected line represents a generic design element (GDE).

Note:

You can only insert a level if the line represents a standard business object type. If the line represents a custom type, copy it to the clipboard and choose **Paste Special**. Teamcenter pastes it as a new level above the currently selected line.

Remove a level from the structure

1. Select the affected line and choose **Edit→Remove** or click **Remove** .

Teamcenter displays the **Remove** dialog box.

2. (Optional) Select **Keep subtree** to reattach the children of the removed level to the next higher level parent line.
3. Click **Yes** to confirm removal of the line. The total number of instances is preserved at the end of this action. Any options of the removed lines are moved up and variant conditions are merged.

If you try to remove a level that would result in option definitions becoming inconsistent (for example, options that are referenced by a parent line), Teamcenter displays an error message.

Caution:

If you select a line for removal and edit tracking is enabled, the line is displayed in red with a strike-through until you commit the edits. Do not attempt to edit or work with this line, or you may obtain unpredictable results. If you want to edit or work with a line that is marked for removal, revert the removal of the line by choosing **Edit→Revert Edit** first.

Similarly, do not edit or work with a marked line in another structure editor such as Multi-Structure Manager. Always complete and save your work on the structure in Structure Manager before you open it in another structure editor.

If you remove one of the lines that is the context of a Mechatronics relation between primary and secondary lines, the relation itself is also removed.

Note:

In most cases, associations between objects (such as **Connected To** relations) are correctly maintained if you select **Keep subtree** or are reassociated. However, after editing a Mechatronics structure, always choose the **Fix In-Structure Associations** command to identify any invalid associations.

You cannot insert a level if the selected line represents a generic design element (GDE).

Move a node to another branch

You can move a selected node from one branch to another. All substructure and occurrence data moves with the node.

1. Move a node using any of the following methods:
 - Cut and paste using the **Edit→Cut** and **Edit→Paste** menu commands.
 - Cut and paste using the Ctrl+X and Ctrl+V shortcut keys.

Caution:

Do not try to move a node by dragging the line to its new position. Teamcenter performs a copy action when you drag a line.

Teamcenter displays the **Paste** dialog box.

2. Do one or more of the following:
 - Change the item ID and revision ID.
 - Change the view type, if applicable.
 - Select if the line should be pasted as a component of the selected assembly line, as a substitute for the selected line, or as a new level above the selected line.
 - Specify the number of occurrences, quantity per occurrence, and find number.
3. Click **OK** or **Apply** to complete moving the line.

Caution:

If you cut a line and edit tracking is enabled, the line is displayed in red with a strike-through until you commit the edits. Do not attempt to edit or work with this line, or you may obtain unpredictable results. If you want to edit or work with a line that is marked as cut, revert changes to the line by choosing **Edit→Revert Edit** first.

Similarly, do not edit or work with a marked line in another structure editor such as Multi-Structure Manager. Always complete and save your work on the structure before you open it in another structure editor.

Note:

In most cases, associations between objects (such as **Connected To** relations) are correctly maintained or are reassociated. However, after editing a mechatronics structure, you should always choose the **Fix In-Structure Associations** command to identify any invalid associations.

Any lines representing GDEs are renumbered after moving a node.

If you move both the primary and secondary lines of a mechatronics relation out of context, the relation is removed. However, if you move both the primary and secondary lines of a mechatronics relation to any level below the context, the relation is not removed. It is listed in the **Fix In-Structure Associations** dialog box when you choose **Tools→Fix In-Structure Associations**, allowing you to fix the invalid association.

If you remove the secondary line of a mechatronics relation out of context, the relation itself is removed. Refresh the primary line to see the updated BOM column properties.

If the line has an associated variant condition and you move it out of the scope of the option referenced in the variant condition, the variant condition is not retained.

If you move a node that has absolute occurrence overrides out of the scope of the context of the overrides, the system does not retain the override values after the move.

Replace a node

You can replace an item representing a node in the structure with another item. All data associated with the original node is preserved.

Note:

Your system administrator sets the **PS_replace_with_substructure** preference to determine if any substructure below the node is replaced. If this preference is **true**, the node and its entire substructure (if any) are replaced without prompting. If it is **false**, Teamcenter displays an error message and does not complete the replacement action.

1. Select the line to replace and choose **Edit→Replace Node** or click .

Teamcenter displays the **Replace Node** dialog box.

2. Enter the item identifier and other attributes of the item that replaces the existing item.
3. Click **OK** or **Apply**.

Teamcenter replaces the existing item.

If you have edit highlighting turned on, the number of the original part is shown in red, strike-through text.

Note:

In most cases, associations between objects (such as **Connected To** relations) are correctly maintained or are reassociated. However, after editing a Mechatronics structure, you should always choose the **Fix In-Structure Associations** command to identify any invalid associations.

If the child of the copied item includes **RealizedBy**, **ImplementedBy**, or **RedundantSignal** as the primary association, the corresponding child in the replaced assembly points to the secondary association of the original (copied) assembly.

You can replace a line that represents a generic design element (GDE) with another GDE line but not with a line that represents another object.

You can replace Mechatronics items with any type of item. However, Siemens Digital Industries Software recommends you use the same item type as the replaced item or one of its subtypes for the replacement item. Use of incompatible types may result in invalid relationships between occurrences in the product structure. The following table lists possible Mechatronics items for replace operations.

Mechatronics items for replace operations

Object	Recommended types for replace
Functionality	Functionality or its subtype
Connection	Connection or its subtype
Network	Network or its subtype
PSConnection	PSConnection or its subtype
Signal	Signal or its subtype
PSSignal	PSSignal or its subtype
Message	Message or its subtype
HRN_Accessory	HRN_Accessory or its subtype
HRN_AssemblyPart	HRN_AssemblyPart or its subtype
HRN_CavityPlug	HRN_CavityPlug or its subtype

Object	Recommended types for replace
HRN_CavitySeal	HRN_CavitySeal or its subtype
HRN_CoPackPart	HRN_CoPackPart or its subtype
HRN_ConHousing	HRN_ConHousing or its subtype
HRN_Fixing	HRN_Fixing or its subtype
HRN_GenTerminal	HRN_GenTerminal or its subtype
HRN_GeneralWire	HRN_GeneralWire or its subtype
HRN_Harness	HRN_Harness or its subtype
HRN_Module	HRN_Module or its subtype
HRN_WireProtect	HRN_WireProtect or its subtype
AppSoftware	AppSoftware or its subtype
Calibration	Calibration or its subtype
ConfigFile	ConfigFile or its subtype
PriBootloader	PriBootloader or its subtype
SecBootloader	SecBootloader or its subtype
Processor	Processor or its subtype

Split an occurrence

You can split a line that represents several occurrences into two branches. The new branch and the original (changed) branch initially have the same notes, variant conditions, and other data, but you can subsequently modify them independently. The quantity on the original line before the split must be greater than 1.

1. Select the occurrence line and choose **Edit→Split Occurrence**.

Teamcenter displays the **Split Occurrence** dialog box.

2. Enter the quantity for the new line that results from the split and click **OK** or **Apply**.

Note:

You cannot split an occurrence if the line represents a logical object, for example, **Connection**, **Signal**, or **Software**. You *can* split interfaces and other Mechatronics objects, for example, **HRN_GeneralWire** and **Processor**.

In most cases, associations between objects (such as **Connected To** relations) are correctly maintained or are reassociated. However, after editing a Mechatronics structure, you should always choose the **Fix In-Structure Associations** command to identify any invalid associations.

If you split an occurrence line that represents a GDE, Teamcenter increments the GDE number. The quantity of a GDE line must always be an integer.

If the child of the original occurrence includes **RealizedBy**, **ImplementedBy**, or **RedundantSignal** as the primary association, the corresponding child occurrence of the split occurrence points to the secondary association of the original occurrence.

Fix in-structure associations

When you manually edit a structure containing Mechatronics elements such as signals and connections, you may inadvertently create invalid associations between elements. To avoid multiple, potentially misleading warnings, Teamcenter does not display error messages during the editing session. However, once you have completed any editing session during which you chose the **Insert Level**, **Remove**, **Move** or **Replace** commands, manually check for and remove any invalid associations.

1. Select the top line of the edited structure and choose **Tools→Fix In-Structure Associations→Current Level** or **Tools→Fix In-Structure Associations→All Levels**.

Teamcenter displays a dialog box containing a list of invalid associations. The scope of the invalid associations depends on whether you chose the current level or all levels.

2. Select the first invalid association and click **Remove**.

Teamcenter removes the selected association from the structure.

3. Repeat the previous step for each of the other invalid associations in turn.

Note:

Any associations that you do not remove manually remain in the structure.

Performing on-demand validation

Your administrator can configure Teamcenter to enforce any rules imposed by the organization on what types of content are allowed in the structure. You cannot add content or make other structure edits that would violate the defined business rules.

The following types of restrictions on content within a structure are enforced:

- Only certain item classes or types may exist anywhere in a structure.
- Only certain item classes or types may be children of others.

- Only certain item classes or types may be parents of others.
- Properties of the parent or child object must satisfy specified values or be NULL.

For allowable substitutes in a given BOM line, the same restrictions that apply to the primary part occurrence are applied to the substitute.

Validations are provided for the following operations:

- Creating a new occurrence
- Adding a substitute for a given occurrence
- Cloning (duplicating) a structure
- Importing or exporting a structure
- Revise and baseline

Note:

Teamcenter validates only the first two operations in real time.

When you save edits, Teamcenter validates that they do not violate the defined business rules and, if they do, displays an error message and does not save the changes.

Optionally, you can perform an on-demand validation of property updates at any time by right-clicking a top line with substructure and choosing **Tools→Validate Occurrences**. If no issues are found, Teamcenter displays a confirmation and saves a validation log. If issues are found, it displays a list of errors.

Note:

The administrator uses the Business Modeler IDE to define these business rules on explicitly stated classes. Any subclasses or subtypes of these classes inherit the same rules.

Your administrator must also create and set the following preferences:

- **PS_Default_Rev_For_Occ_Cond_Validation**

Defines the default revision rule when a child item is used for validation.

- **PS_Bypass_Occurrence_Condition**

Configures the system to bypass occurrence condition validation for defined actions or operations.

Highlighting edits to the structure

If your administrator sets the **PSE_Display_Pending_Edits** preference to **true**, edits to the product structure tabular display are highlighted visually until you save them to the database.

If necessary, you can override this preference setting locally for your current session by selecting the **Display Markups for pending edits** command.

Highlighting edits feature is available only in Structure Manager, not other structure editor applications.

Note:

This feature is not compatible with **the BOM markup feature**, and you cannot use the two features together.

Ensure you select this feature when you want to edit the BOM directly, not when you want to create markups (propose changes).

You cannot convert pending BOM edits into markups.

Tip:

Enable highlighting only when you want to specifically track edits you are making; otherwise, the display may become difficult to interpret.

Close all Structure Manager windows before changing this option to avoid having open windows where edits are not highlighted. (Changing this option does not affect existing windows.)

Edits indicated are as follows:

- Additions

Displayed in green italic font.

- Removals

Displayed in red with a strike-through line.

- Property edits

Displayed with the original values in red with a strike-through line.

If you have pending edits to the structure, you can do any of the following:

- Click **Revert** to undo all pending edits to the selected line.

All edit marks are removed from the line.

- Click **Save** to commit all pending edits to the database.

The structure is redisplayed with no edit marks.

- Click **Revert All** to cancel all pending edits.

The structure is redisplayed with no edit marks.

Note:

You cannot compare structures with pending edits with the **BOM Compare** command. However, you can expand the structure manually to view the effect of pending edits.

Likewise, you cannot highlight pending edits if you enable incremental changes.

Note:

You cannot create new associations (for example, a **Connected To**, **Implemented By** or **Embeds** relation) to a line that is displayed in red with a strike-through line.

When you save pending edits, any associations to deleted lines are also deleted. If you revert pending edits, all associations are maintained.

Marking up the product structure

Marking up the product structure

You can:

- Mark proposed changes on the product structure or an assembly.
- Save the markup in a persistent workspace object.
- Route the assembly with its markup object for review, and apply the proposed changes.
- Add more proposed changes and comments to a previously marked-up structure and save them in the existing markup object.

Note:

This feature is not compatible with the pending edit redlining feature described in *Highlighting edits to the structure*, and you cannot use the two features together. Ensure you select the BOM markup mode when you want to create markups (propose changes), not when you want to edit the BOM directly. You cannot convert pending BOM edits into markups.

The markup is related to the BOM view revision (BVR) of the structure. The BVR may have multiple markups associated with it, but only one markup may be *active*; once a markup is applied, it ceases to be active.

A markup change represents a single proposed change to the BVR or one of its child lines. A markup change always references a markup, and a markup may include multiple markup changes. The author and the date and time of each markup change is tracked.

The following proposed changes to the structure can be included in a markup:

- Addition or removal of an occurrence.
- Addition or removal of a substitute for a line.
- Replacement of a line (a change to the item revision when in precise mode or to the item when in imprecise mode).
- Change to the value of certain occurrence properties, for example, name, notes, quantity, Find No., unit of measure, reference designator, and variant condition. The properties that are tracked in markups are defined in the **Fnd0BOMMarkupSupportedProperties** global constant in the Business Modeler IDE. You can add properties to this global constant, but you cannot delete the default entries.

To allow users to work with markups, the administrator must set the **Fnd0BOMMarkupAllowed** global constant to **true** in the Business Modeler IDE.

Set the following preferences to specify how markup actions are displayed:

- **BOM_MARKUP_ADD_FONT_STYLE**

Specifies the font style in which added line markups are displayed. For example, if this preference is set to **2**, additions are shown in italic.

- **BOM_MARKUP_ADD_FOREGROUND**

Specifies the color in which added line markups are displayed. For example, if this preference is set to **0,255,0**, additions are shown in green.

- **BOM_MARKUP_STRIKE_FOREGROUND**

Specifies the color in which removed line and property markups are displayed. For example, if this preference is set to **255,0,0**, removals and changes are shown in red.

Note:

Many editing actions are not supported in markup mode and the corresponding menu commands are disabled.

The markup commands are not available if Teamcenter is tracking pending edits to the structure in the active pane. Save or cancel any pending changes before inserting the markup. Editing a structure with markups may obsolete or remove impacted markups.

You cannot mark up changes to absolute occurrences; that is, if in-context editing is turned on, the markup commands are not available.

You cannot propose changes to an existing markup change. You should create a general markup with your comments or delete the existing markup change and create a new one.

Changes to properties are limited to 160 bytes.

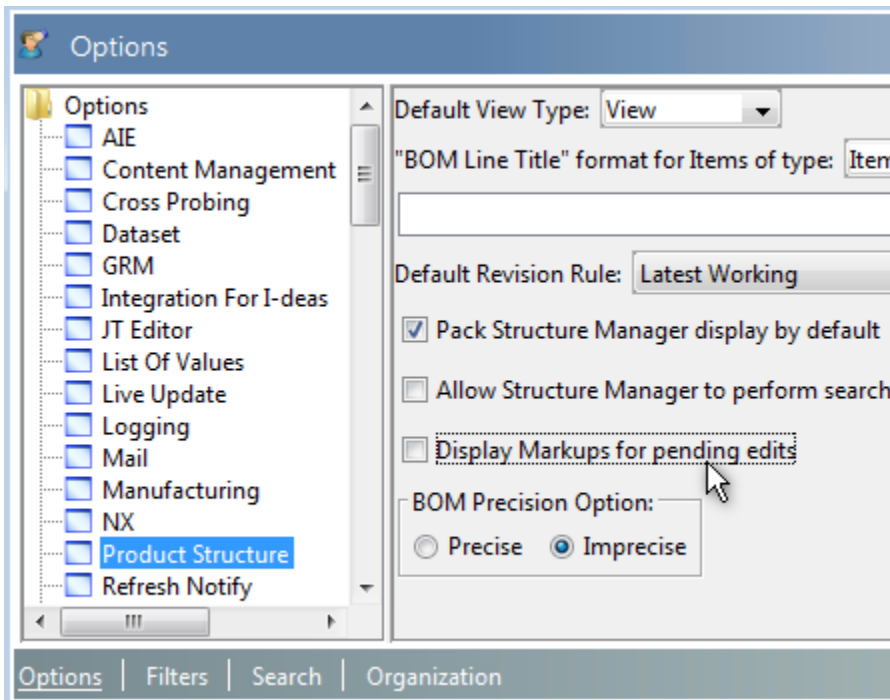
Turn on markup mode

- To turn on markup mode, choose **Tools→Markup→Markup Mode** or click .

Any existing markups to the structure are loaded and displayed.

You cannot turn on markup mode:

- If you have **Display Markups for pending edits** enabled by your option (preference) settings. You must save or cancel those edits first.



- If you have uncommitted changes. You must save or cancel those changes first.

- If you enable incremental change by setting the **Incremental_Change_Management** preference to **True**.
- To turn off markup mode, choose **Tools→Markup→Markup Mode** again or click .

Create and insert general markup

1. Ensure you are in **markup mode**.
2. Select the structure line where you want to add the general markup.
3. Choose **Tools→Markup→Show Markup View** or click .

Teamcenter displays the **BOM Markup** view.

4. Click the **Add General Comment** button  next to the **Show changes for this line** pane.

Teamcenter adds a new line in the pane.

5. Enter an appropriate comment (for example, a general description of the proposed change).

Teamcenter saves this general comment to the markup object.

Note:

You cannot mark up the first property column (**Quantity**).

Display markup properties

In My Teamcenter, select the markup object whose properties you want to display, and then choose **View→Properties**. Alternatively, you can right-click the object and choose **Properties**.

Teamcenter displays the properties of the markup, including the following details for markup changes:

- **A numeric identifier (#)**

Shows a unique identifier for grouping related changes. All changes with the same number are related.

- **Dependent?**

Contains **Y** if there are dependent markup changes; otherwise it is blank.

- **Markup Description**

Displays the description of the markup that was entered by the user who created it.

- **Status**

Shows the current status of the markup, for example, **Working** or **Obsolete**.

- **Note**

- **Last Modifying User and Last Modified Date**

Note:

The **#** and **Dependent** columns are populated for an **ADD** BOM line markup change to allow you to visually relate the change information. When you create an **ADD** BOM line markup change, Teamcenter creates dependent property markup changes for the find number and quantity.

Review and comment on markup

1. Select a top-level line with a related markup and then choose **Tools→Markup→Show Markup View** or click .

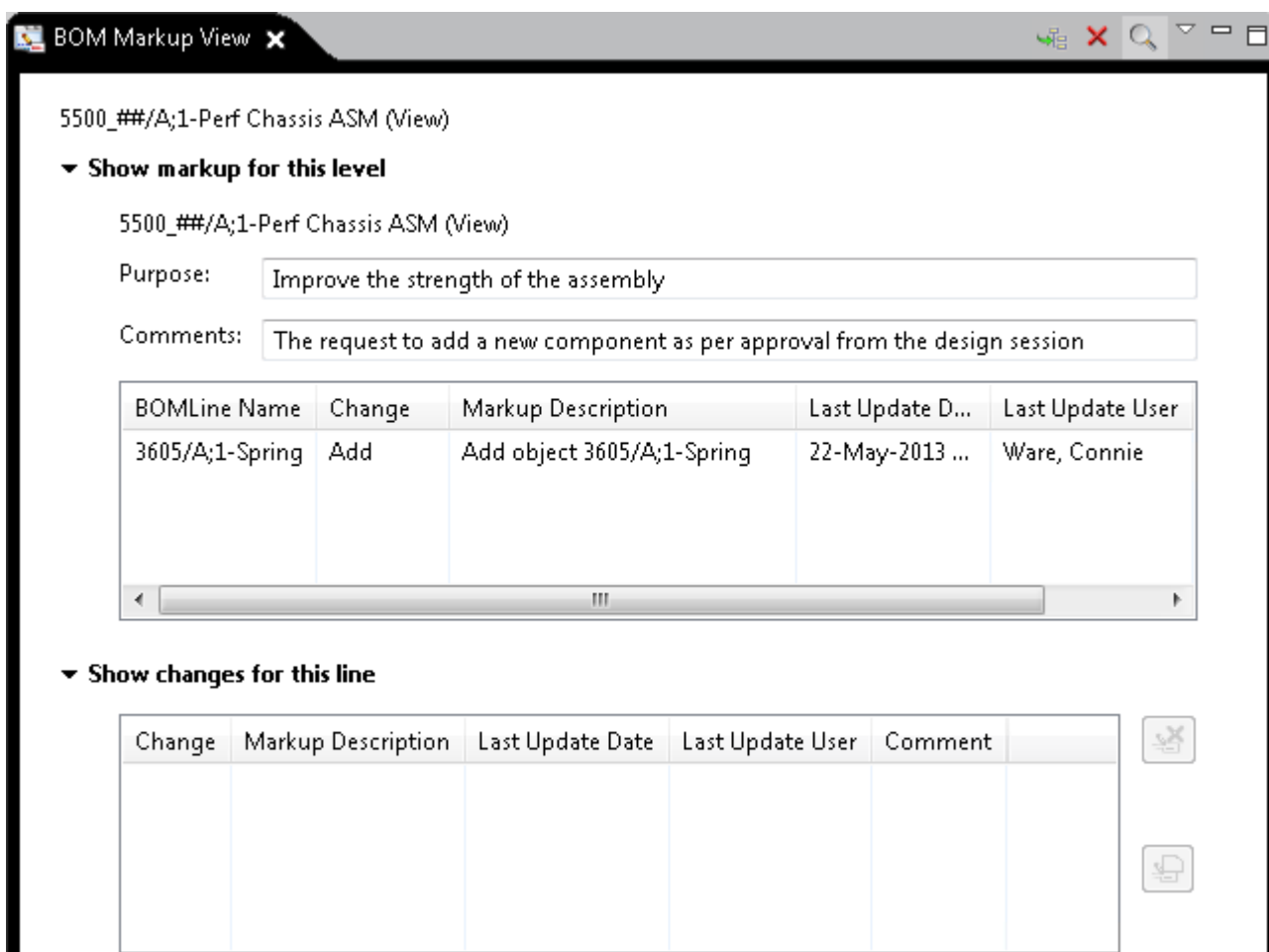
Note:

You can also choose **Structure Manager→Window→Show View→Other→Teamcenter→BOM Markup View** to display the markup view.

Do not select the actual added or removed line; select its parent assembly instead.

The **BOM Markup View** dialog box appears.

2. In **Show markup for this level**, type a text comment in the **Purpose** and **Comments** box.



Teamcenter saves the comment to the markup object.

Note:

The **BOM Markup** pane shows markup information for the selected BOM line. It shows only active markups and active markup changes, not obsolete changes.

For an **ADD** change, it shows only the **ADD** BOM line markup change and does not display the dependent property markup changes. Consequently, the **BOM Markup** view corresponds exactly with the redlining shown in the BOM panel.

The dependent markup changes are not redlined as property changes, but are displayed as part of the **ADD** redlining. The dependent markup changes are deleted as part of an **ADD** markup change deletion.

Validate access to apply markup

Select a line with a related markup and choose **Tools→Markup→Validate Access to Apply Markups (all levels)**.

Teamcenter checks if you have the necessary access privileges to save the changes in the markup and displays a confirmation message.

Note:

This check only identifies if you have access to the BVR associated with the selected line. It does *not* check if you have access to the marked-up child BOM lines.

You do not need write privileges to markup a structure, only to commit (save) the changes included in the markup.

Apply markup

You can save (commit to the database) all changes recorded in the markup that are related to the current line.

This does not affect any changes recorded in markup objects related to the child lines below it. To save changes in markups related to child lines, see [Apply all markups](#).

1. Select a line with a related markup and choose **Tools→Markup→Apply Markup (this level)**.

Alternatively, you can right-click the line and choose **Apply Markup (this level)**.

Teamcenter displays a confirmation dialog box.

2. Click **Yes**.

Teamcenter applies the changes in the markup to the structure.

Once a markup is applied, it ceases to be active and any future markups are captured in a new markup object.

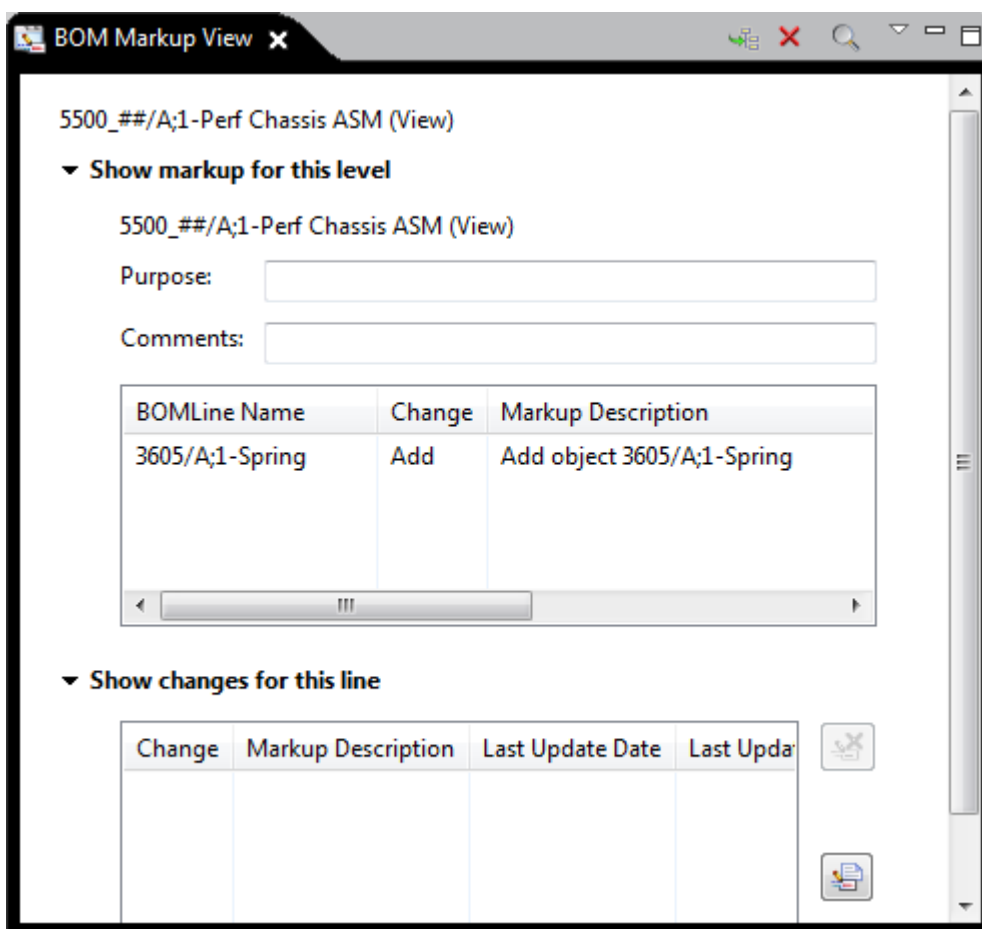
A markup cannot be applied more than once, although the results of an applied markup are visible in the structure.

Alternatively, you can apply a markup at the selected level as follows:

1. Select a line with a related markup and then choose **Tools→Markup→Show Markup View** or click



The **BOM Markup View** dialog box appears.



2. Review the details of the markup, then choose **Tools→Markup→Apply markup (this level)**.

Teamcenter applies the changes in the markup to the structure.

If the apply action causes full or partial errors, Teamcenter displays a dialog box that lists the errors and the failed components. You must evaluate the error descriptions and decide how to fix them.

For example, if the error results from access restrictions, you can ask another user with suitable access rights to apply the markup or revise the item revision to obtain access.

Apply all markups

You can save (commit to the database) all changes in the markup that are related to the current line and also changes in any markups related to the lines below it. You can also **save changes in the markup related to the current line**.

Alternatively, you can select a line that does *not* have an active markup and save all changes to markups of lines below the current selection. This is an enhancement to this feature that was not available in previous versions of Teamcenter.

Caution:

Applying multiple markups to a large structure may take a considerable time.

1. Select a line with a related markup or with markups of child lines, and then choose **Tools→Markup→Apply Markup (all levels)**.

Teamcenter displays a confirmation dialog box.

2. Click **Yes**.

Teamcenter applies the changes in the markups to the structure.

Once a markup is applied, it ceases to be active and any future markups are captured in a new markup object.

A markup cannot be applied more than once, although an applied markup remains visible in the structure.

If the apply action causes full or partial errors, Teamcenter displays a dialog box that lists the errors and the failed components. You must evaluate the error descriptions and decide how to fix them. For example, if the error results from access restrictions, you can ask another user with suitable access rights to apply the markup or revise the item revision to obtain access.

Carrying forward markups

Active markups may be automatically carried forward, depending on how you copy the structure:

- Baselining or revising

Markups are copied.

- Cloning

Markups are not copied, because closure rules do not apply to a structure clone.

- Sequencing

Markups are not copied.

- Saving the item or BVR using the **Save As** command.

Markups are not copied.

Delete markup

1. Select a line with a related markup you want to delete and choose **Tools→Markup→Delete Markup (this level)**.

Alternatively, right-click the top BOM line and choose **Delete Markup (this level)**.

Teamcenter displays a confirmation dialog box.

2. Click **Yes**.

Teamcenter deletes the active markup related to the selected line.

When a markup is deleted, all of its markup changes are also deleted.

Alternatively, you can delete a markup at the selected level as follows:

1. Select a line with a related markup and then choose **Tools→Markup→Show Markup View** or click .

The **BOM Markup View** dialog box appears.

2. Review the details of the markup, and then choose **Delete the Markup Change** .

Teamcenter deletes the active markup related to the selected line.

Defining units of measure

Defining units of measure

Unit of measure is an attribute of the item. In Structure Manager, you specify the value of the **Quantity** occurrence property in the units of measure for the component item (for example, 1.5 L for an **Oil** item). Alternatively, you can specify the unit of measure as **each**, that is, a numerical value. In this case, you must specify the value as a whole number (for example, 500).

You can optionally specify a quantity for a structure line in a user-defined unit of measure.

You cannot change the unit of measure after any revision of the item is released or is used in the structure.

Note:

When you add a line to the structure, its unit of measure (UOM) is initially the same as the default UOM for the corresponding item type. You can subsequently change the UOM of the line, if appropriate.

If the default UOM of the item is not **each**, you cannot change the UOM of the line to **each**.

Teamcenter considers the UOM of the line when displaying a quantity value. If the UOM of the line is **each**, it displays the quantity value as an integer; otherwise, it displays a floating (real) value.

By default, Teamcenter displays quantities with a maximum of two decimal places.

Define unit of measure

1. Double-click the **Quantity** property of the affected BOM line.

Teamcenter displays the **Edit Quantity** dialog box.

2. Type the required value in the **Quantity** box and select a UOM from the **Unit Of Measure** list.

Teamcenter converts the value you entered to the default item UOM and displays it for verification. For example, if the default item UOM is grams, when you enter a quantity of **2** and select a UOM of **lb (pound)**, it displays **907** grams.

3. Click **OK** to save the quantity in the database.

The quantity is stored in the database in the item UOM, not the user-selected UOM.

Managing global alternates

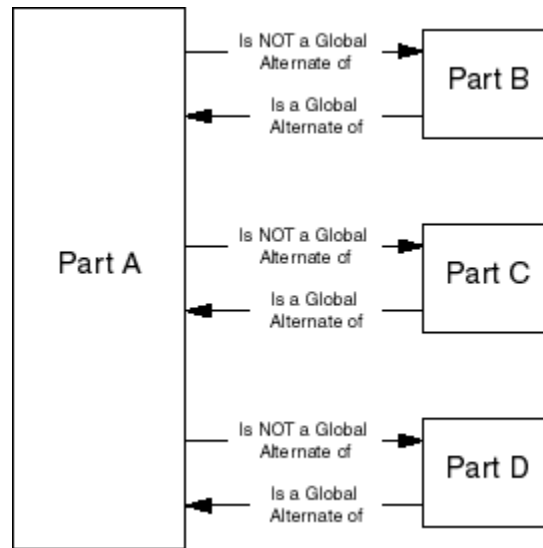
Global alternates overview

A *global alternate* part is interchangeable with another part in *all* circumstances, regardless of where the other part is used in the product structure. A global alternate applies to any revision of the part and is independent of any views.

Note:

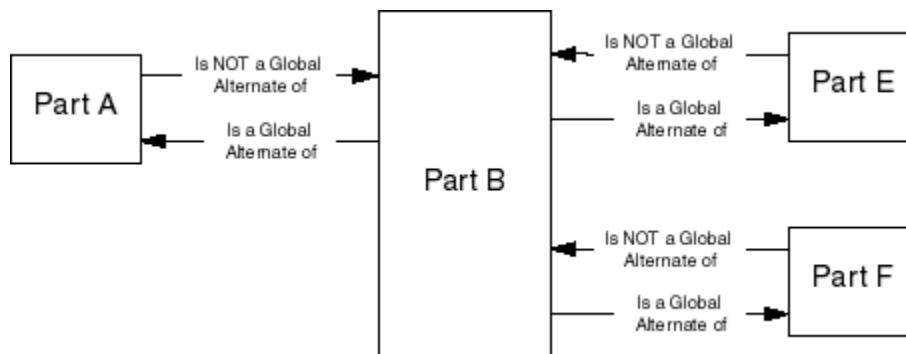
If the parts are interchangeable only in specific products or assemblies, use *substitutes* rather than global alternates.

Parts and their global alternates are related only in a single direction. For example, if part **A** has three global alternates (parts **B**, **C**, and **D**), then **B**, **C**, and **D** are each a global alternate of **A**. However, part **A** is not an alternate of **B**, **C**, or **D**, as shown next.



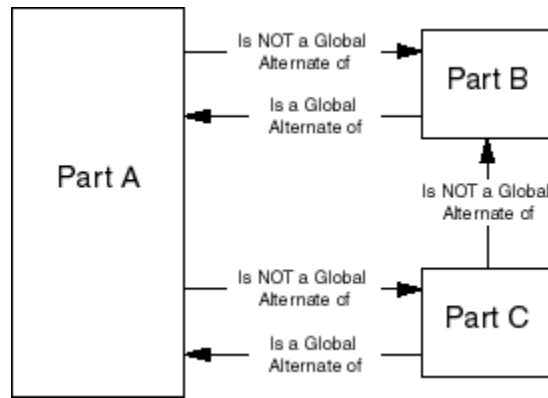
Global alternates – single direction

One part can be a global alternate of more than one other part. For example, part **B** may be a global alternate of parts **E** and **F**, as well as a global alternate of part **A**, as shown next.



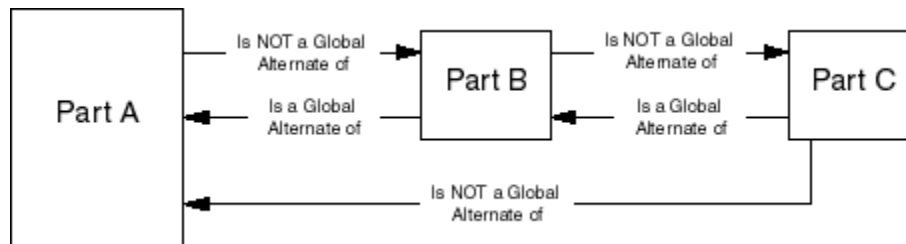
Global alternates – multiple alternates

Global alternate relationships are not shared. For example, part **C** is not a global alternate of part **B**, even though they are both global alternates of part **A**, as shown next.



Global alternates – nonsharing

Likewise, global alternate relationships are not chained. For example, if part **B** is a global alternate of part **A**, and part **C** is a global alternate of part **B**, part **C** is not a global alternate of part **A**, as shown next.



Global alternates – chaining

List global alternates

1. Select a line in the product structure. If it has global alternates, this is indicated by the 🧩 icon.
2. Click **Global Alternates** 🧩 at the bottom of the pane.

Teamcenter displays the **Global Alternate** dialog box, which lists all the global alternatives of the selected item. The preferred global alternate (if any) is marked with a check mark.

Note:

You can also list global alternates in My Teamcenter.

Add global alternates

1. List the global alternates (if any) of the item for which you want to add one or more global alternates.
2. In the **Global Alternate** dialog box, click **Open** 📄.

Teamcenter displays the **Open by Name** dialog box.

3. Search for the item that you want to define as a global alternate of the selected item.
4. If you want to define more than one global alternate of the selected item, repeat the previous step for each global alternate.

Note:

You cannot add the same item as the global alternate more than once. Teamcenter displays a **Cannot create duplicate alternates of same item** message if you attempt this action.

Remove global alternates

1. List the global alternates of the item from which you want to remove one or more global alternates.
2. In the **Global Alternate** dialog box, select one or more global alternates to remove and click **Remove**.

Teamcenter removes the selected global alternates from the list.

Note:

If you remove all the global alternates from an item, the corresponding line in the product structure no longer shows the  icon.

Set or unset preferred global alternate

1. List the global alternates of the item from which you want to remove one or more global alternates.
2. In the **Manage Global Alternates** dialog box, select a global alternate and click **Prefer**.

Teamcenter designates the selected global alternate as preferred and places a check mark next to it in the list.

To remove the preferred designation from a global alternate, select it and click **Prefer** again. Teamcenter removes the check mark next to it in the list of global alternates.

Define global alternate groups

A *global alternate group* refers to a group of parts that can be interchanged with another under *all* circumstances, regardless of where the other parts are used in the product structure. A global alternate group can be applied to any revision of the part and is independent of any views.

In Teamcenter, you can add the interchangeable parts while creating the alternate group or after creating it.

- **Add the interchangeable parts while creating the alternate group**
- **Add the interchangeable parts after creating the alternate group**
- **View details of the alternate groups and global alternates details**

Add the interchangeable parts while creating the alternate group

1. Open a product structure and select the occurrences for which you want to create global alternates.
2. Click **File** → **New** → **Interchangeable Group** → **Alternate Group** and click **Next**.
3. (Mandatory) Specify an ID and name as appropriate.
4. (Optional) Specify a description.
5. To create the alternate group without adding the interchangeable parts, click **Finish**.

You can add interchangeable parts after creating the alternate group.

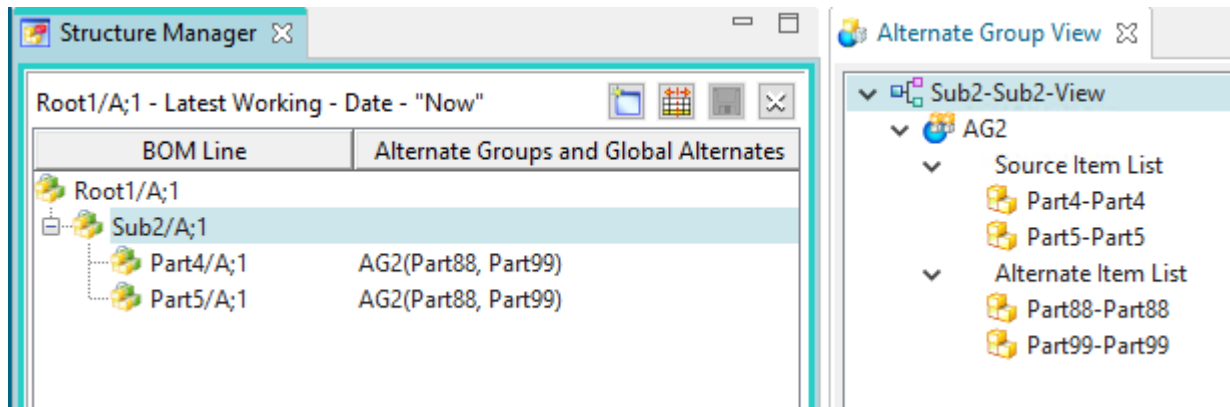
If you want to add interchangeable parts while creating the alternate group, continue the following procedures.

6. To search for the parts you want to replace globally, in the **Source Item List**, click the **Add** button.
7. To search for the parts you want to replace as alternates globally, in the **Alternate Item List**, click the **Add** button.
8. To add the global alternates group, click **Finish**.
9. **View details of the alternate groups and global alternates details.**

Add the interchangeable parts after creating the alternate group

This procedure assumes that you have created a alternate global group without adding interchangeable parts by following **step 1** through **step 5**.

1. Open a product structure, right-click and choose **Alternate Group View**.



2. In the **Alternate Group View**, expand the alternate group you created.
3. Add source items to the source item list.
 - a. Select **Source Item List** and click the **Add source items to the list** view toolbar icon.
 - b. Search the part you want to replace globally, select it, and click **OK**.
4. Add alternate items to the alternate item list.
 - a. Select **Alternate Item List** and click the **Add interchangeable parts to the alternate list** view toolbar icon.
 - b. Search for the part you want to replace with an alternate, select it, and click **OK**.
5. Add another interchangeable group.
 - a. Click the **Create an Interchangeable group** view toolbar icon.
 - b. (Mandatory) Specify an ID and a name, and click **Finish**.
 - c. To add source items and alternate items, repeat **step 3** through **step 4**.
6. Search for and add an interchangeable group.
 - a. Click the **Search and add an Interchangeable group** view toolbar icon.
 - b. Search by ID or name, select the group, and click **OK**.
7. To delete an interchangeable group, select the group, and click the **Delete an Interchangeable group** view toolbar icon.

8. To remove a source item or an alternate item from its list, select the item and click the **Remove a source/alternate item from the list** view toolbar icon and click the **Save the editing of an interchangeable group** view toolbar icon.
9. **View details of the alternate groups and global alternates details.**

View details of the alternate groups and global alternates details

The **Alternate Groups and Global Alternates** column is not available by default. You can enable this column to view the alternate groups and details of the global alternates.

1. Right-click a column and select **Insert Columns**.
2. From **Available Columns**, select **Alternate Groups and Global Alternates** and move it to the **Displayed Columns**. Then select the column and move it to the appropriate level using the **Move** buttons.

The internal name of this property is **BOMLine.fnd0bl_alternate_groups**.

Changing components

Changing components

Any modification you make to the product structure changes the BOM view revision in the parent assembly. Modifications that change the BOM view include adding, deleting, or substituting components; adding a substitute component; or changing any of the occurrence attributes, for example, a note or find number.

You must have write access to the BOM view revision to make such modifications. You may not have write access for one of several reasons, including:

- Another user is modifying the BOM view revision and the changes are not yet saved. In this case, Teamcenter displays an error message, stating who is currently modifying the BOM view revision.
- The BOM view revision is protected against write access, for example, because it is released.

When you choose **File→Save As** for a selected item revision, Teamcenter creates a physical copy of the BOM view revision.

Remove components

1. Select the component or group of components to remove from the product structure tree.
2. Choose **Edit→Remove**, or press Ctrl+R.

Teamcenter removes the selected components from the structure. If you select a line that has substitutes, these are also removed.

Note:

This action does not place the selected line or lines on the clipboard.

Move a component to another assembly

1. Select the component or group of components to move to another assembly
2. Click **Cut**  on the toolbar, choose **Edit→Cut**, or press Ctrl+X to place the selected components on the clipboard. Teamcenter grays out the affected component lines.
3. Select the target assembly.
4. Click **Paste**  on the toolbar, choose **Edit→Paste**, or press Ctrl+P. New component lines appear under the selected assembly, and the grayed-out lines are removed from the structure.

Note:

Lines grayed out after a **Cut** command are not actually removed from the structure until you paste them elsewhere in the structure. If you place another object on the clipboard before pasting, the grayed-out lines are restored to their previous state and are removed from the clipboard.

Replacing a component

Replacing a component

You can make the following replacements in a product structure:

- Replace a component without losing the occurrence data.

You can change an item revision in an assembly by cutting out the old item revision and pasting in the new item revision. However, this method breaks the occurrence link to the old component, so you lose any occurrence attributes including notes and the find number of the old component. A replacement retains the occurrence data.

- Change the revision of a component item in precise assemblies.
- Change the view type.

If the component has multiple views and you want the parent assembly to reference a different view, you can edit to the parent assembly to change the view type.

- Replace all occurrences of a selected item revision.

You cannot replace one component with two or more components. However, you can select multiple components and replace each with a single component.

Note:

Teamcenter does not verify if the replacement request is valid for your business data. If necessary, check the validity of the replacement action with the Teamcenter administrator.

Replace a component

1. Select the component to replace in the product structure.
2. Optionally, copy the replacement component to the clipboard. This action prepopulates the **Replace** dialog box with the item identifier and revision of the replacement component.
3. Choose **Edit→Replace....**

Teamcenter displays the **Replace** dialog box. The dialog box contains details of the selected component to replace.

4. Enter the item identifier of the replacement component. If you copied the replacement component to the clipboard, the item ID and revision boxes are already populated with those of the copied component. You can change the identifier if required, but not the item name; the item name is derived from the item identifier you enter.

Note:

If you specify an item identifier that is shared by multiple objects, Teamcenter displays the **Select Unique Item** dialog box allowing you to select the object you require.

You can specify a revision in some circumstances, depending on whether the parent assembly BOM view revision of the component replaced is precise or imprecise:

- If the BOM view revision of the parent assembly is precise, you can specify a revision. In this case, use the **Replace** command to replace one component item revision with another item revision or to replace the component with a revision of a different item. If an item is taken from the clipboard, Teamcenter determines the revision by the revision rule.
- If the BOM view revision of the parent assembly is imprecise, you cannot specify the revision. In this case, use the **Replace** command to replace one component item with another item.

If there is not a revision that satisfies the revision rule when you add the component to the structure, Teamcenter displays the revision as **???**.

5. (Optional) Use the bottom section of the **Replace** dialog box to change the scope of the replacement by clicking one of the following:

- **The original**

Replaces only the selected component.

- **Adjacent occurrences**

Replaces all components of the selected item revision that are in the parent assembly.

- **All occurrences in *assembly***

Replaces all occurrences of the selected item revision, regardless of their position in the product structure.

If the component to replace has multiple views, Teamcenter uses the default view type. If no default is defined, Teamcenter displays an error message, and you must specify a view type in the **Replace...** dialog box.

Alternatively, to replace one or more items (parts) or item elements for another:

1. Select one or more source lines that represent items or item elements, and choose **Edit→Copy**.
2. Select target lines that represents the same types of item or item element, and choose **Edit→Paste**. If you copied more than one source line to the clipboard, but only selected a single target line, Teamcenter displays the **Select Object for Replace** dialog box. Otherwise, it replaces the targets with the sources and updates the find numbers, as appropriate. If you attempt to replace an item or item element with a line of another type, Teamcenter displays an error message and does not replace any of the selected lines.
3. If Teamcenter displays the **Select Object for Replace** dialog box, select the required source from those listed and click **Replace**.

Replace all occurrences of an item revision

To replace all the occurrences of a selected item revision in the entire structure, regardless of their position in the structure hierarchy:

1. Select the item revision to replace in the product structure.
2. (Optional) Copy the replacement item revision to the clipboard. This action prepopulates the **Replace** dialog box with the item identifier and revision of the replacement item revision.
3. Choose **Edit→Replace....**

Teamcenter displays the **Replace** dialog box. The dialog box contains details of the selected item revision to replace.

4. In the dialog box, enter the item identifier of the replacement item revision. If you copied the replacement item revision to the clipboard, the item ID and revision boxes are already populated. You can change the identifier if required, but not the item name; the item name is derived from the item identifier you enter.
5. In the bottom section of the **Replace** dialog box, set the scope of the replacement by clicking **All occurrences in top-assembly-display-name** and then click **OK**.

Teamcenter replaces all the affected occurrences and displays a progress bar until complete. If any of the replacement actions fail, it continues replacing other occurrences and reports to the user after the action completes. You cannot cancel the replacement of multiple occurrences once in progress.

Change add and delete operations to a replace operation

During prototyping or other changes, you may delete an item or part and subsequently add another item or part in the product structure.

To convert the separate delete and add operations into a single replacement operation during BOM comparison:

1. Open two product structure windows side-by-side and configure two different BOM view revisions (BVRs) showing the individual operations. For example, configure a BVR showing the deleted part in one window and a second BVR showing the added part in the second window.
2. Select the deleted and added parts and choose **Edit→Change To Replace**.

Teamcenter converts the individual delete and add operations into a replacement operation, replacing the occurrence thread of the added part with the occurrence thread of the deleted part to keep the same occurrence thread.

Defining substitute components

Defining substitute components

Substitute components are parts that are interchangeable with a particular component in an assembly. Substitutes are often defined for manufacturing purposes, allowing use of the substitute if the preferred part is unavailable, for example, due to a stock shortage. If the parts are interchangeable in *all* circumstances, regardless of where they are used in the product structure, consider creating a *global alternate*.

You define a substitute for a single occurrence in an assembly and not for an item. In general, you control a change to an item of this nature by making the changes selectively for each assembly, using

a where used search to identify each instance of the item. Do not use substitutes to address marketing variations of a product—use **variants** or **modular variants** for this purpose.

You can define more than one substitute for each component. One of the substitutes is designated the *preferred substitute* and is displayed in the structure. You can see the other substitutes by clicking the **List Substitutes** button . You can change the preferred substitute at any time.

When a primary part has one or more substitutes, you can display all the substitute parts as siblings of the preferred structure line directly below the primary part. You can then easily compare, edit, or remove the substitutes. You can enable the display of substitutes on separate lines by setting the **PSEShowSubstitutesPref** preference.

Note:

If you are working in NX and perform a rollup calculation (for example, cost or weight), the calculation uses the preferred substitute.

If you add a substitute, you modify the BOM view revision and you consequently must have write access to the BOM view revision. You can change the preferred substitute any time during a session (for example, to view the change in NX), but you can only save the change if you have write access to the BOM view revision.

Substitutes of one occurrence all share the same occurrence attributes, for example, find number, quantity, and notes, as specified for the substituted part.

Substitute components are item revisions in a precise assembly and items for an imprecise assembly. In an imprecise assembly, the revision rule selects the correct revision of a substitute component.

If you drag and drop BOM lines and there are substitutes in the selection, the drop operation ignores the substitutes and only copies the primary BOM lines.

When you pack BOM lines with substitutes, the substitute lines associated with the pack master are displayed as its siblings. A group of BOM lines can be packed only if they have the same set of substitutes. The pack count for the preferred BOM line includes the substitutes. For example, if a packed BOM line contains three BOM lines and each of the BOM lines has one substitute part, the pack count is shown as six. If the primary BOM lines do not have the same substitutes, you cannot pack those BOM lines.

When a BOM line is packed, adding a substitute to the packed line recursively add the same substitutes to all of the occurrences. Likewise, removing a substitute from the packed line recursively removes the substitute from all of the occurrences.

You cannot add substitute BOM lines to substitute groups.

BOM rollup report calculations exclude substitute lines.

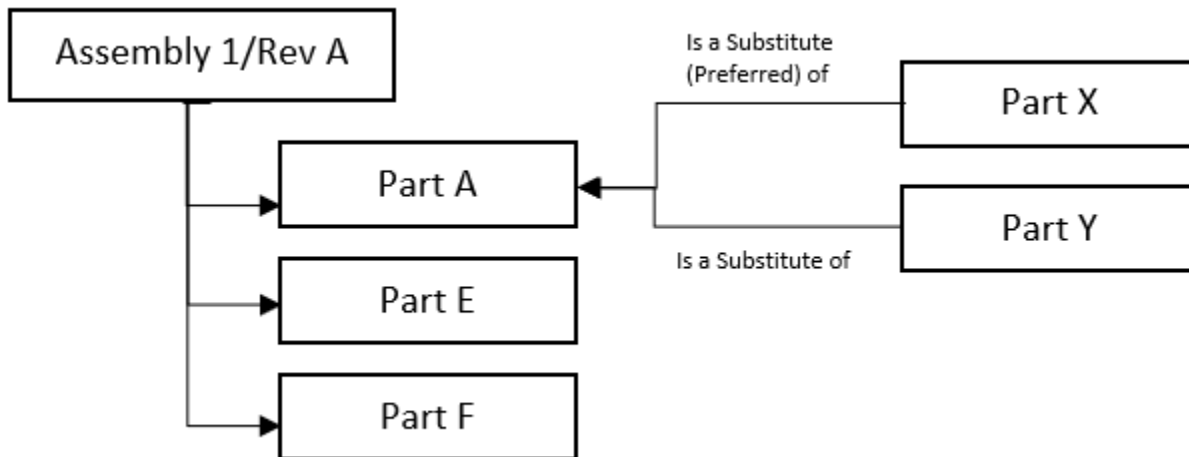
When BOM markup is enabled, added or removed substitute lines are marked.

Understanding substitutes using examples

Let us consider two examples to understand substitutes.

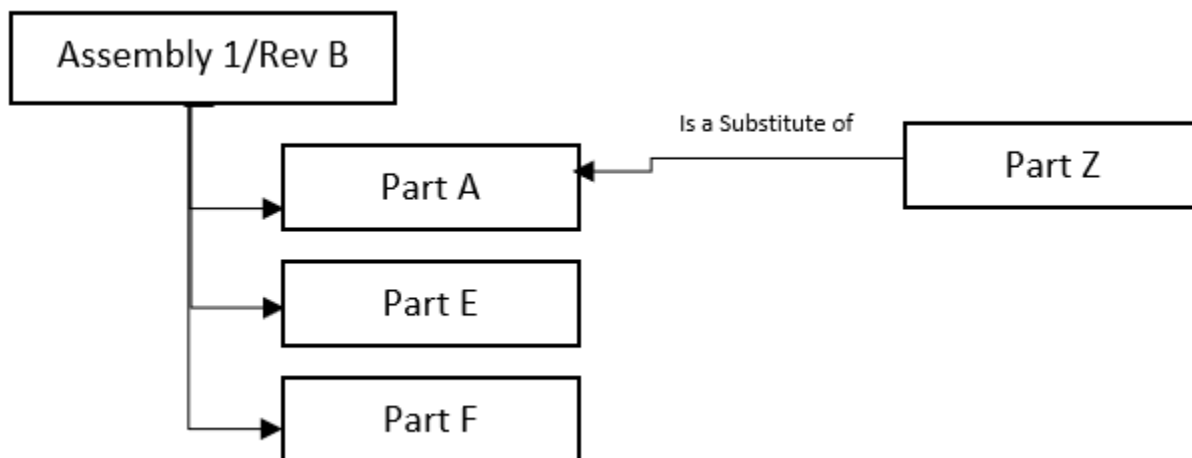
Example 1:

Consider that *Part A* is used in *Assembly 1*. In *Assembly 1*, *Part X* and *Part Y* are set as the substitute parts for *Part A*, and *Part X* is the preferred substitute. In such a case, if *Part A* is unavailable, *Part X* can be used. If *Part X* is also unavailable, then *Part Y* can be used.



Example 2:

Let us assume that you revise *Assembly 1* to create a revision B of the assembly. When you revise an assembly, the occurrences in that assembly are carried forward along with the substitutes. If required, you can change the substitute part. In this example, you can choose to use *Part Z* as the substitute for *Part A* instead of *Part X* and *Part Y*.



Display substitute components for a line

Teamcenter identifies the lines in the product structure with substitute components by a  icon. If the line has substitute components, it has the **Has Substitutes** property set to **Y**.

1. Select the line in the product structure tree.
2. Click **List Substitutes** .

Teamcenter displays the **List Substitutes** dialog box. This allows you to view the available substitutes.

If a substitute part has an underlying structure, it is still represented as a leaf part when displayed as a separate substitute line.

Display substitutes as separate lines

1. Set the value of the **PSEShowSubstitutesPref** preference to **1**.
2. Load the structure that has substitutes defined for primary items.

Teamcenter displays substitutes as separate lines at the same level as the corresponding primary items. For example:

 002811/A:1-Item5	Item	Preferred	002827, 002828
 002827/A:1-Substitute1 (View)	Item	Substitute	
 002828/A:1-Substitute2	Item	Substitute	

Track substitutes with an active change

You can track the creation or modification of a substitute with an active change. To set an active change:

1. In the **User Settings** dialog box, select the required **Active Change**.
2. Click **OK**.

Create substitute component

1. Copy the substitute item revision to the clipboard in Structure Manager or another application.
2. Select the line in the product structure in Structure Manager for which you want to define this item revision as a substitute.

You can also add a substitute to more than one line in a single operation by selecting all the necessary line. If the lines are packed, unpack them before you select them.

3. Choose **Edit→Paste Substitute** to paste the substitute directly. You can also choose **Edit→Paste Special** and click **As Substitute of Selected Line** in the resulting dialog box.

You can also type in the item identifier of the substitute directly, by selecting the line in the structure, choosing **Edit→Add...**, and clicking **As Substitute of Selected Line** in the resulting dialog box.

Edit the properties of a substitute

If you display substitutes as separate lines, follow this procedure:

1. Load a product structure with substitutes defined for the primary items.
2. Select the substitute you want to edit, and make your modification in the data pane.

Teamcenter saves the edited properties.

Note:

You must have necessary permissions to edit substitute parts.

For substitutes, there are no occurrence properties. You can only edit properties for items, item revisions, and master forms.

You cannot make in-context edits or create incremental change data for substitute lines.

Compare substitutes

If you display substitutes as separate lines, follow this procedure:

1. Load the product structures with substitutes that you want to compare in two separate BOM windows.
2. Choose **Tools→Compare**.

The **BOM Compare** dialog box appears.

3. Select the desired report options and the **Single level (with substitutes)** mode, and then click **Apply**.

Teamcenter generates a BOM Compare report that compares the substitute parts as well as the primary parts.

Note:

You can only compare substitute parts with other substitute parts, not with primary parts.
If you choose any other comparison mode, the results may be incorrect.

Removing substitute components

Removing substitute components

You can remove a substitute part that has related substitutes from the product structure. When you do this, Teamcenter:

- Notifies you about all the related substitute parts of the selected substitute.
- Notifies owners of the parent BVRs of all related parts by Teamcenter e-mail.
- Changes or removes all relations in which the selected substitute parts participate to ensure consistency.
- Removes the selected substitute part from the substitute part list.

Remove a substitute component

If you do not display substitutes as separate lines, follow this procedure:

1. Select the required line in the product structure tree.
2. Click **List Substitutes** .

Teamcenter displays the **List Substitutes** dialog box.

3. Select the substitute component you want to remove and click  (**Remove**) or choose **Edit→Remove**.

You can also press Shift+Ctrl to select more than one substitute in the list for removal. If you remove all listed substitutes, the line in the product structure is no longer marked as having substitutes.

If you display substitutes as separate lines, follow this procedure:

1. Load the structure that has substitutes defined for primary items.
2. Select the substitute line and choose **Edit→Remove**.

A confirmation dialog box appears.

3. Click **Yes**.

Teamcenter removes the substitute line from the structure.

This action only removes the substitute from the substitute list of the primary part. It does not delete the underlying part.

Change the preferred substitute

1. Select the required line in the product structure tree.
2. Click the **List Substitutes** .

Teamcenter displays the **List Substitutes** dialog box.

3. Select the item to be the preferred substitute and click **Prefer**.

Teamcenter displays the item identifier of the selected substitute and adds the original preferred substitute to the list.

Alternatively, you can right-click the required line and click **Set Preferred Substitute** to display a list of the substitute components. Click the new preferred substitute.

4. If you have write access to the BOM view revision, you can save this change to the structure. If you do not have write access, Teamcenter warns that you cannot save the preferred substitute but you can make a temporary change. The ability to make a temporary change is useful if you want to visualize one of the nonpreferred substitutes in the structure.

Managing substitute part relationships

Managing substitute part relationships

You can define and edit substitute part relationships to manage dependencies between substitute part selections. You can also define optional parts according to size selections.

Relating substitute parts

If there are dependencies between substitute part selections, you can relate the substitute part of one occurrence with substitute parts of the other occurrence. You can define these relationships for any occurrence in any BOM view revision.

Such relationships are *bidirectional*. For example, you can relate substitute A of the lower bearing in the product structure to substitute B of the upper bearing, if the selection of B depends on the current selection of A. The same dependency applies to the selection of B as the upper bearing; that is, A must

always be the lower bearing if B is selected as the upper bearing, and B must always be the upper bearing if A is selected as the lower bearing. However, Teamcenter does not enforce this relationship, if you choose to override it in a particular structure configuration.

To relate substitutes, you must have write access to the parent BOM view revisions of the selected lines. If you do not have permission to modify either of the parents, you cannot relate the substitute parts.

Relate substitute parts

1. In the product structure tree, select the two lines that represent the applicable occurrences and choose **Tools→Related Substitute→Relate**.

Teamcenter displays the **View/Create Related Substitutes** dialog box.

2. Verify the parent lines and selected substitute items are those you want to relate. You can also click the **Preview** button to check the relation to be created.
3. When you are satisfied that the correct relationship is selected, click the **Create** button to confirm the selection.

Teamcenter creates the relationship between the proposed substitutes and saves it in the database; it is not necessary to explicitly save changes to the product structure. If you create an incorrect relationship, click the **Reset** button to reset the changes.

Note:

The **Related Substitutes** menu command is only visible if your site administrator sets the **PSE_enable_related_substitutes** preference to **True**.

When you save a product structure that includes related substitute parts as a new structure, all substitute part relations are carried forward.

Relate substitutes with existing substitutes

1. Click the **Preview** button before you create the relation to verify if previous relations exist and their effect on the relation you propose to create.

For example, the **000005 Substitute A for Lower Bearing** line in the BVR is already related to the **000014 – Substitute A for Fuel Pipe** line. If you try to relate the **000005 Substitute A for Lower Bearing** line to another line, **000006 Substitute A for Upper Bearing**, and click the **Preview** button, Teamcenter displays the following new relation:

```
000002/A-view:000003:10 ->000005 - Substitute A for Lower Bearing
000002/A-view:000003:20 ->000006 - Substitute A for Upper Bearing
000012/A-view:000013:150 ->000014 - Substitute A for Fuel Pipe
```

- Click the **Create** button to commit the relation. In the previous example, Teamcenter relates substitute A for the lower bearing, substitute A for the upper bearing and substitute A for the fuel pipe.

Edit a substitute part relationship

You can change or remove the relationship between substitute related parts, as follows:

- In the product structure tree, select a structure line with related substitutes and choose **Tools→Related Substitutes→Relate**.

Teamcenter displays the **View/Create Related Substitutes** dialog box.

- Click the **Show Related** button.

Teamcenter shows all the related substitute parts for the selected substitute in the right-hand pane of the dialog box.

- Select the relation to edit and click the **Cut**  button to remove it, or click the **Modify** button to change the relation.

Note:

To modify substitute part relationships, you must have write access to the parent BOM view revisions of the selected lines. If you do not have permission to modify either of the parents, you cannot modify the substitute part relationships.

View the related substitutes of a selected BOM line

Choose **Tools→Relate Substitutes→View Related**. Teamcenter displays all defined relations in a dialog box for information purposes; you cannot change the relations in this dialog box.

Export substitute data

You can export substitute component data in a structure to an external system. To do this, your administrator must add the appropriate closure rule to the transfer mode. You must choose this transfer mode each time you export substitute component data.

Define substitute groups

A *Substitute group* refers to a group of components that are interchangeable with another group of components in a BOM view revision (BVR). This substitution is valid only in the context of the specific BVR.

Substitutes groups are often defined for manufacturing purposes, allowing the use of the substitute if the preferred parts are unavailable, for example, due to a stock shortage. If the substitute groups are interchangeable under *all* circumstances, regardless of where they are used in the product structure, consider creating a **global alternate group**.

In Teamcenter, you can add the interchangeable parts while creating the substitute group or after creating it.

- **Add the interchangeable parts while creating the substitute group**
- **Add the interchangeable parts after creating the substitute group**
- **View the substitute groups and substitute part details**

Add the interchangeable parts while creating the substitute group

1. Open a product structure and select the occurrences you want to substitute.
2. Click **File** → **New** → **Interchangeable Group** → **Substitute Group** and click **Next**.
3. (Mandatory) Specify an ID and name as appropriate.
4. (Optional) Specify a description.
5. To create the substitute group without adding the interchangeable parts, click **Finish**.

You can add interchangeable parts later after creating the substitute group.

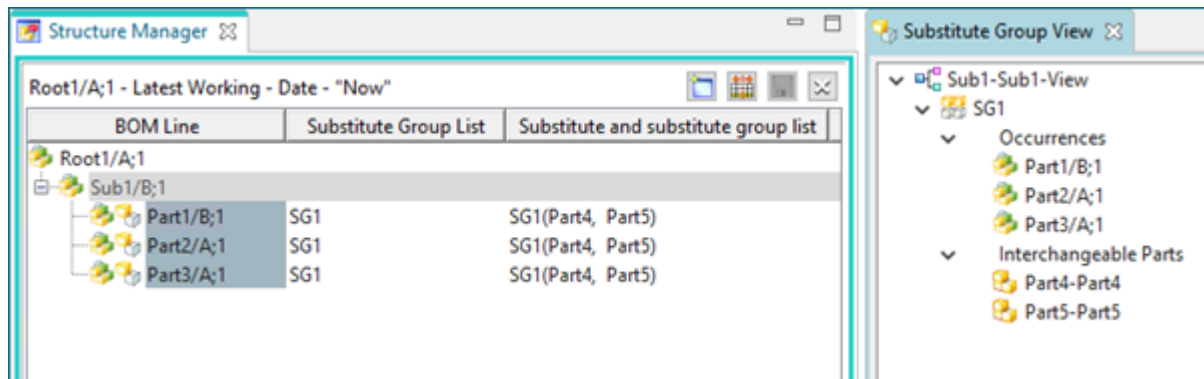
If you want to add interchangeable parts while creating the substitute group, continue the following procedures.

6. In the **Substitute List**, click the **Add** button and search for the occurrences which you want to use as substitutes.
7. To add the substitutes, click **Finish**.
8. **View the substitute groups and substitute part details.**

Add the interchangeable parts after creating the substitute group

This procedure assumes that you have created a substitute group without adding interchangeable parts by following **step 1** through **step 5**.

1. Open a product structure, right-click, and choose **Substitute Group View**.



2. In **Substitute Group View**, expand the substitute group you created.
3. Add an occurrence to the occurrences list.
 - a. Select the **Occurrences** list, and click the **Add occurrence to the list** view toolbar icon.
 - b. In the **Add Occurrences** dialog box, select a child BOM line, and click **OK**.
 - c. Click the **Save the editing of an Interchangeable group** view toolbar icon.
 - d. In the **Structure Manager** view, click the **Save** toolbar icon.
4. Add parts to the **Interchangeable Parts** list.
 - a. Select the **Interchangeable Parts** list and click the **Add item or item revision to the substitute list** view toolbar icon.
 - b. Search for the part by specifying an item ID or item name, select it, and click **OK**.
 - c. Click the **Save the editing of an Interchangeable group** view toolbar icon.
5. Copy an interchangeable group and replace the original one.
 - a. Click the **Copy an interchangeable group and replace the original one** view toolbar icon.
 - b. (Mandatory) In the **Assign information** dialog box, specify an ID and name for the interchangeable group, and click **Finish**.
6. Create another interchangeable group.
 - a. Click the **Create an interchangeable group** view toolbar icon.
 - b. (Mandatory) Specify an ID and a name, and click **Finish**.

- c. Repeat **step 3** through **step 4**.
7. Search and add an interchangeable group in **Substitute Group View**.
 - a. In the **Substitute Group View**, select the root structure and click **Search and add an interchangeable group** view toolbar icon.
 - b. Search for the interchangeable group you want to add, select it, and click **OK**.
8. To delete an interchangeable group, select it and click the **Delete an interchangeable group** view toolbar icon.
9. To remove an occurrence or a substitute part from the list, select it, and click **Remove an occurrence/substitute from the list** view toolbar icon and click the **Save the editing of an Interchangeable group** view toolbar icon.
10. **View the substitute groups and substitute part details.**

View the substitute groups and substitute part details

The **Substitute and substitute group list** and the **Substitute Group List** columns are not available by default. You can enable them to view the substitute groups and substitute part details.

1. Right-click a column and select **Insert Columns**.
2. From **Available Columns**, select **Substitute Group List** and move it to the **Displayed Columns**. Then select the column and move it to the appropriate level using the **Move** buttons.

The internal name of this property is **BOMLine.bl_occ_fnd0SubstituteGrpList**.

3. From **Available Columns**, select **Substitute and substitute group list** and move it to the **Displayed Columns**. Then select the column and move it to the appropriate level using the **Move** buttons.

The internal name of this property is **BOMLine.bl_substitutes_list**.

Create and open structure contexts

A structure context is a container that holds a product structure. A structure context contains a configurator context which holds the configuration of the structure. The structure context is stored in Teamcenter so the next time you open it, both the structure and the configuration are available in the state that you saved the structure context. The configurator context holds the:

- Revision rule
- Variant rules

- Closure rule
- Effectivity groups

By saving structures and their configurations in a structure context, you save time the next time you open the structure. There is no need to reconfigure the structure.

You can create a structure context in Structure Manager, as well as open structure contexts in Structure Manager that are created in other applications. If a structure context holds multiple structures, these are displayed in separate panes in Structure Manager.

Note:

You cannot open a composition-type structure context in Structure Manager. Use Multi-Structure Manager to open structure contexts of this type.

To create a structure context:

1. Select the root of a fully configured product structure and choose **File→Save as structure context** or click .
2. Enter a name and optional description for the structure context.
3. Enter a name and optional description for the configurator context.

Notice that the configuration is listed in the creation dialog box.

The structure context is displayed in the **Open Item** pane.

Add or remove optional parts

You can define *optional parts* for any occurrence and its substitute parts. Optional parts are selected according to their size. A part may have both substitutes and optional parts. A substitute part (including the preferred substitute) may have optional parts.

Note:

Size-selected optional parts are attachments to an occurrence. You cannot view or configure them into the product structure.

1. Choose **Tools→Relate Substitutes→Optional Parts**.

Teamcenter displays the **Optional Parts** dialog box that lists any lines with previously defined optional parts.

- To add an optional part, select the structure line, click the **Add** button and Teamcenter displays the **Add Optional Part** dialog box. You can then enter or browse for the item identifier and name of the component to add as an optional part. To remove an optional part, select the line and click the **Remove** button.

Exporting a product structure containing related parts

You can export a product structure that contains related substitute parts or optional parts in PLM XML format.

Export a product structure to Briefcase Browser

You can export a configured product structure in PLM XML format.

You can also export a configured product structure as TC XML in a Briefcase file to share with a partner or supplier.

You can export:

- Product structures that are configured by a revision rule, variant rule, and incremental change.
- Product structures that are partially configured by only a revision rule and a variant rule is not applied.
- Precise or imprecise product structures.
- Notes, attachments, absolute occurrences and overrides, alternates, substitutes, and generic design elements (GDEs) included in the product structure.
- Systems Engineering and Mechatronics Process Management objects included in the product structure, for example, trace links and signals.

To export the product structure:

- Select the top line of the product structure to export and choose **Tools→Export→To Briefcase**.

Teamcenter displays the **Export To Briefcase Via Global Services** dialog box.

- Click  in the bottom right-hand corner of the dialog box.

Teamcenter displays the **TIE Export Configured Export Default** dialog box.

- Select the check box corresponding to each of the export options you want to use and then click **OK**.

Teamcenter closes the **TIE Export Configured Export Default** dialog box.

4. In the **Export To Briefcase Via Global Services** dialog box, enter all the required information including **Reason**, **Target Sites**, **Option Set**, **Briefcase Package Name**, **Revision Rule**, and **Variant Rule**, and then click **OK**.

Teamcenter displays a **Remote Export Options Setting** confirmation dialog box.

5. Click **Yes**.

Teamcenter starts the export of the product structure using the options you entered.

Briefcase support for variant items not included in the MBOM

When you align individual parts, assemblies, and manufacturing features from the engineering bill of materials (EBOM) into a manufacturing bill of materials (MBOM), variant items are sometimes not included. When you add a variant rule and use a briefcase to export the collaboration context (CC), the external items are included without children in **briefcase** files with a *bcz* extension.

1. Right-click the top line of the MBOM and then click **Rules** .
2. In the **Variant Rule** dialog box, select an appropriate option with rules available, such as a **Steering** option with **Left Hand Drive** and **Right Hand Drive** rules.
3. In the **Item** column, note or copy the selected item value and click **OK**.

Example:

Item values usually add a pretext to the MBOM name, such as the beginning letter, numbers, and dash at the start of item ID **O_00023-PLANT PRODUCT**.

When you export the CC through briefcase export and your variant rules point to a variant item outside of the CC, briefcase retrieves that item without any hierarchy.

Export datasets with structure information

You can export multiple dataset types in an assembly in one operation, as follows:

1. Open the assembly structure in the Structure Manager application and specify the appropriate revision rule and variant condition.
2. Select the structure line representing the assembly in the product structure.

To export *without* structure information, open the item or item revision. When you choose an item, Teamcenter identifies the item revision from the default revision rule.

3. Choose **Tools→BOM→Export**.

Teamcenter displays the **Export to Connection** dialog box.

Note:

The **Export to Connection** menu command is available in Structure Manager only if at least one application is registered to which you can export data.

4. Enter the following information in the dialog box:

Option	Description
• Select an existing connection • Create a new connection	A root directory is shown according to the preset preference for the root directory location. You must define a unique connection name. Choose the Select an existing connection command to use a previously-defined connection or choose the Create a new connection to define a new connection.
Export Rule:	• Add Adds the primary file of the dataset to the connection. • Resend Reexports the selected file and all secondary files with attribute information to the connection directory. Any existing files are overwritten. Only use Resend if you made an error in modifying the files and you want your export data identical to that in Teamcenter. • Refresh Checks if the selected file is modified in Teamcenter since the export to connection. If so, Teamcenter exports the selected file and sends the latest attribute information. It then ensures all the components of the selected files are in the connection by invoking Add for each component file.
Dataset Type	Lists all the dataset types that are registered and can be exported, if they appear in the assembly structure. You can: • Select a single dataset type to export. • Select several dataset types to export.

Option	Description
	Select all dataset types to exported. Enter All to export all known dataset types.

Once you make the necessary selections, the top structure line appears. It can be configured and expanded, if necessary.

- Check the appropriate boxes in the dialog box and click **OK** to initiate the export operation:

Skip Select none of the boxes. Teamcenter exports the selected datasets under this line.

Export Select only the **Export** box. Teamcenter exports the selected datasets under this line but does not check them out (makes a read only copy).

Export+CO Select the **Export** and **CO** boxes. Teamcenter exports the selected datasets under this line and checks them out (makes a read/write copy).

Note:

A checkout can be performed only if you have write access to the dataset.

Add parts to NX

You can add parts from the product structure and paste them into an assembly in NX, as follows:

- Find the parts to add to NX. These may be individual parts outside the context of any assembly (items or item revisions) or parts in the context of an owning assembly (structure lines).

To find individual parts, such as brackets or seals, and send then items or item revisions to NX without any assembly context information:

- Browse through your product structure or perform a Classification search to locate the parts.
- Select the required items or item revisions and copy them to the clipboard.

- Copy the items, item revisions or structure lines from the Teamcenter clipboard to the NX clipboard by right-clicking the clipboard icon in the lower right corner of the Structure Manager window and choosing **Send clipboard contents to NX**.

The item revisions and/or lines on the rich client clipboard are then transferred to the NX clipboard.

Note:

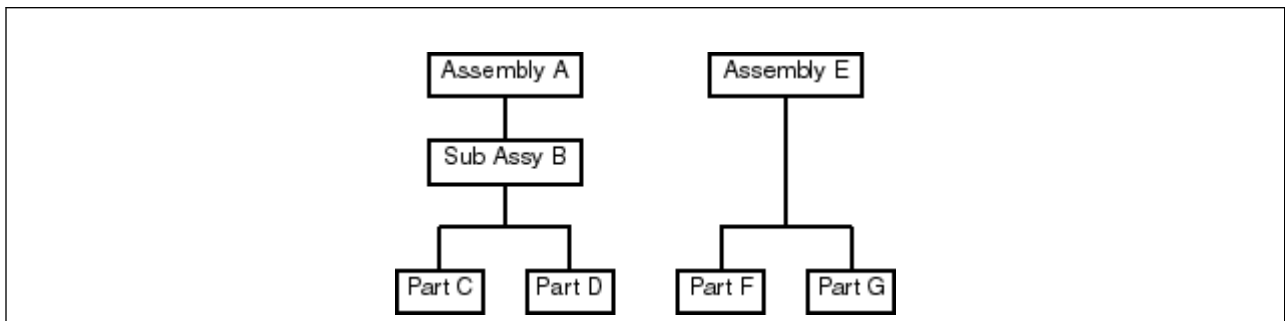
Only item revisions, not items, are sent to NX. If the clipboard contains any items, Teamcenter identifies the latest working item revision corresponding to each item and sends them to NX instead.

- Once you transfer the parts to the NX clipboard, add them to an assembly in NX using one of the NX paste options. The parts become components at the currently selected level in the NX assembly. Because a structure line has positioning information, the corresponding new components are positioned according to the spatial information stored in Teamcenter and, consequently, the parts are positioned correctly regardless of the currently selected level in the NX assembly. Items or item revisions have no inherent positioning information, so the corresponding new components are positioned at a default location.

If the pasted item revision represents an assembly, Teamcenter Integration for NX loads the corresponding assembly, and adds it as a subassembly under the current NX assembly. Depending on the NX load options, this operation may load any additional parts referenced by the pasted assembly.

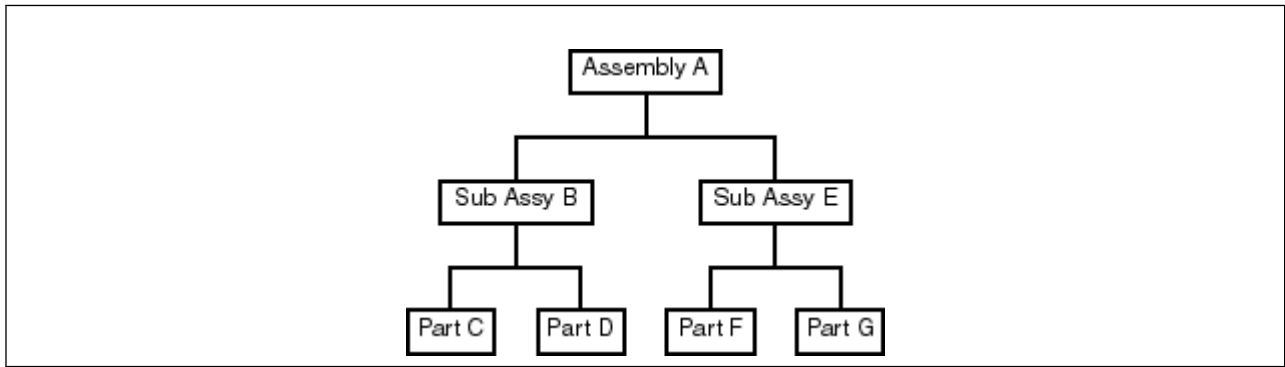
For an example of how to add assemblies to NX, see the following figures. This example assumes you load assembly **A** into NX and decide to add mounting hardware. Having searched Teamcenter for the mounting hardware, you decide assembly **E** is appropriate, and copy its item revision to the clipboard.

Note that you do not copy parts **F** and **G** to the clipboard, only part **E**.



Before pasting assembly E in NX

After sending **E** to the NX clipboard, you can paste it under assembly **A**, and the result is the assembly hierarchy shown in the following figure. Note that **E** was the only item revision explicitly pasted into NX; parts **F** and **G** were implicitly loaded because they are referenced by **E**.



After pasting assembly E in NX

Using item elements

Using item elements

An item element (sometimes called a general design element) represents an interface, characteristic or feature of a component in the structure. For example, it may represent a weld point on a bracket that is welded to a parent assembly. The item element is shown in the product structure as a separate line under the associated component and is represented by the 🟡 image.

Create an item element

1. Select the assembly in the product structure with which you want to associate the item element.
2. Choose **File→New→Item Element**.

Teamcenter displays the **New Item Element** dialog box.

3. Enter the name of the item element and click **OK**.

Teamcenter creates the new item element and adds it as an item element line in the product structure.

Note:

You cannot create a new item element by copying an existing item element. Consequently, the **File→SaveAs** and **File→Save As→Bom View Revision** menu commands are not available when an item element is selected.

Remove item elements

1. Select the item element you want to remove from the product structure.
2. Choose **Edit→Remove**.

Teamcenter displays the **Removing Lines** dialog box.

3. Click **OK** to confirm removal of the selected item elements.

Copy and paste item elements

You can copy and paste item elements in the same way as other lines in the product structure.

To copy an item element, choose **Edit→Copy** to copy a selected item element to the clipboard.

To paste an item element, choose **Edit→Paste** to paste a copied item element from the clipboard into the product structure.

Replace item elements

1. Select one or more item elements (source lines) from the structure and choose **Edit→Replace**.
2. Select one or more (item elements) target lines in the structure and choose **Edit→Paste**.

If you copied more than one source line to the clipboard, but only selected a single target line, Teamcenter displays the **Select Object for Replace** dialog box. Otherwise, it replaces the target item elements with the source item elements and updates the instance numbers, as appropriate.

If you attempt to replace a target item element with a source item element of another type, Teamcenter replaces only those lines where the source is a subtype of the target type. Otherwise, it displays an error message and does not replace any lines.

3. If Teamcenter displays the **Select Object for Replace** dialog box, select the required source item element from those listed and click **Replace**.

View notes on item elements

You can view a note associated with an item element, select the item element and choose **View→Notes**.

Creating connections and links

Creating connections and links

You can create connections or links between item elements in the product structure. Connections can be revised if their characteristics change; links are non-revisable and cannot be updated.

Create a connection

To create a connection between lines with a **PSConnection** relationship:

1. Choose **File→New→Connection→Revisable** to create a revisable connection.

Teamcenter displays the **New Connection** wizard.

2. Choose the connection type and its options, then click **Finish**.

Teamcenter creates the connection as an item element.

3. Select the lines in the product structure you want to connect and the connection, then choose **Tools→Connection Manager→Connect**.

Note:

You can also right-click the lines and choose **Connect**.

Create a link

To create a link between lines with a **GDELinkLine** relationship:

1. Choose **File→New→Connection→Non-Revisable** to create a non- revisable connection (link).

Teamcenter displays the **New Link** wizard.

2. Enter a name and description, then click **Finish**.

Teamcenter creates the new link.

3. Select the lines in the product structure you want to link and the link, then choose **Tools→Connection Manager→Connect**.

Note:

You can also right-click the selected lines and choose **Connect**.

Remove a connection or link

1. Select the lines in the product structure you want to disconnect. You cannot remove a connection or link if the top line of the structure is connected.
2. Choose **Tools→Connection Manager→Disconnect** to remove the connection or link between the selected lines. You can also right-click the lines and choose **Disconnect**.

Creating and editing notes

Creating and editing notes

Teamcenter allows you to attach notes to items or item revisions. These notes contain additional documentation about parts or documents. For example, a note may contain the following instructions:

Round all sharp corners to [Radius: 0.01, 0.02, 0.03] inch
and heat-treat to [Temperature: 100,120,130] degrees Fahrenheit

The following types of note are available:

- Standard note

Contains information established by a standards engineering organization. It conforms to the design practices of a program or project, is stored in a library, and is available to all participating engineers. A standard note is sometimes called a *parametric requirement*.

- Custom note

Contains information that is unique to an individual part or document. It is not stored in a library. A custom help can only be attached to a single item or item revision.

Note:

Do not confuse standard notes and custom notes attached to items or item revisions with *occurrence notes*.

Define or edit custom note text

1. Select a product structure line that represents an item or item revision with a standard note or custom note attached to it.
2. Click the **Show/Hide Data Panel**  button on the toolbar.

Teamcenter displays the data pane.

3. On the data pane, click the **Attachments** tab.

Teamcenter displays any attachments to the selected line, including standard notes and custom notes.

4. Select the line that represents the note you want to define or edit.

If the note is saved in rich text (RTF), it opens in Microsoft Word; otherwise, it is displayed as editable text fields.

5. For a standard note, make the necessary changes, then click **Apply** to save them.

For a custom note in text format, edit the **Note Text** field, then click **File→Save** in Teamcenter.

For a custom note in RTF format, edit the content with Microsoft Word and save the changes with Word's **Save** command.

Deleting items

Deleting items

You can delete a single selected item or item revision; alternatively, you can recursively delete all items below a selected line. You must have read-write permission to the item to successfully delete it.

- If you delete a selected revision of an item, Teamcenter does not delete other revisions of the item or the item itself.
- If you delete a revision of an item and it is the only revision, Teamcenter also deletes the item.
- A delete action only deletes the occurrences of the selected item revision from the current Structure Manager session.
- If a precise or imprecise structure is loaded and you delete an item revision, Teamcenter performs a structure expansion and removes all occurrences of the item revision before deleting the item revision itself. If there is only one revision of the item, the item is also deleted.

Note:

Previously, when two different revisions of the same item were attached to the same precise BVR and you tried to delete one of the revisions, Teamcenter deleted both item revisions.

- You can delete an item or item revision from a structure even if it is duplicated elsewhere in Teamcenter.

Note:

Deleting an item occurs in two steps—removal of the line from the parent in Structure Manager and then deletion of the item from the database. If the deletion fails, the line is removed from the parent, but the item is not deleted from the database. (Deletions typically fail because the user does not have the necessary permission.) You can search for the item, and then copy and paste it back into the structure. Structure Manager checks if the item revision can be deleted before

attempting to cut the line and reports any errors that would be encountered when deleting the item revision after the line is cut.

If the item represents a large assembly, it may take a considerable time to complete. In this case, Teamcenter displays a dialog box that allows you to choose to cancel the action, continue with the deletion, or only remove selected lines instead.

Delete a single item from the product structure

1. Select the item in the product structure.
2. Choose **Edit→Delete** or press the Delete key.

Teamcenter displays a request for confirmation.

3. Click **OK** to confirm and remove the item from the product structure.

Note:

This action *permanently* removes the item from the Teamcenter database if you have read-write permissions to the item.

Delete multiple assemblies or items

You can delete all items in the product structure below a selected line. This process is called a *recursive deletion* and may be useful if you want to delete several nested assemblies or items from the structure at the same time.

When you request a recursive deletion, Teamcenter verifies if the items below the selected line can be deleted. You can only delete an item if it meets the following criteria:

- The item or one of its revisions is referenced by an occurrence of any view of any revision of any other item in the structure.
- The item and its revisions are not referenced by any other occurrences outside the structure.
- You have delete permission for the item and all its revisions.
- Neither the item or any of its revisions is checked out or otherwise locked.

Caution:

Only use recursive deletions on product structures that do not contain CAD data. CAD integrations, including the Teamcenter Integration for NX, may track dependencies at the dataset level, as well as at the item or item revision level. Such dependencies cause the recursive deletion to fail

because of referential integrity violations. For structures containing CAD data, manually delete datasets and items from the top down in a hierarchical fashion when necessary.

1. Select the line in the product structure below which you want to delete all items and assemblies, then choose **Edit→Delete** or click the **Delete** button.

Teamcenter displays the **Delete** dialog box.

2. Click the **Recursive Delete** button.

Teamcenter displays an **Explore Selected Component** dialog box. The **Recursive Delete** button appears only if you select a single item for deletion.

3. Select any associated objects to delete (for example, datasets) in the **Explore** dialog box and click **OK**.

Teamcenter displays the dialog box listing items and any associated objects selected for deletion. The list of items includes both items that can be deleted and items that cannot be deleted. If Teamcenter determines that an item cannot be deleted, it displays the reason.

If you set suitable types or relations with the **Type** or **Relation** buttons, Teamcenter automatically checks all these objects for deletion in the dialog box. Alternatively, you can click the **Select All** button to select all objects for deletion.

4. Click **Yes** in the **Delete** dialog box to begin deleting all applicable items and the selected associated objects.

Teamcenter shows the status of the deletion process in the status bar.

You can pause deletion process by clicking the **Stop** button at any time. You can terminate the deletion process by clicking the **Abort** button.

When the deletion process is complete, Teamcenter displays an updated **Explore** dialog box. This contains a flattened list of all the items in the substructure of the originally selected item. Any duplicates are removed and any items that Teamcenter could not remove are indicated.

Grading structures

Grading structures

Teamcenter allows you validate that the design represented by the product structure contains only approved parts. This process is sometimes called *BOM grading*. Parts approved for use in one project or locale may not be approved for another project or locale. For example, a part may comply with a European standard but not a U.S. standard. Tracking such approvals manually is time-consuming, and this feature automates much of the effort.

Grading results are stored in a structure context associated with the validated product or assembly, and may be retrieved when required.

The grading process checks that each part (item revision) is valid under all conditions under the selected checker. If the structure contains subassemblies, it checks each part in the context of each subassembly. It also checks generic design elements (GDEs) if any are included in the structure.

For example, if you want to check that a product is valid for the U.S. market or the Asia market, the administrator may create the **checkAsiaComplianceRule**, **checkUSComplianceRule**, and **CheckPartIsApproved** conditions and assign them to business objects using verification rules. These conditions may be included in two separate checkers, as follows:

- Asia checker

checkAsiaComplianceRule and **CheckPartIsApproved** conditions

- U.S. checker

checkUSComplianceRule and **CheckPartIsApproved** conditions

CheckPartIsApproved is a common condition and can be assigned to any checker.

For a checker to approve the entire structure, each part and subassembly must pass validation. Depending on your company's working practices, you may be able to request a temporary or permanent override on a failed or unknown part or subassembly to achieve an overall approval. Each such request must be authorized by a designated person, for example, a project manager.

Note:

Before using this feature, the administrator must do the following:

- Create conditions and associate them with business objects using verification rules in Business Modeler IDE. A condition contains multiple expressions that evaluate part attributes to ensure they are approved.
- Add the conditions to a checker in Validation Manager. Create a checker for every project, product, or locale against which you want to grade the structure. Only one BOM grading agent is permitted and all checkers must be included in that agent.
- Set the necessary preferences.

Run grading

1. Configure the product structure and select the line that represents the context in which you perform grading. This may be the top line of the product or a subassembly line.

2. Choose **Tools→BOM Grading→Run**.

Teamcenter displays the **Validation Agent Selection** dialog box.

3. Select the agent revision and desired checker, click , and then click **OK** to begin grading.

On completion, Teamcenter displays the BOM grading viewer. The **BOM Result** box shows the result for the complete structure, based on the results for individual parts.

View grading results

Use the BOM grading viewer to identify results that are out-of-date, due to changes to the checker, condition or assembly.

1. Select the structure line that was the context of the grading action and choose **Tools→BOM Grading→Show**.

Teamcenter updates the BOM grading viewer with the relevant validation results.

Tip:

You can filter the validation results with the **Checker**, **Target Type**, and **Condition** lists.

Examine the **Validation Name** and **Condition Name** property columns to identify the validation agent and condition used for validation.

2. Examine the **Result** property column to determine the validation status of each part, as follows:

Icon	Description
	Pass.
	Fail.
	Unknown or no data. If you modify the structure after running grading, the status of the affected parts is shown as unknown. This status may also indicate that the selected checker does not contain any condition that tested the part.

The **Detail Information** pane shows information about the cause of any failures.

3. (Optional) Filter the structure display by clicking one of the following buttons.



Filter overridden results in or out.



Filter unknown results in or out.



Filter pass results in or out.



Filter fail results in or out.

- (Optional) Click to rerun the validation at and below the selected level, rather than on the entire structure.

The results of a typical grading run are as follows.

Validation Target	Validation Name	Condition Name	Validation Result	Override To State	Override Request Status	Validation Date
000106/A;1-EDA	Demo					17-Sep-2009 16:21
000108/A;1-sub1	Demo					17-Sep-2009 16:21
000107/A;1-EDAComp	Demo					17-Sep-2009 16:21
000109/A;1-001	Demo					17-Sep-2009 16:21
000110/A;1-002	Demo					17-Sep-2009 16:21
000111/A;1-sub2	Demo					17-Sep-2009 16:21
000105/A;1-root (view)	Demo	VerCondition1			Approved	17-Sep-2009 16:41
000112/A;1-003	Demo	VerCondition1				17-Sep-2009 16:43

Detail Information:

Result State Flag: 0

User Name: infodba

Validation Application: BOMGrading

Validation Date: 17-Sep-2009 16:21

Validation Name: Demo

Validation Status: 0

Validation Target: 000106/A;1-EDA

Validation User: infodba (infodba)

Override grading results

- Right-click the result in the table you want to override and choose **Create Override**.

Teamcenter displays the **Create Override** dialog box.

- Choose the override type (for example, **Temporary** or **Permanent**), the requested **Override State** (for example, **Passed**), the **Override Category**, the **Override Reason**, and the **Detailed Reason**.

You must also choose the **Override Decision User** (any user with an **Override Approver** role) and then click **OK**.

Teamcenter updates the **Override To State** column in the tree with the requested state. It also sends a Teamcenter mail to the selected override decision user.

3. The designated override decision user receives the mail, right-clicks the folder in the mail, and then chooses **Send To→BOM Grading Viewer**.

Teamcenter opens the structure and highlights the line for which a result has an override request pending.

4. Right-click the result and choose **Override→Review**.

Teamcenter displays the **Override Decision** dialog box.

5. Choose **Approve** or **Reject**, type any optional comments in the **Override Decision Comments** box, and then click **OK**.

Teamcenter sends a mail containing the decision to the requesting user and updates the structure status. Similarly, if the override decision user updates or deletes the override request, Teamcenter also sends a mail message.

6. Repeat the previous steps for each additional part for which you want to override the grading status. You must request an override for one part at a time.

Grading for substance compliance

Grading for substance compliance

You can grade a structure or BOM for compliance with one or more regulations defined in a preconfigured compliance checker. For more information, see *Substance Compliance With IMDS on Rich Client — Usage*.

Initiate compliance check

1. Select a part or assembly, and then choose **Tools→Initiate Substance Compliance Check**.

Teamcenter displays the **Substance Compliance Check** dialog box.

2. Select one or more of the predefined regulations listed in the dialog box, and then click **OK**.

Teamcenter starts the compliance check process and sends the request to the configured compliance checker.

Apply exemption from regulation

Note:

The compliance officer performs this procedure.

1. Select an item revision or structure line, and then choose **Tools→Apply Exemptions**.

Teamcenter displays the **Apply Exemptions** dialog box.
2. Select one of the regulations listed in the dialog box, and then click **OK**.

Teamcenter starts the exemption workflow and adds a new task to the compliance officer's worklist.
3. In the workflow viewer, the compliance officer selects one or more exemption with its expiry date, enters the reason for the exemption in the **Comments** box, and then clicks **Save** to complete the exemption workflow.

View material and substance dashboard

Select a structure line and choose **Window→Show View→Other...→Material Management→Material and Substance Dashboard**.

Teamcenter displays a list of the constituent materials and substances of the associated part or assembly.

View compliance dashboard

Select a structure line and choose **Window→Show View→Substance Compliance→Substance Compliance Dashboard**.

Teamcenter displays a summary report of the compliance status of the part or assembly.

Request substance declaration from vendor

1. Select one or more structure lines and choose **Tools→Request Substance Declaration**.

Teamcenter starts a workflow that identifies all vendor parts associated with the part or assembly.
2. The compliance officer receives and completes a workflow task to review the vendor parts.

Teamcenter sends the selected vendors an e-mail with two Microsoft Office Excel spreadsheets attached. One spreadsheet contains vendor part information and the other a list of materials and substance information.

Note:

Sending the Excel spreadsheets with list of materials and substance information is optional and is controlled by the **SUBSCMPL_send_materials_list** preference. If this preference is set to **true**, Teamcenter exports a list of all material revision instances, together with the material substance declaration request.

3. The vendor reviews and completes the spreadsheets, and then e-mails them back to the compliance officer.

Save structure change records

If you make changes to the product structure, you can save structure change records in Change Manager in one of two ways:

- Clicking the **Save** button on the menu bar. This button is disabled until you edit the structure.
- Updating the change record while opening the **Supersedure** dialog box as described below.

To create structure changes records for an affected assembly sent to Structure Manager, click the  toolbar button to open the **Supersedure Definition** dialog box; the assembly must be under change control. Teamcenter displays a dialog box asking if you want to update the change records. You can then create or update the existing changes, or leave them unchanged.

Link requirements

Link requirements

Use trace links to associate requirements with items, item revisions, and absolute occurrences that satisfy the requirements. To create, view, or delete trace links, you must enable the trace link features.

Note:

This procedure sets the **Tracelink_Edit_enabled** preference to **true**. That setting also enables the trace link features in other Teamcenter applications such as My Teamcenter, Systems Engineering, and Multi-Structure Manager.

1. Choose **Edit→Options**.

Teamcenter displays the **Options** dialog box.

2. Select **Systems Engineering**.
3. Select the **Trace Link Mode** check box.

Create trace links

1. Select one or more source objects, for example, a requirement.

Note:

If you select only one source object, you can create trace links to multiple target objects. If you select multiple source objects, you can create trace links to only one target object.

2. Choose **Tools→Trace Link→Start Trace Link**, click the **Start Trace Link Creation** button  on the toolbar, or right-click the selection and choose **Trace Link→Start Trace Link**.

You can also choose **Edit→Copy**, click the **Copy** button  on the toolbar, or right-click the selection and choose **Copy**.

3. Select one or more target objects, for example, an item, item revision, or absolute occurrence.
4. Specify the trace link subtype and name by doing one of the following:
 - To accept the default subtype and name, choose **Tools→Trace Link→End Trace Link**, click the **End Trace Link Creation** button  on the toolbar, or right-click the selection and choose **Trace Link→Trace Link→End Trace Link**.
 - To assign a custom subtype and name:
 - a. Choose **Tools→Trace Link→End Trace Link**, click the **End Trace Link Creation with Subtype** button  on the toolbar, or right-click the selection and choose **Trace Link→End Trace Link....**

The **Create Trace Link with Subtype** dialog box appears.

- b. In the list of subtypes on the left, select the subtype to assign to each trace link.
- c. In the **Name** box, type the name to assign to each trace link.

In the **Description** box, you can type plain text as additional information.

A trace link icon  is shown in the **Trace Link** column for each defining and complying object. View a defining or complying path in the **Trace Links** view.

Tip:

You can change the business object icon so that when an object has an associated trace link, the trace link icon appears overlaid on the object's icon in Structure Manager.

Delete trace links

Caution:

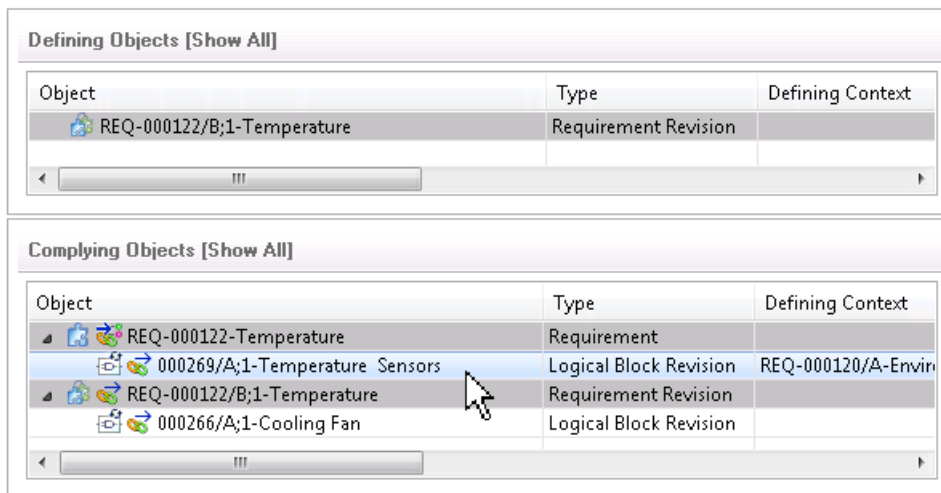
If the defining or complying object for a trace link you attempt to delete is included in a baseline structure, you may be prevented from deleting the trace link. If this is the case, an error message appears. The message is based on the value set for the **Fnd0PreventTraceLinkDelete** business object constant.

The constant setting prevents deletion of trace links to the released object revision/ it does not prevent deletion of trace links to other occurrences of the object. Therefore, you can still delete trace links on other object occurrences in the baseline structure.

In case of trace links on occurrences, if the context line BOM view revision is released, an error message is displayed according to the above values of the **Fnd0PreventTraceLinkDelete** constant.

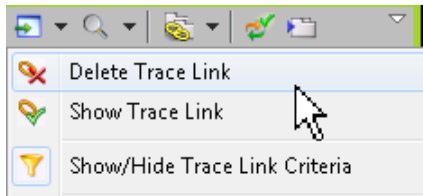
You can use the following procedure to delete trace links from one or more occurrence or absolute occurrence objects at a time.

1. In the **Trace Links** view, select the trace link to delete.

**Note:**

For absolute occurrence objects, you must select the trace link in the correct context.

2. Click **Delete Trace Link**  on the view toolbar, or choose **Delete Trace Link** from the view menu.



3. In the **Delete** dialog box, click **Yes**.

If the trace link has custom notes, the **Delete** dialog states the trace link has custom notes.

The trace link is deleted from the latest revision of the occurrence or absolute occurrence object.

Tip:

If trace link icons are not removed from the primary view, refresh the icon display by doing one of the following:

- On the **Trace Links** view toolbar, click **Associate this 'Secondary' view to a different 'Primary' view** , and then select another primary view.
- Close the **Trace Links** view, and then open a new one.
You can select an object in the primary view and choose **View→Show Trace Links**.
Or, you can double-click the icon in the **Trace Link** column for an object.
- Press F5 to refresh the **Trace Links** view.

Creating trace links to absolute occurrences

Creating trace links to absolute occurrences

You can create trace links between requirements and product structure objects. The product structure object can be a regular structure line, or you can store the trace link on an absolute occurrence. An absolute occurrence is an occurrence that contains additional information that is only relevant in the context of another structure line higher in the structure. Absolute occurrences are created by setting a higher level line as the context of an edit and adding information specific to this relationship.

If you create a trace link on an absolute occurrence, this trace link exists in all structures containing both the context line and the trace link object in the same hierarchical relationship. If multiple revisions of the structure containing the related structures exist, the trace link exists in all the revisions. If you delete the trace link from one revision, it is deleted from all revisions.

You can also create trace links between objects in Structure Manager and objects in other structure applications, for example, Multi-Structure Manager.

Create trace links on absolute occurrences

The following procedure describes how to create a trace link between a source absolute occurrence and a target requirement object. You can also create the link in the opposite direction.

1. Right-click the structure line that is the context of the edit. This line must be an ancestor of the structure line that is the source line of the trace link.

2. Choose **Set In Context**.

Teamcenter displays the  icon in front of the line and colors the line green to show that the item is the context for the creation of absolute occurrences. In addition, Teamcenter grays out all siblings of the selected context and you cannot create absolute occurrences for these lines. The in-context item is also identified in the title bar of the structure tree.

3. Select the source line, or select multiple objects by using the standard Windows functions.
4. Choose **Tools→Trace Link→Start Tracelink**, click **Start Trace Link Creation**  on the toolbar, or right-click the selection and choose **Trace Link→Start Tracelink**.
5. In the **Requirements** view of Systems Engineering, select the target requirement for the trace link and specify the trace link subtype and name by doing one of the following:
 - To accept the default subtype and name, choose **Tools→Trace Link→End Tracelink**, click the **End Trace Link Creation**  button on the toolbar, or right-click the selection and choose **Trace Link→End Tracelink**.
 - To assign a custom subtype and name:
 - a. Choose **Tools→Trace Link→End Tracelink**, click **End Trace Link Creation with Subtype**  on the toolbar, or right-click the selection and choose **Trace Link→End Tracelink**.

The **Create Trace Link** dialog box appears.

- b. In the list of subtypes on the left, select the subtype to assign to each trace link.
- c. In the **Name** box, type the name to assign to each trace link.
- d. (Optional) In the **Description** box, type additional information.

You can view trace links in the **Trace Links** view of Systems Engineering.

Trace links created to absolute occurrences appear in the structure window only if the context BVR in which the trace link was created is open.

Searching the data dictionary

Searching the data dictionary

In typical automotive and aerospace functional and logical design activities, key building blocks or components of the designs are reused to save time and effort. To facilitate reuse of these building blocks or components in multiple designs across several projects or programs, Teamcenter provides a central organizational repository for them. Designers can easily search for and find components based on criteria and reuse them in their designs. Typically the organizational repository is tightly controlled and the components or blocks in it have gone through a formal, customer specific approval process. Once approved, the blocks or components are labeled as ready to use. This central organizational repository is referred to as a data dictionary. It allows you to organize data by your own criteria with the goal of easy reuse.

A data dictionary is modeled in the Classification application as a library. The Classification administrator builds a customer-specific hierarchy under one or more libraries for organizing data, for example, signals and interfaces. Depending on access privileges, you can then:

- Create, modify, and delete data from the dictionary.
- Associate a project or program with one or more dictionaries. Typically, the product design data is also associated with the same project or program.
- Search the dictionary for data meeting specified criteria.
- Add data from the dictionary to a functional, physical, or logical breakdown.
- Create signals in structures and associate them with interfaces and connections.

You search for objects in the library using the **Data Dictionary Search Dialog**. This dialog box provides access to the classification hierarchy where you can search for objects to add to the structure you create. The **Data Dictionary Search Dialog** provides a view to the Classification application.

Open the Data Dictionary Search Dialog

1. Select a line in the structure to which you want to add a signal or other library object.
2. Click **Add Signals from Library** .

Teamcenter displays the **Data Dictionary Search Dialog** containing the classes designated as libraries.

Find a library object

1. Search the classification hierarchy.

When searching the hierarchy, you can:

- Search for a specific ID or part of an ID.
 - Search for groups or classes.
 - Search for objects possessing specific criteria.
2. Navigate through the search results, collecting objects of interest in the selection box at the right of the pane.
 3. Select the object you want.

Searching the class hierarchy

Ways to search the class hierarchy

When you are looking for a specific library object, there are several situations you may encounter:

- You know all or part of the object ID. In this case, you can use the object ID search feature. You can narrow this search using the search by type function. This allows you to search, for example, only for library objects that classify something, or only for objects that do not classify anything.
- You do not know the ID but would like to search within a specific group or class. For this, you must know how to select a class. From within this class, you can either search all objects in the class or search for objects matching specific criteria.
- You do not know the ID but know that the library object should possess specific attribute values. Use the attribute value search to perform this search. You can narrow this search by first selecting a class, or specifying all or part of an object ID.

Note:

There are two search buttons in the **Properties** pane:

- Click the search button  to the right of the **Object ID** box to search the entire classification hierarchy. You can narrow down this search by entering a search type.
- Click the search button  at the bottom of the **Search** pane to search within a selected class.

This type of search can include any search refining features, such as object ID, attribute value, or search by type.

Additionally, there is another search button below the hierarchy tree. This is the quick search button.

Search by object ID

If you know at least a portion of the object ID of a library object, you can use the object ID search feature. An object ID search encompasses the entire classification hierarchy and cannot be limited to the contents of a particular class or subclass.

1. Click the **Search** pane located to the right of the hierarchy tree.
2. Type the exact object ID or partial object ID and wildcard characters in the **Object ID** box, located at the top of the **Search** pane.
3. (Optional) Narrow your search using the search by type feature.
4. (Optional) Click the revision rule hyperlink on the title bar to apply a revision rule for the search. If you enter a specific revision in the **Object ID** box, the search ignores the revision rule. If a revision rule is already set, it is displayed in the revision rule link.
5. Press Enter or click the **Search** button  to the right of the **Object ID** box.

The object ID search returns the objects found in alphabetical/numeric order by object ID. The first object found is displayed in the **Properties** pane. When navigating through the objects, the class and subclass to which the object belongs are highlighted in the classification tree. The total number of objects found is displayed in the **Search Results** box.

6. Navigate through the search results.
7. Select the desired library object and transfer it to Structure Manager.
8. (Optional) Perform subsequent searches by clicking the **Search** tab, clicking **Clear**  and proceeding from step 2.

Search by type

You can search the classification hierarchy for library objects classifying specific workspace object types:

1. In the classification tree, expand the desired class and select it by either:
 - Double-clicking if it is a leaf node.
 - Right-clicking and choosing **Select** if it is not a leaf node.

The class names are highlighted in the tree.

2. Type an ID, a class ID, or attribute values.

- Click the **Drag** button . A list of workspace object types follows.

Click	To
	Search among all classification instances. This is the default search method.
	Search among all classification instances that classify a workspace object.
	Search among all classification instances that do not classify a workspace object.
	Search among all classification instances that classify an item.
	Search among all classification instances that classify an item revision.
	Search among all classification instances that classify a process.
	Search among all classification instances that classify a process revision.

Note:

The types available in this list are configurable.

- Select a type of workspace object to narrow your search. Only library objects classifying this type of workspace object are found in the search.
- (Optional) Click the revision rule hyperlink on the title bar to apply a revision rule to the search. If you search by a type that excludes revisions (for example, item or process), the search ignores the revision rule. If a revision rule is already set, it is displayed in the revision rule link.
- Click the **Search** button  at the bottom of the **Search** pane to list all matching instances within the class.

The total number of instances that match the search criteria is displayed at the bottom of the **Search** pane.

Note:

The **Search** pane displays no values upon completion of the search. You must switch to the **Properties** or **Table** pane to navigate through the results and display the values for a specific instance.

- View the search results using one of the following methods:
 - In the **Table** pane, double-click the instance to be viewed.

Its attributes are displayed on the **Properties** pane. The classification tree is updated to show the class of the selected object.

- In the **Properties** pane, use the navigation arrows at the bottom of the pane to browse forward and back through the list of items that matched your search criteria. As different objects are selected, the classification hierarchy is updated to show the class of the selected object.

Two modes are used for updating the classification hierarchy when displaying the search results:

- Click the **View in class stored** button  to display the class in which the item is stored.
- Click the **View in class searched** button  to display the class that you selected as a basis for the search.

By default, **View in class stored** is active.

As you view your search results, also use the **Viewer** pane to display any image associated with the current item. If you select multiple objects in the table and switch to the **Viewer** pane, only these objects are available in the viewer.

Selecting a class

Ways to select a class

The first step in searching the classification hierarchy is to find a class in which to search. There are three methods to select a group or class:

- Navigate through the classification hierarchy manually, clicking the groups and classes until you find your desired class.
- Use the quick search feature.
- Use the **Search Class** dialog box.

You can search for a class using any of the alias names shown in the class tooltip.

Use the quick search feature

1. In the search box located beneath the hierarchy tree in the **Data Dictionary Search Dialog**, type text corresponding to the name of the group or class that you want to locate. You can also search by ID by typing **id=xxx** in the box, where xxx is the class ID.

The search text can be the exact name or ID of the group or class you are looking for, a class alias name, or you can use character strings combined with wildcard characters.

2. Press Enter to start the search.

The hierarchy tree expands to display the first object in the hierarchy that matches the search criteria. The path of the group, class, or subclass is indicated in bold text. If multiple objects are found, the arrow buttons at the bottom of the hierarchy tree are enabled.

3. Click the left-arrow and right-arrow buttons  to display the matching objects, one at a time. This highlights the classes found in the hierarchy tree. The right-arrow button moves down the hierarchy tree, and the left-arrow key moves up the tree.

Note:

If you prefer to view a list of the results, you can display the **Search Class** dialog box by clicking the magnifying glass button located beneath the hierarchy tree.

4. Right-click the class in the hierarchy tree within which you want to search.
5. Choose **Select**.

The **Search** pane displays the attributes associated with the selected class, and the images appear in the class image window.

Note:

If the class or subclass you select is a leaf node (lowest level node) in the hierarchy, you can double-click the node to display it in the **Search** pane, rather than use the right mouse button.

Use the Search Class dialog box

1. Click the **Find Class** button  located beneath the hierarchy tree.

The **Search Class** dialog box is displayed at the bottom of your window. To move the dialog box, double-click the title bar and drag it to another location on your desktop.

2. Define the search criteria by performing the following steps:
 - a. Choose a property from the list at the upper-left corner of the dialog box. The available properties are **Class ID**, **Name**, **Attribute ID**, and **Attribute Name**.

Note:

You can use the **Name** and **Class ID** properties to search for groups and classes. When searching by attribute, the results include the class in which the attribute is defined and any subclasses in which the attribute is used. Classes that inherit the attribute are not included in the results.

- b. Type search text corresponding to the selected property.

The search text can be the exact name or ID you are looking for, or you can use character strings combined with wildcard characters.

Note:

The search box is case sensitive.

3. (Optional) If localization is enabled, select the language in which you want to search.
4. To start the search, either click the magnifying glass button located in the upper-right corner of the dialog box or press Enter.

Teamcenter displays the results of the search in the message area of the dialog box, sorted in the same order as the hierarchy tree display.

5. To display an object in the tree, double-click the entry in the results list.

The hierarchy tree expands to display the selected group, class, or subclass. The path to the object is indicated in bold text.

6. Click the left and right arrow keys beneath the class hierarchy tree  to move through the search results to locate the desired class or group.
7. Right-click the class in the hierarchy tree within which you want to search.
8. Choose **Select**.

The **Search** pane displays the attributes associated with the selected class, and the images appear in the graphics window.

Note:

If the class or subclass you select is a leaf node (lowest level node) in the hierarchy, you can double-click the node to display it in the **Search** pane, rather than use the right mouse button.

Search all objects in a selected class

1. Select the class in the hierarchy tree within which you want to search for objects.
2. (Optional) Click the revision rule hyperlink on the title bar to apply a revision rule to the search. If you search by a type that excludes revisions (for example, item or process), the search ignores the revision rule. If a revision rule is already set, it is displayed in the revision rule link.

- Determine the scope of the search by clicking the **Search Scope** button. By default, the scope is set to **Hierarchy**.

- Click **Hierarchy**  to search within the selected class and all related child classes.
- Click **Class**  to search only within the selected class.

- If you work in a multilingual environment, select the language in which to search.

Caution:

Changing the language also changes the value of the **TC_language_search** preference interactively, which affects all Teamcenter localization.

- Click one of the following at the bottom of the pane to narrow down the search.

Click	To
	Search only in metric classes.
	Search only in nonmetric classes.
	Search in both metric or nonmetric classes.

Caution:

If you are searching in a different unit of measurement than the one that you use to enter the attribute value, be sure to enter enough digits after the decimal point to avoid rounding errors.

- Click the **Search** button  at the bottom of the **Search** pane to list all search matches within the class.

The total number of objects that match the search criteria is displayed at the bottom of the **Search** and **Properties** pane.

Note:

The **Search** pane displays no values upon completion of the search. You must switch to the **Properties** or **Table** pane to navigate through the results and display the values for a specific instance.

- Navigate through the search results.
- Select the desired object and transfer it to your structure.

9. (Optional) Perform subsequent searches within the same class or subclass by clicking  in the **Search** pane and repeating the process.

Search for library objects by attribute value

1. Select the class in the hierarchy tree within which you want to search for library objects.
2. Type values, including relational operators and wildcard characters, in the boxes corresponding to the attributes by which you want to search.

You can:

- Narrow your search by specifying search criteria for multiple attributes.
- Change the displayed unit of the value by clicking it or typing the unit in the dialog box along with the value.

Teamcenter changes the unit for you automatically.

Note:

If the attribute or attribute value by which you want to search is not available for searching, one of the following reasons may apply:

- It is a reference attribute.
- It may already have a default value assigned in Classification Admin.
- It may be encrypted in the database.
- One or more of the key-LOV's values may be deprecated.

3. (Optional) Click the revision rule hyperlink on the title bar to apply a revision rule to the search. If you search by a type that excludes revisions (for example, item or process), the search ignores the revision rule. If a revision rule is already set, it is displayed in the revision rule link.

You can configure revision rules in the **Data Dictionary Search Dialog**.

4. Determine the scope of the search by clicking the **Search Scope** button. By default, the scope is set to **Hierarchy**.
 - Click **Hierarchy**  to search within the selected class and all related child classes.
 - Click **Class**  to search only within the selected class.

- If you work in a multilingual environment, select the language in which to search.

Caution:

Changing the language also changes the value of the **TC_language_search** preference interactively, which affects all Teamcenter localization.

- Click one of the following to narrow down the search.

Click	To
	Search only in metric classes.
	Search only in nonmetric classes.
	Search in both metric or nonmetric classes.

Caution:

If you are searching in a different unit of measurement than the one that you use to enter the attribute value, be sure to enter enough digits after the decimal point to avoid rounding errors.

- Click the **Search** button  at the bottom of the **Search** pane to list all search matches within the class.

The total number of objects that match the search criteria is displayed at the bottom of the **Search** and **Properties** pane.

Note:

The **Search** pane displays no values upon completion of the search. You must switch to the **Properties** or **Table** pane to navigate through the results and display the values for a specific instance.

- Navigate through the search results.
- Select the desired library object and transfer it to your structure.
- (Optional) Perform subsequent searches within the same class or subclass by clicking  in the **Search** pane and repeating the process.

Configuring revision rules for searching

Configuring revision rules for searching

You can apply revision rules to searches. This narrows down the number of search results so that Teamcenter returns only the revisions you require. You can control the default behavior of the revision rules with the following preferences:

- **ICS_search_default_revision_rule_<application_name>**

Sets the default revision rule for the specified application.

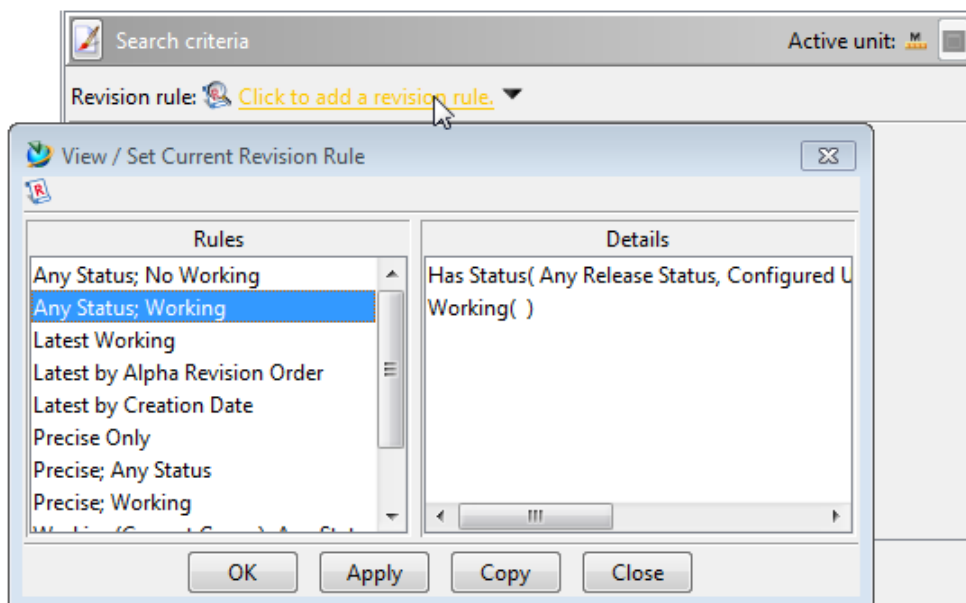
- **ICS_search_use_revision_rule**

Enables or disables revision rules for classification searches.

Apply a revision rule

1. In the **Search** pane, click the **Revision Rule** hyperlink. This link shows the name of a revision rule, if one is set, or simply states **Click to add a revision rule**.

The **View/Set Current Revision Rule** dialog box is displayed containing all existing revision rules.



2. Select the appropriate revision rule and click **OK**.
3. Click ▼ beside the revision rule hyperlink.

A list with configuration options appears.

4. Select one of the following.

Configuration option	Description
Use revision rule	Enables or disables the currently selected revision rule for the search.
Save as default	Saves the currently selected revision rule as the default rule for this application. Teamcenter saves it in the ICS_search_default_revision_rule_<application> preference. The default revision rule is directly selected and enabled for the search the next time you launch the application.
Restore default	Selects and enables the saved default revision rule. The Use Revision Rule menu command is also automatically selected.

Using relational operators

Use the following relational operators to perform Classification attribute searches.

Relational operator	Definition	For example, if you type
=	Equal to	= 3.0 in the Corner Radius attribute box of the Taper Shank End Cutter subclass, all library objects within the subclass with a corner radius equal to 3.0 are found. You can achieve the same behavior by typing a number. If no value is given after the equal sign, the system searches for all instances where no value is set for the attribute.
>	Greater than	> 3.0 in the Corner Radius attribute box of the Taper Shank End Cutter subclass, all library objects within the subclass with a corner radius greater than 3.0 are found.
<	Less than	< 3.0 in the Corner Radius attribute box of the Taper Shank End Cutter subclass, all library objects within the subclass with a corner radius less than 3.0 are found.
>=	Greater than or equal to	>= 3.0 in the Corner Radius attribute box of the Taper Shank End Cutter subclass, all library objects within the subclass with a corner radius greater than or equal to 3.0 are found.
<=	Less than or equal to	<= 3.0 in the Corner Radius attribute box of the Taper Shank End Cutter subclass, all library objects within the subclass with a corner radius less than or equal to 3.0 are found.
!=	Not equal to	!= 15.00 in the Diameter attribute box, all library objects with a diameter not equal to 15.00 are found.

Relational operator	Definition	For example, if you type
–	Range	If no value is given after the equal sign, the system searches for all instances where any value is set for the attribute. 10.00 – 20.00 in the Diameter attribute box, all library objects with a diameter within the range of 10.00 to 20.00 (including the values 10.00 and 20.00) are found. A blank space must precede and follow the hyphen.
	OR	Walter Kennametal in the Vendor attribute box of the Taper Shank End Cutter class, all library objects within the class with a vendor of Walter or Kennametal are found. You can use the wildcard character (*) in this type of statement.
""	Exact string	"blue or green", Teamcenter searches for the string blue or green. If you type "4 – 10", Teamcenter searches for the string 4 – 10, not the range 4–10.

Using wildcard characters

Classification employs the standard wildcard characters defined for your site. You can use these in any text box.

Navigating the matches

Ways to navigate the matches

After you perform a search, there are several methods to navigate the matches returned by the search. You can:

- View the results in the **Properties** pane.
- View the results in the **Table** pane.
- View the results in the **Viewer** pane.

View search results in the Properties pane

When you view library objects in the **Properties** pane, the class it belongs to is highlighted in the hierarchy. Two modes are used for updating the classification hierarchy when displaying the search results:

- Click the **View in class stored** button  to display the class in which the item is stored.

- Click the **View in class searched** button  to display the class that you selected as a basis for the search.

You can see the active unit of measurement in the attribute values title bar in the **Properties** pane using the following icons.

Icon	Description
	The library object is currently displayed and stored in a metric system of measurement.
	The library object is currently displayed and stored in a nonmetric system of measurement.
	The library object is currently displayed in metric, but was originally stored in a nonmetric measurement system.
	The library object is currently displayed in a nonmetric measurement system, but was originally stored in a metric system.

View search results in the Table pane

You can view the data of the library objects found in the search collectively using the **Table** pane.

Note:

If the measurement unit icon at the beginning of each row contains an exclamation mark, the library object is displayed in a unit system other than the one in which it was stored. For example, if the icon  is displayed, the library object was stored in a nonmetric unit system but is currently displayed in a metric unit.

1. Perform one of the following actions:

- Click ▼ to load the next page of found library objects into the table.

The next library objects are appended to those currently displayed.

Note:

By default, the number of library objects displayed on a page is set to 5. Your administrator can change the default display by modifying the `ICS_table_pagesize` preference.

- Click  to load all matches into the table.

2. Use the scroll bars to move through the found library objects.

3. (Optional) Sort the table data; double-click the column header corresponding to the property to switch between ascending, descending, and natural sort order.

Teamcenter can display different units of measurement in the same column. The displayed unit depends on the optimized unit for each of the attribute values. Teamcenter sorts these columns based on the attribute values in the storage unit.

4. (Optional) Select a line in the **Tree** pane and click  to view its properties.
5. Double-click a library object in the table to view it.

The system opens the object in the **Properties** pane and highlights its class in the tree.

View search results in the Viewer pane

You can view all search results in the **Viewer** pane. You can move backward and forward in the match list using the navigation buttons.

Note:

If the object does not have an item attached, or if the item does not contain a graphic, no image appears in the **Viewer** pane.

Select the desired library objects

While you navigate through the search matches, you can collect desired objects in the selection box on the right of the dialog box. After you finish navigating the matches, you select one or several library objects to return to Structure Manager.

1. Click the **Properties**, **Table**, or **Graphics** tabs.

Note:

The **Graphics** pane is only active for a library object that has an item attached.

2. Navigate to the desired library object.
 - In the **Properties** or **Graphics** pane, use the navigation arrows.

Teamcenter displays all attributes and values for each library object.

- In the **Table** pane, do one of the following:
 - Select the library object by clicking it.
 - Double-click the library object.

Teamcenter switches to the **Properties** pane and shows all attributes and values for the selected object.

- Select multiple library objects.
3. (Optional) With library objects selected in one of the panes, click **+** to add them to the selection box on the right.
 4. When you finish adding objects to the selection box, select the objects in the selection box that you want to add to the structure and click **OK**.

The item or item revision classified by the library object is displayed in Structure Manager. If a library object has no item or item revision attached, the system creates one so that it can open that item in Structure Manager.

If you open multiple library objects at once by selecting several library objects in the Data Dictionary Search Dialog, they are all transferred to Structure Manager. The selected objects appear in the structure you are building in the order in which they appear in the Data Dictionary Search Dialog table.

Releasing structures

Releasing structures

You can release any complete product or subassembly structure using a Workflow process defined for your site. You can release any of the following:

- Item revision with assembly
- BOM view revision
- Change revision
- Item revision (assembly structure line)

Note:

Not all components in the structure need be released with the same Workflow process. For example, you can release the connections in an electromechanical design separately from the mechanical structure.

Release a structure

1. Select the appropriate top line in the navigation tree and choose **File → New → Workflow Process**.

2. In the **New Process Dialog** window, type the process name in the **Process Name** box
3. From the **Process Template** list, select **TCM Release Process**.

Note:

The **TCM Release Process** workflow is provided by default. You can also use a workflow that your administrator has created in order to release a structure.

4. Click **OK**.

BOM session recovery

If you are working with Structure Manager in a four-tier environment and a server or network failure or time-out occurs, Teamcenter reassigns the client session to another server. It also attempts to use the client cache to reconstruct the run-time configured structure and minimize loss of information.

If the server connection is lost, Structure Manager displays two dialog boxes:

- **Server Reassigned**

Informs you that the server connection was lost. Click **OK** to log off Teamcenter and attempt to log on to another server.

- **BOM Session Recovery**

Informs you that a BOM recovery session has started. Click **OK** to dismiss the dialog box or click **More** to show detailed information about the recovery session.

On completion of the recovery session, Structure Manager appends **Recovered Session** to the title of the BOM window and colors the title text red. Additional error messages may appear, depending on the state of the recovered session.

The following limitations apply to BOM session recovery:

- BOM sessions are recovered only for the four-tier rich client. Two-tier rich client sessions are not recovered.
- Sessions with CAD and third-party integrations such as Teamcenter Integration for NX are not recovered.
- Teamcenter recovers the BOM session to a usable status, but not necessarily the exact state before failure or time-out occurred. For example, if you expanded multiple levels of the structure, Teamcenter recovers only the first-level expansion of the structure.

- The recovery may take an appreciable time to complete, depending on the quantity of data Teamcenter must process.
- Unsaved changes are lost. For example, if you made changes in normal editing or pending edit mode, but did not save them, the changes are lost.
- If you were performing a complex action when the server terminated, Teamcenter may not recover to the same step. For example, if you started to insert a level in the structure, after recovery Teamcenter does not resume at the same step in the wizard. Incomplete actions do not execute correctly; you should cancel them if they do not terminate automatically.
- All dynamic (run-time objects) such as BOM windows and BOM lines are invalid after reconnection even though the Structure Manager user interface may be recovered to the previous state.
- If you copied BOM lines to the clipboard before the server terminated, Teamcenter removes them.
- If the server terminated after encountering bad data during expansion, the recovery process may expand the same structure and encounter the same bad data. You must resolve these data issues in the database manually.
- If the server terminated due to memory shortage when expanding the first level of the structure, the recovery process may expand the same structure and encounter the same memory shortage. You must resolve such memory issues separately.
- If the data pane was open, Teamcenter closes it after recovery and it may no longer function correctly.

Once Structure Manager is running in the recovered session, you should perform any necessary cleanup tasks, and then continue working.

5. Working with occurrences

Working with occurrences

Teamcenter allows you to work with occurrences and absolute occurrences, according to your product structure needs.

An occurrence consists of one component in an assembly including its relative position with respect to its parent assembly. Occurrence types are representations of the **PSOccurrence** business object.

Occurrences may be suppressed in a CAD tool. If an occurrence is suppressed, the CAD tool behaves as though the occurrence does not exist. The occurrence is not displayed in the CAD system or the Structure Manager viewer. Positioning or mating constraints related to a suppressed occurrence are ignored in geometric solves.

You can determine if an occurrence is suppressed by checking the following **properties**:

- **bl_is_occ_suppressed**

Any line that has this flag set to **true** is hidden unless you choose the **Show Suppressed Occurrences** command. This flag captures occurrence suppression settings from the CAD tool, if you import a CAD structure. You can override this flag in the context of another line for a specific arrangement.

- **bl_is_suppressed**

This read-only, runtime property indicates if a line is suppressed. A line is considered suppressed if the variant state is suppressed, the line is not configured, or the occurrence is explicitly suppressed by setting the **bl_occ_is_suppressed** property. If any of these conditions is **true**, the **bl_is_suppressed** property is **true**, otherwise it is **false**. The value of the **bl_is_suppressed** property is not affected by the **Show Suppressed Occurrences** or **Show Unconfigured** commands.

Occurrence elements

The following table lists elements of the product structure that are relevant to occurrences, absolute occurrences, and managed occurrences.

Element	Purpose
Absolute occurrence	A relationship between a <i>parent</i> assembly and an item one or more levels lower in the structure. The parent assembly is the <i>context</i> in which the absolute occurrence exists. You can define data on the absolute occurrence that overrides the data stored on the item when you select the context assembly and view the structure. Both relative occurrence data (notes and transforms) and attachments can be overridden with data on absolute occurrences.

Element	Purpose
	Each absolute occurrence can have one or more unique attribute values that distinguish it from the other absolute occurrences derived from the same single occurrence.
Occurrence (relative)	(Sometimes called <i>relative occurrence</i> .) A hierarchical structure relationship between the immediate parent assembly and its child component item (in an imprecise assembly) or item revision (in a precise assembly). You can use a find number to identify for an occurrence, but this number may not be unique. Data can be stored on the occurrence, including occurrence notes and transforms.

Creating precise and imprecise occurrences

When you add a component to an assembly, you create an occurrence of the item or item revision in the assembly. Teamcenter displays the item or item revision as a line in the product structure.

The occurrence is precise or imprecise, depending on whether the BOM view revision is precise or imprecise in the parent assembly. Teamcenter applies the following rules:

- If the BOM view revision parent assembly is precise, the occurrence references the specific item revision for the component that you pasted. If you add an item, the revision is chosen by the revision rule. If no revision is found that satisfies the revision rule, Teamcenter displays an error message.
- If the BOM view revision parent assembly is imprecise, the occurrence references an item for the component. The revision is determined by the revision rule.

Note:

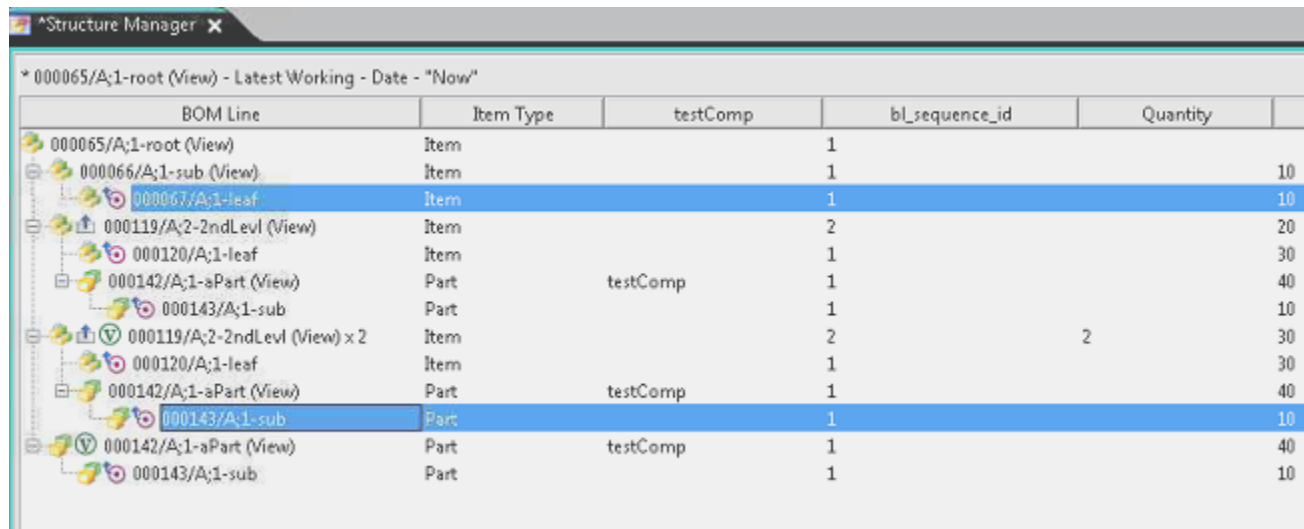
If you try to paste an item revision with an imprecise BOM view revision into an item revision that has a precise BOM view revision, Teamcenter may display a warning message. If you paste an imprecise assembly into a precise structure, it displays a warning. If you paste a precise assembly, Teamcenter applies the precision of the parent assembly and does not display a warning.

Suppress occurrences

You can suppress lines in a structure in the context of another line higher in the structure. You can hide lines in one of the following ways:

- If you want to hide a single line, select the line and toggle the **Suppressed** property to **True** .
- If you want to hide multiple lines, select each line and choose **Edit→Toggle Suppression**.

Teamcenter sets the **Suppressed** property of each selected line to **True** .



The screenshot shows the 'Structure Manager' window with a tree view on the left and a table on the right. The tree view shows a hierarchy of BOM lines, including '000065/A;1-root (View)', '000066/A;1-sub (View)', '000067/A;1-leaf', '000119/A;2-2ndLevl (View)', '000120/A;1-leaf', '000142/A;1-aPart (View)', '000143/A;1-sub', and '000142/A;1-aPart (View)'. The table on the right lists the absolute occurrences for these lines.

BOM Line	Item Type	testComp	bl_sequence_id	Quantity
000065/A;1-root (View)	Item		1	
000066/A;1-sub (View)	Item		1	10
000067/A;1-leaf	Item		1	10
000119/A;2-2ndLevl (View)	Item		2	20
000120/A;1-leaf	Item		1	30
000142/A;1-aPart (View)	Part	testComp	1	40
000143/A;1-sub	Part		1	10
000119/A;2-2ndLevl (View) x 2	Item		2	30
000120/A;1-leaf	Item		1	30
000142/A;1-aPart (View)	Part	testComp	1	40
000143/A;1-sub	Part		1	10
000142/A;1-aPart (View)	Part	testComp	1	40
000143/A;1-sub	Part		1	10

- If you want to hide all suppressed lines, choose **Edit→Show/Hide Suppressed Occurrences**.

If you view suppressed lines in context, they can be identified by the  icon.

If you export a structure with hidden lines, they are not included in the PLM XML of the structure and are not exported.

Using absolute occurrences

Understanding absolute occurrences

You can use absolute occurrences to manage data that is unique to a specific use of an item within a product structure. If you have ownership of and write access to a particular BOM view revision, you can define a subset of BOM line properties that other users can edit in the context of the BVR. You can also allow users to attach forms or datasets in context, by configuring business rules that define the types of primary and secondary objects for the relationships.

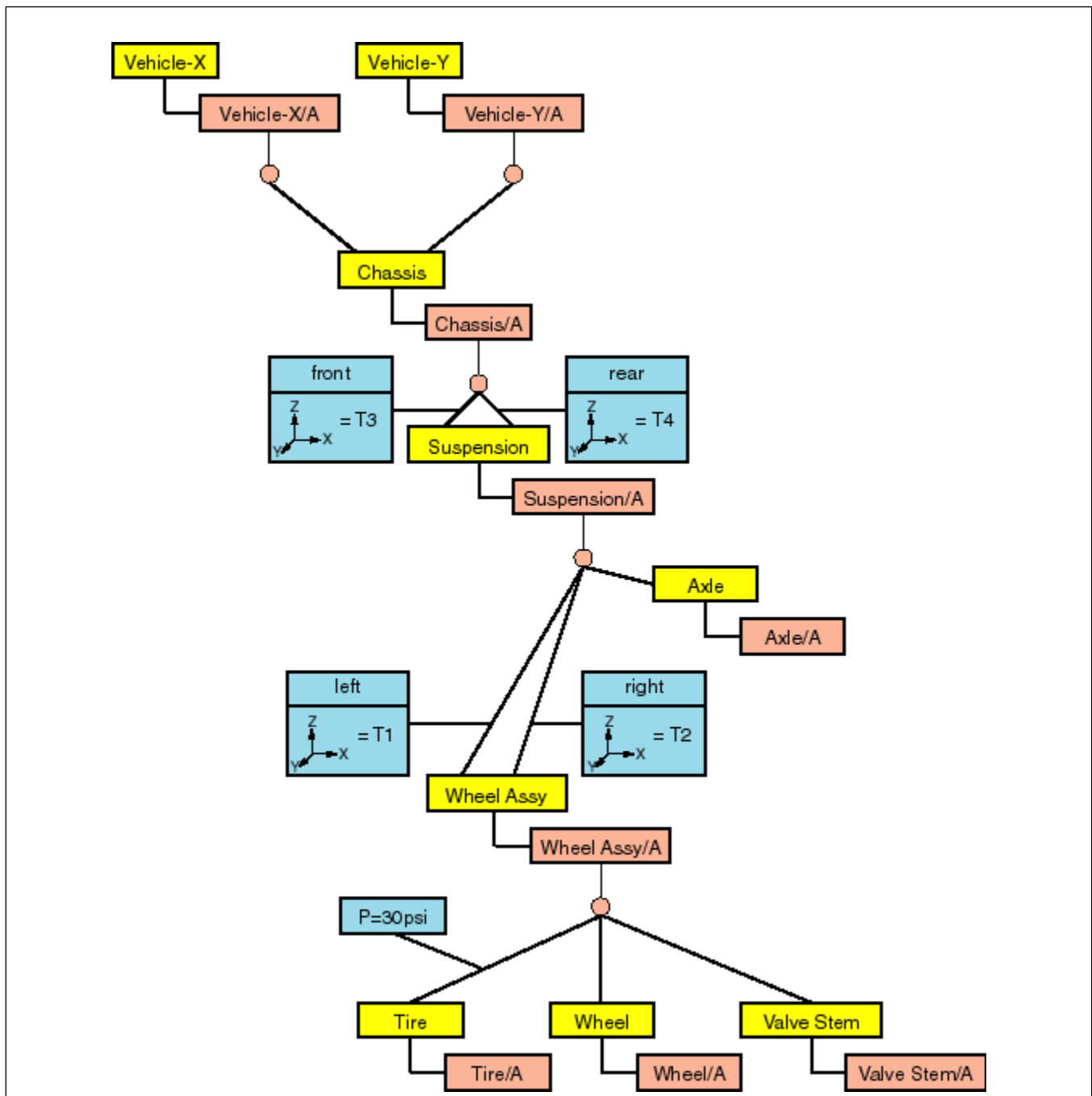
When a user enters in-context values or attachments, Teamcenter *overrides* certain structural data associated with a relative occurrence in the context of a specific higher level assembly. Data you can override includes:

- Occurrence notes
- Occurrence type
- Quantity
- Absolute transform
- Find number

- Variant condition
- Attachment, for example, a JT file for a different rendering
- Component item for a replacement

A BOM line represents an absolute occurrence with respect to the current top line in the product structure. You can set occurrence attribute values on such a BOM line, without those values appearing in the product structure everywhere the BOM line's parent appears. There are cases where a user needs to store values specific to the BOM line with respect to the top line or some intermediate assembly between the BOM line's parent and the top line. Absolute occurrences are always created in the context of a selected top line; the same absolute occurrence may not be in context for another top line.

The following figure shows an example where two vehicles are built on the same chassis. The chassis contains two occurrences of a suspension system, one for the front of the vehicle and one for the rear; these occurrences are positioned relative to the chassis by transforms T3 and T4, respectively. The suspension assembly contains two occurrences of a wheel assembly, one for the left side of the suspension system and the other for the right side of the suspension system. The wheel assembly occurrences are positioned relative to the suspension assembly by transforms T1 and T2, respectively. The wheel assembly is composed of a wheel, tire, and valve stem. The occurrence of the tire is annotated with a recommended tire pressure of 30 PSI.



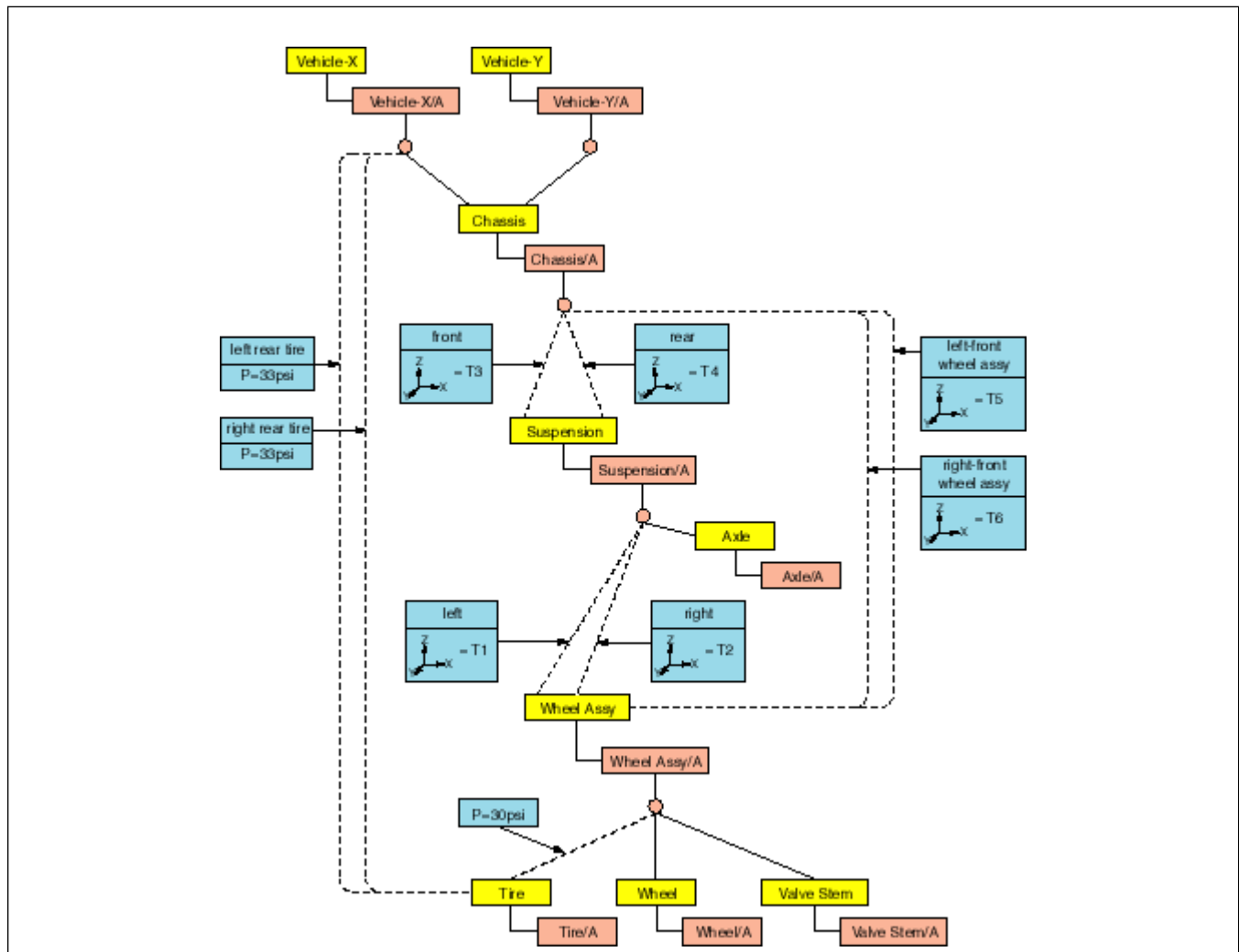
Sample product structure with relative occurrences only

Relative occurrences correlate directly to structure relationships. If the structure relationship has a quantity associated with it, the number of relative occurrences associated with the structure relation equals the quantity.

In the previous figure, when you display the product structure for vehicle Y, every occurrence of the tire shows a recommended tire pressure of 30 PSI; that is, the value set on the occurrence of the tire in the wheel assembly is propagated to all BOM lines for the tire. Positioning information is derived in the same

way. The position of the wheel assembly in a vehicle is derived from transformation values specified on the (relative) occurrences in the product structure, for example, the position of the front left wheel is derived by multiplying T1 and T3.

Consider a case when the position of the front wheels must change so they toe-in by 0.5 degrees or the case where the recommended tire pressure for the rear-tires in vehicle X must change to 33 PSI. One way to accomplish this is to modify the structure, but in most situations, this approach is not practical. Instead, you should make context-specific modifications to BOM line properties without changing the product structure. To permit such context-specific modifications, you can create *absolute occurrences*. Creating absolute occurrences allows you to effectively *flatten* the representation of a structure while knowing how to map back to the actual product structure. The following figure illustrates this concept, expanding on the preceding example.



Sample product structure with absolute occurrences

The dashed lines in the figure represent absolute occurrences. In this case, the absolute occurrences specify or override values in a specific context. In the example, they override positioning information and

recommended tire pressure. The context of the override and the value is shown in the label on each dashed line.

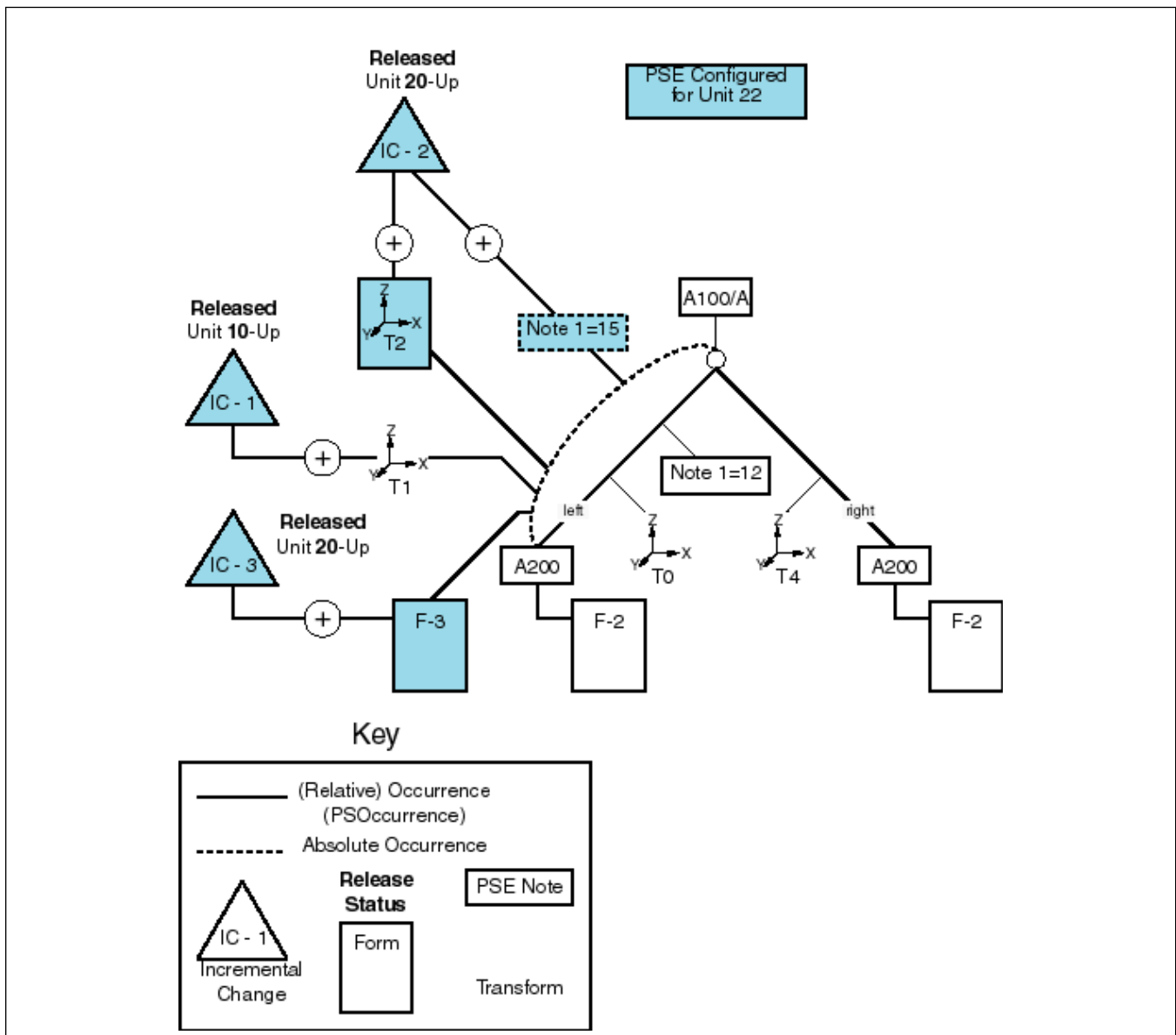
Specifically, in the context of the vehicle-X, the front tires have a recommended tire pressure of 30 PSI; this is derived from the relative occurrence of the tire in the wheel assembly. However, the two rear tires have a recommended tire pressure of 33 PSI; this is explicitly set on the absolute occurrence in the context of the vehicle. The value of 33 PSI on the absolute occurrence overrides the value of 30 PSI that appears on the relative occurrence of the tire in the wheel assembly. Vehicle-Y, however, has a recommended tire pressure of 30 PSI for all four tires.

Positioning information is derived in a similar way. The values specified on the absolute occurrence override the values that are otherwise derived by catenation of the transforms from the relative occurrences. That is, in the second figure, T5 overrides the value that would otherwise be derived from the multiplication of T3 and T1. Because this example specifies the transform overrides in the context of the chassis, both vehicle-X and vehicle-Y use T5.

If you release an intermediate BOM line that represents a subassembly, the line is locked and you do not have write access to it. However, you can still make changes to its absolute occurrences in the context of a parent assembly whose BOM view revision is also released, for example, to attach a dataset with associated JT files.

Tracking changes to absolute occurrences

The following figure shows how you can track changes to absolute occurrences with incremental changes.



Tracking changes to absolute occurrences

The possible configurations of occurrence data on A200 (left occurrence) in assembly A100 are as follows:

- Units 1 through 9: No incremental changes configured. Original occurrence data: Transform=T0, Note 1=12, Form F-2.
- Units 10 through 19: Incremental change 1 configured. Transform=T1, Note 1=12, Form F-2.
- Unit 20 and above: Incremental change 1, incremental change 2 & incremental change 3 configured. Transform=T2, Note 1=15, Form F-3. Form F-2 is still attached to the right occurrence of A200.

There is no **Remove** change on the occurrence data, for example, for the transform or note 1. You simply define a new value that overrides the value on the normal relative occurrence. For example, the new value may define an end unit for an incremental change.

Managing absolute occurrences (in-context editing)

Managing absolute occurrences (in-context editing)

An *absolute occurrence* is a specific instance of a component or assembly in a structure. It may be independent of the top-level assembly and only meaningful in the context of a lower level assembly. For example, you may have four occurrences of a wheel in the design of a vehicle; you can label one of those occurrences as **left rear wheel**, which is an absolute occurrence of the wheel. When you open a window containing the structure, each absolute occurrence is represented by a single line.

To create an absolute occurrence, you edit the occurrence line *in context* with respect to the assembly in which the absolute occurrence data is meaningful. Hence, the creation of absolute occurrences is sometimes referred to as *editing in context*.

Note:

Absolute occurrences are not the same as *appearances*. Absolute occurrences are generated when you build the structure (edit in context) and do not have associated spatial information.

A component or subassembly that appears in more than one product structure can have the same absolute occurrence in each structure.

You cannot create absolute occurrences directly, only by converting a relative occurrence and editing its properties. Similarly, you cannot delete absolute occurrences directly. You cannot create absolute occurrences on substitutes.

An absolute occurrence may appear more than once in the structure, depending on the context in which you created it.

Interpreting absolute occurrence data

Interpreting absolute occurrence data

The following figure shows how absolute occurrences appear in the structure when in context editing is enabled.

Incremental Change (IC) Edit Context: No IC context

ASSY_2345-04-69/B-VOLVO ASSEMBLY FOR BETA TESTING (view) - Latest Working - Date - "Now"

IN CONTEXT: 20487187/C (view)

BOM Line	Seq...	Assy Note	Item Rev...	Configured ICs	Revision Effectivity	Associated ICs	I...
ASSY_2345-04-69/B-VOLVO AS...	B						Y
04_MAZ/A	A 10		Released		Released 1-UP (ASSY_2345-0...		Y
TYPE-FM_NORMAL_W60-2...	A 20		Released		Released 1-UP (ASSY_2345-0...		Y
ENG-VE12_UTURBOC/A	A 30		Released		Released 1-UP (ASSY_2345-0...		Y
04_MR/A	A 40		Released		Released 1-UP (ASSY_2345-0...		Y
PAR3140/A	A 50		Released		Released 1-UP (ASSY_2345-0...		Y
RAP_6640/A	A 60		Released		Released 1-UP (ASSY_2345-0...		Y
ASSY_2345-04-69_1/A	A 70		Released		Released 1-UP (ASSY_2345-0...		Y
ASSY_2345-04-69_2/A	A 80		Released		Released 1-UP (ASSY_2345-0...		Y
20409535/A (view)	A 90		Released		Released 1-UP (ASSY_2345-0...		Y
20392008/A	A 10		Released		Released 1-UP (ASSY_2345-0...		Y
20567341/A (view)	A 100		Released		Released 1-UP (ASSY_2345-0...		Y
20453035/A	A 10		Released		Released 1-UP (ASSY_2345-0...		Y
20453035/A	A 20		Released		Released 1-UP (ASSY_2345-0...		Y
20487187/C (view)	C 300						Y
20367635_101/B (view)	B 10	AAA	Released		Released 1-UP (ASSY_2345-0...		Y
20367635_201/A	A 10	CCC	Released		Released 1-UP (ASSY_2345-0...		Y
20367635_3/A	A 10	XXX	Released		Released 1-UP (ASSY_2345-0...		Y
3988731/A	A 20		Released		Released 1-UP (ASSY_2345-0...		Y
3988731/A	A 30		Released		Released 1-UP (ASSY_2345-0...		Y
20429251/A	A 40		Released		Released 1-UP (ASSY_2345-0...		Y
20429252/A	A 50		Released		Released 1-UP (ASSY_2345-0...		Y
1076334/A	A 60		Released		Released 1-UP (ASSY_2345-0...		Y
1076334/A	A 70		Released		Released 1-UP (ASSY_2345-0...		Y
1075726/A (view)	A 80		Released		Released 1-UP (ASSY_2345-0...		Y
1075726/A (view)	A 90		Released		Released 1-UP (ASSY_2345-0...		Y
3171036/A	A 100		Released		Released 1-UP (ASSY_2345-0...		Y
3171036/A	A 110		Released		Released 1-UP (ASSY_2345-0...		Y
3171036/A	A 120		Released		Released 1-UP (ASSY_2345-0...		Y
3171036/A	A 130		Released		Released 1-UP (ASSY_2345-0...		Y
1075723/A	A 140		Released		Released 1-UP (ASSY_2345-0...		Y
1075723/A	A 150		Released		Released 1-UP (ASSY_2345-0...		Y
1075723/A	A 160		Released		Released 1-UP (ASSY_2345-0...		Y
1075723/A	A 170		Released		Released 1-UP (ASSY_2345-0...		Y
20374919/A	A 180		Released		Released 1-UP (ASSY_2345-0...		Y
20374919/A	A 190		Released		Released 1-UP (ASSY_2345-0...		Y
1628449/A	A 200		Released		Released 1-UP (ASSY_2345-0...		Y
1628449/A	A 210		Released		Released 1-UP (ASSY_2345-0...		Y
914170/A	A 220		Released		Released 1-UP (ASSY_2345-0...		Y
914170/A	A 230		Released		Released 1-UP (ASSY_2345-0...		Y
914170/A	A 240		Released		Released 1-UP (ASSY_2345-0...		Y
914170/A	A 250		Released		Released 1-UP (ASSY_2345-0...		Y
914170/A	A 260		Released		Released 1-UP (ASSY_2345-0...		Y
914170/A	A 270		Released		Released 1-UP (ASSY_2345-0...		Y
966360/A	A 280		Released		Released 1-UP (ASSY_2345-0...		Y
966360/A	A 290		Released		Released 1-UP (ASSY_2345-0...		Y

Absolute occurrences in a structure

Note the following lines in this structure:

Line	Purpose
20487187/C (view)	The immediate parent that is in context for absolute occurrence edits. The line is also color-coded in the structure and in the title bar of the pane where the current context is shown. The color is green in this example but may be changed by your administrator. Lines that are <i>not</i> in the current context are grayed out. Similarly, the out-of-context parts corresponding to the grayed out lines may also be grayed-out in the viewer. You cannot create absolute occurrences from grayed-out lines in

Line	Purpose
	the current context and you cannot edit an existing property value on such lines.
	Lines below 20487187/C (view) are generally not grayed out and <i>are</i> in context.
20367635_101/B (view)	This is a standard occurrence note. It is in context and may be edited.
20367635_201/A	This occurrence note is <i>not</i> in context because it is not in all occurrences of the immediate parent assembly.
20367635_3/A	The overriding note value in the context of 20487187 only for this specific occurrence of the parent. To obtain more information about edited absolute occurrence data, place the cursor over any cell containing the  icon. The tool tip banner shows the context in which the edited data is valid.

By default, the assembly viewer highlights only those items in the assembly that are in scope in the selected context; items that are not in context are shown grayed out. The administrator may optionally change this behavior so that all items are shown.

The structure contains icons that indicate the status of the structure lines as follows:

Icon	Indicates
	A line containing this icon is the context for the creation of certain absolute occurrences. The line is also color-coded in the structure and in the title bar of the pane where the current context is shown.
	A line that contains this icon has one or more of the absolute occurrences edited in a context but not necessarily the current context.
	A property cell containing this icon is already edited in a context; the current absolute occurrence data is shown in the cell. Each cell that contains data for a specific absolute occurrence includes this icon.
	A line that contains this icon before its name is a target for editing data in the current context. Look for a  icon in one or more properties cells of the same line to identify if the necessary edits are already made.

Note:
This icon identifies a target in the current context. It may not appear in the same line if you select a different context.

Icon	Indicates
	A line that contains this icon has an in-context edit made by an incremental change. The edit may be an add, remove, or both.
	A cell that contains this icon has an in-context edit removed by an incremental change.
	A cell that contains this icon has an in-context edit added by an incremental change.
	A cell that contains this icon has in-context edits added and removed by an incremental change.

Showing and hiding the in-context line

You can show or hide the line that is the context of a particular in-context edit.

To show the line:

1. Click in a property cell, then click outside the same property cell. Ensure you do not select *another* property cell.

Note:

Right-clicking when editing the value in a cell has no effect.

2. Hover the cursor over the same property cell, right-click, and then choose **Show/Hide In-Context BOM Line** from the menu.

Structure Manager shows the in-context line highlighted in yellow and the editable property cells are highlighted similarly.

To hide the line, click outside the property cell you edited, right-click, and then choose **Show/Hide In-Context BOM Line** from the menu.

Structure Manager hides the previously highlighted in-context line.

Create absolute occurrences

Create absolute occurrences

To create an absolute occurrence, you must enable in-context editing mode and edit the properties of an occurrence, as follows:

1. If necessary, expand the structure by choosing **View→Expand Below**.

2. Select the top line that is the context of this edit and choose **Edit→Toggle In-Context Mode**. You can also right-click the line and choose **Set In-Context**, or click the  button on the toolbar.

If a line in the displayed structure is marked with a  icon and colored green, it is the item that is the context for the creation of absolute occurrences. If a line is grayed out, it is not in the selected context and you cannot create absolute occurrences for these lines. The in-context item is also identified in the title bar of the structure tree.

- You cannot enable in-context editing mode for a line that has no children.
 - You cannot create an absolute occurrence in the context of its immediate parent.
 - You cannot change the value of a property that is already overridden at a higher level.
3. Click the cell in the lower line containing the property you want to enter or edit. You must select one of the following supported properties:
 - Suppressed
 - Position constrained
 - Suppression constrained
 - Any GRM relation impacted by preferences
 - Any occurrence note
 - Quantity
 - Find number
 - Occurrence type
 - Variant conditions
 - Variant formula
 - Absolute transformation matrix
 - Unit of measure
 - Is designed in place
 - Requires positioned design

Caution:

Ensure you have selected in-context editing mode. If this mode is not selected, the change is made to every instance of the selected item anywhere in the assembly.

4. Type the required new value and press the Enter key. A  icon on the line indicates one of its property cells has an absolute occurrence override.

Note:

If you create an absolute occurrence override of a property and the same property is already overridden at a lower level in the structure, the new, higher level value replaces the existing value.

Conversely, you cannot edit an individual property value if the same property is overridden at a higher level in the structure.

Identify absolute occurrences

You can assign identifiers to absolute occurrences and these identifiers are displayed in two columns in the property table, as follows:

- **ID In Context (Top Level)**

Shows only the identifier assigned to the line in the context of the loaded top-level line. You can add or edit an identifier by double-clicking in this cell and typing the necessary value.

Note:

Any absolute occurrence identifiers defined at a lower level than the currently selected top-level line are not visible.

If in-context editing mode is disabled, the top-level line is always considered the in-context line.

- **ID In Context (All Levels)**

Shows the identifiers assigned to the line in all contexts. You cannot edit this column.

Change absolute occurrence override data

You can change the override data for an existing absolute occurrence at any time. For example, you may want to change the quantity assigned to a structure line to correct a previous error. It is not necessary to enable context editing to make such changes, ensure only the correct context is selected, then double-click the property cell and edit the value.

Note:

If you want to define relative occurrence data for a property that is already defined in context, remove the absolute occurrence data from the property first.

Remove absolute occurrence override data

You can remove override data from an absolute occurrence without entering replacement data. To do this, right-click the property to remove (that is, select the relevant cell) and choose the **Remove In Context Override** command.

Deselect in-context editing mode

When you are not creating or editing absolute occurrence data, consider deselecting in-context editing mode to avoid inadvertent changes. Do this by choosing **Edit→Toggle In-Context Mode** or clicking the  button in the toolbar.

About associating data with absolute occurrences

About associating data with absolute occurrences

During the design process, an engineer may attach data such as a CAD design file, viewer (JT) file, classification information, and specifications to an item revision. The actual usage of the item revision in the structure, including its transformation, is tied to an occurrence.

You can attach data to a specific instance of an item revision in the structure, which is represented by an absolute occurrence. You can attach data that is unique to the absolute occurrence, or information that is already attached to the associated item revision or occurrence. Examples of data that you may want to attach to a specific absolute occurrence include:

- Cost data
- Transformations
- Quantity
- Variant conditions (not modular variant expressions)
- Viewer information
- Name and ID
- Occurrence note, type, or find number
- Instance number
- Find number
- Occurrence position constrained
- Occurrence suppressed

For example, you may want to attach a different occurrence note to each absolute occurrence to specify additional assembly work instructions.

The level of the absolute occurrence in the structure determines the precedence of data you attach to it. Data attached at a high or mid-level in the structure override the corresponding data at lower levels; data attached to an absolute occurrence at the lowest level does not override data elsewhere.

Associate a dataset or form with an absolute occurrence

1. Ensure you have selected in-context editing mode by choosing **Edit→Toggle In-Context Mode**, right-clicking the structure line, and choosing **Set In Context**; or clicking the  button on the toolbar.
2. Select the line containing the absolute occurrence with which you want to associate a new instance-specific dataset or form, then click the **Attachments** tab in the data pane.
3. If you are associating a new dataset or form, create it by choosing **File→New→Dataset** or **File→New→Form**, respectively.

If you are replacing an existing dataset or form, select it in the **Attachments** tab. You can then search for and insert a replacement dataset or form.

Associate a transformation with an absolute occurrence

1. Ensure you have selected in-context editing mode by choosing **Edit→Toggle In-Context Mode**, right-clicking the structure line, and choosing **Set In Context**; or clicking the  button on the toolbar.
2. Select the line containing the absolute occurrence for which you want to change the transformation.
3. Click the **Graphics** tab and choose **Graphics→Transformation→Persistent Transformation**.
4. Change the position of the affected component and save the changes.

Associate an occurrence note with an absolute occurrence

1. Ensure you have selected in-context editing mode by choosing **Edit→Toggle In-Context Mode**, right-clicking the structure line, and choosing **Set In Context**; or clicking the  button on the toolbar.
2. Select the line containing the absolute occurrence with which you want to associate an occurrence note.
3. Choose **View→Notes**, or click the **Notes** button on the toolbar.

Teamcenter displays the **Notes** dialog box.

4. Type the properties of the note and click **OK**.

Apply a variant condition to an absolute occurrence

1. Ensure you have selected in-context editing mode by choosing **Edit→Toggle In-Context Mode**, right-clicking the structure line, and choosing **Set In Context**; or clicking the  button on the toolbar.
2. Select the line containing the absolute occurrence with which you want to associate a variant condition.
3. Choose **Edit→Variant Condition** or click the **Edit Variant Conditions**  button on the menu bar.

Teamcenter displays the **Variant Condition** dialog box.

4. Add a new variant condition to the absolute occurrence or edit the existing variant condition.

View attachments associated with an absolute occurrence

To view all the attachments associated with an absolute occurrence, select the line containing the absolute occurrence and choose the **Attachments** pane. All the attachments to the absolute occurrence are shown below the absolute occurrence.

Note:

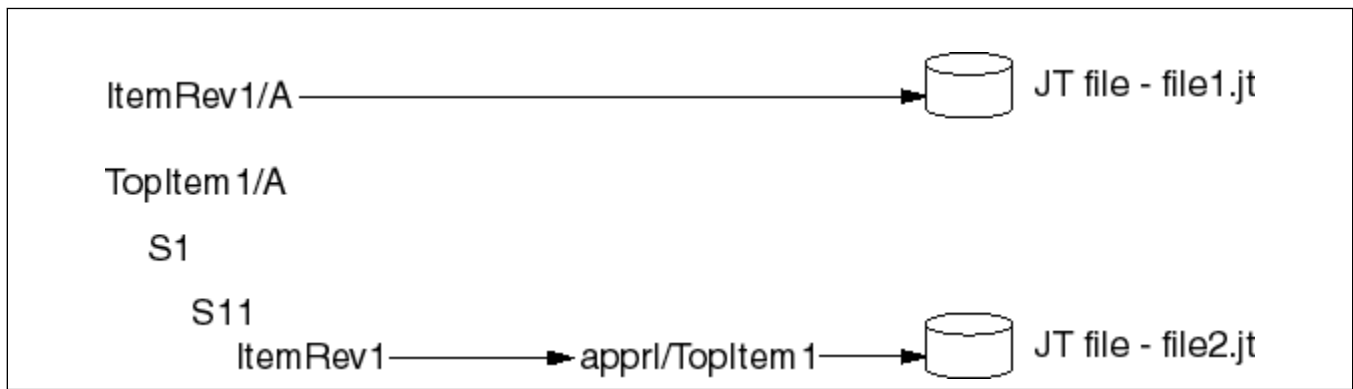
If incremental change orders are used at your site, attachments associated with unconfigured changes may be hidden. To view all absolute occurrence data, choose **View→Show Unconfigured Changes** and set unconfigured changes to on.

About data precedence

About data precedence

You can associate data with an item revision or absolute occurrence. You can create the absolute occurrence in the context of a top-level item.

The following figure shows how visualization (JT) files may be attached to items.



Attaching visualization files to items

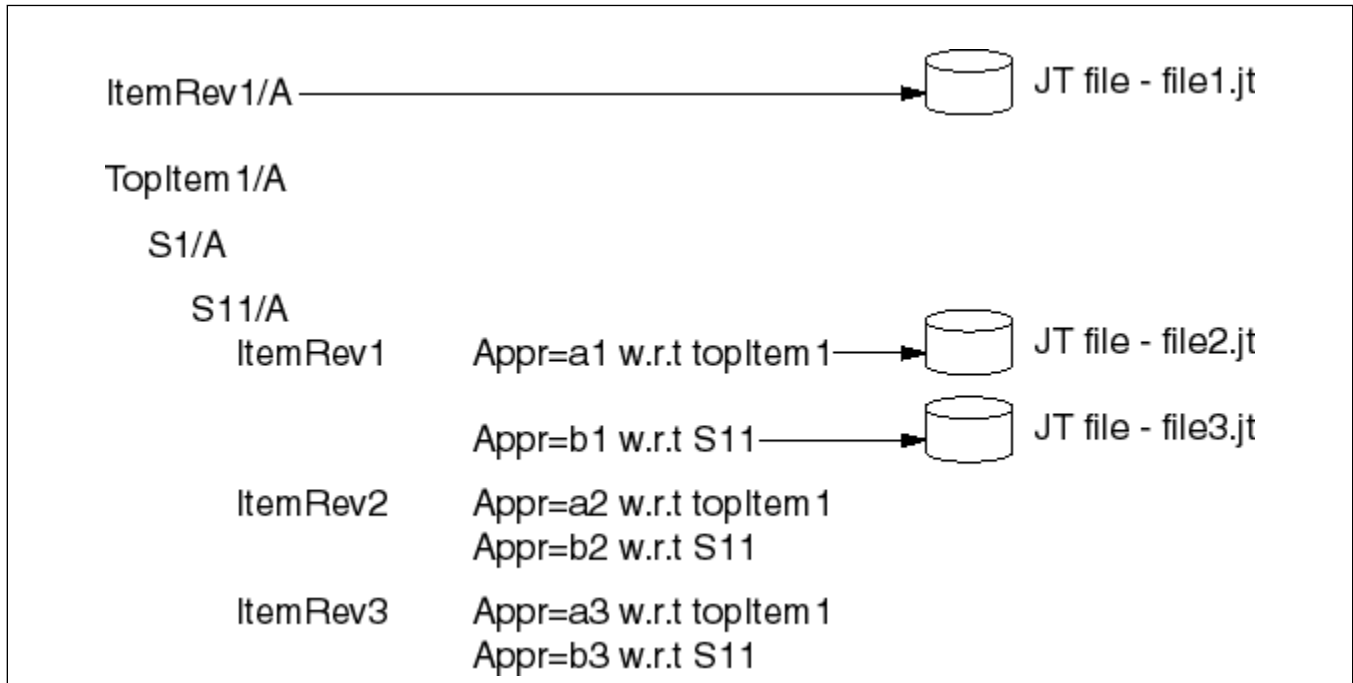
In this example, you can see **file1.jt** in the viewer in My Teamcenter without any context. However, when you view the same item revision (**ItemRev1**) in the context of **TopItem1**, you see the JT file (**file2.jt**) that is associated with the corresponding absolute occurrence (**appri1**) in the context of item **TopItem1/A**.

You can associate a different JT file as an override if **TopItem1** is revised from revision A to revision B.

Data is associated with an absolute occurrence in the context of a specified revision. When you revise an item, the data associated with the previous revision is copied and you can change it as necessary.

Propagate override data

You can associate data to absolute occurrences in the context of an intermediate level, as well as in the context of the top level, as shown in the following figure.



Propagate override data

In this example, **ItemRev1** has two override JT files, **file2.jt** and **file3.jt**. The **file2.jt** file is added in the context of **TopItem1/A**, while the **file3.jt** file is added in the context of **S11/A**. Consequently, if you view **ItemRev1** in the context of **TopItem1/A**, you see the **file2.jt** file.

Override data in multiple contexts

You can create absolute occurrence data on a single line in more than one context. For example, you may want to override the find number in the context of the top-level assembly and the quantity in the context of a lower level assembly. Make these in-context edits in turn, ensuring you have selected the correct context (line) each time. The system shows the relevant absolute occurrence data for the current context and consequently data that applies to other contexts is hidden.

Note:

You cannot change the value of a property that is already overridden in a higher level context.

Using arrangements

In NX, you can define *arrangements* to specify alternative positions for one or more components in the assembly, and store those alternatives with the assembly. For example, a car door assembly may have different arrangements when the door is open or closed and the position of certain components may be overridden accordingly. Likewise, you can suppress components in a particular arrangement, for example, to hide the hinges. When you manage an assembly with arrangements in Teamcenter, each component in NX has a corresponding occurrence in Teamcenter and each different override or suppression has an equivalent absolute occurrence.

Note:

You cannot create an arrangement for a piece part.

6. Managing properties and notes

Managing properties and notes

Properties and notes contain information about items in the product structure that does not necessarily appear in the CAD design. Examples of properties of a line in the product structure may include find numbers for parts in an assembly, release status, and cost. Your Teamcenter administrator can change or customize the **list of properties** displayed in Structure Manager at your site according to business requirements.

Occurrence notes contain information pertinent to occurrence of the part in the structure, for example, the inflation pressure of a particular tire or the torque value for a bolt. Your Teamcenter administrator creates and manages the occurrence note types required at your site. You can then make use of any of the available note types to specify a value for a particular line in the structure.

Displaying properties

The following table lists some of the columns available in the properties view of the product structure and provides a description of their functions.

BOM line properties have display names or system names, and the system names are in the format **bl_xxx**. **Add or edit a display name** for a system name using Business Modeler IDE.

You can add or remove property columns in the table tree by right-clicking the BOM window and choosing **Insert Columns** in the shortcut menu. By default, Teamcenter displays selection lists of all available properties to add or remove that may contain a large number of system and custom properties. To make the selection list more manageable, the administrator can restrict the properties that are displayed by group or role. You can also freeze commonly used columns so that they are always visible.

You can **save property column configurations** at a user, site, or group level. The same columns are then available for every session and for multiple users.

You can update the values of all the displayed properties in the BOM window by pressing the F5 key. This feature may be useful if more than one user is working on the structure and you want to synchronize to the latest information, for example, a changed value or modified occurrence note.

Note:

If you make a change to a persistent object (for example, an item, item revision, item master, item revision master, GDE, or BOM view revision) in My Teamcenter or a data pane, the BOM line that references the updated property may not refresh automatically.

You specify custom item or item revision classes to add as derived BOM line properties. To configure the list of available properties of custom item or item revision classes available to the end user, the

administrator sets the **Fnd0BOMLineItemConfigProps** and **Fnd0BOMLineRevConfigProps** Business Modeler IDE constants and the **BOM_Properties_For_Column_Selection** preference.

In addition to the default and custom properties, your administrator may also create customized **note** types.

Column	Description	Application	Object
Absolute Transformation Matrix	Shows the positioning transformation data.	CAD managers	Structure line
Affected IC	Shows the effective incremental change.	Incremental change	Incremental change/ structure line
All Notes	Combines all occurrence notes into a single property	All	Occurrence
Architecture Element ID	Shows the architecture element identifier.	Platform Designer	Occurrence
bl_abs_xform_matrix	Shows a run-time, rolled-up non-PLM XML transformation matrix value assigned to the part occurrence.	Transformation matrix	Structure line
bl_appearance	Shows the appearance tag ID assigned to the line by the appearances system.	Appearances	Structure line
bl_appearance_path	Shows the appearance path node (APN) tag ID assigned to the line by the appearances system.	Appearances	Structure line
bl_bounding_boxes	Contains a comma-separated array that specifies the dimensions of one or more bounding boxes.	Spatial search	Structure line
bl_is_occ_suppressed	If set to true , the line is hidden unless you choose Show Suppressed Occurrences . Occurrences may be suppressed by a CAD tool. This property may be edited for a specific arrangement.	All	Structure line
bl_is_suppressed	If true , the line is suppressed or not configured.	All	Structure line

Column	Description	Application	Object
bl_item_altid_list	Shows the alternate ID of the item or item revision represented by the line.	Alternate IDs	Structure line
bl_item_ip_classification	Shows the intellectual property (IP) classification attribute of the part occurrence.	All	Structure line
bl_markup_type	Shows the markups (if any) that you can display for the selected line.	All	Structure line
bl_occ_xform_matrix	Shows the non-PLM XML transformation matrix value assigned to the part occurrence.	Transformation matrix	Structure line
bl_plmxml_abs_xform	Shows a run-time, rolled-up PLM XML transformation matrix value assigned to the part occurrence.	Transformation matrix	Structure line
bl_plmxml_occ_xform	Shows the PLM XML transformation matrix value assigned to the part occurrence.	Transformation matrix	Structure line
bl_substitute_id_compare	Specifies the ID of the selected substitute that is used in comparisons.	Compare	Substitute
bl_substitute_name_compare	Specifies the ID of the selected substitute that is used in comparisons.	Compare	Substitute
Changed by Current IC	Set to Y if the item is affected by the current incremental change.	Incremental change	Incremental change/ structure line
Changes	Set by the BOM comparison utility to indicate the nature of any changes relating to this line.	Compare	Display
CO - Checked out	Set to Y if the item revision is checked out.	Teamcenter Integration for NX	Display

Column	Description	Application	Object
Configured IC's	Shows the currently configured incremental changes.	Incremental change	Incremental change/ structure line
Configured Out	Shows if the line is configured out by effectivity, variants, incremental change, or a combination of these techniques.	All	Structure line
Default Unit of Measure	Shows the default unit of measure for the item. It may be overridden for an individual occurrence.	All	Item
Effectivity ID	Shows the ID of the date effectivity object on the occurrence.	Effectivity	Occurrence
EOC - Effective Occ. Config'd	Indicates if this occurrence is configured by the date set in the current revision rule. Set to Y for yes, blank for no.	Effectivity	Display
Find No.	Find number of the line in the structure. Editable.	All	Occurrence
GDELine Name	Shows the item element name.	All	Display
Generic Component	Indicates if this is a generic component.	Variants	Item
Has Substitutes	Set to Y if the line has substitutes; otherwise, blank.	Substitutes	Occurrence
Has Children	Set to Y if the line has any children; otherwise, blank.	All	BOM view revision
HVD - Has Variant Data	Set to Y if the item revision has any variant data (options, defaults, or rule checks).	Variants	Item revision
Has Legacy Occurrence Effectivity	Indicates if the occurrence has associated legacy effectivity.	Effectivity	Occurrence
Has Module	Indicates if there is an associated module.	Variants	Display

Column	Description	Application	Object
Has Notes	Indicates if a standard note or custom note is attached to the line.	All	Item or item revision
Has Trace Link	Indicates if the line is the source or target of a trace link.	All	Item, item revision, absolute occurrence or absolute occurrence revision
Has Unified Occurrence Effectivity	Indicates if the occurrence has associated unified effectivity.	Effectivity	Display
IC Effectivity	Shows the effectivity of the current incremental change on the occurrence.	Incremental change	Incremental change/structure line
IC Intent	Shows if the occurrence is configured by the current incremental change intent.	Incremental change	Incremental change/structure line
IC Release Status	Shows the release status of the relevant incremental change.	Incremental change	Display
ID In Context (All Levels)	Shows the occurrence identifier in the context of all levels.	All	Display
ID In Context (Top Level)	Shows the occurrence identifier in the context of the top-level item.	All	Display
IOC configured	Shows if the occurrence is configured by the current incremental change.	Incremental change	Incremental change/structure line
Is PublishLink Source	Shows Y if the line represents the source occurrence of a publish link.	Part-CAD alignment	Occurrence
Is PublishLink Target	Shows Y if the line represents the target occurrence of a publish link.	Part-CAD alignment	Occurrence
Item Classified	Set to YES if the item is classified directly or to yes if the classification data is inherited from the item revision. If blank, the item	Classification	Display

Column	Description	Application	Object
	is not directly or indirectly classified.		
Item Description	Shows a description of the item.	All	Item
Item ID	Shows the ID of the item.	All	Item
Item Name	Shows the name of the item.	All	Item
Item Revision Classified	Set to YES if the item revision is classified directly or to yes if the classification data is inherited from the item. If blank, the item revision is not directly or indirectly classified.	Classification	Display
Item Revision Status	Displays the release status of the item revision.	All	Item revision
Item Revision Subclass Name	Displays the name of the subclass to which the item revision belongs.	All	Display
Item Subclass Name	Displays the name of the subclass to which the item belongs.	Classification	Display
Item Type	Shows the business object type of the item.	All	Item
Make/Buy	Indicates if you manufacture a part or purchase it from a supplier. It is set to None if the line does not represent a part or if you do not use this property. That is, it cannot be edited on an item, item revision, or occurrence.	Part	Display
MCVD — Has Classic Variant Data	Indicates if there is associated classic variant data.	Variants	Display
MCE — Has Occurrence Effectivity	Indicates if there is associated occurrence effectivity data.	Occurrence effectivity	Display
Multifield Key Information	Contains any multifield key information associated	BOM comparison	Item

Column	Description	Application	Object
	with the item. (bl_item_fnd0mfkinfo)		
Occurrence Date Range	Shows the range of dates for which the occurrence is effective.	Effectivity	Occurrence
Occurrence Effectivity	Shows if there is applicable occurrence effectivity.	Effectivity	Display
Occurrence Effectivity ID	Shows the identifier of any occurrence effectivity.	Effectivity	Display
Occurrence Name	Displays a user-defined name for the occurrence. It cannot be overridden in context.	All	Occurrence
Pack Count	Shows the number of occurrences that a packed line represents.	All	Display
Packed	Set to Y if the displayed line represents multiple packed lines; otherwise blank.	All	Display
Part Number	Displays the identification number of a part.	All	Display
Position Designator	Shows a value that represents the position of a single part from a line of usage. For example, if the line of usage references four wheels, there are four position designators—one for each wheel.	All	Occurrence
Precise	Set to Y if this BOM view revision is precise, otherwise blank.	All	BOM view revision
Published Data from Source	Set to TRANSFORM or SHAPE to indicate data that has been published from the source occurrence.	Part-CAD alignment	Occurrence
Quantity	Shows the quantity of the item represented by this line.	All	Occurrence
Qty Change	Set by the structure comparison feature to	Compare	Display

Column	Description	Application	Object
	indicate a change in quantity of an item between two structures.		
Ref Designator	Displays a unique identifier for an occurrence of a part. It cannot be overridden in absolute occurrence mode. Editable.	All	Display
Requires Design	Indicates if a part requires a CAD design. Certain parts do not require a design, for example, paint or glue.	All	Part
Revision	Shows the ID of the item revision.	All	Item revision
Rev Change	Set by the structure comparison feature to indicate a change in revision of an item between two structures.	Compare	Display
Rev Description	Displays a description of the item revision.	All	Item revision
Rev Name	Shows the name of the item revision.	All	Item revision
Rev Process Stage	Displays the release process stage of the item revision, if it is in a process.	Workflow	Item revision
Rule configured by	Shows the name of the revision rule that configures this item revision.	Revision configuration	Display
Structure Line	Contains a combination of item ID, revision ID, revision name, view name, and quantity.	All	Display
Structure Line Name	Contains a combination of item ID, revision ID, and revision name.	All	Display
Structure Line Title	By default, shows the same text as Line , but you can edit the format .	All	Display

Column	Description	Application	Object
Substitute	Set to Preferred if the line has any substitutes.	Substitutes	Occurrence
Unit Net Effectivity	Shows the calculated net effectivity of the selected line.	Occurrence effectivity	Occurrence
Unit Net EOC	Shows the calculated EOC of the selected line.	Occurrence effectivity	Occurrence
Unit of Measure	Shows the unit of measure for the occurrence. Overrides the default unit of measure for the item.	All	Occurrence
Usage Address	Displays the type of object that occupies the occurrence in the structure, for example, wheel.	All	Occurrence
Variant Conditions	Shows the variant condition under which the occurrence is configured. The Variant Conditions property is only used with the old classic variant model.	Variants	Occurrence
Variant Formula	Shows the variant formula under which the occurrence is configured. The Variant Formula property is only used with the new classic variant model.	Variants	Occurrence
Vendor Parts	Shows related vendor parts and vendor location data, determined by the current vendor part selection rule.	Vendor management	Item revision
View Type	Shows the type of the BOM view revision.	All	BOM view revision
VOC - Variant Occ. Config'd.	Indicates if this occurrence is configured by the current variant rule. Set to Y for yes, blank for no, or ? for undefined.	All	Display

Note:

You cannot edit or mark up the first property column (**Quantity**).

Tip:

You can use some of additional properties not listed in the table to determine why a particular line is configured or hidden, for example:

- **bl_is_occ_configured**
Shows if the line is configured by the current occurrence effectivity.
- **bl_ic_state**
Shows if the line is configured by the current incremental change.
- **bl_variant_state**
Shows if the line is configured by the active variant.

Check for redundant appearance path nodes

To check for redundant appearance path nodes, run the **apn_medic** utility from the Teamcenter command prompt. For more information on running this utility, type **apn_medic -h** on the Teamcenter command prompt.

Creating and editing display names

Creating and editing display names

BOM line properties have both display names and system names, and the system names are in the format **bl_xxx**. You should define a display name for a system name if you add a custom business object type to your system.

Define a display name for a BOM line using the **BOMLineFormConfiguredProperties** and **BOMLineRevFormConfiguredProperties** global constants and compound properties available on the **BOMLine** business object in the Business Modeler IDE.

Caution:

Siemens Digital Industries Software recommends that you do not include a dot (.) in the property name. Such names cannot be edited in Structure Manager.

Note:

In previous versions, the administrator could create or change display names by editing the `/textserver/xml` files in the **lang** folder, for example, **system_property_names_locale.xml**. Display names are no longer stored in XML files, and you can now only create or edit them in the Business Modeler IDE.

Create a display name

1. In the Business Modeler IDE, open the **BOMLine** business object and click the **Properties** tab.
2. Select the property whose display name you want to create and scroll to the **Localization** section.
3. Click **Add**.

The Business Modeler IDE displays the **Add or Modify Localization** dialog box.

4. Enter the display name in the **Value Localization** box, select the locale, and set the status to **Approved**.
5. Save the data model and deploy the template.

Managing column configurations

Managing column configurations

You can save and apply column configurations available for your group and configure your view of Structure Manager to view and edit only those properties that your group deals with. Depending on your role, you can save column configurations.

- A *site* administrator can save configurations with the scope set to **User**, **Group**, or **Site**.
- A *group* administrator can only save configurations with the scope set as **User** and **Group**.
- If a site has multiple levels of groups, users can access the site configurations and configurations for all groups to which they belong.

Save column configuration

1. Right-click the column header and choose **Save Column Configuration**.

The **Save Column Configuration** dialog box appears.

2. Type values in the **Name** and **Description** boxes.

Note:

Column configuration names should be unique.

3. Select the **Scope** option as **User**, **Group**, or **Site**.

Note:

The options you see enabled depend on your role. If you are a site administrator, you see all three options enabled. If you are a group administrator, you see the **User** and **Group** options enabled. If you are not an administrator, no option displays and the column configuration is saved at the user level.

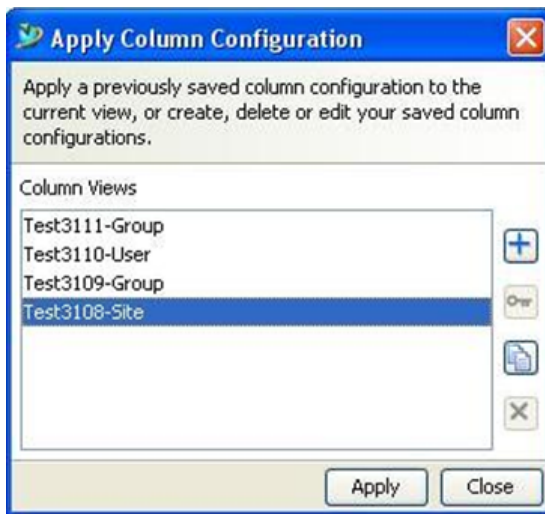
4. Click **Save**.

Teamcenter creates a column configuration and saves it for the chosen scope.

Apply column configuration

1. Right-click the column header and choose **Apply Column Configuration**.

The **Apply Column Configuration** dialog box appears with the column configurations available to you, your group, or site.



2. Select the column configuration name you want to apply to the tree table and click **Apply**.

Teamcenter applies the column configuration to the tree table and adjusts the columns in the Structure Manager window according to the applied configuration.

3. Close Structure Manager and then reopen it again to verify that the correct column configuration is applied.

Update column configuration

1. Right-click the column header and choose **Apply Column Configuration**.

The **Apply Column Configuration** dialog box opens.

2. Select the column configuration name depending on your role.

Note:

If you are a site administrator, select the site column configuration name. If you are a group administrator, select the group column configuration name. If you are not an administrator, select the user column configuration name.

3. Click **Modify** to modify the column configuration.

The **Change Columns** dialog box opens, allowing you to update the selected configuration.

4. When you have updated the column configuration, click **Apply**.

Teamcenter updates the column configuration for the current and future sessions.

Delete column configuration

1. Right-click the column header and choose **Apply a Column Configuration**.

The **Apply Column Configuration** dialog box appears.

2. Select the column configuration name depending on your role.

Note:

If you are a site administrator, select the site column configuration name. If you are a group administrator, select the group column configuration name. If you are not an administrator, select the user column configuration name.

3. Click **Delete**  to delete the column configuration.

Teamcenter displays the **Delete Column Configuration** dialog box.

4. Click **Yes** to confirm deletion of the selected column configuration.

Freeze columns

You can freeze selected columns on the left of the pane, so they are always visible when you scroll horizontally, for example, making the item name and number visible while you browse other properties.

1. Right-click the table header and choose **Freeze Column(s)**.

Structure Manager displays the **Freeze Columns** dialog box.

2. Select the number of columns you want to freeze and click **OK**.

Structure Manager freezes the selected number of columns on the left. You can scroll the remaining columns horizontally.

Note:

Setting the **BOM_Frozen_Column_Count** preference to a positive integer (n) also freezes the specified number of columns. If you change the number of columns in the **Freeze Columns** dialog box, Teamcenter resets the preference value to match the specified number of columns.

Tip:

You should always leave at least one column unfrozen, so that vertical scroll bars are available. This configuration provides easier navigation, especially if you are comparing structures in a split window. If you try to remove the last unfrozen column, Teamcenter displays a **Cannot delete the last column outside of the frozen area** error message.

Note:

If you reset the **BOM_Frozen_Column_count** preference to **0**, no columns are frozen.

This preference freezes a specified number of columns independently of the selected column configuration. You cannot freeze specific columns.

When you set a number of frozen columns for the first time, you should restart Structure Manager for the selection to take effect. If you do not restart Structure Manager and try to set another value, Teamcenter displays the earlier value in the dialog box. If you previously froze columns, it is not necessary to restart Structure Manager.

If you open more than one structure pane in Structure Manager, the same number of columns are frozen in each pane.

View properties

- To view the properties of a selected line in the product structure tree, click **Properties**  on the toolbar or choose **View→Properties**.

Teamcenter displays the **Properties** dialog box containing the properties of the selected line.

- To view the properties of a selected line in the viewer, hover the mouse over the part and Teamcenter displays selected properties in a tool tip.

To configure the display of properties in the viewer:

- Edit or add the following entries in the **client_specific.properties** file:

```
ViewerMouseHoverEnable=true
```

```
ViewerPartInfoProperties=bl_item_item_id,bl_config_string,bl_all_no  
tes
```

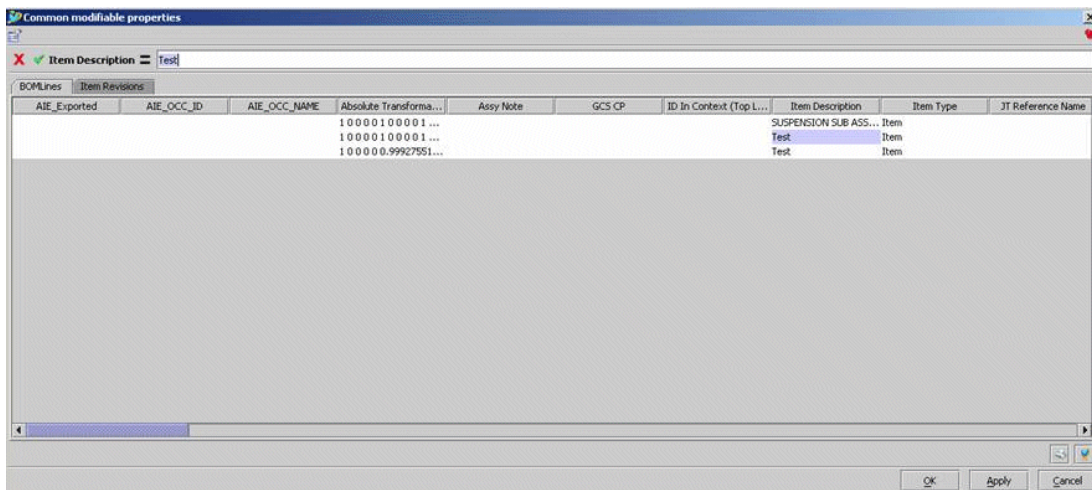
where **ViewerPartInfoProperties** contains a comma-delimited list of properties to display.

- Run the **genregxml** utility to register your changes.
- Restart the rich client.

Modify common properties

- Select the lines representing items or item revisions in the product structure whose properties you want to modify and choose **View→Properties**.

Teamcenter displays the **Common Modifiable Properties** dialog box, as shown in the following example.



Note:

If you select a single structure line, Teamcenter displays the **Properties** dialog box containing the properties of the selected line.

In the example, the **Absolute Transformation**, **Item Description**, and **Item Type** properties are common and can be modified. The other properties are unique to each line and cannot be modified here; however, you can **modify a single modifiable property in place**.

It is not necessary to check out the source object if you want to modify properties.

2. Click the **BOM Lines** tab in the dialog box. This tab shows the common modifiable properties of the items corresponding to the selected lines. Select the property you want to change and enter its new value in the text box.

In the example, the **Item Description** property is selected and is modified to the value of **Test**.

When the correct replacement value is shown in the text box, click the  button to complete the change. Alternatively, you can click the  button to clear (delete) the current value.

Click the  button to display the **Find/Replace** dialog box that allows you to search for any property value.

3. Click the **Item Revisions** tab in the dialog box. This tab shows the common modifiable properties of the item revisions corresponding to the selected lines. Repeat the process given in the previous step to update the values of common modifiable properties of item revisions.
4. Click **OK** or **Apply** to update the properties of the selected items and item revisions.
5. To commit the changes to the database, choose **File→Save**.

Note:

The pending edit markup option highlights some occurrence property edits, including edits to the occurrence name, find number, reference designator, quantity, unit of measure, notes, variant conditions, and occurrence type. However, absolute occurrence (in-context) edits are not highlighted.

Note:

If you select multiple lines, Teamcenter displays the common properties of the selected objects. If you edit any of the common properties and then click **OK** or **Apply**, Teamcenter saves the property

changes to the database but does not update the dialog box. To display the property changes, choose **View→Refresh window**.

Tip:

If you want to modify a common property for several but not all lines, copy the required value, right-click each line in turn, and then choose **Paste Property**.

If you have a large number of property columns to modify, it may be easier to export the structure lines to Microsoft live Excel, make the necessary edits, and then import the modified data back to Structure Manager.

Editing a single property in place

Editing a single property in place

You can edit a single modifiable property *in place* by double-clicking the appropriate cell in the properties list and entering the new value. Changes made in this way are immediately committed to the database, together with the associated item or item revision.

Property values you can edit include the find number and reference designator. Find numbers and reference designators can only be edited if the product structure is unpacked. Teamcenter verifies a reference designator is in the correct format after editing; examples of the acceptable formats are **C1** or **SKA21**.

Note:

Editing of certain properties may not be permitted, even though selection of the associated cells is not disabled. If you try to edit such a property, Teamcenter displays an error message, indicating the cell cannot be edited.

You cannot edit occurrence note types in this way.

Tip:

If you want to modify a common property for several, but not all lines, copy the required value, right-click each line in turn, and then choose **Paste Property**.

Edit find numbers

The components in a single-level assembly can be arranged by find number if you click the appropriate column header in the properties table. If you edit a find number in such a way that the order of the structure components must be changed, they are not reordered until you collapse and expand the particular structure or open it in a new window.

If you change the find number of packed lines, this action changes the find number of all the packed lines.

Edit quantities

If you edit a quantity, Teamcenter enforces the following restrictions:

- If the quantity is a property of an item that has no unit of measure defined or has a unit of measure of **Each**, the value must be a whole number.
- If the quantity is a property of an item that has a unit of measure defined, you can enter a whole number. You can also enter an **A/R** string (case insensitive) to indicate *as-required*; you can abbreviate this entry to **a**.
- By default, you can specify quantities to two decimal places. However, your administrator can edit the **Displayed_Decimals_for_Qty** preference to change this restriction.

You cannot edit the quantity on lines that are packed.

Creating structure properties rollup reports

Creating structure properties rollup reports

A *rollup* is a recursive calculation of selected properties of all children of a selected line in the structure. For example, you can create rollup reports of the mass, center of mass, or moments and products of inertia for a particular assembly.

You can also create and view rollup reports periodically or in batches with the **bom_roll_up_report** utility. Teamcenter creates these reports as XML files and attaches them to a **Roll Up Report** dataset. The rollup process unpacks the BOM before doing any calculations.

- You can generate mass and center of mass reports from Teamcenter from data stored in NX, as an alternative to generating the report directly from NX. To do this, you must first define the necessary compound properties and rollup templates. (Teamcenter does not provide the necessary rollup templates or store NX mass compound properties in the database.) You may encounter issues if you try to create a rollup report using compound properties that are defined on the BOM line. Consequently, Siemens Digital Industries Software recommends that you define the compound properties on the item revision or on your custom item revision type.
- Use the **Input Accuracy** column to determine if the properties of the line being rolled up are used as-is or calculated from the rolled-up values of its children (asserted). This column supports NX, but you can use it with any other system that permits you to choose between asserted values at an assembly level or values derived from the values of its children. NX allows you to assert static mass property values on its parts.

If you do this, the **accuracy** property on the **UGPartMassPropsForm** form that is attached to the **UGMASTER** dataset in Teamcenter is set to **-1.0**. The value of the **accuracy** property determines whether the rollup process calculates the values of specific assembly levels. To do this, create a compound property that represents the **accuracy** property on the **UGPartMassPropsForm** form and then apply that compound property to the **Input Accuracy** column.

The **Input Accuracy** column is available on the **Summation**, **Center of Mass**, and **Inertia** calculation tabs of the **Roll up Report Templates** dialog box.

- The formulas used to determine center of mass and moments/products of inertia depend on the use of **bl_plmxml_abs_xform** in the **Input Transformation Matrix** column in both the center of mass and moments/products of inertia templates.

Use **bl_plmxml_abs_xform** in the **Input Transformation Matrix** column.

Note:

Use the **ROLL_UP_QUANTITY_FLAG** preference to define if the rollup calculation takes the quantity into account. However, you cannot rollup the quantity itself.

For example, if the quantity on a line is **2**, the value is doubled for both the line and the substructure. If this preference is set to **true**, the quantity is included in the summation; if it is set to **false**, the quantity is excluded. Quantity applies only to rollups of mass. By default, this preference does not exist in the system and must be created if required.

Substitutes are not included in rollup reports.

Create a structure rollup report template

To define the standard content of structure rollup reports, you create templates in the rich client.

To create a template, you must be a member of an appropriate group. To create, edit, or delete a *Site* template, you must be a member of the **DBA** group. To create, edit, or delete a *Group* template, you must be a member of that same, specific group. You can create, edit, or delete your own user templates.

Note:

A member of the **DBA** group can create, edit, or delete group or user templates if bypass is turned on.

To create a structure rollup report template:

1. In the rich client, choose **Tools→Rollup Reports→Templates**.
2. In the **Roll Up Template Manager** dialog box, optionally select an existing template in the **Templates** list to use as the basis of the new template.

You can select only from the templates that your group has permission to modify.

3. Enter the template name or change the name of the preloaded template. The template name must be unique within the group.
4. Enter a template description, which Teamcenter uses as the name of the rollup dataset, for example, *<Item_ID> <Rev_ID> <RT_name> <RT_date> <RT_Mass Total>*.
5. Check one of the **Scope** options to indicate which users have access to the template—**Site**, **Group**, or **User**.
6. Enter a delimiter character to use between data fields if this report is exported to a text file or to an Excel file.

The default delimiter character is a tab, which works correctly in the case of a text file. However, in the case of an Excel file, you must change the delimiter character to a comma (.). If you do not do this, the data columns do not display correctly in Excel.

7. Add or delete **Summation**, **Center of Mass**, and **Moments/Products** calculations for any relevant structure line property.
8. Add or delete any other properties to include in the rollup report in the **Reference** box. Referenced properties are not included in rollup calculations.
9. Click **OK** or **Apply** to save the new template in the database.

Caution:

While creating a rollup report template, if you specify **Pack Count** (bl_pack_count) as a summation property, you get correct rollup results for the occurrences only with unpacked structure elements. Therefore, you must unpack the structure elements and then generate a rollup report to get the correct number of occurrences.

Create a structure rollup report

1. Select the top-level line of the product or assembly.
2. Choose **Tools→Rollup Reports→Create**.

Teamcenter displays the **Create Roll Up Report** dialog box.

3. Enter the name of the generated report in the **Name** box. By default, the name is generated from that of the root item revision.
4. Optionally, edit the description of the report in the **Description** box. The description is generated from the report template and typically is not changed.

5. Enter the delimiter to use if this report is exported to a text file. The default character is a tab character.

Note:

If you intend to open the report in Microsoft Excel, change the default delimiter character to a comma (,). If you leave the default delimiter as a tab, the data columns do not display correctly in Excel.

6. Choose the name of the report template to use from the **Template** list.
7. Optionally, select the name of the destination directory for the report in the **Output Folder** box. By default, this is blank.
8. Click **OK** to generate the report.

Teamcenter saves the report in a rollup dataset. The dataset is attached to the item revision of the root line of the report, if you did not select an output folder in the previous step.

View or edit a structure rollup report

Choose **Tools→Rollup Reports→View/Edit** and Teamcenter displays a list of reports you can select.

The report contains the following data fields:

- **Roll Up Reports**

Lists all reports attached to the item revision. For each report, complete information is shown for the top level line, allowing you to identify its content without opening the report. To show the details in the selected report, click **Details**.

- **Details**

Shows the detailed content of the selected report.

To create a new report based on the information in the current report, click **Create**.

Export a structure rollup report

1. Choose **Tools→Rollup Reports→View/Edit**.

Teamcenter displays a list of available reports.

2. Select a report and click **Export**.

Teamcenter displays the **Export** dialog box.

- Enter or browse to the desired destination directory, then click **OK**.

Teamcenter exports the content of the report in a text file to the operating system.

Using the Variant Formula property

Effective from Teamcenter 8.2, a new BOM line property with a system name of **bl_formula** and a display name in the English locale of **Variant Formula** allows you to view and edit variant expressions. To achieve best performance, Siemens Digital Industries Software recommends you reconfigure your list of displayed BOM line properties in structure editor applications by replacing the existing **bl_variant_condition** property (English locale display name **Variant Conditions**) with this new property. Teamcenter continues to support the **Variant Conditions** BOM line property but, to compute the property text value from new style variant expressions, it must convert the new variant expression into the old variant data model. This conversion eliminates the performance and memory footprint benefits of the new variant data model. (If you avoid the computation of the old style variant expression data format in this way, you typically reduce the number of objects in memory by several million).

Note:

The new **Variant Formula** property is available only if you enable the new data model.

You can edit the new **Variant Formula** BOM line property in the usual way, by double-clicking the cell to display the **Edit Variant Condition** dialog window. When you do this, Teamcenter converts the variant expression into the old data model; however, the performance impact is more limited as only data for the selected BOM line is converted.

The differences between the old and new BOM line properties are shown in the following table.

	Old Variant Conditions property	New Variant Formula property
English locale display name	Variant Conditions	Variant Formula
Internationalization property name key	bl_variant_condition	bl_formula
Operator precedence and associativity	All Boolean operators have the same precedence. All operators are <i>left-associative</i> , that is, A OR B AND A = (A OR B) AND A .	NOT (!) is higher than AND (&) ; AND (&) higher than OR (!) . That is, A OR B AND A = A OR (B AND A) .
Internationalization value	Yes	No. Operators are represented by static icons.
		Equal =
		Not equal !=

Old Variant Conditions property		New Variant Formula property	
	English value	Greater than	>
I18N key		Less than	<
k_variant_op_is_equal	=	Greater than or equal	>=
k_variant_op_not_equal	!=	Less than or equal	<=
k_variant_op_gt	>	AND	&
k_variant_op_lt	<	OR	
k_variant_op_gt_eq	>=	Not	!
k_variant_op_lt_eq	<=		
k_variant_op_and	AND		
k_variant_op_or	OR		
k_variant_op_not	NOT		

Decodable text values	No. A text value may not always be parsed back into its variant expression. For example, a value name of 4 AND[Item]Fam = val (a 21 character value) would give parsing errors. Also, it may give syntax errors in locales other than English.	Yes. A text value may be parsed back into its variant expression. For example, you can enclose a value name of 4 AND[Item]Fam = val (a 21 character value) in single quotes to pause special character interpretation when parsing. The text value uses the following punctuation marks:
		[Left square bracket Begin option family name space (owning item ID).
		] Right square bracket End option family name space (owning item ID).
		(Left parentheses Begin overriding normal precedence.

Old Variant Conditions property		New Variant Formula property	
		)	Right parenthesis End overriding normal precedence.
		'	Single quote Pause or resume interpretation.
		\	Escape Do not interpret next character.
PSE_show_option_item_prefix preference	The owning option item is suppressed if this preference is turned off.	The owning option item is suppressed if this preference is turned off and the variant option family is unique in the context of the top-level item revision of a BOM window.	
PSE_show_option_family_prefix preference	Not supported.	The variant option family name is suppressed if the preference is turned off and the variant option value is unique in the context of the top-level item revision of a BOM window.	

Note:

If you use the **Variant Conditions** property, the owning option item is suppressed if this preference is turned off. If you use the **Variant Formula** property, the owning option item is suppressed if this preference is turned off *and* the variant option family is unique in the context of the top-level item revision of a BOM window.

Even when the preference is turned off, the owning option item may not be suppressed in certain situations to avoid ambiguity in the resulting formula expression. For example, this may be necessary when an option is defined on an intermediate assembly but is not defined on the top assembly.

Modify AND and OR operators in variant conditions

1. In your Teamcenter installation directory, search for the **tc_text_locale.xml** file, for example, `TC_ROOT\lang\textserver\en_US\tc_text_locale.xml`.
2. Create a backup of this file.
3. Open the file and search for the **k_variant_op_and** and **k_variant_op_or** values and modify them.

Example:

```
<key id="k_variant_op_and">AND</key>
<key id="k_variant_op_or">OR</key>
```

Change as follows:

```
<key id="k_variant_op_and">&</key>
<key id="k_variant_op_or">|</key>
```

4. Start Teamcenter and confirm that formula representation is now changed from **AND, OR** to **&, |** successfully.

Displaying occurrence notes

Displaying occurrence notes

You can display selected occurrence note types or the text of all available notes.

Note:

Do not confuse notes that are attached to an occurrence with standard notes and custom notes attached to an item or item revision.

Display a single note type

You can configure the displayed columns to show only those containing those occurrence note types you want to see. You can specify any of the note types created by your Teamcenter administrator for the site.

Display the all notes column

Typically only one occurrence note is attached to each component. However, if you use a large number of note types, providing a column for each note type occupies a great deal of space in the window. In this situation, use the **All Notes** column to display notes of any type.

If a component only has one note, the **All Notes** column shows the text of the note, preceded by the name of the note type and a colon. If the component has several notes, the column shows a comma-separated list of the note types.

Editing and copying occurrence notes

Editing and copying occurrence notes

Your Teamcenter administrator creates all the occurrence note types required for your site, for example, a note type to contain assembly cost and another for a torque value. You can make use of any of these note types to specify a value for a particular occurrence line in the structure.

Notes are occurrence properties, and you should not use them to specify attributes of an item, for example, revision or material.

Note:

There are a number of special occurrence note types that are used by Teamcenter Integration for NX, for example, **NX REF SET**.

For more information, see the *Teamcenter Integration for NX* documentation in the NX Help.

You can edit an occurrence note in the same way as any other property, except for the **All Notes** property.

Set the value of an occurrence note

When you create an occurrence note in the Structure Manager window on a particular line, Teamcenter populates the value of the corresponding note with the default value of the note type, if one exists. If a list of values (LOV)  is attached to the note type, you can select a value from the list when you create a note.

Note:

You must have write access to the BOM view revision. Otherwise, you can only browse existing occurrence notes not add, remove, or edit notes.

1. Select the appropriate line in the product structure.
2. Choose **View→Notes** or click the **Add/Edit Notes** button  on the toolbar, or double-click the **All Notes** column in the properties table.

Teamcenter displays the Notes editor.

3. In the Notes editor, choose the **Existing Notes List of Values** option and select an existing note to view or edit. Alternatively, choose the **Create List of Values** option to add a new note type.

If the note has a list of values (LOV), select the appropriate value from the list.

A default value may initially be selected in the LOV. The default value is *not* set on the note until you actually create the note.

To change the default value of a note:

- a. Select a structure line that represents an occurrence and the corresponding column for the note.
- b. Click the **Add or Edit Notes** button .

Teamcenter displays the **Notes** dialog box.

- c. In the **Notes** dialog box, set a value manually or choose from the LOV.
4. Enter a note of up to 160 characters, depending on the particular note type.
5. Repeat steps 3 and 4 for more note types if required.
6. Click **OK** to apply your changes or click **Cancel** to exit.
7. Choose **File→Save** to commit the changes to the database.

Remove a note

Click **Remove** if you want to delete the currently displayed note.

Copy a note

1. Select the line with the note text you want to copy. You can select any point on the line, not necessarily the note type cell itself.
2. Right-click the selected line over the cell containing the note you want to copy.

Teamcenter displays the structure line shortcut menu.

3. From the shortcut menu, choose **Copy** to copy the contents of the occurrence to the clipboard. You can also use the Ctrl+C shortcut keys.
4. Right-click the cell of the note type of the target line where you want to copy the occurrence.

Teamcenter displays the structure line shortcut menu.

5. From the shortcut menu, choose **Paste Property** to complete copying the occurrence.

Note:

There is no shortcut for the paste action; you cannot use Ctrl+V.

Viewing packed notes

If a set of occurrences is packed and any of the occurrences has notes, any notes columns display **Packed notes** for the packed line. You cannot edit the packed notes.

Tracking occurrence note changes

Teamcenter creates structure change records for occurrence note changes when changes to the structure are saved, if the **CM_note_types_to_track** preference is set accordingly. Occurrences note changes are also tracked in the appearance cache (if used) if you set mapped attributes.

7. Visualizing product structure

Visualizing product structure

You can visualize the structure of the product from Structure Manager in one of two ways—with the embedded viewer or the stand-alone Teamcenter lifecycle visualization product. The embedded viewer allows you to visualize the product structure in the same way as with the stand-alone Teamcenter lifecycle visualization, but within the **Viewer** tab of the data panel. If you want to use the enhanced Lifecycle Visualization capabilities of Teamcenter lifecycle visualization or the embedded viewer, you must purchase and install the necessary additional licenses.

Using standalone Lifecycle Visualization

Depending on how standalone Lifecycle Visualization is installed and configured for use with your rich client applications, one of the following levels of functionality is available to you:

Teamcenter lifecycle visualization base

Teamcenter lifecycle visualization standard

Teamcenter lifecycle visualization professional

Teamcenter lifecycle visualization mockup

Lifecycle Visualization is integrated with the rich client and enables you to view 2D formats, such as GIF, JPEG, CGM, and PNG files, as well as 3D formats, such as JT files.

JT file translators are required to generate 3D-format JT files. For example, the **ugtopv** translators shipped with the NX software translate **UGMASTER** datasets and create JT files in the database.

You can view the following 3D format or 2D format files:

- **DirectModel**

Imported JT files or JT files created by the translators

- **DirectModelMotion**

Imported **VisMovieCapture** files.

- **DirectModelMarkup**

Captured image of a **DirectModel** dataset

- **DrawingSheets** and **Markup**

Imported CGM files

- **Image**

Imported files in formats such as TIFF, GIF, and JPEG.

To view the properties of an assembly or component JT file, right-click the line to which the file is attached and choose **Show JT Attributes**.

Viewing a structure in Lifecycle Visualization

You can open a structure in stand-alone Lifecycle Visualization (if installed) by selecting the top-level assembly and choosing **File→Open in Lifecycle Visualization**.

When you use stand-alone Lifecycle Visualization, a viewing window opens containing the structure or assembly. To the left of this viewing window is a project workspace window that is a pane containing a tree display with buttons along the bottom. These buttons allow you to choose the context in which you are working, including assembly context (**View Structure Tree**), PMI context (**View PMI Tree**), snapshot context (**View Snapshots**), and cross-section context (**View Section Tree**).

By default, the **Open in Lifecycle Visualization** button and menu command are not visible in Structure Manager. You must set the `TC_show_open_in_vmu_button` preference to **on** to make them visible.

Lifecycle Visualization must be purchased separately and is not provided with Teamcenter.

Note:

If Lifecycle Visualization and Teamcenter are on same machine, a **libsyss.dll** conflict can occur. To avoid this conflict, turn off Lifecycle Visualization when you perform a batch run.

For more information about using stand-alone Lifecycle Visualization, see the Lifecycle Visualization online help.

Using the embedded viewer

Using the embedded viewer

The embedded viewer is available when you click the **Graphics** tab in Structure Manager and allows you to view graphics attached to assemblies and components in the structure tree. The embedded viewer provides a similar visualization capability as the **View Structure Tree** context in stand-alone Lifecycle Visualization; consequently, you can complete most visualization procedures in stand-alone Lifecycle Visualization or in the embedded viewer. Typically, you use the embedded viewer in Structure Manager to visualize 3D assemblies or structures.

Note:

If a **UG ALTREP** occurrence note type is attached to the selected structure line, you visualize the underlying item revision that is associated with the **UGALTREP** dataset with an **IMAN_UG_altrep** relationship. The dataset must also have the same name as the name defined in the **UG ALTREP** occurrence note. (The **UGALTREP** dataset does not have to be the same **ALTREP** but it must have the same name.) If the **UG ALTREP** occurrence note does not exist or the **UGALTREP** dataset is not found, the item revision's **IMAN_Rendering** relationship with the **DirectModel** dataset defines the visualization.

If a revision rule is applied and the current revision does not contain an **UGALTREP** dataset with the same name as the one used in the assembly, the **ALTREP** is not displayed in the **Graphics** panel.

You can also view and mark up schematic diagrams in the viewer, including electrical routing, hydraulic, and piping diagrams. To view schematics, the administrator sets a site preference to the corresponding view type, for example, **Piping System View**. If this preference is not set, you can only view 2D and 3D images.

When in schematic mode, the following features are available:

- Selection
- Visualize components

Depending on your authoring tool, some parts of a schematic may be displayed as JT geometries (blocks) that represent the components.

- Preferences
- Zoom
- Pan
- Seek
- View All
- Rubber band
- Image capture
- Product views
- Print
- Measure
- Markup

You can anchor markups to any appropriate component type.

The following standard Lifecycle Visualization features are not available in schematic mode:

- Edit color/translucency
- Insert
- View control
- Export 3D
- Repositioning
- Rotation

- PMI
- Clearance analysis
- Cross section
- Navigation
- Visibility

Structure Manager viewer

The viewer embedded in Structure Manager is available within the **Viewer** tab of the data pane. The viewer allows you to view JT files attached to assemblies and components in the structure tree when you are viewing and editing a product structure.

Visualization use cases

- View 3D assemblies or structures.
- View subcomponents in an assembly.
- Compare product structures.
- Create and save product views.

Visualization tools available

- **3D Alignment**

Align parts with other parts in the viewing window.

- **3D Appearance**

Change the appearance of 3D models.

- **3D Clearance**

Check the clearance of parts in 3D models.

- **3D Comparison**

Compare the geometry of two sets of parts.

- **3D Coordinate System**

Create and align parts to local coordinate systems.

- **3D GDT Markup**

Create 3D GD&T markups.

- **3D Manipulators**

Transform 3D models.

- **3D Markup**

Create 3D markups.

- **3D Measurement**

Perform 3D measurements.

- **3D Movie Capture**

Capture your actions in the 3D viewing window as movie files.

- **3D Navigation**

Pan, rotate, and zoom 3D models.

- **3D PMI**

View and manipulate PMI in your model.

Note:

PMI functionality is available only when PMI is enabled on your system. If PMI is enabled, you can right-click a part and choose one of the following commands:

- **Show PMI**

Shows all effective PMI on the selected part or subassembly and its children.

- **Toggle in PMI Tree**

Adds PMI from the selected part or subassembly and its children to the PMI tree. Alternatively, if the part or subassembly is already in the PMI tree, Teamcenter removes it.

- **3D Section**

Create 3D cross sections.

- **3D Selection**

Select parts and pick part entities.

- **3D Standard Views**

Examine your model from preset viewing angles.

- **3D Thrustline Editor**

Create and manipulate thrustlines.

- **3D Visibility**

Hide obscuring parts and clip areas of your model.

Configuring a viewer cache

To display structures in the embedded viewer, you must create the corresponding JT file and store it in the Teamcenter file system. To optimize performance, Teamcenter saves the JT file in a *cache* directory. Whenever you view the image after the initial request, Teamcenter obtains the file from the cache directory, rather than recopying it from the Teamcenter file system. By default, the cache directory is the Java system temporary directory of the workstation, but you can specify a different cache directory using the **PortalViewer_Cache** property. Typically, the cache directory is set to a local directory, but it can be set to a shared directory (for example, an NFS mounted directory) so that multiple users can share the same set of cached JT files.

Opening the structure

You can view a structure if a **DirectModel** dataset is attached to the associated item revision by choosing **View→Show/Hide Data Panel** and clicking the **Graphics** tab. Alternatively, you can click the **Show/Hide Data Panel** button  on the toolbar.

The selected lines in the structure tree are now shown with a check box on the left of the node. These check boxes allow you to control the lines that are displayed in the viewer. By default, they are all not selected. To modify the view, you can:

- Select the check box for the top-level line in the structure to load the graphics for every line in the structure, that is, view the entire structure.
- Select the check boxes only on those lines for which you want to load the graphics, that is, view a selected part of the structure.
- Select the check box on the line for a piece part to view only the part.
- Select the check box on a line representing an assembly to load the graphics and view the assembly.
- Clear the check boxes to blank the graphics to hide the entire structure.

Note:

If you applied a variant rule to the structure and unconfigured components are hidden, the graphics for the unconfigured lines are not loaded when you select the check box for the top-level item or an assembly.

When you edit the structure in the tree (for example, adding, removing, or substituting a part or assembly), the view is updated to reflect the changes. When you remove, replace, or substitute a part or assembly, Teamcenter unloads the selected item from the viewer if it is loaded. When you add a part or assembly to the structure, Teamcenter does not automatically display the selected item in the viewer, but adds to the structure tree, allowing you to load it manually.

If a part occurrence has more than one design representation associated with it, the primary published design is shown in the viewer.

Refresh the embedded viewer

You can refresh the viewer when the active 3D dataset or BOM line is modified outside the rich client in an external application such as NX.

- To refresh a part or a subassembly, right-click the appropriate line and choose **Refresh**.

If the current view is exploded, Teamcenter displays a confirmation dialog box, allowing you to save changes. Otherwise, it updates the scene to reflect changed parts, properties and referenced objects.

Note:

Only the selected line is refreshed, not the entire assembly.

- To refresh the geometry associated with the entire structure tree, choose **View → Refresh Window**.

If the current view is exploded, Teamcenter displays a confirmation dialog box, allowing you to save changes. Otherwise, it updates the scene to reflect changed parts, properties and referenced objects.

Working with visual reports

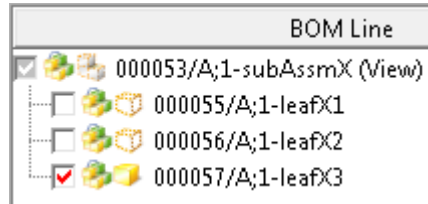
Teamcenter supports using visual reports in the embedded viewers, for example, Structure Manager and CAE Manager. You configure visual reports to quickly display and analyze part and BOM line attributes. You can create search queries using conditions and regular expression language. To create the structure of your search, specify part and BOM line attributes and their values. Then apply the report rules, so you can see matched and unmatched parts in the viewing window. Optionally, you can then save your visual report to the local file system, to a server, or to the Teamcenter database. For Teamcenter, you can also use Classification to specify how you want to sort and save visual reports for later use.

Understanding the structure tree

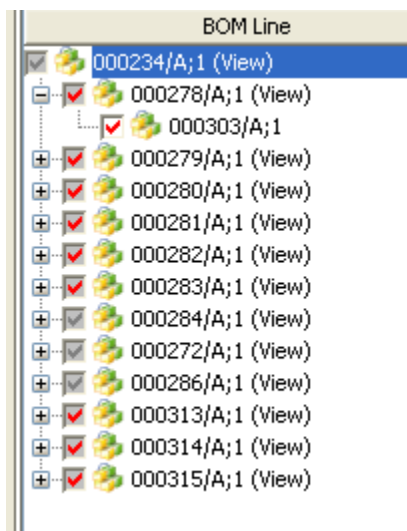
When you open the structure in the embedded viewer, the structure tree contains different icons and information to that available when you select other tabs. These icons show the state of a node, as follows:

Icon	Indicates
	The part or assembly is fully loaded and all geometry is visible. This icon appears for an assembly even when some parts in the assembly intentionally have no associated geometry, as indicated by  (see below).
	The part or assembly is loaded but not visible.
	The part or assembly is not loaded.
	Some parts of the assembly are loaded and some of the parts with associated geometry are visible (assembly only).
	The assembly is loaded and some of the parts with associated geometry are visible (assembly only). The assembly may have some parts for which the part geometry failed to load ().
	No geometry (JT file) is associated with the part. This represents parts for which no geometry has been added. This does not represent geometry that fails to load. For example, an assembly references a new BOM line that does not have a JT representation. Either the file has not yet been translated or the item has only a placeholder for a part that has not yet been designed.
	New. This icon may appear when you compare the current assembly with an assembly that you saved in a session file.
	A file containing part geometry (.jt file) could not be opened. This icon appears when the assembly references a .jt file that for some reason is not accessible; for example, it has been deleted. This icon appears for parts with geometry that fails to load, not parts that are intentionally without geometry, as indicated by .

Icon	Indicates
	When the embedded Graphics viewer is open, a transparent yellow icon indicates a part has JT dataset attached to it.
	When you load the part into the Graphics viewer, this icon becomes solid yellow.
	When the embedded Graphics viewer is open, a transparent yellow icon indicates the assembly or its child part has a JT dataset attached.



Select the check boxes next to the components in the tree that you want to display. If you select the root item, the entire structure is displayed, for example:



Synchronizing the structure tree and the viewer

The viewer is synchronized to the structure tree, allowing you to visually associate the geometry for a part or assembly with its location in the structure.

When the graphics are loaded, you can click an object in the viewer and Teamcenter highlights the corresponding part or assembly in the structure tree. Similarly, you can click a line in the structure tree and Teamcenter highlights the corresponding part in the viewer.

Note:

You can use the **Fly To Selected** command on the shortcut menu in the viewer to help locate a part. For example, if you highlight a line in the structure tree, but cannot see the corresponding part in the viewer, choose **Fly To Selected** and the viewer changes its scale and orientation so that the selected part is prominent in the graphics window.

When you open 3D model files, two types of information are available: a textual representation of the model assembly and a visual representation of the geometry. The assembly structure appears in the tree and the geometry appears in the viewer.

When you open a **DirectModel** (JT) assembly file that consists of more than one part, the model assembly is loaded, but the geometry is not automatically displayed in the viewer. This is because assemblies often consist of hundreds or even thousands of parts, and it often takes a long time to load the geometry of such complex models. Because only the assembly is initially displayed, you can turn on only the parts you want to view, and preserve system resources. When you open a model that contains a single part, the part is loaded and displayed immediately.

Isolate parts for viewing

You can remove unwanted parts from the viewer, isolating the part of interest:

1. Select one or more the parts you want to see in the viewer and deselect unwanted parts.
2. Choose **Graphics→Visibility→View Selected** and Teamcenter blanks all unwanted visible parts and shows only the selected parts. Alternatively, you can right-click required parts in the viewer and choose **View Selected**.

Generate an outline image

Generate an outline image

You can generate an outline image of a 3D object in the viewer, as follows:

1. Click the **Capture 2D Image** button on the viewer toolbar and Teamcenter displays the **Image Capture** dialog box.
2. In the **Image Capture** dialog box, select the type of 2D image file you want to generate and click **Apply** or **OK**. Teamcenter calculates the 2D outline image and an outline progress meter displays the current status during this process.

To create a hidden line image, select the **Outline** type from the **File Type** list, enter a name for the dataset under which the outline image is stored, and optionally enter an description of the dataset.

- On completion, Teamcenter attaches the 2D outline image in a CGM (Computer Graphics Metafile) file to a **DirectModelMarkup** dataset and places it in the **NewStuff** folder. You can then view and mark up this dataset in My Teamcenter.

To view the 2D markup, you must first create a markup dataset on top of the 2D image by clicking the **Open File** button on the toolbar.

Set parameters to calculate the 2D outline image

You can set the various parameters Teamcenter uses to calculate the 2D outline (hidden line) image:

- Click the **Capture 2D Image** button on the viewer toolbar and Teamcenter displays the **Image Capture** dialog box.
- In the **Image Capture** dialog box, click the **HLR Prefs** button and Teamcenter displays **Outline Capture Preferences** dialog box. This button is disabled unless the file type is set to **Outline**.
- In the **Outline Capture Preferences** dialog box, set the commands as listed in the following table.

Menu command	Description
Remove Hidden Lines	If this command is selected, only the edges that are visible in the front of the model are displayed in the CGM image file. If this command is not selected, all lines are displayed.
Preserve Colors	If this command is selected, the lines in the CGM image have the same colors as their associated parts. If this command is not selected, the lines are displayed with the default 2D background color and line properties.
Line Thickness	Enter an integer value between 0 and 5 for the thickness of the outline; the larger the number, the thicker the lines.
Include Lines for Rounded Edges	Select this command to draw rounded edges. If this command is not selected, the only lines drawn are silhouette lines, horizon lines, and feature lines as defined by the feature angle.
Feature Angle	Enter a value between 0 and 180. If the angle between the normals of two adjacent surfaces equals or exceeds the specified feature angle, the two surfaces are considered separate features and the edge between them is drawn. If the angle between the normals of two adjacent surfaces is less than the specified feature angle, the two surfaces are considered one feature and the edge between them is not drawn. To draw more edges, decrease the feature angle.

Manipulate graphics

You can use transformation tools to graphically manipulate parts or assemblies in the structure.

You can perform two types of manipulations:

- Choose **Graphics→Transformation→Temporary Transformation** to temporarily translate, rotate, or scale parts or assemblies. You cannot save temporary transformations, but you can capture images of them.
- Choose **Graphics→Transformation→Persistent Transformation** to edit the structure by permanently translating and rotating parts or assemblies. (Scale option is not available.)

Note:

If there are arrangements in the structure, by default persistent transformations are applied to all of them. To limit persistent transformations to the active arrangement, set the **TCVIS_reposition_all_arrangements** preference to **False**.

The differences between performing a temporary transformation and editing the structure are listed in the following table.

Functionality	Temporary Transformation	Persistent Transformation (editing the structure)
Permanence	All changes are temporary. Teamcenter removes the modifications when you close the window.	Changes are permanent.
Repositioning options	All options are permitted.	All options are permitted except scaling.
Occurrences repositioning	Occurrences are not repositioned.	Occurrences are repositioned, potentially updating multiple BOM lines.

The **Temporary Transformation** dialog box provides the same options as the Lifecycle Viewer **Part Transformation** dialog box. The **Permanent Transformation** dialog box provides the same options, except for scaling.

Save the current session

You can save the current state of the viewer in a session file that you can reopen at a later time to resume your work. The session file contains:

- The top-level item revision in the structure window.

- The effective revision rules.
- The visibility state of individual parts or assemblies.
- New locations of parts moved when creating an exploded view.
- The current 3D viewing orientation and scale.

To save a session file, choose **File→Save Session**. Teamcenter displays the **Save Session** dialog box. You can specify the name and location of the new session file. Session files are stored in the file system with an extension of **.pses**.

Note:

By default, you cannot save a session file. To enable saving of sessions, set the **enableSessionFile** entry in your **customer.properties** file to **true**. If this file does not already exist, you should create it.

To open a saved session file, choose **File→Open Session**. Teamcenter displays the **Open Session** dialog box and an MRU (most recently used) list. Enter the name of the session file to open and Teamcenter displays the structure in a new viewer window that is configured in the same way as when the session file was originally saved.

Product view overview

About product views

You can save data in the assembly viewer, including current items, zoom factor, rotation angle, and pan displacements. You can retrieve a saved product view (sometimes called a *3D snapshot* or *snapshot view*) during a subsequent session or share it with other users. You can only save or retrieve product views when a base view structure is displayed in the viewer. You cannot create product views of occurrence groups.

You can create product views that contain one or more of the following:

- Collaboration contexts
- Structure contexts
- Configurator contexts
- Item revisions (structure lines)
- 2D and 3D NX CAD and Lifecycle Visualization files
- Motion (VFM) files

- Published documents, including work instructions

Each product view is stored in a dataset containing a thumbnail image file, a PLM XML session file, 3D markup layers, and the top-level item of the view.

You can configure the structure with revision rules, effectivity, variant rules, and similar techniques. If appropriate, you can use several **Show Unconfigured** menu commands to hide unconfigured objects in the structure and in the viewer. When product views are captured, these view selections are taken into account; otherwise, potentially unbuildable combinations of parts may be displayed when the view is restored. You can retrieve the original state of the menu commands and consequently the original state of the view.

If the product view is attached to a structure and the structure is cloned, the product view functions correctly in the new (clone) structure. Likewise, product views may be attached to a structure that is shared with Multi-Site Collaboration.

You can also update product views in the Lifecycle Viewer or stand-alone Lifecycle Visualization. You send a dynamic product view to one of these applications, and then create a new product view or update and replace the existing one. When you send the updated product view back to Teamcenter, you can open it in the assembly viewer.

Your Teamcenter administrator sets the size and presentation of the product views with system properties and preferences..

Note:

In Teamcenter 8.0, the file format of 3D product views changed. If you open a file that was created in an earlier Teamcenter version, it is automatically converted to the new format.

Create and save a product view

1. Adjust the content of the viewer window using the pan, rotate, eyeball, and zoom buttons to create the necessary scene.
2. Select an object in the structure base view window.
3. If necessary, right-click in the viewer menu bar and choose **Create Markup**.

Teamcenter displays the **Create Markup** toolbar.

4. Click **Create 3D Product Views**  on the **Create Markup** toolbar in the assembly viewer.

Teamcenter displays the **Product View Gallery** dialog box, which contains thumbnails of any previously saved product views that are associated with the selected object.

5. Do one of the following:

- Click **New Product View** .
- Right-click in the window and choose **Create New Product View**.

You are prompted to enter a name for the product view if the **Vis_PV_Show_Name_Dialog** user preference is set to **True**. If it set to **False**, Teamcenter generates a name automatically.

Teamcenter saves the product view and its configuration in a dataset. It also adds a thumbnail of the view to the **Product Views** dialog box.

Note:

Thumbnails of all product views are not visible at all times, only for those items related to the selected end item (the top entry in the structure window).

Configure and manage product views

1. Choose **Options**→**Visualization**→**Product View**.

Teamcenter displays the **Product View Creation Preferences** pane.

2. Set the following preferences as required:

Preference	Description
Geometry Asset	Determines whether a geometry asset file is added when a product view is created. This file is required if you want to export a PLM XML file of the product view. This option is equivalent to the Vis_PV_Geometry_Asset preference.
Show Product View name dialog	If selected, you are prompted for a name each time you create a product view. If not selected, Teamcenter generates the name automatically. This option is equivalent to the Vis_PV_Show_Name_Dialog preference.
View Toggle Warning Level	If selected, Teamcenter displays a warning or prevents you from continuing if you try to create a product view when one or more of the View menu commands to show unconfigured data is selected. This option is equivalent to the Vis_PV_InvalidConfigWarnLevel preference.
View Toggles to consider	Select the View menu commands to show unconfigured data that are considered if the View Toggle Warning Level option is selected. This option is equivalent to the VisPVBlockingViewToggles preference.

Preference	Description
Image Capture	Determines if Teamcenter saves a preview image of the 3D product view when it is created. If you choose Perform Image Capture (Using Image Export Dialog) , you are prompted for the settings to use. If you choose, Perform Image Capture (with preferences) , it uses values set in preferences. This option is equivalent to the Vis_PV_ImageCapture preference.
Image Format: Image Resolution, Width of image, and Height of image	Depending on the setting of the Image Capture option, these options may determine the file format, resolution, and size of the preview image. If Perform Image Capture (Using Image Export Dialog) is set, these options are disabled. These options are equivalent to the Vis_PV_ImageCaptureType , Vis_PV_ImageCaptureResolution , Vis_PV_ImageCaptureWidth , and Vis_PV_ImageCaptureHeight preferences, respectively.
Thumbnail: Width, Height, and Quality	Determine the size and resolution of the thumbnail image created for each product view. These options are equivalent to the Vis_PV_ThumbnailWidth , Vis_PV_ThumbnailHeight , and Vis_PV_ThumbnailQuality preferences, respectively.
Play motion in current view	If selected, any motion (VFM) file in the current product view plays when the view is selected. This option is equivalent to the Vis_PV_Play_Motion preference.
Configuration rule to use	Offers you two choices: • Use configuration from the current BOM ignores stored rules and preserves the configuration that was active before you applied the product view. • Use configuration from product view considers any arrangements, effectivity, variant rules, and revision rules stored with the product view when you apply it. This option is equivalent to the Vis_PV_HowTo_Configure_BOM preference.

Note:

Your administrator may configure these preferences with SITE or GROUP protection scope, rather than USER protection scope. If so, you may be able to view but not change the current settings.

- Right-click a selected product view thumbnail in the **Product View Gallery** dialog box.

Teamcenter displays a shortcut menu.

Note:

You can identify the currently selected product view by the green border (if checked out) or red border (if not checked out) around its thumbnail.

- Choose one of the following.

Command	Description
New Tab	Creates a new tab for the element currently selected in the structure. This tab is unavailable if no element is selected in the structure base view window.
Refresh Tab	Refreshes the currently selected tab in the product view gallery to reflect structure configuration changes.
Remove Tab	Removes the current tab from the dialog box.
Refresh All Tabs	Refreshes all the tabs in the product view gallery to reflect structure configuration changes.
Remove All Tabs	Removes all tabs from the dialog box.
Add 	Creates a new product view from the current contents of the viewer.
Apply	Applies the configuration of the selected product view to the viewer.
Delete 	Deletes the selected product view.
Update 	Refreshes the stored product view with changes made in the viewer. This command is enabled only if you check out the product view dataset.
Rename	Displays a dialog box that allows you to change the name and description of the selected product view. A product view name appears below each button; the description appears when the cursor is placed over the button. If you rename a product view, the order in which thumbnails are displayed in the Product View Gallery dialog box changes. Teamcenter generates the default name of a view from the date and time it was initially created. It lists available views in alphanumeric order. You can choose an appropriate new name to move the view up or down the list.

Command	Description
Enable Multiple Selection	Allows you to select more than one product view.
Options	Displays the Product View Creation Preferences pane.

Note:

If you right-click any part of the **Product View Gallery** dialog box (except one of the buttons) and no product view is selected, the menu commands to apply, update, rename, and delete the product view are unavailable.

Previewing product views

By default, Teamcenter provides a small 2D thumbnail image of the captured scene in the product views gallery. Optionally, you can create a high-quality 2D image that replaces the thumbnail and provides a higher resolution preview of the scene. The size, resolution, and format of the image file are defined in the following preferences.

- **Vis_PV_ImageCaptureWidth**

Defines the width, in pixels, of the preview image created when you save a product view. Teamcenter only uses this preference if the **Vis_PV_ImageCapture** preference is set to **CaptureUsingPrefs**. The valid values are positive integers from 1 to 1040, with a default value of 600.

- **Vis_PV_ImageCaptureHeight**

Defines the height, in pixels, of the preview image created when you save a product view. Teamcenter only uses this preference if the **Vis_PV_ImageCapture** preference is set to **CaptureUsingPrefs**. The valid values are positive integers from 1 to 1040, with a default value of 400.

- **Vis_PV_ImageCaptureType**

Defines the format of the preview image created when you save a product view. Teamcenter only uses this preference if the **Vis_PV_ImageCapture** preference is set to **CaptureUsingPrefs**. Valid values are **BMP 24bit**, **BMP 8bit**, **BMP BW**, **JPEG 24bit** (default), **PNG 24bit**, **PNG 8bit**, **PNG BW**, **TIFF 24bit**, **TIFF 8bit**, and **TIFF BW**.

- **Vis_PV_ImageCaptureResolution**

Defines the resolution of the preview image created when you save a product view. Teamcenter only uses this preference if the **Vis_PV_ImageCapture** preference is set to **CaptureUsingPrefs**. The valid values are positive integers from 1 (lowest resolution) to 1040 (highest resolution), with a default value of 250.

Note:

The width and height you specify must be the same as the source image, or you can increase or decrease both values by the same proportion. Teamcenter always preserves the aspect ratio of the graphics window to prevent distortion. Consequently, the resulting image dimensions may not exactly match the height and width values set in the properties file.

You can create high-quality images in any of the following file formats and resolutions:

- BMP 24-bit, 8-bit, or black and white
- JPEG 24-bit
- PNG 24-bit, 8-bit, or black and white
- TIFF 24-bit, 8-bit, or black and white

A high-resolution preview image can be captured automatically or **manually**, as follows:

- If the **Vis_PV_ImageCapture** preference is set to **CaptureUsingPrefs**, a high-quality 2D image is created automatically each time a product view is created or updated. The size and resolution of the image is derived from the preferences listed previously.
- If the **Vis_PV_ImageCapture** preference is set to **CaptureUsingDialog**, Teamcenter prompts you to create a high-quality 2D image each time you create or update a product view.

If the **Vis_PV_ImageCapture** preference is set to **NoImageCapture**, no high-quality images are created, and the thumbnail image is used in the gallery.

The preview image is stored in the snapshot dataset as a named reference.

When you update an existing product view, the old image is deleted. Depending on the setting of the **Vis_PV_ImageCapture** preference, it may be replaced by a new image.

Create product view preview manually

Note:

The menu commands described in this procedure are available only if the **Image Capture** option is set to **Perform Image Capture (using Image Export dialog)**. If you do not select this option, you cannot manually adjust the size, resolution and file format each time you create or update a product view.

1. Right-click a product view or the **Product View Gallery** tab and select **Image Capture**.

Teamcenter enables the capture of 2D images, as indicated by a check mark next to the menu command.

2. Create or modify the product view.

If you selected **Perform Image Capture (using Image Export dialog)** previously, Teamcenter displays the **Image Export** dialog box.

3. Change the size and file format of the image if necessary, then click **OK**.

Teamcenter creates the product view using the parameters you entered.

Manage unconfigured data in a product view

You can use several menu commands to show or hide unconfigured objects in the structure and in the viewer, as follows:

- **Show Unconfigured Variants**
- **Show Unconfigured By Occurrence Effectivity**
- **Show Unconfigured Changes**
- **Show GCS Connection Points**
- **Show Suppressed Occurrences**

When product views are captured and restored, these view selections are preserved; otherwise, potentially unbuildable combinations of parts may be displayed when the view is restored. If you choose to update the configuration from the product view when you reopen it, the saved view selections are retrieved; if you choose to use the current configuration, the saved view selections are ignored.

To evaluate the configuration of an existing product view, right-click a product view in the **Product View Gallery** and choose **Show Configuration**.

Teamcenter displays a dialog box that shows the assembly configuration when the product view was created. The name of the product view is shown in the title bar of the dialog box. The dialog box also lists any **Show Unconfigured** menu commands that were active at the time the product view was created.

Retrieve and open an existing product view

- Open the product view in Teamcenter:
 1. Select an object in the structure base view window and open the assembly viewer.

- Click the **Create 3D Product Views** button on the viewer toolbar.

Teamcenter displays the **Product View Gallery** dialog box containing thumbnails of available product views of the selected structure. Only product datasets associated with the currently selected end item are visible.

- Right-click below the image area in the **Product View Gallery** dialog box and select the configuration that you want to use for the product view.

Command	Description
Options→Configuration rule to use→Use configuration from Current BOM	Applies the product structure configuration that is currently set to the product view that you are loading.
Options→Configuration rule to use→Use configuration from product view	Adopts the configuration that was set at the time the product view being loaded was created.

- Do one of the following:

- Select the thumbnail of the product view you want to open and click **Apply**.

Teamcenter opens the product view and retrieves the saved configuration for the structure window and viewer. You can then click **Cancel** to close the dialog box without opening the product view.

- Select the thumbnail of the product view you want to open and click **OK**.

Teamcenter opens the product view as before and closes the dialog box immediately.

- If the product view contains a motion file, replay it by right-clicking the product view and choosing **Load Motion File(s)**. If **Play motion in current view** is selected, the motion file is played against the current structure; otherwise, it is played against the original structure.

- Open the product view in stand-alone Teamcenter lifecycle visualization:

- Select one or more product view datasets in the **Attachments** tab.
- Click the **Send to Lifecycle Visualization**  button.

Checking product views in and out

Checking product views in and out

After you create a product view (3D snapshot), you can check it into the Teamcenter database to make it available to other users. To refresh or delete an existing product view, you must first check it out to prevent other users from inadvertently overwriting your changes.

You can identify a checked out product view by a green frame around the thumbnail image in the **Product View Gallery** dialog box. Similarly, you can identify a checked in product view by a red frame around the thumbnail.

Check out product view dataset

Select a product view and choose **Tools→Check-In/Out→Check-Out**.

Teamcenter applies a checkout lock to the dataset, allowing you to refresh or delete the product view. Other users cannot refresh or delete the product view while you have checked it out.

Note:

If you close the **Product View Gallery** dialog box while you still have datasets checked out, Teamcenter displays a request for confirmation that you want to continue. If you do, all active checkout locks are canceled.

The **Check-Out** command is enabled only if you select a product view that is not checked out by another user.

Check in product view dataset

Select the product view you checked out and choose **Tools→Check-In/Out→Check-In**.

Teamcenter removes the checkout lock from the dataset, allowing other users to update or delete the product view.

Cancel checkout of product view dataset

Select the checked out product view and choose **Tools→Check-In/Out→Cancel Check-Out**.

Teamcenter removes the checkout lock from the dataset, allowing other users to update or delete the product view.

Refresh a product view

You can refresh a saved product view of the current structure at any time with changes you make during the current session in one of the following ways:

- Right-click the product view gallery and choose **Refresh Tab** to update the 3D snapshot in the selected tab to reflect any structure configuration changes.
- Right-click the product view gallery and choose **Refresh All Tabs** to update the 3D snapshots in all tabs to reflect any structure configuration changes.
- Right-click the product view and click the refresh product view button, which is the center graphical button in the middle row of buttons.
- Right-click the product view and choose **Apply**.

Note:

The **Apply** command and refresh button are only enabled if you check out the product view.

Send a product view to an external viewer

Select one or more product views in the structure tree and choose **File→Open in TcVis** or right-click and choose **Send to→Lifecycle Viewer**.

The selected viewer opens the product view with a configured structure. If you already have a 3D document active, Teamcenter allows you to open your product view or merge it into the active document, if the formats are compatible.

Note:

This method is not available if an incremental change is applied to the structure.

Note:

You can also select multiple product views in the product view gallery and send them to the Lifecycle Viewer or stand-alone Lifecycle Visualization. The product views open one at a time and any configuration of the original structure is retained.

Delete a product view

1. Click the floppy disk button on the Viewer toolbar.

Teamcenter displays the **Product Views** dialog box.

2. Select the thumbnail of the product view you want to delete and click the delete product view button, which is the right graphical button in the middle row of buttons. Alternatively, you can right-click in the window and choose **Delete**.

Teamcenter deletes the product view and its associated dataset.

Viewing visualization components and subcomponents in an assembly

Viewing individual visualization components

An assembly imported into Teamcenter as a single part file without CAD models may represent an assembly of individual solid objects. Teamcenter treats such an assembly as a single line in the structure and, by default, you cannot expand it to visualize the individual components. For example, if you import an assembly from a non-NX CAD system, Teamcenter creates a single part file without the associated CAD model within the structure.

Note:

In this instance, parts files are not necessarily devoid of CAD models and structure. They may have NX or other CAD application models. However, these files may have more than one solid or subcomponent within them. A typical part file only has one subcomponent or solid in it.

To view the individual visualization components, you must specifically select the affected and unpacked structure line and choose **Show Subcomponents**. You can subsequently hide the subcomponents when you have viewed the assembly.

If the assembly node has a monolithic **DirectModel** dataset associated with it and the **JT_File_OverrideChildren_Refsets** user preference is set appropriately, Teamcenter uses the monolithic JT file to display the assembly. This icon  means the assembly node has a monolithic JT file. If you use **Show Subcomponents** to expand the structure in the monolithic JT file, you can manipulate the individual subcomponents, control their visibility, and create product views capturing the current state.

View subcomponents in an assembly

1. In the structure, select the BOM line node containing an assembly of solids.

The part file can be a root node or subassembly node. If it is a subassembly node, the **JT_File_OverrideChildren_Refsets** user preference must be set appropriately. You can also select and expand nodes containing multiple part files.

2. Do one of the following:

- Choose **Graphics→Show Subcomponents**.
- Right-click the node and choose **Show Subcomponents**.

Teamcenter expands the part file to show the structure of the subcomponents.

You can display selected subcomponents in the viewer by selecting the corresponding check boxes.

Display selected subcomponent in expanded part file

1. Unpack and select the leaf line node for the relevant subcomponent. You can select more than one node.
2. Do one of the following:
 - Choose **Graphics→Show Subcomponents**.
 - Right-click and choose **Show Subcomponents**.

Teamcenter expands the node. If the node has a monolithic JT file, you can see the structure of the subcomponents.

Check boxes appear in the tree for each node.

3. Select or clear the check boxes in the tree to show or hide the subcomponents in the viewer.

You can control the solids independently, select them in the viewer or the structure tree, and use transformation tools to reposition them.

After breaking down the solids, you cannot reload the monolithic JT file for the line node.

Merge subcomponents

After manipulating the individual subcomponents, you can merge them back into the subassembly.

1. In the structure, select the leaf node or assembly node part file.

You can select multiple nodes.

2. Do one of the following:
 - Choose **Graphics→Hide Subcomponents**.
 - Right-click and choose **Hide Subcomponents**.

Teamcenter unifies the subcomponents within the parent part and removes the tree from the structure. The subassembly behaves like a single part in the viewer.

8. Making where-used searches

Making where-used searches

Where-used searches allow you to identify all the item revisions that use another item revision of interest. For example, you can search for all assemblies that contain a particular item or item revision. You can do this to assess the impact of engineering changes to the product structure or to check if changes in one assembly affect other assemblies. If you use Teamcenter product master management, the results show all lines of usage that a part references.

Note:

You can perform where-used searches on configured precise or imprecise structures.

Where-used searches do not identify any BOM view revisions (BVRs) where the item or item revision occurs.

There are two methods of performing where-used searches. The first method produces a graphical representation of the assembly or assemblies in which the item or item revision is used. The second method uses the Referencers print wizard and produces a report of the where-used results.

The results of where-used searches can be viewed in the **Referencers** pane or **Impact Analysis** pane. If the **ReferencersPane_Shown** user preference is set to **off**, the **Referencers** pane is hidden.

Configuring for where-used searches

A where-used search can take into account the revision rule when searching the product structures and you can choose one of the following outputs:

- All revisions

Reports all item revisions that have an occurrence of the target item revision. This search result displays all combinations of usage that can possibly occur; when a particular set of revision rules is applied, not all paths may be realized.

- Only the revision configured by a selected revision rule.

Reports all item revisions that have an occurrence of the target item revision when the selected revision rule is applied.

Use the **REV_RULE_WHERE_USED_DEFAULT_VALUE** preference to set the default revision rule for where-used searches. This preference is not available by default, and you must create it. Teamcenter populates the **Impact Analysis** pane with this revision rule.

By default, the search results include all parent item revision objects, regardless of whether they are themselves configured by the revision rule. With this setting, you can (for example) make a where-used query on **Part1-A** to identify every occurrence where **Part1** is used with **A** as its configured revision. You obtain the same results whether you query one level at a time or all levels simultaneously, including with mixed precise and imprecise structures.

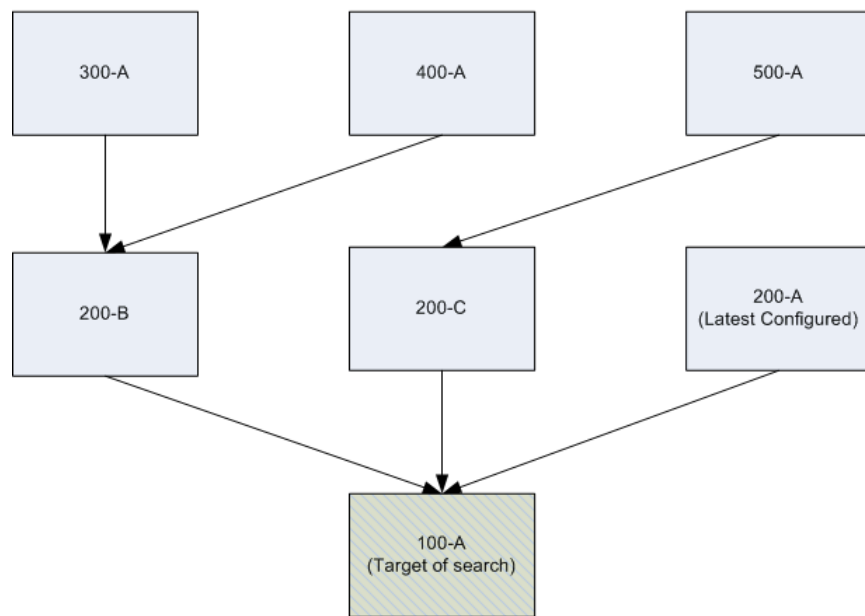
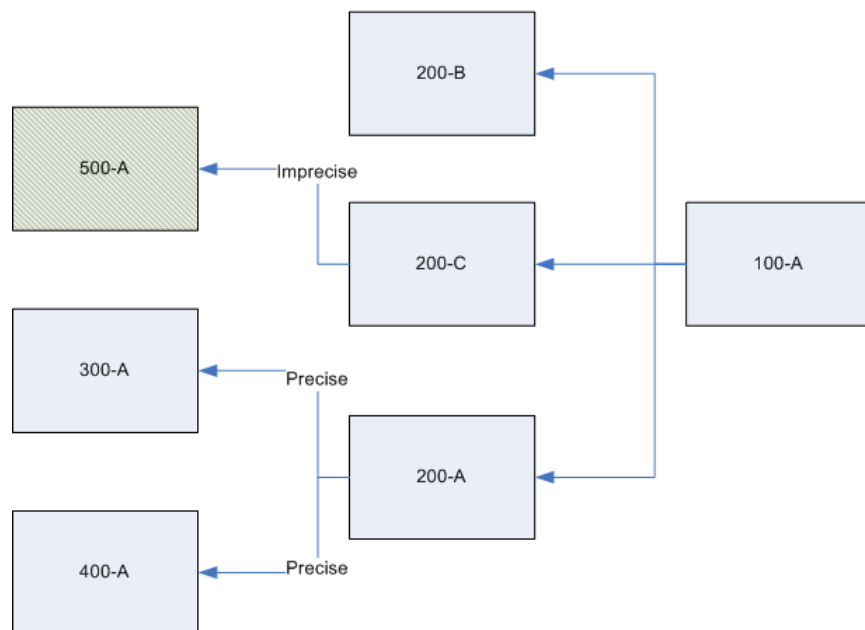
With precise or mixed structures that have a large number of item revisions, the standard mode may return many results that can be difficult to interpret. In this case, you can configure the results to omit parent item revision objects that are not themselves configured by the revision rule. That is, this mode reports all intermediate items or item revisions that configure the target.

Note:

This alternative mode is an enhancement of the behavior in Teamcenter Engineering 9.1 and earlier releases. It is no longer necessary to expand all levels to obtain a valid result.

To configure this alternative mode, set the **PS_wu_configd_imprecise_only** preference to **true**. This preference has no effect if the selected revision rule contains any precise entries.

To appreciate the differing results obtained by these modes, consider the following structure and the results of a where-used search on item **100-A**. With the preference set to **false**, item **500-A** is reported in the search results; if it set to **true**, the same item is not reported because it is not configured by a precise rule.

Structure Configuration:Where Used Results:**Where-used search results**

Perform a where-used search and obtain a graphical result

1. Choose **View→Show/Hide Data Panel** or click the **Show/Hide Data Panel** button  on the toolbar to display the data pane.
2. Click the **Referencers** tab.
3. Select an item or item revision in the tree or properties table, and drag or copy and paste it to the **Referencers** pane.
4. Set the following search parameters in the **Referencers** pane:
 - Select **Used** in the **Where** option list, located in the upper-left of the pane.
 - Select a rule from the **Where-Used Rule** list. This rule provides parameters to locate the assemblies in which the item or item revision is used. For example, if you select the **Any Status; Working** rule, only the latest released revision of the assembly is retrieved if one exists; if not, the latest working revision is retrieved.

If you modify the current revision rule in Structure Manager, you can also select the modified rule as the basis of the search. To do this, select **From Structure Manager** from the **Where-Used Rule** list.

Note:

In the **Referencers** pane in Structure Manager, the rule defaults to the current revision rule in the Structure Manager window.

- Choose one of the following options in the **Depth** list located in the bottom-right corner of the pane:
 - **One Level** to report immediate parent assemblies only
 - **All Levels** to report all parent assemblies up to the top level
 - **Top Level** to report the top-level assembly or product only
5. Double-click the item or item revision in the **Referencers** pane to start the search.

If the item or item revision is not part of an assembly that matches the selected revision rule, Teamcenter displays a message to that effect. If the item or item revision is part of a configured assembly, the structure is displayed in graphical format in the **Referencers** pane. The results can be used as a basis for another where-used or where-referenced search or they can be formatted and printed.

You can change the item revision properties that are shown in the results by selecting the required properties from the **Display** list. Teamcenter remembers your selection for future sessions.

You can also filter the results to show only selected item types. To do this, select the **Filter by Item Type** check box and select the required item type and filter level from the lists. You can also select the **Include Subtypes** check box to include both item revisions whose item is of the specified type and any subtype of that type. You can further refine the selection by showing the results only for the top level of the structure or for all levels below the selected top level. To rerun the where-used search with changed criteria, double-click the target node.

Perform a where-used search with the print wizard and obtain a printable result

Perform a where-used search with the print wizard and obtain a printable result

1. Choose **View→Show/Hide Data Panel** or click the **Show/Hide Data Panel** button  on the toolbar to display the data pane.
2. Click the **Referencers** tab.
3. Select an item or item revision in the tree or properties table, and drag or copy and paste it to the **Referencers** pane.
4. Click the **Report Wizard** button  on the toolbar.

Teamcenter displays the Referencers print wizard.

5. (Wizard step 1) Select the **Where-Used** option to generate a where-used report and click **Next**.
6. (Wizard step 2) Select one of the following **Depth** options and click **Next**:
 - **One Level** to report immediate parent assemblies only
 - **All Levels** to report all parent assemblies up to the top level
 - **Top Level** to report the top-level assembly or product only
7. (Wizard step 3) Select a **Where-Used Rule** revision rule and click **Next**. This rule provides parameters to locate the assemblies in which the item or item revision is used. For example, if you select the **Latest Working** rule, only the revisions of the assembly are retrieved that can configure the item or item revision selected in step 3. That is, **Where Used** only retrieves the parents that configure the selected item or item revision as a child with the selected revision rule.

If you modify the current revision rule in Structure Manager, you can also select the modified rule as the basis of the search. To do this, select **From Structure Manager** from the **Where-Used Rule** list.

8. (Wizard step 4) Select the item or item revision properties to include in the report and click **Next**.

Note:

The preselected properties are those used when you last ran the wizard. You can change them as necessary.

9. (Wizard step 5) Select an item type to filter the search results by and click **Next**. You can also select the required filter level, either **Top Level Only** or **All Levels**.

Teamcenter displays the item or item revision and selected revision rule that will be the basis of the search, together with report generation options.

10. Confirm that the required items, item revisions and revision rule are shown correctly, then choose one of the following report generation options:

- **Generate the HTML/Text report**

Presents the where-used results in HTML format in the **Print** dialog box. From this dialog box, you can format the report and either print it or save it to a file.

- **Generate the structure report**

Presents the where-used results in tree format.

11. Click the **Yes** button.

Teamcenter runs the where-used search and displays the results. At this point, you can format, save, and print your report, as follows:

- Optionally, change the print format to **Text** or **HTML Table**. HTML is the default print format; HTML table format allows easier interpretation of large lists of property values.
- Optionally, format the report by performing the following steps:

- a. Click the **Set Result Format** button  in the upper-right corner of the **Print** dialog box.

Teamcenter displays the **Print Format** dialog box. The formatting options vary depending on the type of object selected and whether you are printing in HTML, HTML table or text format.

- b. Modify the result format.

- c. Click **Update** to apply your changes.
 - d. Close the **Print Format** dialog box. Teamcenter activates the **Print** dialog box.
- To save the file or send it to a printer, complete the process that is appropriate to the file type and desired output format.

Open HTML files in a Web browser

1. Click the **Open in Web Browser** button.

The HTML file is displayed in your default Web browser.

2. Execute your browser's print command.
3. Return to the Teamcenter window and click the **Close** button to dismiss the dialog box.

Print a text or HTML file

1. Click the **Print** button  located in the lower-right corner of the **Print** dialog box.

Teamcenter displays the system **Print** dialog box.

2. Define the printer to which the file will be sent. You can accept the default printer that is displayed in the **Name** box or select a different printer from the list.
3. Click **OK** to print the file and dismiss the dialog box.
4. Click **Close** to dismiss the **Print** dialog box.

Save output to an HTML or text file

1. Click the **Save** button  located in the lower-right corner of the **Print** dialog box and the **Save** dialog box appears.

Teamcenter displays the system **Save** dialog box.

2. Navigate to the directory location where you want to save the file.
3. Enter the name of the file, including the **.htm**, **.html**, or **.txt** extension, in the **File name** box.
4. Click **Save** to save the file and dismiss the dialog box.
5. Click **Close** to dismiss the **Print** dialog box.

Performing impact analysis with configured parents

Performing impact analysis with configured parents

When evaluating the impact of a change to a target part, an engineer requires the appropriate revision of the part to determine impacted assemblies. This revision may be in a working state but the impact analysis should be conducted with the appropriate revision rule qualification. By inspection and study, it may be possible to find the correct occurrence but this method may be challenging for a complex configuration. Multiple revisions may configure a specified target part and it is critical that subsequent changes should be made from the correct revision.

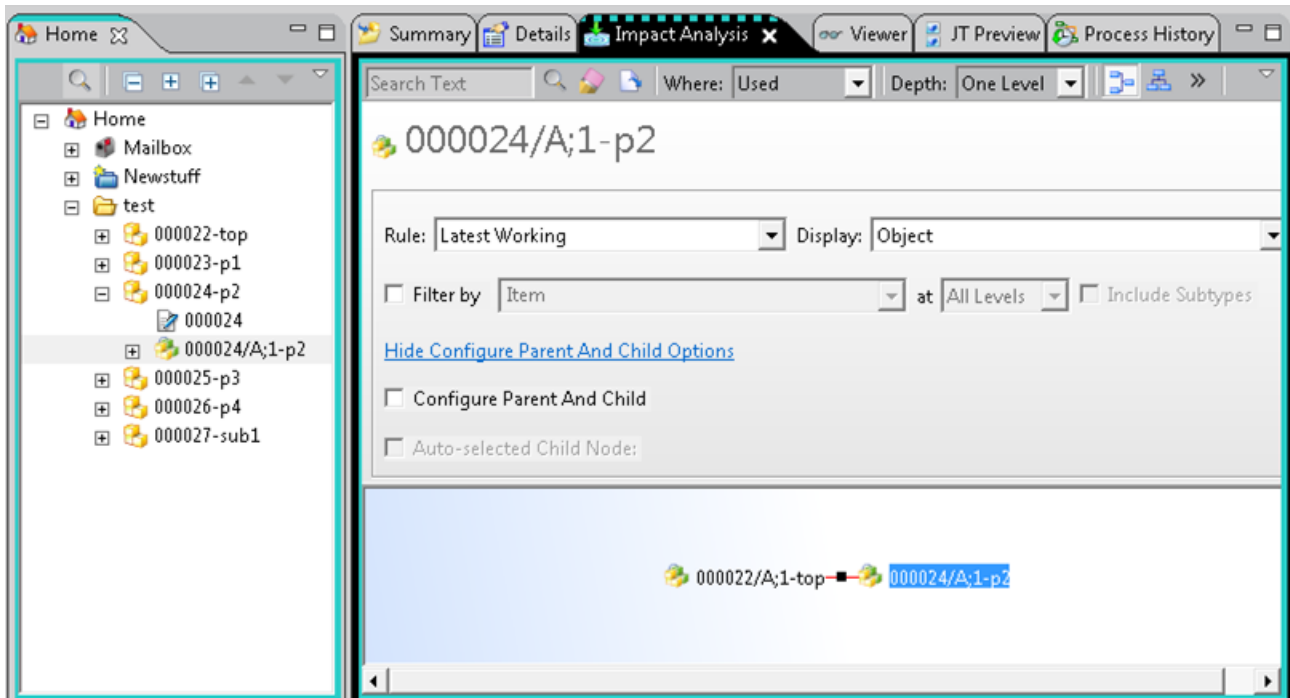
When evaluating the impact of a change, the engineer needs to know the release status of impacted assemblies to understand their maturity and also what business process is necessary to execute subsequent activity.

Starting from a target revision or item, the engineer specifies a revision rule in the **Impact Analysis** pane. Teamcenter selects the appropriate revision of the target revision for that item for the specified revision rule.

Note:

This method of impact analysis is only available in the **Impact Analysis** pane and not in the **Referencers** pane.

By default, Teamcenter does not take evaluate configured parent assemblies when impact analysis is performed. You can optionally evaluate the parent item's configured revision if you click the **Show Configured Parent and Child Options** link and then select the **Configure Parent and Child** check box on the **Impact Analysis** pane. If the check box is selected, the parent item revision and the child item revision must be configurable by the same revision rule. This method of analysis is similar to the one available in Teamcenter Enterprise.



Note:

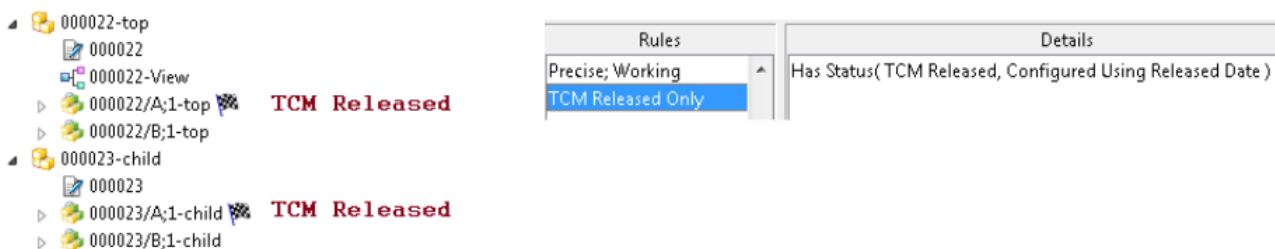
When you select the **Configured Parent and Child** check box, Structure Manager shows an **Auto-selected Child Node** check box. If this second check box is selected, Teamcenter automatically selects the applicable child when you do a where used search.

Note:

The where-used/referenced report does not support configured parent and child options.

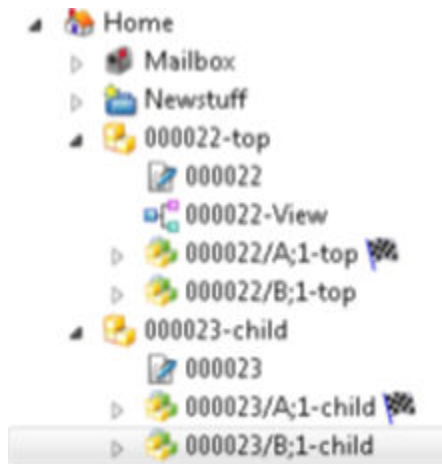
Perform impact analysis with configured parents

You can perform an impact analysis that will find parents and children that match defined search criteria, for example, both are released. Consider the results of a where configured search of the structure shown below.

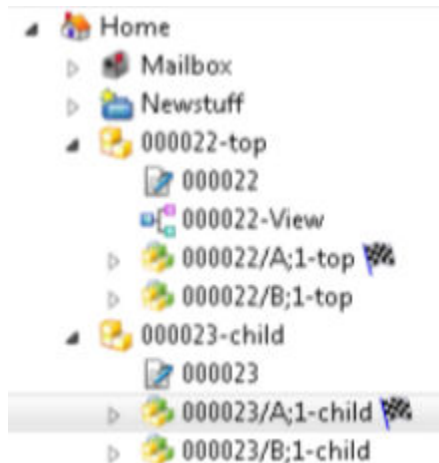


When you make a **where configured** search on an unreleased child (for example, **00023/B;1-child**) with a **TCM Released Only** revision rule, both the top assembly and the child are returned as shown below.

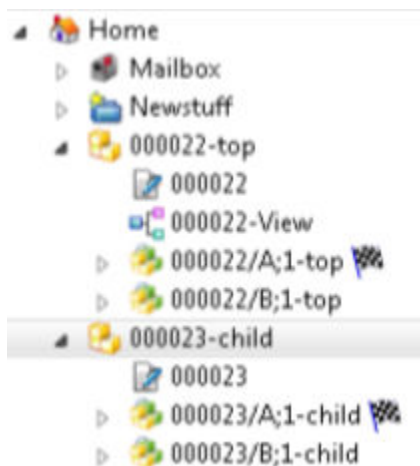
The system automatically switches to a matching child part, if the current selection does not match, before performing the search. Only one latest configured revision of a parent is returned, namely the one that matches the selected revision rule.



Likewise, if you make a **where configured** search on an released child (for example, **00023/A;1-child**) with a **TCM Released Only** revision rule, the configured parent assembly and the child are returned as shown below. Only one latest configured revision of a parent is returned and it matches the selected revision rule. (If you do not select the **Configure Parent** check box, all parent assemblies are shown regardless of whether they are configured by the revision rule.)



If you make a **where configured** search on an unreleased item (for example, **00023-child**) with a **TCM Released Only** revision rule, both the assembly and the child are returned as shown below. The system automatically switches to a matching released child part, if the current selection does not match, before performing the search. Only one latest configured revision of a parent is returned, namely the one that matches the selected revision rule.

**Note:**

The **Filter By** check box and related options are disabled if you select the **Configured Parent and Child** check box.

9. Making spatial and attribute searches

Making spatial and attribute searches

You can search large products with spatial criteria or with a combination of spatial and attribute criteria. Spatial searches are particularly useful for end items that represent large products containing a large number of lines, allowing you to focus quickly on a particular area or part of the product. For example, if you are designing a ship, you may want to identify all pipes that pass through a selected compartment, but not pipes that are routed around its perimeter.

It is not necessary to create caches of product structure data or to install a separate database.

The spatial search can function with CAD data from two sources:

- NX

NX calculates the bounding box for a part and stores it in Teamcenter as a **UGPART-BBOX** named reference in a **UGMASTER** dataset. It can also be configured to create TruShape data for the part and store it as a **Trushape-Data** named reference in the **UGMASTER** dataset.

The accuracy of the search depends on the cell size you configure in NX. A small cell size provides more accurate search results, but the TruShape files are larger and response times slower.

- Other CAD systems capable of saving JT files

Teamcenter uses the Dispatcher Server and **JtToBboxAndTso** translator to create the necessary bounding box and TruShape data.

The accuracy of the search depends on the voxel size you configure in Teamcenter. A small voxel size provides more accurate search results, but the TruShape files are larger and response times slower.

Note:

The bounding box and TruShape data generated for a JT dataset are ignored if an NX dataset exists for the same item revision.

You enter search criteria as numerical values by manually creating a bounding box in the embedded viewer or by specifying minimum and maximum coordinates. You can also construct a bounding box from selected target parts. Teamcenter displays the results of the search as a list of matching items and item revisions. The results include any object that has partial or complete geometry inside, outside, or intersecting the box. Selecting an entry in the list highlights the item or item revision in the structure tree pane and in the embedded viewer.

If the results contain packed lines, the relevant lines are unpacked and displayed. The remaining lines remain packed and are shown as a pack master with a corrected total of lines or with pruned siblings.

You can refine spatial searches with other attributes as follows:

- Scope

You can select an assembly as the scope of the search, rather than searching the entire product.

- Item and item revision attributes

You can refine the search by including attributes of the item or item revision. Typically, this is the item ID, but you can use any attributes stored on the item master or revision master forms.

- Classification data

If the items are classified, you can refine the search with classification attributes. This is called a *classification ad hoc search*. You can search through classified data and find objects contained within a class you specify and containing attribute values that you specify.

- Occurrence notes

You can refine the search with values for occurrence attributes (occurrence notes).

- Attributes of forms

You can refine the search with the attributes of forms that are attached to an item, item revision, or their subclasses.

You can save search criteria for future use, if you perform the same search frequently. You can also create and save searches using the Query Builder application.

Configuring spatial searches for local session

The following preferences must be set to optimize spatial searches:

- To enable automatic updates of spatial indexes, set the **QSEARCH_update_enabled** user preference to **True**. If it is set to **False**, you cannot make spatial searches.
- If you want to perform spatial searches from **target part** selections, set the **RDV_set_default_use_selections_from_tree** user preference to **true** to use selections from the tree or **false** to use selections from the table.
- Set the **RDV_set_default_3DBox_search** user preference to **true** to set the 3D box search option as default or **false** to set the proximity search option as default.
- Set the **RDV_set_default_3DBox_dimensions** user preference to set the default option for 3D box dimensions, **0** for centroid and size, **1** for origin and size, or **2** for maximum and minimum extents.

- Set the **RDV_set_default_true_shape_filtering_ON** user preference to **true** to turn TruShape filtering on by default or **false** otherwise.
- Set the **RDV_default_find_intersecting_parts** user preference to **true** to specify whether parts intersecting with the 3D bounding box during a spatial search are included in the results by default or **false** otherwise.
- Set the **RDV_default_find_inside_parts** user preference to **true** to search parts inside the 3D bounding box during a spatial search by default or **false** to search parts outside.
- Set the **RDV_show_targets_on_results_dialog** user preference to **true** to specify if the target parts table is displayed in the results dialog box after a proximity search or **false** otherwise.
- Set the **RDV_show_targets_on_spatial_dialog** user preference to **true** to specify if the target parts table is displayed in the spatial search dialog box after a proximity search or **false** otherwise.
- Set the **RDV_set_default_slider_increment** user preference to the default increment of the slider, for example, 0.01.
- Set the **RDV_set_default_3D_Manipulator_ON** user preference to **true** to have 3D manipulators on by default or **false** otherwise.

Perform a search

Perform a search

1. Open the product structure and select the top line against which you want to search.

Note:

Search always returns lines in an *unpacked* state. If there are packed lines, while performing a spatial search, ensure that the first column in the Structure Manager view is **BOM Line Name** and not **BOM Line**. By default, **BOM Line** is the first column.

2. Click the **Search**  button on the toolbar.

Teamcenter displays the **Search** pane directly below the structure tree.

3. If appropriate, click the **Clear All**  button to reset any previously specified criteria.
4. Use the **Search** pane to specify one or more of the following search criteria:
 - Scope

You can search an assembly, rather than the entire product, to obtain results more quickly. To set an assembly as the scope of the search, click the ... button next to the **Search Scope** box and

browse to the desired assembly. Teamcenter displays the name of the selected assembly in the **Search Scope** box.

- Item identifier

Tip:

You can search for items whose identifiers, names, attributes or types match a specific pattern. For example, you can type **57h*** into the **Item ID** box to find all items whose ID start with **57h**. Select the appropriate arithmetic function in the leftmost box to obtain the desired results, for example, **=** to obtain an exact match.

- **Classification family or attributes**
- Occurrence notes
- **Spatial information using 3D boxes or proximity values**
- **Form attributes**

To specify search criteria, click the ... button to the right of each box and enter information in the resulting dialog box. All the criteria you enter are combined so that you can, for example, search for all bolts whose name starts with **bo** and are within 3 centimeters of another part.

5. Click the **Search** button  on the pane to begin the search.

Teamcenter starts the search and loads the lines into the **Search Results** dialog box in batches. It displays a progress bar indicating the number of structure lines found as a percentage of the likely results. You can click the **Pause** button to the right of the progress bar at any time to halt the search. Click the button to the left of the progress bar to load all the results.

Select a line in the **Search Results** dialog box to highlight the corresponding item or item revision in the structure tree and the embedded viewer. You can also click **Display** or **Display in New Window** to view a selected item from the results list.

Note:

Search results are dynamically updated if a variant rule configures the structure and you remove a structure line. However, the search results are not updated if you *add* a structure line.

You can hide the **Search** pane when it is no longer needed by clicking the **Search**  button in the toolbar again.

Enter search criteria

Enter search criteria

You can enter one or more of the following search criteria:

- Search scope
- **Classification or family attributes**
- Occurrence notes
- **Proximity or 3D spatial filters**
- **Target parts**

Enter Classification or family attributes search criteria

1. Click the ... button to the right of the **Classification** box.

Teamcenter displays the **Classification** dialog box.

2. Click  to open the classification hierarchy.

3. Double-click a class name to select it from the tree.

Teamcenter adds a line to the table containing the name of the class you select.

4. Specify the system of measurement.

The systems available (metric, nonmetric, or both) depend on the system in which the class is stored in the Classification Admin application.

5. In the **Property Name** column, click the cell containing the name of the class.

Teamcenter displays a list of all the attributes within the class.

6. Select the class and attribute with which you want to search.

7. Click the cell containing the = sign and select an operator.

8. In the **Searching Value** column, select the cell and type a value for the attribute for which you want to search.

9. (Optional) Click  to create an additional search parameter.

The lines of the table, each representing an individual search parameter, are joined by the **AND** operator.

10. Click **OK**.

Teamcenter displays the classification search parameters in the **General** search pane.

If you select a single Classification class, you can further refine the search criteria to include specific attribute values. For example, if you select the **Bolt** class, you can then:

1. Click the **Bolt** line in the **Family Attributes** dialog box to define classification attribute criteria.
2. Click **Add** to specify additional attribute criteria. For example, you can set two classification attribute criteria—**thread=.25** and **Lock_Wire=1**.

If your site has not configured Classification, you cannot search by classification attributes criteria.

Enter occurrence note search criteria

Click the ... button to the right of the **Occurrence Notes** box and you can search for specific occurrence note values. Your administrator can define occurrence notes and associate them with particular structure lines. You can use these mapped occurrence notes as search criteria.

For example, a mapped occurrence note may contain an interior/exterior flag that indicates if a given part is used on the interior or exterior of the product. You could then search for all parts on the exterior of the product or, by refining the search with other criteria, for all exterior brackets.

Similarly, a mapped occurrence note may contain a number that references an illustration in a service manual that describes how to disassemble the part. You can search for all parts illustrated in the appropriate section of the manual.

Enter the spatial search criteria

Enter the spatial search criteria

1. Click the ... button to the right of the **Spatial Filter** box.

Teamcenter displays the **Spatial Criteria** dialog box, allowing you to define one of two types of spatial filters and optional target parts.

Note:

The spatial filter option is disabled if Teamcenter is not configured for cacheless searches or if the necessary NX or JT files are not available.

2. (Optional) Select the **Use selections from table** check box above the **Target Parts** table if you want to search against specified target parts.
3. Use the **Proximity** and **3D box** radio buttons in the **Spatial Criteria** dialog box to select a search type, and then click **OK** to save the selections.

- Proximity

Limits the search to parts within a specified proximity distance, for example, all parts within 10 centimeters of part X.

- 3D box

Allows you to define a three dimensional box in the embedded viewer and search for parts completely inside, completely outside or intersecting the box. Use the **Spatial Criteria** dialog box to define the coordinates and size of the box.

Note:

If you are making appearance searches, you can only search inside and intersecting the box when TruShape filtering is selected.

Note:

You can use *altreps* (alternative representations) to define different physical configurations or shapes of a flexible part such as a tube or hose. Spatial searching takes into account an alternate geometric shape of a flexible part by searching the dataset that corresponds to the altrep defined on the occurrence object.

Define a proximity filter

1. In the **Spatial Criteria** dialog box, select the **Proximity** button.
2. (Optional) Select **Valid overlays only** and Teamcenter loads otherwise physically mutually exclusive parts, filtering out those known to never coexist in any possible variant combination with any one of the target parts. It determines the minimum number of variant rules that cover all product variants in which the target components can exist. This selection requires that classic variants are configured at your site.
3. (Optional) Select **True Shape filtering** if you want to test items with intersecting bounding boxes to identify if they have TruShape volumes that intersect the TruShape volumes of the selected objects. Depending on the TruShape parameters configured, Teamcenter displays the geometry of each object as regular cubes (voxels) to provide a simplified representation of the actual shape. TruShape searches return more accurate results but may take longer to complete.
4. Define a proximity value in the **Distance** box in the **Spatial Criteria** dialog box and click **OK**.

Teamcenter limits the search to those parts within the defined proximity of the parts selected in the viewer or structure tree. A part is considered within the proximity if any portion of it is within the specified distance; the part may not be completely within the specified distance.

Define a spatial filter with a 3D box

Define a spatial filter with a 3D box

Note:

This procedure requires a mockup license for the viewer and is not available with the base license.

1. In the **Spatial Criteria** dialog box, select the **3D box** button.

Teamcenter displays a brown bounding box at a default location in the viewer.

2. (Optional) Select **True Shape Filtering** if you want to test items with intersecting bounding boxes to identify if they have TruShape volumes that intersect the TruShape volumes of the selected objects. Depending on the TruShape parameters configured, Teamcenter displays the geometry of each object as regular cubes (voxels) to provide a simplified representation of the actual shape. TruShape searches return more accurate results but may take longer to complete.
3. Make the following selections to define the location and size of the 3D box:

- **Slider increment**

Specifies the actual distance equivalent to one increment of the **Maximum** and **Minimum** sliders and spinners.

- **Extents**

Determines how Teamcenter constructs the bounding box from the values you specify, as follows:

- **Centroid and size**

Allows you to specify the bounding box with coordinates of the centroid and lengths in X, Y, and Z directions. It is oriented with respect to the global axes of the end item.

- **Origin and size**

Allows you to specify the bounding box with coordinates of the origin and lengths in X, Y, and Z directions.

- **Minimum and Maximum**

Allows you to specify the bounding box with minimum and maximum coordinates. This is the default selection.

- **Maximum** and **Minimum** sliders and spinners

Allow you to manually define the maximum and minimum extents of the bounding box.

- **Find Parts**

Allows you to specify if parts returned by the search are fully contained inside or fully outside the bounding box.

- **Include parts intersecting the box**

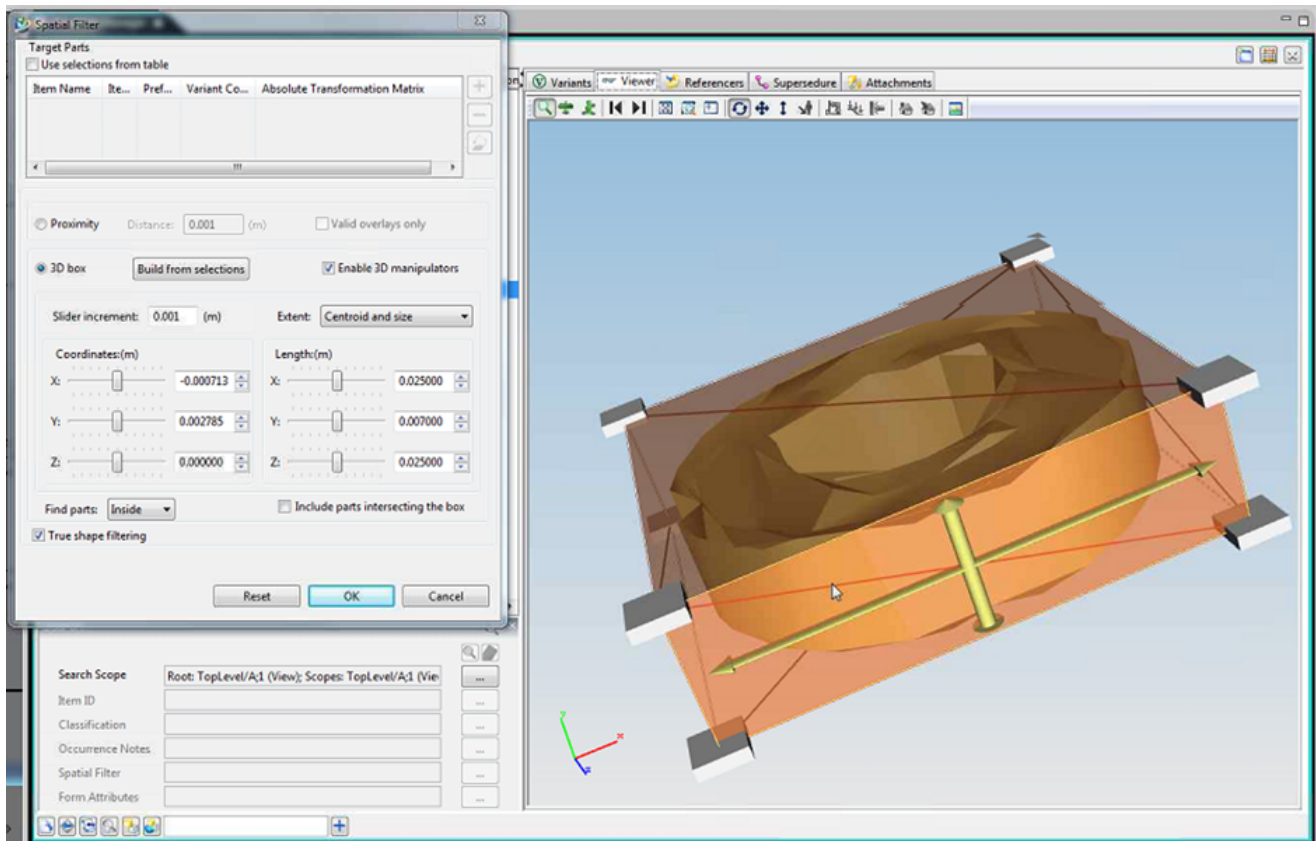
If checked, the search returns parts that intersect the bounding box, as well as parts that are fully inside or outside it. This option is enabled only if you select the **True Shape filtering** option.

Note:

If you use appearance searches, this option is always checked.

- **Enable 3D manipulators**

If checked, drag handles are displayed on the bounding box, allowing you to move and resize it manually. You can then drag the 3D manipulator to resize or reposition the bounding box.



4. (Optional) Do any of the following to move and resize the bounding box with the manipulators:

To	Do this
Move the manipulator parallel to a face.	Drag the face of the manipulator.
Move the manipulator perpendicular to a face.	Press Ctrl as you drag the face.
Constrain the move to one axis.	Press Shift as you drag a face.
Resize the manipulator uniformly.	Drag a corner of the manipulator.
Resize the manipulator along one axis.	Press Ctrl as you drag a corner of the manipulator.

5. (Optional) Click **Build from selections** to construct a bounding box containing all target parts specified in the **Target Parts** table, or selected in the tree or viewer.
6. Click **OK** to save the search criteria.

The 3D box remains visible while the search is active, even if the **Spatial Criteria** dialog box is not open.

Note:

You can visualize mixed unit assemblies in the **Spatial Search** dialog box, that is, assemblies composed of parts defined in both Imperial (English) and metric units. The dialog box uses the appropriate units when you type in dimensional values, for example, spatial distance in the **Spatial Criteria** dialog box.

Defining granularity of spatial searches

By default, spatial searches return piece parts, that is, parts rather than assemblies. However, you may want the search to return a higher level assembly. For example, if you have small assemblies consisting of parts welded together, you may want to treat the assembly as a unit, rather than returning some of its individual parts.

You can change the search granularity by modifying the TruShape voxel size in NX to only return larger assemblies. You can also disable TruShape voxel searches completely, if the results still provide useful information. The coarser the search results, the more quickly they are displayed.

Use target parts

As an alternative to manually generating the spatial search bounding box with the spinner and slider controls, you can construct a bounding box quickly and accurately from a table of target parts. You can use this method for proximity or 3D bounding box searches.

Note:

Generic objects such as GDE elements, GDE link lines, interface definitions, and processes are not valid participants in spatial searches. Consequently, they are not added to the target parts table. If you try to add a generic object to the target parts table, Teamcenter displays an error message indicating the BOM line is invalid.

However, you can add valid generic objects such as signals and designs to the target parts table. If you select these objects in the table or perform a search on them, Teamcenter displays a warning message indicating that they do not have associated bounding boxes.

Note:

The target parts table is not available if you are making appearance-based searches.

1. By default, the target parts table is hidden. If necessary, show the target parts table by setting the **RDV_show_targets_on_spatial_dialog** user preference to **true**.
2. Select the **Use selections from table** check box.

Teamcenter enables the **Target Parts** table and its associated buttons.

Note:

If you select **Use selections from table**, any selections in the tree or viewer are ignored.

3. Select target parts in the structure tree or viewer, and then click the + button to add them to the **Target Parts** table.

To remove a target part, select it in the table and click the – button.

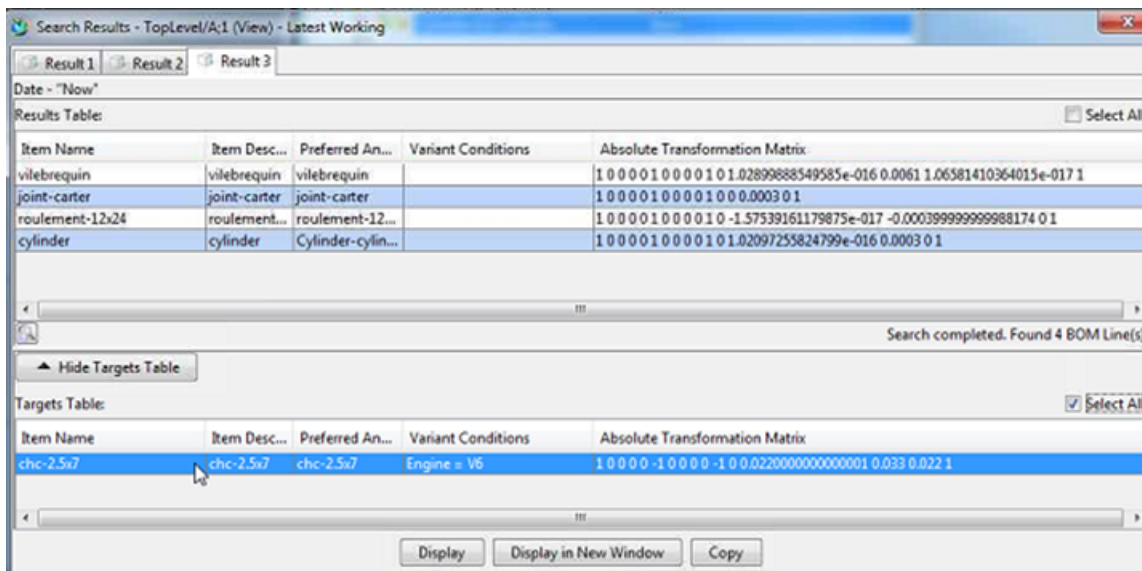
To clear the table of all entries, click .

4. Once all the required target parts are listed to the table, click **OK**. Alternatively, if you are defined a 3D box search, click **Build from selections**.

Teamcenter draws a bounding box enclosing all the target parts in the viewer.

5. **Perform a spatial search.**

Teamcenter displays the **Search Results** pane containing the results of the spatial search.



6. (Optional) Select the **Show targets table** check box to display a list of the target parts of the search.
7. (Optional) Select one or more BOM lines in the list of target parts or select **Select all targets**, and then do one of the following:
 - Click **Display** to show the target parts in the tree and viewer in the same window.

- Click **Display in New Window** to open a new window to show the target parts in the tree and viewer.

Filter search with form attributes

You can filter searches using the criteria of forms attached to the items or item revisions.

1. Click the ... button to the right of the **Form Attributes** box.

Teamcenter displays the **Form Attributes** dialog box.

2. Enter the form attributes for the search, including any mathematical operators.

Teamcenter displays the form type and search values as a string in the format similar to the following example:

```
"ItemRev:BVRSyncInfo:last_struct_mod=value1 AND
ItemRev:BVRSyncInfo:last_Sync_date=value2"
```

Managing search results

Managing search results

The same part may be listed many times in the search results if it has multiple occurrences in the end item that match the search criteria. For example, the same bolt may be used seven times in the end item and, if all seven usages satisfy the defined proximity filter, the bolt appears seven times in the search results.

The search results always displayed shows individual lines without indication of any structure.

When Teamcenter displays the result of a search, the children of the node you searched for may be hidden so the search results are displayed quickly. Each hidden node is represented by a ... (pruned siblings) icon enclosed in a box. You can click in this box to load and view the hidden children.

If the results contain packed lines, the relevant lines are unpacked and displayed. The remaining lines remain packed and are shown as a pack master with a corrected total of lines, or with pruned siblings.

The search results contain lines that may not be configured by the variant rules in effect to minimize the time needed to generate the search results.

Manage search results

To manage the search results, you can:

- Sort the list by clicking the header of a column in the properties table. By default, the search results table includes the same columns as the product structure tree.
- Customize the columns that are displayed by right-clicking in the column header and Teamcenter displays the **Insert Columns** dialog box. You can click the + button to add a column (for example, **In Validity**) to the search results or click the – button to remove unwanted columns.
- Save the list to a file or print it by right clicking in the column header. When saving the results list to a file, you can specify whether to use HTML or text format. The text file contains comma-separated values (CSVs), and you can import data in this format into Microsoft Excel or similar applications.
- Click **Display** or **Display in New Window** to open the currently selected lines in a separate Structure Manager window for examination.
- Click **Copy** to copy the currently selected lines for subsequent pasting into another Structure Manager window.

Examples of managing search results

Because a single search may potentially return thousands of BOM lines, you can control how many search results are listed in the table. If the search finds only a few lines (less than five), Teamcenter lists all of them in the table. If there are more lines, Teamcenter lists only the first five and you can click the **Display** button in the **Search Results** pane to add the next group of five to the list.

The information label in the title bar of the **Search Results** pane identifies the end item, view, or effective revision rule in effect.

You can view the search results in a new window, if required, by clicking the **Display in New Window** button. You can then perform another search in that window to refine the results.

Managing the search results panes

The search results pane contains an individual tab for each set of search results and a new tab can be added by each new search. Each tab has a label to indicate the configuration rules (for example, revision rule or effective date/unit) in effect when you performed the search.

Having the results in individual tabs allows you to manage and retain distinct lists of search results that might have resulted from:

- Different search criteria
- Different configurations (revision rules)
- Different end items

Your first search results are listed in a tab named **Result 1** by default. Any subsequent search results are added to the current tab. This allows you to merge the results of separate searches. For example, if you want to find all brackets that are on the interior of the product or within 2 cm of part X, you could perform two searches and merge them.

Alternatively, you can lock the results tab causing the next search results to create a new tab—**Result 2**.

To lock a results tab, right-click the tab and choose **Lock/Unlock** from the shortcut menu. You can lock any number of tabs.

If the configuration of the end item changed since the last search, Teamcenter automatically adds a new tab rather than merging the next set of search results into the current tab. For example, if you changed the revision rule since the previous search, the next search results create a new tab. This ensures that all lines in a given tab correspond to the same configuration of the end item.

Manipulate search results

To manipulate search results, use the following buttons at the bottom of the search results pane:

- **Display**

Highlights in the viewer and tree all lines that are selected in the search results list. You can then perform another search to refine the results.

- **Display in New Window**

Displays all lines that are selected in the search results list in a new window. You can then perform another search to refine the results.

- **Copy**

Copies to the clipboard all lines that are selected in the search results list.

You can also select the **Select All** check box to select all lines in the search results list.

You can right-click one of the lines in the search results list and Teamcenter displays a shortcut menu. You can choose any of the following commands:

- **Display**

Displays the line.

- **Copy**

Copies the line to the clipboard.

- **Send To**

Sends the line to another application.

- **Properties**

Lists properties of the selected line.

Limiting search results

You can remove extraneous lines when displaying search results to keep the structure tree compact and manageable.

For example, you perform a search that finds a single line that is 10 levels deep in the structure. If you fully expand the branch from the root down to the line of interest, you may also display hundreds of other lines (all of its ancestors and the siblings of itself and its ancestors). To avoid this, you can prune the branch of the tree and not display any sibling lines (and potentially none of its ancestors).

When you select lines in the search results pane to display, the following occurs:

- If the **Show unconfigured variants** option is turned off, Teamcenter applies the current variant rules to the selected structure lines. If any lines become unconfigured as a result of the variant rules in effect, Teamcenter displays a **Lines are unconfigured due to Variant rules** message.
- The remaining lines are displayed in the tree and pruned as described previously.
- If the viewer is active, the lines are displayed in the viewer.

This assumes that the revision rules associated with the search results match the revision rules in effect in the structure. If not, Teamcenter evaluates each line in the search result to see if it is valid in the context of the currently configured end item. If it is valid, the line is displayed as before. Otherwise, it is displayed in a separate section of the tree called **Unconfigured Objects**.

If you do not have read access to an item that satisfies the search criteria, the corresponding line is not listed in the search results table. If this occurs, the count of lines in the search results is reduced to exclude any lines to which you do not have read access.

10. Comparing product structures

Comparing product structures

You can compare two structures to identify changes or differences between two product structures, for example, to:

- Identify component changes between assemblies
- Test for consistency between multiple views of the same item
- Find differences between differently configured structures

You may only be interested in the immediate components that have changed in a single-level assembly. Conversely, you may want to identify the differences between all the piece parts in the complete product structures (for example, between related multiple views or different variants of the product).

Teamcenter allows you to compare structures in two ways.

- You can compare two product structures (BOMs) in separate Structure Manager windows.

The differences are highlighted in the product structure trees.

- You can also perform a graphical comparison of two structures.

Teamcenter highlights differences in the viewer.

You can optionally **compare product structures that are controlled by change management**.

Understanding product structure (BOM) comparisons

Understanding product structure (BOM) comparisons

You compare the *displayed* state of the product structures (BOMs), that is, everything that is currently visible in the two compared structures. Collapse assemblies if you do not want to include them in the comparison.

You must set the appropriate revision rule and variant rule (if any), to configure the structure in each window. If you apply a variant rule, ensure you hide the unconfigured components. You can also compare loaded view types.

The comparison also identifies differences between supporting objects, including:

- Item elements (also called GDEs or general design elements).

- Connections
- Signals
- Reference designators
- Find numbers
- Vendor parts, if the optional vendor management solution is installed.
- Multi-field key properties. Multi-field key information may be defined to distinguish between items with the same identifier, which would otherwise give incorrect results in the comparison.

Choose a comparison mode

Choose a comparison mode

You can compare product structures in one or more of the following standard modes, depending on the setting of the **BOMCompareVisibleModes** user preference:

- *Single-level mode comparisons* compare only the first level of the product structures. You can choose to include one of find numbers, substitutes, or reference designators in the comparison or exclude them. To use this mode, set the preference to **IMAN_bcm_single_level** or **IMAN_ibcm_single_level_occ** (the second setting is for occurrence-based comparisons of logical BOMs).
- *Multilevel mode comparisons* perform a single-level comparison at the top level of the structure. Teamcenter may then make further single-level sequential comparisons of any subassemblies that appear in the two product structures. You can choose to include find numbers in the comparison or exclude them. To use this mode, set the preference to **IMAN_bcm_single_level_seq**.
- *Lowest level mode* compares only the lowest level items of the product structures, ignoring all intermediate assemblies. To use this mode, set the preference to **IMAN_bcm_lowest_level**.
- Variable level comparisons of the product structure, where the level in the current comparison is selected by the user. To use this mode, set the preference to **IMAN_bcm_var_level** or **IMAN_bcm_var_level_seq**, depending on whether you want to include just the current level or also further sequential comparisons of any subassemblies.

The modes listed above are available if the **BOMCompareVisibleModes** preference remains set to its default values. The following non-default modes are available if you edit the preference value:

- Comparison of all levels of the BOM, if the preference setting includes **IMAN_bcm_every_level**.

Caution:

If you use this mode with very large BOMs, performance may be adversely affected.

- Comparison of the lowest level items, with sequential comparisons of any subassemblies, if the preference setting includes **IMAN_bcm_lowest_level_seq**.
- Externally initiated variable level comparisons of the product structure if the preference setting includes **IMAN_bcm_ext_var_level** or **IMAN_bcm_ext_var_level_seq**.
- Item-based comparisons of logical BOMs if the preference setting includes **IMAN_ibcm_var_level** (variable level comparisons) or **IMAN_ibcm_lowest_level** (lowest level comparisons).
- Occurrence-based comparisons of logical BOMs if the preference setting includes **IMAN_ibcm_var_level** (variable level comparisons) or **IMAN_ibcm_single_level** (single level comparisons).

Your Teamcenter administrator may define custom comparison modes appropriate for your site. If they are added to the **BOMCompareVisibleModes** preference, they also appear as available modes in the **BOM Compare** dialog box.

Single-level mode comparisons

Single-level mode compares only the first level of the product structures. Two components or subassemblies match if they are the same item and have the same revision and quantity. If there is more than one occurrence of the same item, they are rolled up for the purposes of the comparison. Consequently, one occurrence with a quantity of **2** is the same as two occurrences with a quantity of **1**. You can optionally include any one of find numbers, reference designators, and substitutes in the comparison.

In this mode, Teamcenter reports the following differences:

- Additions to one of the product structures
- Quantity changes
- Revision changes
- Addition, revision, and removal of commercial parts
- Addition, revision, and removal of vendor parts
- Change to the preferred status of a vendor part

If included in the comparison, find number changes result in a new item and the comparison reports such changes as additions.

If included in the comparison, reference designator changes result in a new item and the comparison reports such changes as additions.

If included in the comparison, substitute part changes result in a new item and the comparison reports such changes as additions.

Multilevel mode comparisons

In multilevel mode, if the comparison process matches two subassemblies in the two product structures, it proceeds to compare the two subassemblies. This process continues down the product structure until it reaches the bottom of the structure or there are no matching subassemblies left.

The subassemblies match if they are the same item and have the same revision, quantity, and find number (if included).

In this mode, Teamcenter reports the following differences:

- Additions to one of the product structures
- Quantity changes
- Revision changes
- Addition, revision, and removal of commercial parts
- Addition, revision, and removal of vendor parts
- Change to the preferred status of a vendor part

If included in the comparison, find number changes result in a new item and the comparison reports such changes as additions.

If included in the comparison, reference designator changes result in a new item and so the comparison reports such changes as additions.

Use this mode to find differences between two configurations of the same product, for example, when variants are applied.

The extended multilevel comparison mode continues until it finds a difference in item or find number. It reports differences in quantity or revision but continues with the comparison.

Lowest level mode

Lowest level mode compares the lowest level items in the two product structures, ignoring the intermediate structure. Teamcenter totals the quantities of each item in the product structures before comparing them. Find numbers are not considered in this mode.

In this mode, Teamcenter reports the following differences:

- Additions to one of the product structures
- Quantity changes
- Revision changes

Use this mode to compare multiple views, such as a design view that may have a different structure to a manufacturing view, while maintaining the same set of piece parts.

Comparing logical structures

A logical structure (LBOM) contains GDE lines that represent signals and connections, as well as items and items revisions. Teamcenter compares GDE lines using their names, signals and connections. When necessary, it compares signals using their source port and destination port attributes. (Not all lines in a logical structure have source and destination ports.)

For such structures, Teamcenter uses single level, multilevel, and lowest level modes to compare the following properties:

- Item ID for item lines
- Revision for item lines
- Name for GDE lines
- Endpoints for connections
- Source, target, and transmitter lists for signals and process variables
- Process variable associations for signals
- Quantity for functionalities

To allow comparison of two different configurations or views of the same LBOM structure, Teamcenter supports occurrence-based and nonoccurrence-based comparisons in single-level and multilevel modes.

Performing a comparison and interpreting the results

Performing a comparison and interpreting the results

You must open the two structures to compare in separate Structure Manager panes and configure them before you initiate the comparison process.

Note:

If you have four or more spaces in any property value, such as the find number or item identifier, you must create the site-level string preference called **BOMReportDelimiter** to ensure the results are displayed consistently. Set the value of this preference to the delimiter character you want to use instead of spaces when generating a BOM comparison report, for example, **||@||**. If you do not create this preference and your BOM lines have four or more spaces as part of any property value, an incorrect BOM comparison report is generated.

Configure the structures for comparison

You compare two configured structures displayed in separate Structure Manager panes. Open the source structure in the left pane and the target structure in the right pane.

1. If the structures are not already open, do the following to open the first structure:
 - a. Select the BOM view revision and click the **Open By Name** button . You can also double-click the BOM view revision or use your MRU list to open the required structure.

Teamcenter opens the **Open By Name** dialog box.

- b. In the **ID** box of the **Open By Name** dialog box, type the identifier of the item you want to compare and click **Find**.
 - c. Click the **Load all** button.

Teamcenter displays the results.

Alternatively, you can right-click an item, item revision, or BOM view revision, and then choose **Send To→Structure Manager** to open it.

2. Click the **Split BOM** button .

Teamcenter open a second pane, adjacent to the current pane.

3. Select the second pane and repeat step 1 to open the second structure.
4. Select the correct top-level line in each structure to use for the comparison.
5. Configure the structures by setting the revision rule and variant rule in each window.
6. Expand and collapse assemblies to define the scope of the comparison. You can compare only the visible structures displayed in the windows.
7. Hide unconfigured variants by choosing **View→Show Unconfigured Variants**.

Note:

If you have a product structure open in a split window, you can only open another structure in the same split window, not in a new split window.

Initiate the comparison process

When you have configured the two structures in separate panes:

1. Choose **Tools→Compare....**

Teamcenter displays the **BOM Compare** dialog box.

2. In the dialog box, select the mode of operation for the comparison from the **Mode** list.

Note:

The modes displayed depend on the value set in the **BOMCompareVisibleModes** preference.

3. Check the **Report** check box if you want to display the report pane summarizing the differences between the structures.
4. Click **OK** to begin the comparison.

Interpret comparison results

Teamcenter presents the results of the comparison in the following ways:

- In the structure trees

Teamcenter highlights each of the lines in each Structure Manager pane that differ between the two structures. By default, additions in the target with respect to the source are highlighted in red and changes in quantity or revision are highlighted in orange. Your Teamcenter administrator can change these default colors by changing the **PSEAdditionColorPref** and **PSEChangedColor** preferences, respectively.

To view details of the changes (for example, revision or quantity changes), examine the **Changes** column in the structure properties table. If this column is not visible, you can **add it to the table**.

- As a report

Teamcenter displays an additional pane at the bottom of the window, listing the differences. You can select a line in the report to highlight the corresponding changed lines in the two Structure Manager panes. This helps you locate where in the structures the changes took place.

The pane indicates the type of change: **Added** for additions, **Qty** for quantity changes, and **Rev** for revision changes. A comma-separated list appears if more than one change occurs on the same line.

- In single-level mode and lowest level mode, the reports are flat lists of differences.
- In multilevel mode, the report is an indented output showing the parent assemblies of any changed items.

Example result of a single-level comparison

The following figure shows the result of a single-level comparison between two revisions of the same structure.

Notice that a single item (**000220/A**) is added to the target view in the right-hand pane and this addition is highlighted in a different color.

The difference is also listed in the report pane.

Item Id	Item Name	Seq No	Rev	Qty
000220	test2	20	{ } -> A	0 -> 1

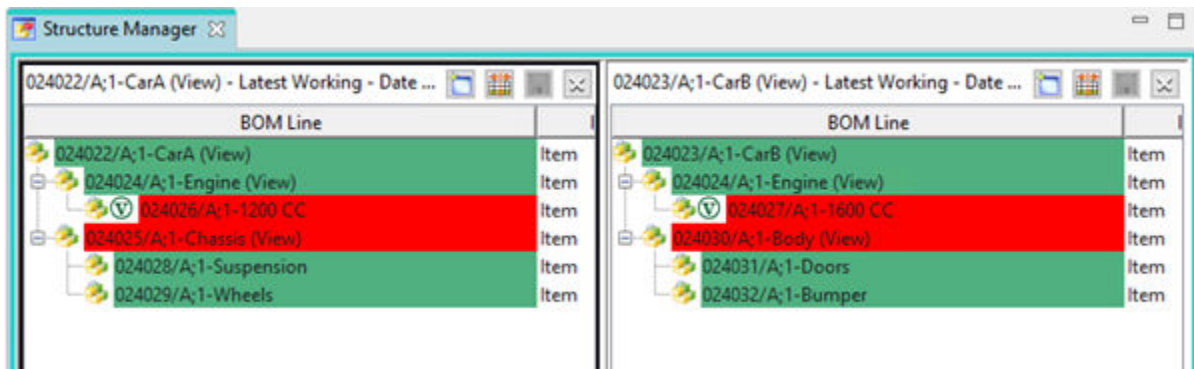
Example results of structure comparison

Example result of a multilevel comparison

The following figure shows the results of a **Multi Level** compare between two different structures.

If the structures you compare have:

- The same subassembly, the system continues with the comparison to check if there are differences below the subassembly level.
- Different subassemblies, the comparison stops at the level where the subassemblies are different.



In the above example, the **Engine (View)** subassembly is the same for both *CarA* and *CarB* structures. However, the subassemblies have two different types of engines because of variant options. Therefore, the multilevel comparison highlights the differences for **1200 CC** and **1600 CC**.

At the next level, the subassemblies are different for both structures. *CarA* has **Chassis (View)** while *CarB* has **Body (View)**. The multilevel comparison highlights that they are different and stops the comparison. Though the two subassemblies have completely different parts, the comparison does not highlight the differences by drilling down because the structures are different at the subassembly level itself.

Clear comparison results

Choose **Tools**→**Clear Compare**.

Teamcenter clears the highlighting colors and the compare columns in the two panes. It also closes the report pane.

Note:

If you start a new comparison before clearing the results of the previous comparison, the existing results are automatically cleared.

Understanding graphical comparisons

Understanding graphical comparisons

You can compare two revisions of a part or assembly and view differences in the embedded viewer pane. Teamcenter displays any differences by color coding parts or assemblies to indicate the type of change made. The differences are also shown in the product structure tree by icons. You can also compare two occurrence groups to identify differences.

You can compare both revision controlled and nonrevision controlled assemblies (for example, configured by effectivity) graphically.

You can compare:

- An assembly with another assembly.
- A part with another part.
- An occurrence group with another occurrence group.
- Supersedures.

If you compare two assemblies under change management (where one assembly is an impacted item and the other is a solution item of an engineering change object), Teamcenter displays a list of supersedures.

Note:

You must implement change management if you want to define and use supersedures.

You *cannot* compare multilevel structures by this method.

Configuring graphical comparison

Configuring graphical comparison

You must ensure the Lifecycle Visualization license level is set to the **Advanced** level if you want to use graphical comparison. If this is not set correctly, the **Tools→Graphical BOM Compare** menu command is not visible.

Change comparison results colors

1. Click the **Icons/Colors Legend**  button.

Teamcenter shows your current change color settings.

2. Choose **Edit→Options**.

Teamcenter displays the **Options** dialog box.

3. In the **Options** dialog box, expand the **Change Management** folder and click the **BOM Tracking** entry.

Teamcenter displays the colors representing the different structure change types.

4. Double-click the type of comparison whose color you want to change and Teamcenter displays the **Color Chooser** dialog box.

5. Choose a new color with the **Swatches**, **HSB**, or **RGB** color selector and click **OK**.

Teamcenter uses the new color to identify the selected type of comparison everywhere structure changes are displayed in the rich client, including the Structure Manager Supersedure pane.

Initiating the graphical comparison

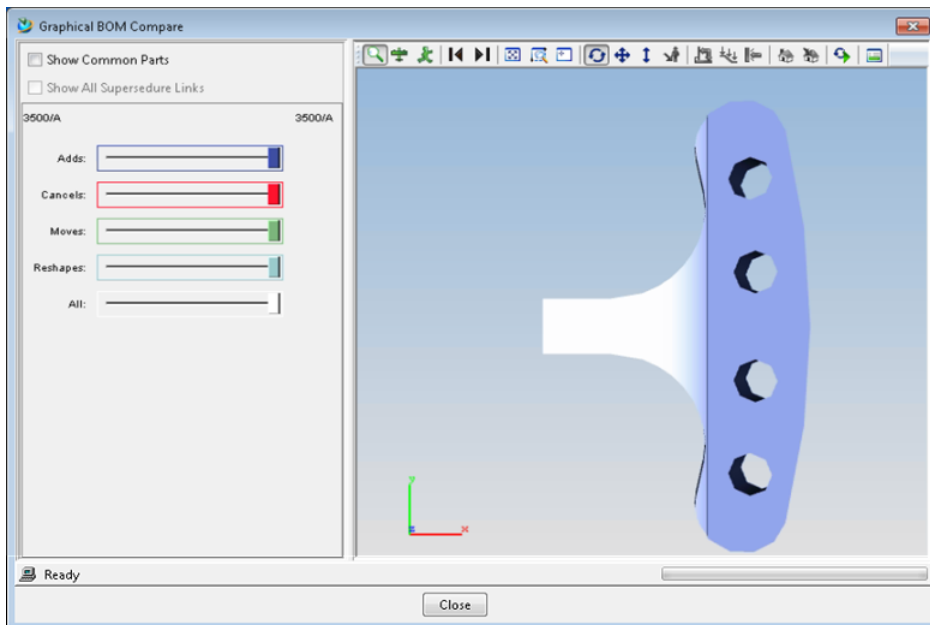
Initiating the graphical comparison

To access the graphical comparison feature, load the two parts, occurrence groups, or configured structures in separate Structure Manager windows, and choose **Tools→Graphical BOM Compare**



or click the  button (if you added this button to the toolbar).

Teamcenter displays the **Graphical BOM Compare** dialog box, allowing you to manipulate the results.



After running the comparison, Teamcenter highlights the following differences between the two windows in the viewer:

- **Adds**

Objects that are in the target window but not the source.

- **Cancels**

Objects that are in the source window but not in the target.

- **Moves**

Objects that are in different positions in the source and target windows (the transformation matrix has changed).

- **Reshapes**

Objects that have an alternative representation between the source and target windows, as identified by an **UGALTREP** note.

You can use the comparison sliders in the **Graphical BOM Compare** dialog box to dynamically view the changes. Parts that are added, canceled, moved, or reshaped from one revision to another move across the window as the respective slider is slid from one revision to another.

Also, the parts are color-coded, depending on whether they are added, canceled, moved, or reshaped.

After you create the graphical history, you can capture it to export or print.

Show and hide common parts

Certain common parts may remain unchanged between the two structures. By default, Teamcenter does not display these common parts in the viewer, allowing you to more easily distinguish changed parts. Hiding these common parts also allows Teamcenter to load the assembly more quickly.

When required, you can display the common parts to more easily see the changes in context of the larger assembly. To show common parts when required, select the **Show Common Parts** check box.

Note:

You can only use common parts if you compare two revisions of the *same* assembly, not different assemblies. Do not use this option if one assembly is a subassembly of the other assembly in the comparison.

To always display common parts, you can change the **CM_show_common_parts** preference, as follows.

1. Choose **Edit→Options**.

Teamcenter displays the **Options** dialog box.

2. In the dialog box, expand the **Change Management** folder and click **Graphical History**.

Teamcenter displays the **Graphical History Settings** pane.

3. In the **Graphical History Settings** pane, select the **Show Common Parts** check box.

Teamcenter now displays common parts during the initial loading of graphical history. If required, you can hide common parts by clearing the box after the history is loaded.

Change the revision rule

To use a different revision rule from the revision rule applied before you began the comparison:

1. Select the affected structure pane and click the **Revision Rule** button.

Teamcenter opens the **View/Select Revision Rule** dialog box.

2. In the dialog box, select the desired revision rule from the list on the left-hand side and click **OK** or **Apply**.

Teamcenter sets the selected revision rule for the structure pane. It recalculates the graphical comparison result and resets all the sliders and buttons in the control pane to their default positions.

If you want to change the revision rule for the both structure windows, repeat these steps in the other window.

Comparing structures under change management

Comparing structures under change management

If the structures you compared graphically are under change management, you can view additional information about the change status (*genealogy*) of your product structure or its components. Structure Manager can exchange data with Change Manager.

When change management is enabled and you save product structure changes in Structure Manager, Teamcenter generates add and cancel information for the affected assembly. You can define the supersedure relationships between the various adds and cancels when you save the changes or later. Change management also allows you to display the genealogy of a component in the assembly.

Supersedure relationships are always created manually in Change Manager. You copy the old item revision to the **Impacted Items** folder and the new item revision to the **Solution Items** folder to establish the relationship.

Select comparison information

Select information about the change-managed objects you compared by clicking the **Revisions** and **Graphical Compare** tabs of the **Change History** dialog box.

The **Change History** tab includes the following two panes:

- Revision list pane

The **Revision List** pane displays the item revisions belonging to the selected item. The item revision nodes are color-coded to convey the change revision information of each revision. If a revision has an associated change, it is displayed in pink, otherwise it is displayed in black.

- Progression pane

The **Progression** pane displays all the revisions of the parent structure in a vertical multibranched tree. The tree displays one of the two following relationships between child and parent objects, depending on the **CM_progression_tree relation** preference setting.

Preference value	Types of relationship displayed in the progression tree
EC_affected_to_problem_relation	In the impacted/solution relationship, the selected revision is the solution revision. The impacted revision is shown as a parent revision. This relationship is only displayed in the progression tree if the selected revision is part of a change process. This is the default setting of the preference.
TC_based_on	In the based on relationship, the revision upon which the selected revision was based is shown as the parent revision. Note: This relationship does not depend on the selected revision being included in a change process.

The **Graphical Compare** dialog box includes the following controls and boxes:

Component	Description
Progression and Revision buttons	Choose the required mode of the revision list. By default, the revision list includes all revisions in a color-coded format. If a revision has change associated, it is displayed in pink; otherwise, it is black. If you click the Progression button, revisions are displayed sequentially.
Compare With combination box	Selects the revision with which you want to compare the selected revision in the left side tree. By default, the problem revision is selected if a change object created the selected

Component	Description
	revision. Otherwise (for users not using Change Management), the Based On revision is automatically selected.
View Type combination box	Chooses a particular BOM view type in case the selected revision has multiple BOM view revisions associated. Your default BOM view type is selected automatically. If you are not using multiple BOM view types, the correct type is automatically shown.
Set Revision Rule button	Chooses the revision rule to configure the selected change revision.
 Change button	Opens the associated change revision in Change Manager.
Effectivity Data table	Displays the effectivity data attached to the selected revision. If no effectivity is attached, the table is blank. If the revision is effective for multiple end items, all end item effectivity entries are displayed.
 Paste button	If you want to compare the selected revision with a revision of another item, you can copy the revision from another application and paste it into the Compare With box.
Status pane	The status pane at the bottom of the dialog box gives status information (for example, loading parts).

Viewing and comparing revisions

Viewing and comparing revisions

When you select a revision from one of the revision trees and click the **Graphical Compare** tab, Teamcenter displays the graphical history in the right pane. This tab has two tabs at the bottom, the **Controls** tab and the **Structures** tab.

If the selected revision has change associated with it and has a problem revision, Teamcenter displays the current configuration in the embedded viewer. The viewer includes a number of control sliders and buttons that allow you to see the differences between the impacted and solution configuration.

If the revision does not have an impacted configuration, you can choose another revision for comparison.

Using the comparison sliders

Using the comparison sliders

When you select a revision and click the **Graphical Compare** tab, the graphical configuration is displayed with five slider controls. Use these comparison sliders to dynamically view the changes

between the selected revisions. Parts that are added, canceled, moved, or reshaped from one revision to the other move across the screen as you move the slider is slid from one revision to the other. The parts are color-coded according to their status.

Use the sliders to view the histories of the following modifications:

Slider	Views the following modifications
Adds	Objects that are on the target assembly but not on the source (<i>added</i>). Indicates parts that are added to the revision. This addition corresponds to the addition tracked in any related structure comparison or supersedure. By default, these parts are colored blue.
Cancel	Objects that are on the source assembly but not on the target (<i>removed</i>). Indicates parts that are removed from the revision. This cancellation corresponds to the addition tracked in any related structure comparison or supersedure. By default, these parts are colored red.
Moves	Objects that are repositioned (transform matrix changed) between the source and target assembly. Indicates parts that are repositioned. A <i>move</i> is not considered an addition or a cancel in related supersedures. In a structure comparison, the move is tracked with the defined move image. You create a move to track the relocation of a component between the impacted and solution assembly. This change is made using an ALTREP note type in the two assemblies. Supersedures do not track this type of comparison. By default, these parts are colored green.
Reshapes	Objects that have an alternate representation (identified by an UGALTREP note) between the source and target assembly. Indicates parts whose shapes are changed. A reshape is not considered an add or cancel in any related supersedure. In a structure comparison, the reshape is tracked with the defined reshape image. You create a reshape to track the relocation of a component between the impacted and solution assembly. This change is made using an ALTREP note type in the two assemblies. Supersedures do not track this type of comparison. By default, these parts are colored light blue.
Common	Objects that are in both source and target assemblies.

Slider	Views the following modifications
All	Shows all of the modifications described previously at the same time.
Triangular slider	The triangular slider is situated under the standard sliders. It adjusts the speed of the moving parts when you interact with the standard sliders. For example, when parts are large compared with the viewer size, they may move too quickly out of the viewer. Use this slider to reduce the speed to obtain a better transitional effect. Similarly, when parts are too small, you can increase the speed.

Note:

You can modify the comparison colors by clicking **Icons/Colors Legend**  to view and change the currently defined color for each type of comparison.

The **All** comparison slider moves all the comparison slider bars simultaneously. In the far left position of the slider, the assembly is the problem assembly before any parts were modified.

Example of graphical history

Assume an assembly named Revision B (that is based on Revision A) contains Part B, which replaced Part A. Assume all the comparison sliders are set under Revision A. At the same time, Part C was moved 10 degrees from its previous location and Part D's curve now begins 9 millimeters higher. Assume all the comparison sliders are set under Revision A.

- Moving the **Adds** slider from Revision A to Revision B causes Part B (colored blue) to move across the viewer and overlay Part A.
- Moving the **Cancel** slider from Revision A to Revision B causes Part A (colored red) to pull out of the assembly and move out of the window.
- Repositioning the **Moves** slider from Revision A to Revision B causes Part C (colored green) to change its location in the assembly.
- Moving the **Reshapes** slider from Revision A to Revision B causes the curve in Part D (colored light blue) to start 9 millimeters higher on the part.

Moving the **All** slider causes all of these changes to occur simultaneously.

After you create the comparison, you can capture the image to export or print.

Controlling a graphical comparison

You can use the following controls on the **Graphical Compare** tab to manage the comparison process of change-managed structures:

Function	Description
Show Common Parts	Use this check box to control if Teamcenter displays common components between the two assemblies.
Show Supersedure link	Use this check box to control if Teamcenter displays supersedure links between added and canceled components.
Show	These buttons allow you to display other configurations, without returning to the revisions tab and selecting another revision. Use the three buttons provided to display one of the following configurations: • Previous revision as configured by creation date • Next revision as configured by creation date • Latest working according to site settings
Display pane	Shows the list of supersedures (if any) associated with the currently displayed affected assembly.
Structure tab	Displays a color-coded structure tree for both the configurations. Buttons are provided to allow you to set the variant and revision rules.

Display comparison results in the structure trees

You can view the differences between the two revisions in tree format as well as in a graphical display. To do this, click the **Structures** tab at the left bottom corner of the **Graphical Compare** tab and Teamcenter displays two structure trees. It shows any modifications (adds, compares, moves, or reshapes) to the selected lines that were detected by the comparison in the appropriate colors.

Use the following buttons to set the effectivity for revision rules and the variant rule.

- **Set Date/Unit/End Item** button

If you select a dynamic revision rule in the **Revisions** tab before you display the comparison results, the structure tree remains unconfigured and no parts are visible in the viewer.

A revision rule is *dynamic* if Teamcenter requires end item, date, or unit entries to correctly configure the structure against that rule. If Teamcenter uses a dynamic revision rule to load a structure, it requires the unit number and end item to load the structure correctly.

To set the correct configurations in this situation:

1. Select each structure pane and click **Calender** .

Teamcenter displays the **Set Date/Unit/End Item** dialog box.

2. Enter the unit number or end item values and click **OK** in both structure panel.

Teamcenter configures the structures and displays the comparison results in the viewer.

When you load a new revision rule, Teamcenter recalculates the comparison results and the control sliders return to their default positions.

- **Set Variant Rule** button

If the two structures you compare contain components with variant conditions, the comparison results include all the lines, irrespective of the associated variant conditions.

To limit the comparison to a set of variant rules:

1. Select each structure pane and click the **Variant**  button.

Teamcenter displays the **Variant Rule** dialog box.

2. Enter the required variant rule and click **OK** in both structure panels.

Teamcenter hides the nonconfigured components in the graphical display and the structure tree.

When you load a new variant rule, Teamcenter recalculates the comparison results and the control sliders return to their default positions.

Define structure change colors, slider colors, and position

You can set your own preferences for the colors of structure changes and for the default color and position of the sliders, as follows.

1. Choose the **Edit→Options** menu command.

Teamcenter displays the **Options** dialog box.

2. In the **Options** dialog box, select the desired color for any structure change type.
3. In the **Options** dialog box, modify the initial location of the slider. (The default initial slider position is 100.)

Create related revision histories

You can compare the graphical histories of two revisions of the same assembly.

1. Select an assembly line in the structure tree and click the **Graphical History**  button.

Teamcenter displays the **History** dialog box.

2. In the dialog box, click the **Revisions** tab.

Teamcenter displays the **Revision** pane.

3. On the **Revision** pane, choose two assemblies to compare. Click **Revision List** to show all the revisions associated with the parent assembly in a tree-format structure. Click **Progression** for a tree-format display of associated revisions.
4. In the **Revision List** view, select one of the revisions to compare.
5. From the **Compare With** list, select the second revision. This list includes all the revisions associated with the selected parent assembly.

By default, Teamcenter populates the **Compare With** box with the problem revision if the revision you selected in step 3 is in a change process.

6. If the parent assembly has multiple BOM view revisions associated with it, select a view from the **View Type** list.
7. Optionally, click **Change**  to open the associated change in Change Manager.
8. Review the effectivity data table for any effectivity data defined for the selected revision. If no effectivity data is defined, the table is blank. If multiple effectivities are defined for the revision, Teamcenter displays all end item effectivity entries.
9. Click the **Graphical Compare** tab to display the comparison pane.

Teamcenter displays the revision selected in step 3 in the viewer. The names of both the selected revisions are listed in the comparison sliders pane, with the revision selected in step 4 to the right. By default, the comparison sliders line up under this revision.

10. Check **Show Common Parts** to load all the parts common to the two assemblies in the viewer.
11. View the history of adds, cancels, moves or reshapes by moving the appropriate slider. To see all changes simultaneously, move the **All** slider.
12. To compare the histories of other revisions without returning to the **Revisions** tab and choosing another set of revisions to compare, click one of the following buttons:
 - Click **Previous** to display the previous revision based on creation date.
 - Click **Next** to display the next revision based on creation date.

- Click **Latest Working** to display the latest working revision, based on your site's definition.
13. To view the comparison information in tree format, click the **Structures** tab at the bottom of the dialog box. The comparison controls are replaced by two structure tree diagrams, indicating the modifications (adds, cancels, moves, reshapes) to each revision by icons and color coding.

Click the **Icons/Colors Legend**  to view the meanings of the icons and colors. In this view, you can also set options for variant rules, view current revision rules and set the current rule and set effectivity information.

Create disparate revision histories

You can compare the graphical histories of two revisions that do not belong to the same parent revision:

1. Select an assembly line in the structure tree and click **Graphical History** .

Teamcenter displays the **History** dialog box.

2. Click the **Revisions** tab to display the **Revision** pane.

Use the **Revision** pane to select two objects to compare. Select **Revision List** to view all the revisions associated with the parent assembly in a tree structure. Select **Progression** to view a graphical display of associated revisions.

3. In the **Revision List** view, select the revision you want to compare with a revision not related to this assembly.
4. Locate the other revision from your **Home** folder or by searching for the revision in the database. Copy it to the clipboard.
5. Paste this second revision into the **Compare With** box. This list always includes all the revisions associated with the selected parent assembly. It now lists all the associated revisions plus the disparate revision you inserted.
6. Continue with the **create related revision histories** process, beginning with step 5.

Create detail part histories

Use the **History** dialog box to generate a graphical history of revisions of detail parts. You can compare two revisions of the same detail part or two revisions of different parts. Teamcenter displays the differences graphically in the viewer and uses color coding to indicating the type of changes performed on the parts. You can also view the differences in a tree-format structure with color-coded icons indicating the types of changes performed upon them.

Use a standard view, tricolor mapping, or distance mapping to view the changes between detail parts.

Use this view	To
Standard view	Display two detail parts side-by-side. The part colors correspond to the current legend settings.
Tricolor mapping	Display the two detail parts at the same position. Click the Preferences button to set the color of common material and of each of the two part group materials.
Distance mapping	Display the distance comparisons between two detail parts at the same position. Click the Preferences button to set the base color and the colors of the high and low values.

To create a comparison between two revisions of a detail part:

1. Select the concerned part in the structure tree and click **Graphical History** .

Teamcenter displays the **History** dialog box containing similar information as for assemblies, except that the configuration switches (BOM view type and revision rule) are not available.

2. From the **Compare With** list, select a different revision of the same part or a different part.
3. Click the **Graphical Compare** tab to view the differences between the two part revisions.

Only one control slider is provided and you can use it to move between the solution and impacted revision of the detail part.

Viewing supersedure

Viewing supersedure

Supersedure allows you to view a graphical representation of the replacement history of a given occurrence in the product structure.

Parts and assemblies are often added to and deleted from a product structure during its construction or modification. Some of these additions and deletions can be grouped together as a *replacement* action. For example, two added parts may replace the form and functionality of one canceled component, making a replacement.

To view and manage the supersedure of the selected line, click the **Show/hide data pane** button , and then click the **Supersedure** tab.

The supersedure tree shows the history of such replacements graphically, starting from the selected part.

Note:

Before you can view the supersedure of a component, you must create a supersedure that defines the replacement. You cannot create a supersedure in Structure Manager.

Using the supersedure toolbar

The following buttons are available on the toolbar on the **Supersedure** pane.

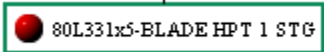
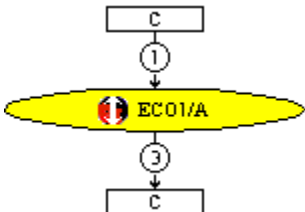
Button	Button title	Description
	Expand screen	Expands the supersedure pane to full size, or decreases the full-sized screen to partial size.
	New node	Displays a different supersedure for the selected component in the context of a different parent assembly. Select the alternate parent assembly from the Where Used search pane below the supersedure layout.
	Automatic/Manual Layout	When activate, changes supersedure layout mode to <i>automatic</i>. Teamcenter lays out nodes are automatically and ensures that no intersections between the nodes and the supersedures occur. When inactivate, changes supersedure layout mode to <i>manual</i>. You can lay out nodes manually. The supersedure's current layout and motion mode is displayed in the status bar below the supersedure layout.
	Single Node	When active, only a single node can be moved in the display. When inactivated, a supersedure can be moved. This button is active only when the Automatic/Manual Layout button is in manual mode. This button's current mode is displayed in the status bar below the supersedure layout.
	Watch Box	Displays the item properties of the selected component in the Item Properties dialog box that opens when this button is clicked. If you select a change node, the watch box shows customer-defined properties of the associated supersedure component.
	Note History	Select a structure line and click this button to display the Note Change History dialog box. This

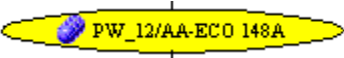
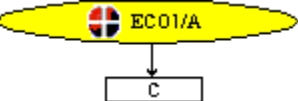
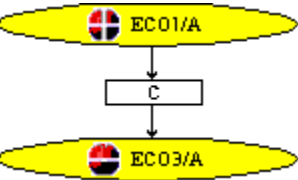
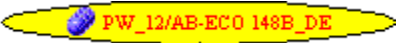
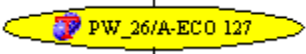
Button	Button title	Description
		dialog box displays the trail of note changes for the selected part or assembly.
		Structure change records for occurrence note changes are created when changes to the structure are saved. To permit this, set the CM_note_types_to_track preference.
	Variant History	Displays the Variant Condition Change History dialog box.
	Graphical Supersedure	Displays the Graphical Supersedure dialog box.

Using supersedure lists in the Supersedure pane

Supersedure list	Description
Product List	Select a product from the list to generate a new supersedure for the selected part in the context of the selected product.
Layout	Displays search results in horizontal, vertical or tree layout.
Find	Performs a query for the part or assembly shown in the text box.
Where-Used Rule	Performs a where-used search on the selected part or assembly.
Where-Used Depth	Sets the depth of the where-used search. One level searches immediate parent assemblies. All levels searches all assemblies up to the top-level product. Top level searches the final product.

Interpreting supersedure icons

Icon	Icon title	Description
	Component Node	Displays the item name corresponding to the change.
	Selected Component Node	Displays the currently selected component node.
	Quantity Node	Shows supersedures created between quantity changes. These are displayed in the Supersedure pane. In this example, EC01/A changed the quantity of part C from 1 to 3.

Icon	Icon title	Description
	Change Node	Connects the component nodes and displays change information. Component nodes listed above the change occurred before the change was created. Component nodes listed below the change occurred after the change was created. A tool tip lists the parent structure and the component's effectivity when you place the cursor over the node.
	Pure Add	Shows the supersedure trail associated with part C, as displayed in the Supersedure pane. In this example, part C resulted from ECO1/A.
	Pure Cancel	Shows the supersedure trail associated with part C, as displayed in the Supersedure pane. In this example, part C resulted from ECO1/A, but was canceled by ECO3/A.
	Selected Change Node	If red, the selected part or assembly is the currently selected change node.
	Transfer Change Node	Shows a T to indicate the change node is a transfer supersedure. Transfer supersedures involve the transfer of a part from one level of an assembly to another level of the same assembly.
	Delivered Product Change	Displays if the supersedure was created as part of a delivered product change. For this type of supersedure, the arrow line appears in red.
	Duplicate Supersedure Flag	Displays if the selected component has a supersedure that is already displayed. The supersedure does not continue from this point as this would produce an infinite loop.
	Additional Supersedures	Displays if there are additional supersedures in the history to display.
	Latest Supersedure	Displays if there are no more additional supersedures in the history to display.

Icon	Icon title	Description
	Move	Green highlights a part or assembly that has moved. You cannot create supersedure for move changes.
	Reshape	Green highlights a part or assembly in the structure that is reshaped. You cannot create supersedure for reshape changes.

Managing supersedure

Managing supersedure

The supersedure tree starts from a selected part and shows the visual path of the subsequent superseded parts. The supersedure tree also shows related product information.

Navigate through the supersedure tree by double-clicking component nodes. Clicking a node expands it to show the next supersedure in the sequence.

You can use the supersedure tree to:

- Browse the supersedure of the selected part.
- Create a new supersedure based on a different parent assembly.
- Create a new supersedure based on a different top-level product.

Browse supersedure

The supersedure tree graphically displays the replacement history of the selected part or assembly using rectangular and oval elements to represent components and changes.

Only part numbers are displayed in supersedure, not revision numbers. You cannot create supersedures for revisions; they are assumed to be interchangeable in form, fit, and function.

To view the supersedure of a part or assembly:

1. In the product structure, select a line that represents a part or assembly that has an associated supersedure.
2. Click **Show/Hide Data Panel** .

The window divides to show the structure tree on the left, and the data pane on the right.

3. In the data pane, click the **Supersedure** tab.

Teamcenter opens the supersedure view containing the replacement history of the selected component in the context of its parent assembly. It generates the supersedure for the item you specify in the **Where-Used** pane located below the **Supersedure** pane.

4. Optionally, place the cursor over a change to show a tool tip that lists the parent assembly item revision and effectivity of the selected change.

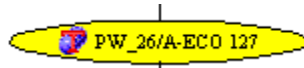
Note:

A part may be used in more than one assembly and each assembly has its own supersedures. Thus, a part may have more than one supersedure trail.

Create a transfer supersedure

Transfer supersedures are generated when a component is moved from one assembly to another. Transfer supersedures require at least two solution items and two impacted items, one for each assembly level.

When a transfer supersedure is viewed in the supersedure window, **Transfer** shows next to the supersedure. A transfer supersedure is viewed in the **Supersedure** pane, as shown.



1. Delete an **Impacted** component from a subassembly:
 - a. Send the pertinent change to Change Manager.
 - b. Select the desired subassembly item revision from the **Solution Item** folder.
 - c. Right-click the item revision, choose **Send To**, and send the item revision to Structure Manager.

Note:

There must be at least two item revisions in the **Solution Item** folder, and one item revision must belong to a subassembly of the other.

- d. Structure Manager opens and the selected subassembly is displayed.
- e. Select the component you want to delete. Click **Delete Line**.
- f. Click **Save**.
- g. Structure Manager saves the assembly, then displays the supersedures view.

- The left pane displays the contents of the **Solution Item** folder.
- The right pane displays the contents of the **Impacted Item** folder.
- The file name and revision rule of each item revision are displayed at the top of the respective panes.
- The bottom pane displays the supersedure once it is created.
- Items that are deleted from the solution item revision display in red in the right pane. In other words, components of the impacted item revision (displayed in the right pane) that are deleted from the solution item revision display in red.

2. Transfer the component to a parent assembly:

- Return to Change Manager and select the parent assembly from the **Solution Item** folder. Right-click the item revision and choose **Send To**. Send the item revision to Structure Manager.
- In Structure Manager, select the level of the assembly where you want the component added.
- Select the component you want to add and click **Copy**. You can select this item revision from My Teamcenter.
- Return to Structure Manager and click **Paste**.
- Click **Save**.

Structure Manager displays the split window. The left pane displays the contents of the **Solution Item** folder. Items that are added to the solution item revision display in blue in the left pane.

- Select the appropriate subcomponent assembly from the **Sub-Assembly** list below the right pane. The assembly is displayed in the right pane. Items that are deleted from the assembly are shown in red.
- Click **Transfer**.

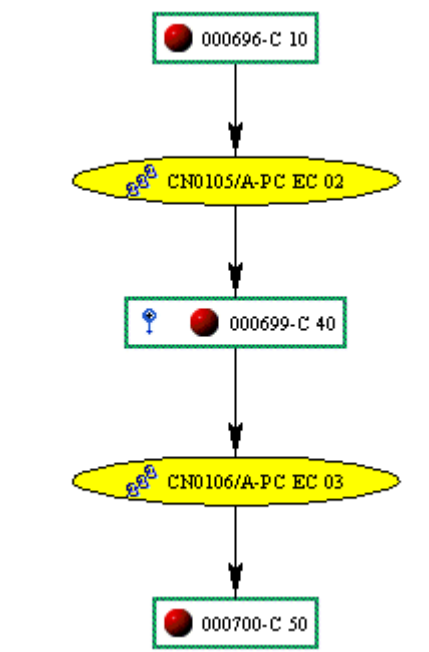
A transfer supersedure is created.

Commonly encountered supersedure examples

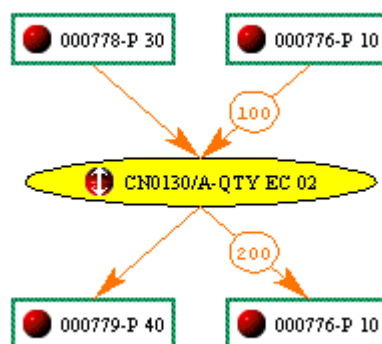
Description

Image

Regular supersedure



Quantity supersedure, from 1 to 2



Description	Image
Regular supersedure plus pure add	
Pure add with quantity	
Quantity supersedure	

View a supersedure in Structure Manager

Viewing a supersedure displays the additions and deletions to the selected affected item.

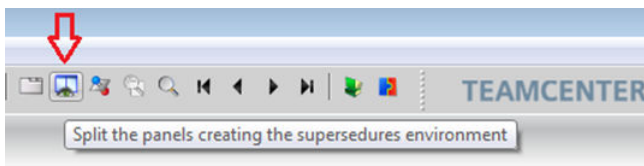
1. Select an affected item in Change Manager and choose **Send To Structure Manager with Supersedure Window** .

Note:

The affected item must be related to a change. If you send any other item to Structure Manager in this way, you cannot work in the supersedure environment.

If Structure Manager displays a **Do you wish to update BOM Changes (needed only if structure is edited outside change control)?** message, click **Yes**. This ensures you can manage the BOM changes that are now being managed in Structure Manager, outside of change control.

2. When you open a change object in the supersedure window for the first time, click the split panels icon:



You must select **Yes** from the confirmation dialog. If you select **No**, clicking the split panels icon when opening subsequent changes results in no action; the confirmation window does not appear nor does the supersedure window open. To reset this behavior after clicking **No**, you must close all Structure Manager windows.

To disable the confirmation dialog and open supersedure windows automatically in the future, set the **CM_disp_bom_edits_dialog** preference to **Yes**.

3. Click **Supersedures Environment** .

The supersedures folder is displayed in the supersedures view in the bottom pane. The **Adds** folder displays additions to the assembly with a  to the left of the component name.

The **Cancels** folder displays deletions from the assembly with a  to the left of the component name.

4. View the supersedure of the same affected item with a different problem item by selecting a different problem item from the list below the right pane. This list displays any other problem items that have been used to create a supersedure with the selected affected item revision.
5. A new supersedure appears, displaying the additions and deletions of the new supersedure.

Create a structure change

In Structure Manager, perform the necessary modifications (additions, deletions, moves, reshapes) by adding and deleting structure lines, then click **Save**.

Note:

You must have write access to the assembly.

Change management compares the selected solution item with the associated impacted item in the change by displaying two panes. The left pane displays modifications to the solution item assembly, the right pane displays modifications from the impacted item assembly.

By default, additions are blue, deletions are red, moves are green, reshapes are light blue, quantity changes are orange, and so forth. Click **Icons/Colors Legend**  to view the currently defined color for each type of comparison. You can select the comparison colors by choosing **Edit→Options→Change Management→Bom Tracking** and changing the colors.

If the change contains more than one impacted item, change management applies the following rules to select the appropriate impacted item:

1. Choose the item revision with the same ID as the selected solution item.
2. If there is no item revision with the same ID, or if there are multiple revisions of the item revision, you are prompted to select one from those listed in the **Impacted Items** folder.

Note:

If the selected assembly is a new part, or else not a solution item (for example, you are only making structure change modifications, not creating a supersedure), choose **No Impacted Item** at the prompt. **BOM Change** objects of the type **Add** are created for every component.

In the example, the left pane displays the additions to Assy100/B, and the right pane displays the deletions from Assy100/A, as shown.

Left pane: Additions to Assy100/B	Right pane: Deletions from Assy100/A
P10	P10
P21	P11
P15	P15
P25	P18
	P19

Left pane: Additions to Assy100/B	Right pane: Deletions from Assy100/A
Assy200/A	Assy200/A
P30	P30
P21	P11

This completes the first stage of making a supersedure—creating structure changes. These same changes can now be viewed from the **BOM Changes** view in Change Manager by selecting the solution item. The **BOM Changes** view displays the modifications (adds, cancels, moves, reshapes) with the specified buttons in the **Icons/Colors Legend** .

The convenience of viewing color-coded changes to a structure might be sufficient for your change management requirements and you have no need to create supersedures.

Note:

When creating structure changes, the only changes processed are additions, deletions, moves, reshapes, and quantity changes. Changes to other component properties, for example, Find No., occurrence notes) are not included. Variant components are treated as any other component.

Create a structure change using dynamic revision

Create a structure change using dynamic revision

You can use dynamic revision rules to track a particular change. A dynamic revision rule is dynamic when it requires end item, date, or unit number input to generate correct configured revisions.

When defining a dynamic revision rule to track a change, Teamcenter uses the revision rule set in the **TC_config_rule_name** user preference.

Use the CM Base Configuration form to determine the product unit or date that causes the change to go into effect. This form can be attached during the definition of the change object using the Business Modeler IDE.

If a configuration form is attached to the change, the revision rules are modified according to the form's effectivity entries.

Create the CM base configuration form

A structure change based on dynamic revision rules requires a change containing the **CM Base Configuration** form. This form must be manually created before the dynamic revision rule functionality can be used. Before the form can be created, the form type must be defined.

To create a new form, choose **File→New→Form**. The **New Form** wizard appears to create the **CM Base Configuration** form.

Use the following information to create the form and class in step 1 of the **New Form** wizard:

Form Name:	CM Base Configuration
Class Name:	CMBaseRevRuleForm

Use the following information to complete the form fields in step 2 of the **New Form** wizard:

Name	Type	Size	Null
end_item_str	String	128	Check
unit_no	Integer	N/A	Check
from_date	Date	N/A	Check

Note:

It is important that the form fields are defined exactly as shown in the table. If the definitions are altered the dynamic revision rules will not work correctly, and once the forms are created, they are not easily revised.

To complete the setup of the dynamic revision rule functionality, the **ECM_base_revrule_relation** relation type must be created.

Create the relation type using the Business Modeler IDE.

Create a BOM change based on dynamic revision rules

A run-time override folder is created for the revision rule of the affected assembly that contains all the affected and solution revisions set in the first entry of the folder. This ensures that the revisions created as part of the change are displayed as the configured revision, irrespective of the effectivity entries.

Create structure quantity changes

A quantity change for an assembly or a component-level item revision must be based in the context of Change Manager.

1. Select a change revision master and send it to Change Manager, using the **Send To** command.
2. From Change Manager, select the item revision under the **Solution Item** folder and send it to Structure Manager, using the **Send To** command.

3. In Structure Manager, make sure the **Quantity** column is displayed.
4. If the **Quantity** column is not displayed:
 - a. Choose **Edit→Options**.
 - b. Select **Structure Manager**.
 - c. Select **Hidden Columns→Quantity** to place it in the **Shown Columns** list.
 - d. Once **Quantity** is in the **Shown Columns** list, click **Up**  or **Down**  to position its display in the Structure Manager window columns.
 - e. Click **OK**.
 - f. When you have verified the **Quantity** column is displayed in Structure Manager, return to Change Manager.
 - g. Select the same item revision and send it to Structure Manager again, using the **Send To** command.

The **Quantity** column is displayed.

5. In Structure Manager, select the component for which the quantity needs to be changed.
6. Click the quantity in the selected structure line; the **Quantity** cell is outlined.
7. Type in the quantity, then press **Enter**.
8. Click **Save**. A split window displays the item(s) whose quantities have been changed in orange.

The quantity for item revisions can also be viewed from the **Properties information** dialog box.

Attach a form to structure change

You can associate a form with a structure change from Change Manager. Once a form is associated with a structure change, it displays in the **Form** pane of the **BOM Changes** tab. Its fields can be used to indicate the purpose behind the change or other change information, such as comments, requirements and so forth.

Use the **Form** pane with the **BOM Changes** tab to associate a form to a selected structure change.

To associate a form with a structure change:

1. In Change Manager, select the item revision whose structure changes you want to associate with a form.

- Click the **BOM Changes** tab.

The item revision is displayed in the **Revision** tree of the **BOM Changes** tab.

- Click **+** to expand the **View** folder.

Any structure changes made to the item revision appear.

- Select the structure change to which you want to associate a form.

- Click **Create**.

The form type specified in the **CM_bomchange_formtype** preference by the administrator displays in the **Form** pane.

- Type the requested information into the available text boxes.

- Click **OK**.

The information is saved to the database and the form is associated with the structure change.

- After the form has been associated with the structure change, click **Display** at any time to display the form and its contents.

- Click **Modify** to modify the contents of the form.

- Click **Delete**  to delete a structure change form.

Note:

To create structure changes, the changes performed in Structure Manager must be made in the context of an change for a given assembly. The item revision must be selected from the **Solution Item** folder from within Change Manager and then sent to Structure Manager.

Create delivered change

A change, rework, or re-identification of an original part that is assigned **Delivered** status can be tracked from the original item revision by creating a parallel revision sequence using the **Save As** command. For example, a parallel revision sequence for the delivered assembly Assy100/C can be based on the site number of the customer to whom the product was delivered, for example, #3382. This allows the item revision to continue the revision progression in a parallel path.

You can perform a delivered product change and named design progression using the same change. The change process must be configured so that the delivered change is assigned special release status which is used to display delivered changes in supersedure.

1. In Change Manager, select the item revision you want to change.
2. Choose **File→Save As**.

The **Save Item Revision As** dialog box is displayed.

3. Type the new **Revision ID** sequence. In the previous example, change the existing sequence of Assy100 to 3382.
4. Optionally, type a description of the change.
5. Click **OK**.
6. Click **Apply** to save the changes to the database and leave the dialog box open for additional changes.

Creating a custom supersedure form

Using supersedures

When evaluating an engineering change, it can be useful to know the genealogy or replacement history of a part. A *supersedure* defines the part or parts that replaced a component. Create supersedures when defining an engineering change so that the genealogy can later be displayed. This feature is useful for evaluating the impact of engineering changes on parts that may still be in service for products with long lifetimes, for example, in aerospace environments. (Associated engineering changes may be required for these earlier, but still active, parts.)

Note:

You can define supersedures with revision changes and not with incremental changes.

Components can be added to and removed from a product structure over its life cycle. Some of these additions and replacements can be related together as a replacement. For example, two *added* parts can replace the form and functionality of one *canceled* component, making a replacement. The parent assemblies of the components must be the **Affected** and **Problem Items** of an engineering change created in the Change Manager application.

You can define a supersedure to record this replacement history. You can then view a graphical representation of such replacement, as a supersedure history, starting from a selected occurrence of a part and continuing to the following superseded or preceding part. This allows you to compare the loaded structure before and after such changes.

Associate a custom form with a supersedure

1. Select a supersedure and click the **Custom Form** button . Teamcenter displays the Supersedure form.

Your Teamcenter administrator selects the custom form associated with supersedures.

2. Complete the form and click **Apply**.

Teamcenter saves the form and associates it with the selected supersedure. Once the form is associated with a supersedure, it cannot be detached.

Once a form is created for a supersedure, it displays in the **Supersedure** pane whenever the supersedure is selected. You can modify the form at any time and save changes by clicking **Apply**.

View the history of variant changes

1. Open the data pane by clicking the **Show/Hide Data Panel** button  on the toolbar.
2. On the data pane, click the **Supersedure** tab.
3. On the **Supersedure** pane, click the **Variant Change History** button.

Teamcenter displays the **Variant Change Details** dialog box, showing variant conditions for the impacted item and the solution item of the chosen occurrence.

11. Using item revision configuration

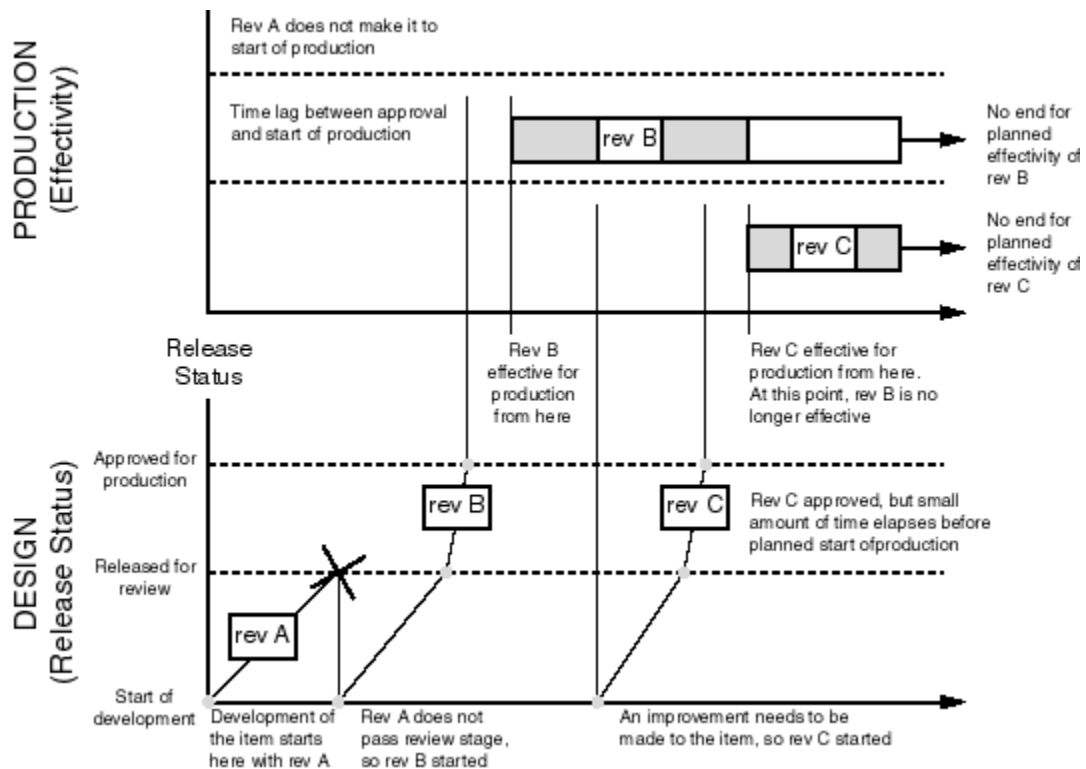
Understanding revision effectivity

Revision effectivity principles

Note:

As an alternative to revision-based effectivity, consider incremental change.

You can use *revision* effectivity to control when various revisions of an item are in effect. The product structure can be configured for a particular date or unit (serial) number by the application of a revision rule. The following example shows an application of revision effectivity.



When you set an effectivity range, consider the following:

- You express effectivity as a start to end range of dates or unit numbers, for example, **1–May-2007 to 31–May-2007**.
- You can configure open-ended effectivity with an infinite end date or unit number (**UP**) or until stock is out (**SO**).

For example, **1–May-2007 to UP** or **1–May-2007 to SO**. **UP** and **SO** are both provided to aid integration with ERP systems but, in Teamcenter, they are functionally the same.

- Effectivity may be discontinuous, for example, **1–May-2005 to 31–May-2007, 1–July-2007 to UP**.
- Effectivity can be shared. A reusable effectivity has an identifier.
- You must qualify unit effectivity by an end item, for example, **Unit 10 to UP, End Item A1000**.

Revision effectivity configuration algorithm

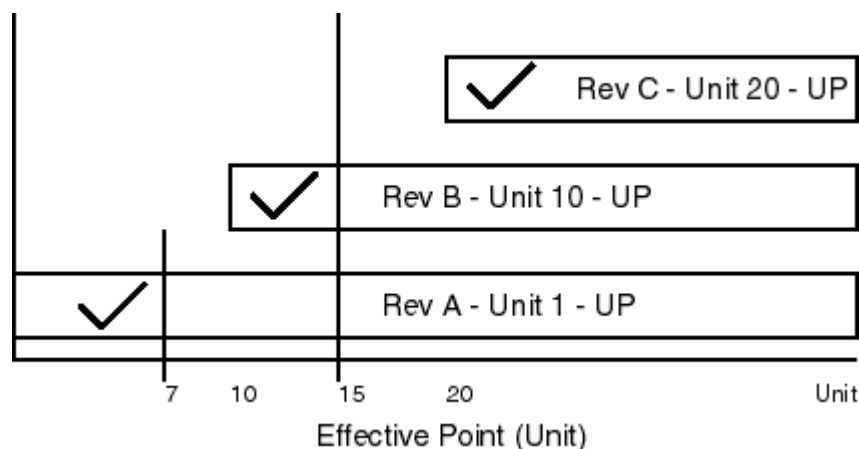
You can use **Has Status** revision rule entries to configure revisions by their effectivities. A revision rule entry is qualified by one of the following:

- Configured by effective date
- Configured by effective unit

For any item, a revision rule must configure only one revision, but revisions may have overlapping effectivities.

Typical effectivity unit configuration

The following is an example of effectivity ranges for three revisions of an item with open-ended unit number effectivity. If the structure is configured at unit 7, revision A is configured. If the structure is configured at unit 15, revision B is configured.



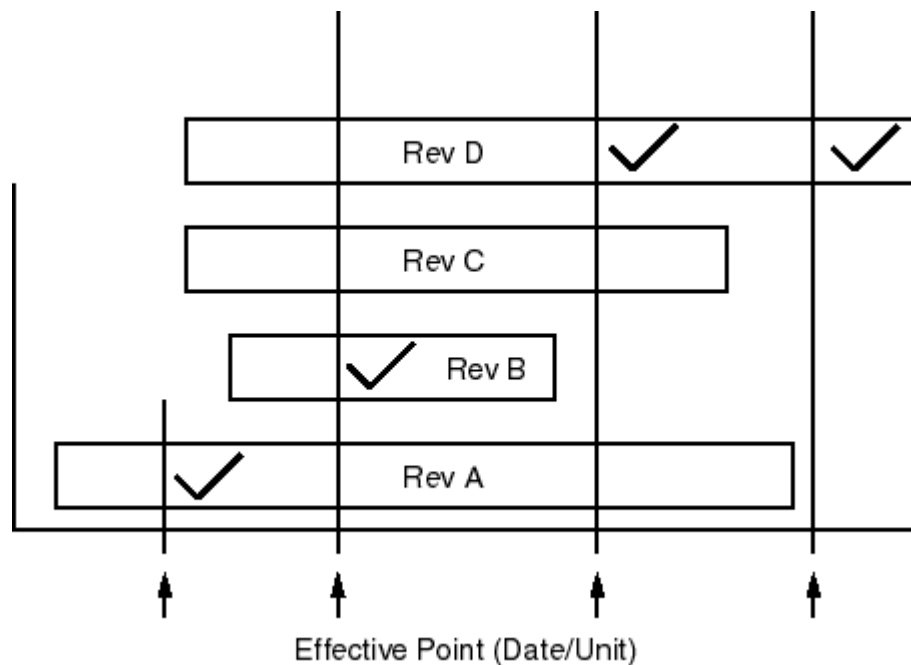
Revision effectivity configuration algorithm with closed range

The following is an example of effectivity ranges for three revisions of an item with closed range effectivity, that is, with an end unit or date set. A check mark (tick) indicates the particular revision that is configured for a given effectivity point.

- When the effective point line crosses only one revision, the revision is configured, as shown for revisions A and D.

The red line corresponds to the effective point (date or unit) at which the structure is being configured.

- If the effective point line crosses more than one revision, the revision with the latest start date or unit is configured, as shown for revision B.
- If two or more revisions have the same start date (for example, revisions C and D), the revision with the latest release date is configured, as shown for revision D.



Using date effectivity

Date effectivity allows you to specify a valid range of dates for a particular item revision. The effectivity definition may be:

- Open

For example, an item revision may be valid from 05 January onward.

- Closed

For example, an item revision may be valid from 01 January to 30 April.

Using unit number effectivity

Unit effectivity allows you to specify a valid range of unit numbers for a particular item revision.

- Unit effectivity is always specified in the context of an *end item* to which the units apply.
- You can specify a discrete, noncontinuous range, if appropriate.

Using item revision configuration

You can create and apply revision rules to select the appropriate revision of components in the product structure. A revision rule sets the criteria for selecting the revision, for example, whether to load working revisions or determining the released revisions that are loaded. This allows you to configure a structure as it was or will be on a particular date, for example, by utilizing effectivity data on each item revision (release status).

Users can use combinations of effectivity data to do the following:

- Create and set date and optional end item revision effectivity.
- Create and set unit number and end item revision effectivity.
- Share an existing effectivity between structures.
- Create and share a named effectivity.
- Protect an effectivity so that only certain users can apply it.

Both unit number and date ranges can be closed or open-ended. For open-ended ranges, **UP** and **SO** (stock out) values can be specified. Ranges can be discontinuous, for example, unit numbers **1, 5, 10–UP**.

A privileged user (typically, the system administrator) creates the revision rules that are then made available to other users. Consequently, nontechnical users do not have to understand the full complexity of revision configuration but simply apply the appropriate revision rule.

Before creating or implementing item revision configuration, you must first implement the appropriate effectivity and release schemes.

Understanding revision rules

Understanding revision rules

Item revision configuration allows you to create and apply revision rules that select the appropriate revision of parts and assemblies in the product structure. A revision rule:

- Selects working revisions and (optionally) specifies the owning user or group.
- Selects revisions by status (according to status precedence) or the latest revision with any status using release date.
- Optionally specifies the effectivity against which the revisions are configured. Effectivity may be specified by date or unit number.

Note:

Do not confuse the effectivity in the revision rule with the actual effectivity data visible on item revisions.

- Select revisions in a specified override folder.
- Select the latest revisions according to the revision ID by alphanumeric, numeric, or creation date order. This selection does not depend on whether revisions are working or released.

You define each of these criteria with a revision rule entry. A revision rule may contain any number of rule entries, each of which attempts to select a revision according to the specified criteria, for example, the status that the revision should have or the user or group that owns the revision.

Teamcenter evaluates rule entries in order of precedence until a revision is successfully configured. You can include some entries more than once to define an order of precedence, for example, **Status**:

```
Working (Owning Group = Project Y)
Has Status (Production, Effective Date)
Has Status (Pre-Production, Effective Date)
```

You can modify the order of the rule entries to change the precedence Teamcenter uses when evaluating the revision rule. Certain rule entries can also be grouped so they are evaluated with equal precedence.

Teamcenter always enforces a revision rule when you open a structure in a Structure Manager window.

Evaluate revision rules for read access

By default, Teamcenter applies a revision rule to configure a product structure before it applies an access rule. As a result, if a higher revision rule entry configures a particular revision of an item and the user has no read access to this revision, the structure line in Structure Manager shows an **UNREADABLE** stub entry.

You can optionally configure Teamcenter to continue evaluation when expanding the structure against the revision rule until it encounters a revision of the item to which the user has read access. However, if it finds no accessible item revision for any of the entries, it shows an **UNREADABLE** stub, as before. To allow Teamcenter to continue revision rule evaluation by making read access checks in this way, set the **PSE_check_read_access_for_Rev_Rule_entry** preference to **TRUE**. Structure Manager shows the next

item revision to which you have access. If this preference is set to **FALSE**, evaluation stops when the first inaccessible configured item revision is encountered.

Unreadable lines may be shown or hidden, depending on the setting of the **BOM_hide_unreadable_lines** site preference. If the preference is set to **None**, unreadable lines are shown and labeled as **UNREADABLE**; this is the default setting. If the preference is set to **All**, unreadable lines are hidden. If the preference is set to a group name, unreadable lines are hidden from users in the specified group.

- If the user has no access to an item or GDE (generic design element) in an imprecise structure, the line is not displayed.
- If the user has access to the item in a precise structure but not the configured item revision, the line is displayed.
- If the BVR is precise and the user has no access to the item revision, the line is not displayed.
- If the BOM has only unreadable lines, the parent is shown as a leaf node.

Unreadable lines do not participate in roll ups, configuration, BOM compare, accountability checks, duplication, import/export, and searches. Hidden lines cannot be used as global alternates or substitutes.

You can use any of the following revision rule entries to show configured item revisions to which the user has read access:

- **Latest Working**
- **Status**
- **Latest Revision**
- **Override**

You can include more than one of these entries in the same revision rule to find accessible item revisions.

This behavior applies only to imprecise structures and does not affect the evaluation of precise structures. Similarly, there is no effect if you configure a structure by unit number or date effectivity.

Elements of a revision configured product structure

The following elements may appear in a product structure that is controlled by revision configuration.

Element	Purpose
Baseline	A copy of the currently configured structure at the time the baseline was created. Baselining configures a completely released structure and thereby guarantees that the models are always the same as when the baseline was created.
End item	A product, system, or module with respect to which you can configure the structure by effectivity. For example, you can configure the structure of unit number 110 in product X400 , where X400 is the end item.
End item revision	The configured revision for the selected end item.
Imprecise assembly	A single-level assembly that has items (<i>not</i> item revisions) as the components. Teamcenter determines the applicable revision from the revision rule settings.
Override list	A mechanism that allows a user to override the revision that would normally be loaded by the revision rule. The user places item revisions in a workspace folder, and the revision rule is overridden by the rule specified in the override list. The folder provided for the override list may contain multiple nested folders. The item revision in the topmost folder is configured.
Precise assembly	A single-level assembly that has specific item revisions as the components. When Teamcenter applies the revision rule, the precisely specified item revision is configured by a precise entry in a revision rule.
Release status	An object assigned to an item revision after it is successfully released. Item revisions can be configured according to their status. The status may optionally contain effectivity data for revision configuration (<i>not</i> occurrence effectivity configuration).
Revision rule	The parameters set by a user that determine which revision of an item at a particular time. You can also save a revision rule as a workspace object.
Rule entry	A revision rule comprises an ordered list of rule entries. Each type of rule entry is concerned with a particular type of configuration.
Snapshot	You can save a configured product structure as a <i>snapshot</i> . The snapshot folder contains all revisions of the structure, and you can use it to redisplay a saved structure at any time.
Working revision	An unreleased version of the structure. Any user with write privileges can freely change this revision. Teamcenter maintains no record of intermediate states of a working revision.

Applying a revision rule to a Structure Manager window

Each Structure Manager window has an associated revision rule that Teamcenter applies to the displayed structure. The name of the revision rule appears in the banner at the top of the window. Setting a revision rule in one window does not affect the revision rule that is applied in another window. When you open a new Structure Manager window, Teamcenter applies your default revision rule to the structure.

If you do not want to use the default rule, you can set a revision rule for your current Structure Manager session by clicking the **Revision Rule** button  on the toolbar or choosing **Tools→Revision Rule→View/Set Current**. If there are existing windows containing previously opened structures, Teamcenter uses the revision rule of the current window when you open a new structure; otherwise, it uses the default revision rule.

A revision rule is always in effect when a Structure Manager window is open. The revision rule allows Teamcenter to determine the specific revision of each part and assembly to configure in the structure. You set your default revision rule by choosing the **Edit→Preferences** menu command.

When a new revision rule is set on a window already containing a structure, the revision rule only reconfigures the child lines; the top line of the window is not changed. If the top line was revised and you want to set the latest revision as the top line, you should open the latest revision in a new window.

Note:

Unlike a revision rule, a variant rule is optional and no default is applied.

Set a revision rule

Set a revision rule by clicking the **Revision Rule** button on the toolbar or choosing **Tools→Revision Rule→View/Set Current**.

Teamcenter displays the **Set Revision Rule** dialog box containing a list of revision rules that were configured by a privileged user. The right side of the dialog box shows the details of the selected revision rule. To set a revision rule, you select the required rule and click **OK** or **Apply**. If you are a nonprivileged user, you do not need to understand the complexity of the rule syntax, but should understand the appropriate rule to apply in a particular circumstance.

Tip:

You can save a **default revision rule** by choosing the **Edit→Options** menu command.

Set dates, units, and end items

To set the date, unit number, and/or end item of the currently active revision rule, choose **Tools→Revision Rule→Set Date/Unit/End Item**.

Teamcenter displays the **Set Date/Unit/End Item** dialog box into which you can enter a date, a unit number, and an end item for the current revision rule.

The first time you make a change to a saved revision rule (including setting a date, unit number, or end item), Teamcenter creates a modified copy of the rule and applies it to the window. This is the rule to which you make the unit number change.

If any date, unit number, or end item has been explicitly set in the current rule, you cannot change the value in this dialog box and the relevant boxes are grayed out.

Tip:

You can add a button to the toolbar to initiate the **Tools→Revision Rule→Set Date/Unit/End Item** command, by right-clicking the toolbar, choosing **Customize**, and selecting the required button.

If you specify an end item identifier that is shared by multiple objects, Teamcenter displays the **Select Unique Item** dialog box, allowing you to select the object you require.

You can create or modify a revision rule in applications other than Structure Manager, for example, in 4G Designer. Structure Manager does display such revision rules and their entries, and you can use them to configure the structure based on the displayed entries. However, a product structure in Structure Manager and a collaborative design in 4G Designer may have different data conditions. If so, the configurations in the applications are different, even if you use the same revision rule.

Set an override folder

To add an override folder into the currently active revision rule, choose **Tools→Revision Rule→Set Override Folder**. This command is available to unprivileged users, but is only active for revision rules that contain a special empty override entry (no folder specified). Thus privileged users who define the revision rules should place an empty override entry into a revision rule if they want to allow unprivileged users to use their own override folders with the rule.

The **Set Override Folder** dialog box allows you to set an override folder and also to see the folder that is currently set. The dialog box has the following boxes:

- A **Name** box into which you can enter a case sensitive search string to find the required override folder. Click the **Find**  button next to this box to perform the search.
- The search results box. Double-click the folder you want to set.
- A **Folder** box that displays the folder currently used as the override folder in the revision rule.

To use the existing override folder, simply click **OK** or **Cancel**.

Note:

- The first time you make a change (such as setting an override) to a saved revision rule, Teamcenter creates a modified copy of the rule and applies it to the window. This is the rule to which you then make the override change.
- When you make a change to a folder (for example, adding an item revision to it when Teamcenter Integration for NX is active) and open an assembly configured by a rule that uses the override folder, Teamcenter does not automatically reevaluate the revision rule. Consequently, it does not take into account the change to the override folder. This rule is reevaluated only if you choose **File→Options→Load Options** in Teamcenter Integration for NX. Click **OK** before opening the part file.

Viewing revision rule information

Use the **Rule Configured By** column in the product structure window to interpret how a particular line is configured. The values that may appear are:

- **Working (Owning User = *user*, Owning Group = *group*)**

This appears if the item revision is working and thus configured by a **Working** entry in the revision rule. The owning user and owning group arguments only appear if they are specified in the revision rule.

- **Has Status (*status*, Configured Using ...)**

Shows the status specified in the revision rule that configured the item revision. If **Any Release Status** is specified, **Any Release Status** is shown. The **Release Status** column shows the status of the configured item revision.

The method of configuration (**Configured Using**) is also displayed and may be **Released Date**, **Effective Date**, or **Effective Unit No.**

Additionally, this column shows the date or unit number used in the configuration, as follows:

- **Date (Today) or Date (1-Jan-2007)**

The date specified in the revision rule. Used to configure historical revisions with status.

- **Unit No.(4)**

The unit number specified in the revision rule.

- **End Item (*item object id*)**

Identifies the end item specified in the revision rule.

- **Override Folder (*folder*)**

The override list folder name is shown if the override list caused the item revision to be configured.

- **Precise**

This appears if the occurrence is precise and is configured as such.

- **Latest (...)**

This appears if the item revision is configured by a **Latest** entry in a revision rule. The method of latest configuration can be **Creation Date**, **Alphanumeric Rev ID**, **Numeric Rev ID**, or **Alpha+Number Rev ID**.

- **Not Found**

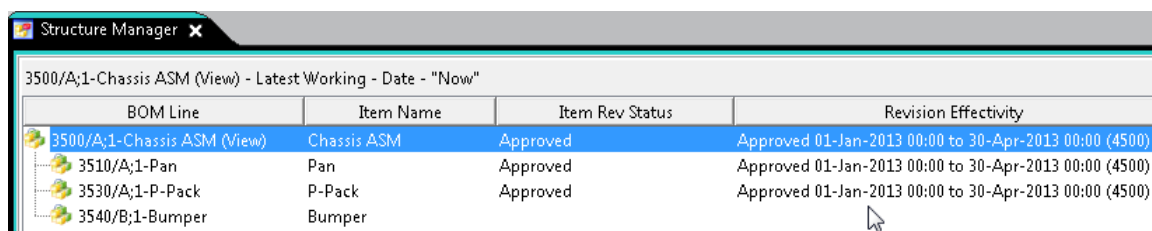
This is shown if no revision meets the revision rule criteria. Teamcenter displays **???** to represent the revision.

Displaying and editing revision effectivity

Displaying and editing revision effectivity

By default, revision effectivity data is not displayed in the Structure Manager properties table. Before editing revision effectivity, you must first display the data.

If you are working with revision effectivity, you may want to display the **Revision Effectivity** property.



The screenshot shows the 'Structure Manager' window with a table titled '3500/A;1-Chassis ASM (View) - Latest Working - Date - "Now"'. The table has four columns: 'BOM Line', 'Item Name', 'Item Rev Status', and 'Revision Effectivity'. The data is as follows:

BOM Line	Item Name	Item Rev Status	Revision Effectivity
3500/A;1-Chassis ASM (View)	Chassis ASM	Approved	Approved 01-Jan-2013 00:00 to 30-Apr-2013 00:00 (4500)
3510/A;1-Pan	Pan	Approved	Approved 01-Jan-2013 00:00 to 30-Apr-2013 00:00 (4500)
3530/A;1-P-Pack	P-Pack	Approved	Approved 01-Jan-2013 00:00 to 30-Apr-2013 00:00 (4500)
3540/B;1-Bumper	Bumper		

Display revision effectivity data

1. Select the line whose item revision effectivity data (ranges of dates or unit numbers for which the revision is effective) you want to view.
2. Choose **Tools→Effectivity→Revision Effectivity**.

Teamcenter displays the **Effectivity** dialog box. This dialog box lists all the effectivity ranges for each status attached to the item revision.

Note:

While you can set date effectivity without an end item, unit effectivity must always have an end item.

Edit revision effectivity data

Edit revision effectivity data

For easier access to editing functions, consider adding an **Edit Revision Effectivity** button to the toolbar by right-clicking the toolbar, choosing **Customize**, and selecting the required button.

If you previously released two or more items or item revisions simultaneously, when you edit the effectivity of one such item or item revision, you also edit the effectivity of any associated items or item revisions. You can identify any such affected items by sending the structure line to the Workflow Viewer to see the other targets of the process that share the same release status and whose effectivity will also change.

1. In the **Revision Effectivity** dialog box, select the appropriate revision effectivity line and click **Edit**, or double-click the line.

Teamcenter displays the **Edit Revision Effectivity** dialog box.

Note:

You can also edit revision effectivity in My Teamcenter. Double-click the item status and change the displayed value.

2. In the **Create or Edit Effectivity** dialog box, choose **Units** or **Dates** effectivity, as appropriate, and define the effectivity data.

If defining unit effectivity, type the desired effectivity range in the **Units** box. Use the - character within a continuous range, and the , character to separate discontinuous ranges. For example, the unit range **1-5,7-9** defines effectivity for units 1 through 5, and 7 through 9 (but not effective for unit 6).

If defining date effectivity, select a cell in the **From** or **To** column, select a date from the calendar (and optionally enter a time), and click **Set Date** to place that date in the selected cell. Click the **Clear Date** button to remove the date from the currently selected cell. Repeat these steps for additional date ranges until you have entered all the desired date ranges.

- Click the **UP** button to add the **and up** (open-ended effectivity) condition to the end of the unit or date effectivity range.
- Click the **SO** button to add the **stock out** condition to the end of the unit or date effectivity range.
- Select the **Apply Access Manager effectivity protection** check box to apply the predefined access rules to this effectivity.

Note:

Teamcenter interprets **UP** and **SO** conditions as open-ended for revision configuration purposes. The revision is considered effective for any value greater than or equal to the unit or date value immediately preceding the **UP** or **SO**. *Stock out* indicates that existing stocks of a component revision should be used up before the next revision.

3. Optionally, for date effectivity, use the **Edit Revision Effectivity** dialog box to define an end item to qualify the effectivity range. You *must* use this with unit effectivity to specify a product, module, or subsystem that carries the unit number to which this effectivity refers. You can select an end item in one of the following ways:

- Clicking **Find**  adjacent to the **End Item** box and searching for an item by identifier and/or name.
- Copy an item to the clipboard before opening the **Revision Effectivity** dialog box and click **Paste**  adjacent to the **End Item** box.
- Click **MRU**  adjacent to the **End Item** box.

Note:

If you want to remove the entered end item, click **Clear**  adjacent to the **End Item** box.

4. Click **OK** to save the effectivity data you entered.

Reuse components in different products

To support reuse of the same components in different products, you can define multiple effectivities on the same status of an item revision, if each effectivity specifies a different end item. To create an additional effectivity on a status that already has effectivity:

1. In the **Revision Effectivity** dialog box, select the appropriate line and click **Create**. Teamcenter displays the **Edit Revision Effectivity** dialog boxes, with blank effectivity ranges.
2. Define the new effectivity, as described in steps 2 and 3 of the previous procedure.

Releasing multiple item revisions in a single workflow process

Teamcenter creates a single release status object and attaches it to all child item revision that are selected as a group and have a revision effectivity applied. Because they share the same release status object, if you change the revision effectivity on any child item revision, the change affects all the child item revisions. For example:

```
Top_Assy/A
  |_Part1/A
  |_Part2/A
  |_Part3/A
```

If you select all of the child parts at the same time and apply a release status, they are all associated to the same release status object and have the same revision effectivity. Therefore, updating the revision effectivity of the **Part3/A** component applies the same revision effectivity to the other components (**Part1/A** and **Part2/A**). If each child item revision requires a separate revision effectivity, select a component by itself and apply the release status to each one separately.

Caution:

Do not attempt to release multiple item revisions of the *same* item simultaneously. This action would apply the same release status object to all revisions and cause unpredictable configuration. Teamcenter may also apply incorrect revision effectivity—because the same release status object is attached to each item revision, it applies the same effectivity details to each of them. Always release item revisions of the same item individually.

Managing nested effectivity

Managing nested effectivity

A product structure may include a product that has its own effectivity that is separate from that of the product structure. For example, the product structure of a car may include an engine that is obtained from an external supplier. In this case, the effectivity of the engine differs from the effectivity of the car. You can use nested effectivity to change the end item context when you configure the car, as only one effectivity can be set in a revision rule; in this example, you must set the effectivity from car to engine at the engine.

Note:

You can use nested effectivity with date or unit number effectivity.

To accommodate variations of effectivity within a product, you create a *configuration item* to attach to each assembly that is configured by a different end item to the top-level item. In the previous example, you would create a configuration item for the engine and the effectivity of the configuration unit defines the engine assemblies. A configuration item is where the effectivity context of the structure changes; it defines a new end item for the affected substructure.

You can create a mapping table to define the ranges of dates or unit numbers in the top-level product that configure a particular unit number or effective date in the lower level assembly. When you expand the product structure and apply a revision rule, the unit number or date set at the top level is converted to the scheme defined in the mapping specified for the assembly.

Create effectivity mapping on a configuration item

Effectivity mapping allows you to modify the parameters of the revision rule (for example, the end item, date and unit number) as you cross the borders of configuration items. Teamcenter attaches a mapping table to the revisions of the configuration item, and each entry in this table defines an optional end item and an optional effectivity range that defines the effectivity of the mapping itself. A mandatory subeffectivity entry defines the effectivity parameters used in the configuration item's substructure.

To view or define the effectivity map for an item, select the item corresponding to the configuration item in the product structure tree and choose **Tools→Effectivity→Effectivity Mapping**. Teamcenter displays the **Effectivity Mapping** dialog box allowing you to view any defined mappings for the configuration item or create new mappings.

To create a new effectivity map in the **Effectivity Mapping** dialog box:

1. Select an end item to which the effectivity map applies. The end item is *not* normally the configuration item.
2. Optionally, select the **Use Shared Effectivity** check box to use an effectivity map and share it with another end item. You can also select the **Create New** check box to create a new effectivity map and make it available to share with other end items.

Note:

You can share any effectivity type, not just effectivity maps.

3. Define a date or unit effectivity in the usual format.
4. Define the subeffectivity.

Optionally, you can select the **Use last release date** check box to set the subeffectivity date to that one which the configuration item is released. This allows you to configure the released substructure without needing to specify the exact date.

Note:

A blank entry in the mapping table indicates **ALL**.

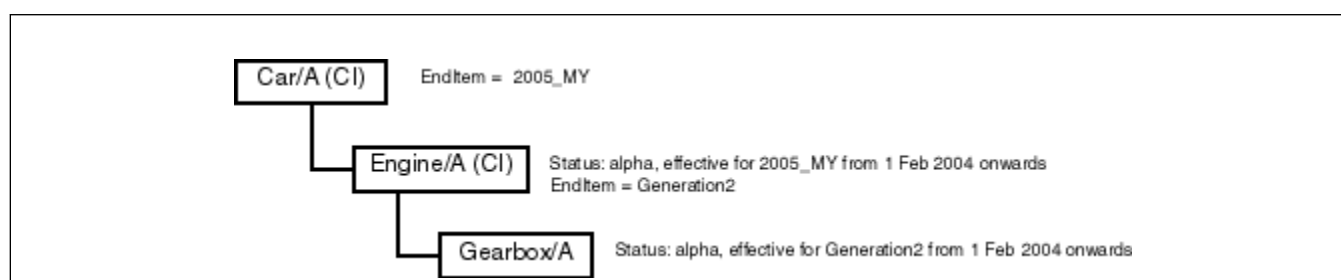
To create a new effectivity map, select an item revision in the **Effectivity Mapping** dialog box and click the **Create** button. Teamcenter displays the **Create Effectivity Mapping** dialog box, allowing you to define the parent product effectivity and the subeffectivity of the item revision.

Similarly, to edit an existing effectivity map, select an item revision in the **Effectivity Mapping** dialog box and click the **Edit** button. Teamcenter displays the **Edit Effectivity Mapping** dialog box, allowing you to modify the parent product effectivity and the subeffectivity of the item revision.

Managing product generations

Managing product generations

Instead of referencing a specific configuration item when you define an effectivity map, you can reference a separate entity—the generation item. The following figure shows a simplified product structure in which the effectivity statements referenced separate generation items (**2005_MY** and **Generation2**), rather than a specific configuration item. These generation items are items that can exist independently of a product structure.



Product generations

The effectivity map of this structure is as follows:

End item/revision	Effectivity range	Subeffectivity
2005_MY		Gen2
2006_MY		Gen3
002585–Truck	Jan 2007 – Apr 2007	Jan 2007
002997–Truck	May-2007 – Onward	Gen2, Apr 2007

In this example, the **2005_MY** parent end item configures the **Gen2** end item when you enter the **Engine/A** assembly. Similarly, **2006_MY** configures **Gen3**.

The final line of the example shows how you can transform multiple parameters (**End Item** and **Date**) in a single mapping.

Defining end item revisions

To implement product generations, you can create *end item revisions*. You define end item revisions in the same way as end items, but additionally specify a revision of the end item. For example, you define the following effectivity:

Release status	Unit/date range	End item/revision
Production	10-Feb-2007 00:00 to UP	002988–Car/A
Production	01-Apr-2007 00:00 to UP	002988–Car/B

In this example, the effectivity of a component may have a different effectivity, depending on the revision of the car that is configured. The component is effective from 10–Feb in **Car/A** and from 01–Apr in **Car/B**. If you create a revision rule that defines an end item revision and Teamcenter encounters an object that has effectivity based on the end item (not the revision), it successfully matches if the end item revision is a revision of the end item.

You can also *pack* or collapse all effectivity entries that share the same release status and unit or date range into a single line by selecting the **Packed** check box in the **Effectivity** dialog box.

Using revision rules from My Teamcenter

You can create revision rules and save them as workspace objects. These workspace objects can be referenced by folders in other applications, for example, My Teamcenter. You can copy a revision rule into My Teamcenter.

You can also search in My Teamcenter to locate a particular rule. You can then reference a rule within a particular item or revision for configuration purposes.

You can view the contents of a revision rule in My Teamcenter by clicking the **Viewer** tab. This displays the list of entries in the rule.

Managing occurrence to part relationships

Managing occurrence to part relationships

By default, an occurrence automatically references a particular item revision, depending on the revision rule currently in effect. Optionally, you can set the occurrence to unconditionally reference a precise revision of the part. You can then detect any precise occurrences that reference an out-of-date revision and manually upgrade each occurrence to an approved revision of the referenced part. This option is available only with a precise structure.

Note:

This functionality is only available if you work with supersedures in a change management environment.

The administrator defines the valid approved status of an item revision in the **TC_ValidApprovedStatus** preference.

Show occurrences of superseded item revision

When you create a new item revision and it is approved, the occurrences of older revisions are not automatically updated with the new revision if the structure is precise. To identify superseded item revisions, right-click a line with children and choose **Edit→Show Superseded**. Teamcenter places the superseded item revision icon () against each child with an approved later item revision.

Update precise occurrences of superseded item revision

To update an occurrence with an old revision to the new approved revision, right-click the occurrence and choose **Update Superseded**. Teamcenter shows the **Update** dialog box listing all the approved revision of the item, and you should select a revision and click **OK**. You can update all the applicable occurrences in the parent assembly or just the currently selected component.

12. Capturing configurations

Capturing configurations

Capturing configurations

Teamcenter provides the following formats for persistently capturing the configuration of a structure:

- **Snapshots** containing only the configured product structure (item revisions), not the associated data. Consequently they require relatively little disk space.

You can redisplay the saved structure at any time by sending the snapshot folder to Structure Manager. However, any item revisions that are not released are subject to change, including the associated data and CAD models.

Note:

If the **Baseline_create_snapshot_folder** preference is set to **1**, when you create a baseline of a structure, Teamcenter creates a snapshot folder under the baselined revision.

- **Baselines** containing a copy of the complete working data for the structure. Baselines occupy a significant amount of disk space, as you create a copy of the structure each time you baseline it. Many new revisions might be created and (with them) copies of the associated data and CAD designs.
- **Intermediate data capture (IDCs)**. IDCs are similar in purpose, but save the configuration in PLM XML format. You can create and view IDCs in any application that supports PLM XML, for example, Multi-Structure Manager.
- **Product view**. When you click the floppy disk button on the Viewer menu bar, Teamcenter saves a PLM XML file that contains a visual representation of your current viewer session. The session file may subsequently be reopened to show the saved product view.

Using snapshots

Using snapshots

A *snapshot* captures the current information, such as variant rules and occurrences and puts this information in a folder in **My Teamcenter**. In other words, a snapshot creates a flat list of a structure in a folder in **My Teamcenter**.

A baseline is a released snapshot of the structure. When you modify the original structure, the baseline is not affected. You can view the snapshot only in the folder in **My Teamcenter**. Therefore, if you send the snapshot to **Structure Manager**, you see a configuration that may not be the same when you captured the snapshot.

Example:

Consider that you create a snapshot at the moment A for a structure. The structure may contain some children, it may be released or not released, and it may be precise or imprecise. You add or remove one or more children from the structure and then create a second snapshot at the moment B.

Now, you can see two different snapshots in the folder in **My Teamcenter**. However, when you send the first snapshot to **Structure Manager**, you see a different configuration than what you had saved earlier at the moment A. This is the same configuration that you had saved at the moment B.

When you create a baseline, you can configure Teamcenter to also create a snapshot folder by:

- Setting the **Baseline_create_snapshot_folder** preference to **1**.
- Choosing **Edit→Options→General→Item Revision**, and moving **Snapshot** from the **Available Relations** column to the **Shown Relations** column.
- Choosing **Edit→Options→Related Objects→Item Revision**, and moving **Snapshot** from the **Available Relations** column to the **Shown Relations** column.

Tip:

Snapshots and baselines are separate features that are normally used for different purposes.

You cannot create snapshot folders for precise baselines, only imprecise baselines. The **Baseline_create_snapshot_folder** preference is ignored if you create a precise baseline.

When you create a baseline of an imprecise structure, Teamcenter:

- Creates the baseline item revision.
- Creates a snapshot folder with the baseline job name under the baselined item revision.
- Populates the snapshot folder with references to the item revisions included in the structure when you created the baseline.

Create a snapshot

1. Configure the structure you want to save by applying the appropriate revision rule.
2. Choose **File→New→Snapshot**.

Teamcenter displays the **Create Snapshot** dialog box.

3. In the dialog box, type a name for the snapshot and (optionally) a description.

To track snapshots and what they refer to, name them carefully. Use the **Name** and **Description** boxes to do this. You may want to record the name of the revision rule used to construct the snapshot in the **Description** box.

4. Click **OK**.

Teamcenter create the snapshot and folder, persisting the root item information in the folder.

This action performs a full expansion of the structure, which may take some time for a large structure.

5. (Optional) Attach the snapshot to an item revision.

- a. Select the folder and choose **Edit→Copy**.
- b. Select the item revision and choose **Edit→Paste Special**.

Teamcenter displays the **Paste Special** dialog box.

- c. Select **Snapshot** and then click **OK**.

Teamcenter pastes the snapshot under the item revision.

Open an existing snapshot

1. Select the snapshot folder in My Teamcenter.
2. Drag-and-drop the snapshot folder into the Structure Manager application. The structure is displayed as you saved it in the snapshot.

The ad hoc revision rule applied in this Structure Manager window uses the snapshot folder as an override list. It also configures precise references.

View a snapshot

You can view the item revisions stored in a snapshot by expanding the snapshot folder in My Teamcenter.

Note:

You should protect snapshots against modification of their contents using the access rule tree.

Using baselines

Using baselines

During the development of a product design, you may want to share your working design with other users. You may also want to save an interim version of your design for future reference. To do this, you can create a *baseline* of the work-in-progress (WIP) design. When you request a baseline, Teamcenter creates a new revision for each unreleased revision in the structure and releases it with a predefined status, for example, **TC_Baseline**. It also links the new revision with the WIP revision using an **IMAN_baseline** relation. This method configures a completely released structure and thereby guarantees that the models are the same as when the baseline was created.

When you create a baseline, Teamcenter observes deep copy rules when copying datasets, forms, and other attachments associated with the item revision. Siemens Digital Industries Software recommends you use **CopyAsObject** in deep copy rules as the baseline process takes a snapshot of objects in their current state.

If the baseline finds an invalid item type or the current user does not have write access to any of the items, the baseline operation is rolled back.

Before creating a baseline, Siemens Digital Industries Software recommends you first perform a *dry run* mode to identify invalid conditions.

The baseline process always starts from the top line of the current window, regardless of the selected line. The baseline operation processes lines that are configured out by variants or occurrence effectivity. Substitutes and packed lines are always processed. However, if the structure has suppressed components, you can optionally process them by selecting **Show Suppressed Occurrences**. If the structure has incremental changes, Siemens Digital Industries Software recommends you use incremental change baselines.

To view the completed baseline, load it into Structure Manager after applying the appropriate revision rule.

You can set the **Baseline_precise_bvr** user preference, which controls whether a precise or imprecise baseline is created. If the latest revision is the baseline revision, Teamcenter generates the next revision ID based on the ID of the revision of the baseline revision.

You can also create a baseline of a single item revision in My Teamcenter. In this case, a new copy of each BVR of the WIP revision is created. The precision of the new BVR is the same as that of original BVR, irrespective of the setting of the **Baseline_precise_bvr** user preference.

Define baseline naming rules

Teamcenter provides a default baseline suffix rule with a pattern of **".NNN**, an initial value of **.001**, and a maximum value of **.999**.

Use the Business Modeler IDE to create the appropriate baseline naming rules for your site. The following example shows how to format a naming rule in the Business Modeler IDE for baselines of items:

```
Item Rule
A Rev
A.001
A.002
A.003
B Released Rev
B.001
B.002
C Working Rev
```

To establish this rule:

1. Create an item business object (type) called **ItemPDR**, if it does not already exist.
2. Create a naming rule called **Baseline rev rule** (any name can be used) with the following pattern:

```
". "NNN
```

Ensure you also select the **Generate Counters** check box.

3. Attach the **Baseline rev rule** naming rule to the baseline suffix property on the **ItemPDR** item business object.

Create a baseline

1. Ensure you are logged on to an account that has **Author** privileges.
2. In the product structure tree, display the top line item revision of the structure you want to capture and choose **Tools→Baseline**.

Teamcenter displays the **Baseline** dialog box.

Baseline...

Baseline Information

ItemID / Baseline Rev ID - Name

000044 / A.001 - Design

Description:

Baseline Template Select a Release Procedure

Job Name Baseline_000044-Design_A.001

Baseline Label Baseline_000044-Design_A.001

Job Description

☐ Open On Create ☐ Dry Run Creation ☐ Precise Baseline

OK Apply Cancel

3. In the dialog box, fill in the following boxes:

- **Baseline Rev ID**

This is generated according to naming rules defined in the Business Modeler IDE. You cannot change the displayed value.

- **Description**

Type a description that is stored with the baseline.

- **Baseline Template**

Select a release procedure template from the list. The list does not show templates that are in edit mode. The default Workflow process is **TC Default Baseline Process**. The workflow process used for baselines must not include any sign-offs.

- **Job Name**

Teamcenter generates this name in the format **Baseline_ItemID_BaselineRevID**.

- **Baseline Label** (optional)

Enter an alphanumeric string that represents the baseline label. Teamcenter uses the label you enter as the name of the baseline folder. This box is displayed only if your site uses baseline labels.

- **Job Description**

Enter a description of the baseline job.

4. In the dialog box, select one or more of the following check boxes, and then click **OK** to create a baseline or dry run:

- **Open on Create**

Opens the baseline automatically after it is created.

- **Dry Run Creation**

Creates a report.

- **Precise Baseline**

Selects the type of baseline to create—precise or imprecise. Your site may be configured to allow only precise baselines, depending on the setting of the **Baseline_precise_bvr** user preference.

Depending on a preference setting by the administrator, and if you created an imprecise baseline, Teamcenter also creates a snapshot folder under the baselined item revision.

Using smart baselines

The standard baseline process may be time-consuming and use significant disk space as it may create many new revisions and (consequently) copies of all the associated data and CAD designs. To avoid this, you can create a *smart* baseline, reusing a baseline revision whose work in progress revision is unmodified since its last baseline was created. You can only create smart baselines of assemblies.

If you try to create a smart baseline of an assembly that has not changed since the previous baseline, a new baseline is not created. No informational message is displayed in Structure Manager to indicate this.

Note:

If you make changes to an occurrence property (for example, quantity) the last modified date of the parent BVR changes and Teamcenter therefore considers the parent item revision as a candidate for a new baseline. However, the item revision of the BOM line on which changes were made does not qualify for the new baseline.

Finding the baseline folder

After creating a baseline, Teamcenter places all the baseline item revisions in the structure in a baseline folder if the **Baseline_create_snapshot_folder** preference is **ON**. It attaches this folder to the top level of the structure using a **Snapshot** relation.

Caution:

If you expand the baseline item revision, Structure Manager displays the snapshot folder. If you then expand the snapshot folder, Structure Manager shows the item revisions that were captured in the snapshot. If you then expand the baseline revision in the snapshot folder, Structure Manager shows the snapshot folder again. Be aware that if you expand baseline data below a certain level, Structure Manager displays duplicate objects.

Note:

You must set the **Snapshot** relationship on the item revision to make the snapshot folder visible. Do this by choosing **Edit→Options→General→Item Revision** and adding **Snapshot** to the **Available Relation** column.

Creating a dry run

Performing a dry run of a baseline allows you to validate the data associated with the base item revision or structure before you create the actual baseline. This avoids the necessity to roll back the baseline, if Teamcenter encounters errors during its creation.

The dry run generates a report that contains error messages, if Teamcenter encountered any problems while traversing the structure.

Your administrator can configure Teamcenter to always make a dry run, by setting the value of the **baselineDryRun** and **Baseline_dryrun_always** preferences.

Hiding and viewing baselines

Hiding and viewing baselines

Teamcenter lets you control the display of baseline revisions.

Hide baselines

1. Choose **Edit→Options**.

The **Options** dialog box appears.

2. Select **Item**.
3. Click the **Display** tab.
4. Select the **Show displayable revisions only** check box.

The **Select Revision Relation** dialog box appears.

5. Select **Displayable Revisions** and click **OK**.
6. Specify the order and rule for revisions display.

For example, when the released status on baseline item revisions is **Pending**, you display the latest baseline revisions by setting the rule, **Released Status**, equal to the condition, **Pending**, and set the limit to the maximum number of baselines you want to display.

7. Select **Descending** as the display order.
8. Click **OK**.

The hierarchy tree pane displays the latest baselines up to the limit set.

View hidden baselines

When there are more baselines created than are displayed, the hierarchy tree pane displays a **More** button under the item.

1. Click **More**.
2. Select the required baseline revision from the list.

The baseline is displayed in a separate pane.

Using intermediate data captures

Using intermediate data captures

Note:

You can only create or view IDCs in Multi-Structure Manager or other applications that interpret PLM XML. You *cannot* create or view IDCs in Structure Manager.

An IDC is a PLM XML file that contains the definitions of all the objects in the captured structure. You can manage the PLM XML file in the same way as any other workspace object, including assigning it to a workflow, assigning it a release status and controlling access rules.

You can create intermediate data captures (IDC) that contain the configuration of a structure at the time the IDC is created. An IDC may contain any configured structure including a collaboration context, structure context or group of structure lines. You can view IDCs with the Multi-Structure Manager application.

You can create an IDC that stores the current state of the selected root object and any related objects, such as structure lines or attachments. You cannot capture workspace objects that are not in the structure.

Capture structure lines into IDC

1. Select the root object in the structure and choose **Tools→Intermediate Data Capture**.

Teamcenter displays the **New Intermediate Data Capture** dialog box.

2. Select **IntermediateDataCapture** from the list of IDC types at the left of the dialog box.
3. Enter the name and optional description of the intermediate data capture, choose a transfer mode name from the drop-down list, and then click **OK** or **Apply**.

Teamcenter validates the objects in the structure you selected. If any of the objects cannot be captured, it displays an error message, otherwise it creates the PLM XML file containing the IDC.

Note:

Ensure you select a transfer mode that is appropriate for the data you want to capture, for example, **ConfiguredDataExportDefault** or **BOMwriterExport**. The displayed list shows all transfer modes that are available in the system.

13. Managing incremental changes

About incremental changes

Teamcenter supports two methods of controlling changes to product structures, incremental change (described here) and **revision configuration**.

An incremental change collects together a number of structure changes to a component such as addition or removal of components or changes to attachments (data). Effectivity can be applied to incremental changes to configure the associated changes. This method of change control allows several independent structure changes to be made concurrently, including the addition or removal of unrelated components. Those changes can be implemented in any sequence. This method of change control is suitable for large, flat structures without nested subassemblies or components. The revisioning approach is not suitable for this type of structure, as a separate revision is required for every permutation of change.

Caution:

Siemens Digital Industries Software recommends you do not use the **Cancel Checkout** command on item revisions that contain changes tracked by incremental change. This action causes permanent loss of incremental changes that are tracking structure edits.

You cannot manage changes to substitute parts with incremental changes.

Elements of incremental change

The following table describes product structure elements that may participate in an incremental change.

Element	Purpose
Absolute occurrence	A relationship between a parent assembly and an item one or more levels lower in the structure. The parent assembly is the <i>context</i> in which the absolute occurrence exists. You can define data on the absolute occurrence that overrides the data stored on the item when you select the context assembly and view the structure. Both relative occurrence data (notes and transforms) and attachments can be overridden with data on absolute occurrences. Each absolute occurrence can have one or more unique attribute values that distinguish it from the other absolute occurrence derived from the same single occurrence.
Attachment	A form, dataset, or folder related to an item revision.
Baseline	(Incremental change baseline.) A new revision of the parent assembly that has the occurrences and attachments as configured in Structure Manager when the incremental change baseline was created. There

Element	Purpose
	are no incremental changes and all unconfigured occurrences are removed.
Change	An individual change to a component (occurrence) or attachment. A change may be an add or a remove.
Incremental change (IC)	A collection object that contains the individual changes. An IC is modeled as an item of the EngChange type. You can release an incremental change and apply effectivity to it by attaching a release status. Incremental change (revisions) are configured by the revision rule, as are the components (occurrences) and attachments associated with the changes on the incremental change. You can revise incremental changes if required, in which case the changes are copied (this is not typically required).
Intent	A named object that represents an alternate solution. You can apply one or more intents to an incremental change to signify that the incremental change is valid for those intents. The user sets one or more intents in the revision rule that configures the incremental changes with those intents and, consequently, the associated changes. Intents are only available with incremental change, not with standard revision configuration.
Occurrence	(Sometimes called <i>relative occurrence</i> .) A hierarchical structure relationship between the immediate parent assembly and its child component item (in an imprecise assembly) or item revision (in a precise assembly). You can use a find number to identify for an occurrence, but this number may not be unique. Data can be stored on the occurrence, including occurrence notes and transforms.

Setting independent incremental change contexts

You can make independent edits in different Structure Manager windows using a different incremental change in each window. This process is referred to as setting independent incremental change contexts. Use the **IC Context** column in the list of available windows to identify the incremental change context in each window.

Creating an incremental change baseline

Creating an incremental change baseline

You should periodically create a new baseline revision for an item that is tracked by incremental change after a certain number of incremental changes are created. By default, all outstanding incremental changes are rolled into the new revision. This approach reduces the amount of data in the new revision and reduces the time needed to configure the assembly. Review the **example** of how incremental change baseline may affect the revision rules applied.

When you create an incremental change baseline, the new revision of the parent assembly has the occurrences and attachments configured by the revision rule or unit effectivity set when you created the incremental change baseline.

When you create an incremental change baseline, by default any active incremental changes are not carried forward to the baseline, as described later. However, you can optionally configure your system to roll up or carry forward active incremental changes. (Active changes are any changes that are currently effective or will be effective in the future.)

Do *not* simply revise a structure that has incremental changes on any of the components because the incremental changes are not copied and the structure is not configured as expected. You must create the incremental change baseline first.

Ensure the baseline cannot be modified by applying a status to apply vaulting to the BOM view revision, rather than the item revision. Do not use the status on the item revision for this purpose because the status is also used for configuration.

You must have access to the incremental changes to create an incremental change baseline. If Teamcenter determines that you do not have the necessary access, it rolls back the baseline operation and does not create the new item revision.

Note:

Do not confuse incremental change baselines with creating **standard baselines** of item revisions. With standard baselines, if the item is an assembly, you can automatically create a new revision of any unreleased components throughout the substructure. With incremental change, the baseline is applied only to the product structure, not to the components.

It is good practice to apply unit number effectivity to the assembly item revisions, even if the components are configured by incremental change. This approach identifies the effectivity of the new incremental change baseline revision, and also configure it appropriately. There should be no incremental changes on components in the new incremental change baseline revision that are effective prior to the unit number at which the incremental change baseline revision was created.

Baselining structures with active incremental changes

Optionally, when you create an incremental change of an item revision, any incremental changes that are active are carried forward or rolled up. An active change is any incremental change that has an **out** effectivity equal to or greater than the baseline effectivity, including any open-ended effectivity.

When you carry forward a change, the affected object of the change is copied to the new item revision. The copy of the affected object is qualified to the same incremental change. Consequently, the old and new copies of the affected object share the same change effectivity.

When you roll up a change, *only* the affected object of the change is copied forward. The qualification is not present on the new item revision.

Determining active changes

Teamcenter drops, rolls up, or carries forward changes to the new item revision, depending on the following conditions. (X indicates the baseline, which may be a unit number or date.)

Lower end	Higher end	Drop, roll up, or carry forward?	Explanation
<X	<X	Drop	The change was effective in the past with respect to the baseline and will not be effective in the future. The change is dropped.
<=X	>=X	Carry forward	The change is effective and remains effective to a certain point in the future. Beyond that point, the change is not configured and is therefore carried forward.
<=X	UP	Carry forward if Pending status or roll up if Secured status.	The change is effective and remains effective in the future. It can be rolled up into the next revision. However, if the incremental change is not released, it can be edited and such edits may be reverted. Therefore, if the status is Pending , changes are carried forward.
>X	>X,UP	Carry forward	The change is effective in the future, so is carried forward.

Note:

Teamcenter supports discontinuous effectivity, with multiple **out** effectivities. If any of the effectivities is equal to or greater than the baseline effectivity, the change is considered active.

When you create the baseline, changes that are past effective are dropped, irrespective of status. For example, if you create a baseline at unit 25, there may be changes on an incremental change with effectivity on units 5 to 15. All these changes are dropped because they are past effective. If you subsequently change the effectivity of this incremental change to span or cross baseline unit 25, you must recreate the baseline to take the effectivity change into account.

Teamcenter determines if an effectivity is *applicable* in the current context. An item revision under incremental change may have several status objects attached to it, and the objects may be different types. A revision rule may have several entries configured by effectivity, and the entries may specify different status and effectivity types. To determine if an effectivity statement on an incremental change revision applies to the revision rule, Teamcenter checks that the combination of status type and effectivity type (date or unit) match an entry in the revision rule.

Carrying forward or rolling up active changes

Teamcenter carries forward active changes if:

- The change is currently active and the qualifying incremental change is not released, or
- The change will be configured in the future.

It copies the affected object to the new item revision. It also connects the new copy of the affected object by an incremental change element (ICE) to the same incremental change as the original affected object.

Teamcenter rolls up active changes if the change is currently active and the qualifying incremental change is released. It copies *only* the affected object to the new item revision.

ICEs link affected objects to *revisions* of incremental changes. As an incremental change evolves, the affected object may be qualified by several ICEs to multiple revisions of the same incremental change. If you do not assign explicit **out** effectivities, but supersede them with later **in** points (for example, A: 1–UP, B: 10–UP, C: 20–UP), multiple revisions of the same incremental change may be considered active. If the baseline effectivity is equal to or more than 20, the latest in rule determines that C is the currently configured revision. However, as you may subsequently change any effectivity, Teamcenter carries forward the affected object with ICE qualification to all of these active incremental change revisions.

Dropping inactive changes

If Teamcenter determines that a change is not active, it is dropped from the new item revision. If the affected object is added by the incremental change, because the relevant change is no longer active, Teamcenter omits the affected object from the new item revision. If the object is removed by the incremental change, the removal is reversed and the affected object is copied forward without the incremental change qualification.

Viewing properties of incremental change data

Viewing properties of incremental change data

You can display the **Associated ICs** property for any line in the structure that has a change. This property shows the incremental change that resulted in the change. If there is more than one add or remove change on a given line, the incremental change associated with each change is listed.

You can also view the following properties in the **Attachments** pane:

- Incremental changes of relations

Displays incremental changes that caused the attachment to be added to or removed from the item revision.

- Incremental changes of objects

Displays incremental changes that caused the attachment to be created or deleted.

- Attachment root node (**AI_absocc_rootline_string**)

Displays the root line of the attachment. If this is not the same as the item revision at the top of the **Attachments** pane, the attachment does not apply to all occurrences of the item revision, but to a specific (absolute) occurrence that may be the parent assembly or a higher level assembly.

Adding property columns

Note:

Adding properties in this way may slow the loading of the structure. The properties are populated only for structure edits and do not apply to changes made to occurrence attributes, replacements, or attachments.

Several structure line properties that contain information about incremental change are not shown by default and you may want to **display these properties** when you work with incremental changes. Consider displaying some of the following properties:

- **Configured ICs**

Lists the incremental changes that affect each structure line that is configured by the current revision rule. + and – icons in the cells indicate adds and deletes, if applicable.

- **IOC – Incremental Change Occurrence Configured**

Shows if the structure line is configured with incremental change.

- **IC Effectivity**

Lists the incremental changes that affect each structure line and their effectivities. + and – icons in the cells indicate adds and deletes, if applicable.

- **IC Release Status**

Lists the incremental changes that affect each structure line and their release statuses. + and – icons in the cells indicate adds and deletes, if applicable.

- **IC Intent**

Lists the incremental changes that affect each structure line and their intents. + and - icons in the cells indicate adds and deletes, if applicable.

Using incremental change

Using incremental change

Using incremental change management is optional. To use it, your administrator must set the **Incremental Change Management** preference to **true**. When this preference is set to **false**, the incremental change toolbar is not visible and any loaded items or relationships under incremental change control display in a different color.

Using the incremental change toolbar

Use the incremental change toolbar to create, find, and manage incremental changes. The toolbar is located at the bottom of the Structure Manager application window if your Teamcenter administrator has set the **Incremental_Change_Management** preference to **true**.

Note:

If this preference is changed, you must exit and start a new session to see the incremental change buttons.

The toolbar is grayed out if no structure is loaded. When you load a structure, Teamcenter activates the toolbar buttons.

You can drag the incremental change reference from the toolbar and drop it into an application such as Change Manager or My Teamcenter. For example, you can do this to release the incremental change or introduce it into a workflow. The incremental change window includes the following toolbar buttons.

Button	Function
	Creates a new incremental change.
	Searches for an incremental change order.
	Displays the MRU list containing the most recently used incremental changes.
	Displays the incremental change Information dialog box.
	Clears the active incremental change and turns off incremental change tracking.

Using the attachments and information panels

You can view the **Attachments** and **Incremental Change Information** panes when the data pane is displayed. To display the data pane, click the **Show/Hide Data Panel**  button.

If you display the **Associated ICs** property, you can easily identify the incremental change that added or removed a structure line. You can sort the structure on this column to identify all the structure changes to a given assembly that are implemented by a specific incremental change.

- The **Attachments** pane allows you to view attachments (forms or datasets) to the item revision that corresponds to the selected line. It also allows you to add, remove, or create attachments and track these changes with an active incremental change.
- The **Incremental Change Information** pane allows you to identify the incremental changes that affect the selected line. This is useful if there are several changes (adds or removes) associated with a single line, and each change is attached to a different incremental change.

You can drag-and-drop incremental changes from the data pane to set incremental change context.

- The **Incremental Change Info** pane allows you to undo (remove) individual changes from the selected line.

Using the incremental change menus

Use the following commands available on the **Tools→Incremental Change** menu to manage incremental changes.

Menu command	Function
Add	Retrospectively creates an add change and attaches it to the active incremental change.
Remove	Retrospectively creates a remove change and attaches it to the active incremental change.
Create on Object	Establishes a create change to the attachment.
Delete on Object	Establishes a delete change to the attachment.
Edit Attachment	Allows you to edit an attachment (dataset or form) and track the changes with the active incremental change.
Remove Changes	Removes (undoes) changes on the active incremental change.
Incremental Change Baseline	Revises the parent assembly to create an incremental change baseline.
Split	Allows you to split some of the changes from the active incremental change into another existing incremental change.
Display Icons	Allows you to configure how Teamcenter displays incremental change icons by selecting one or more of the following options: • None

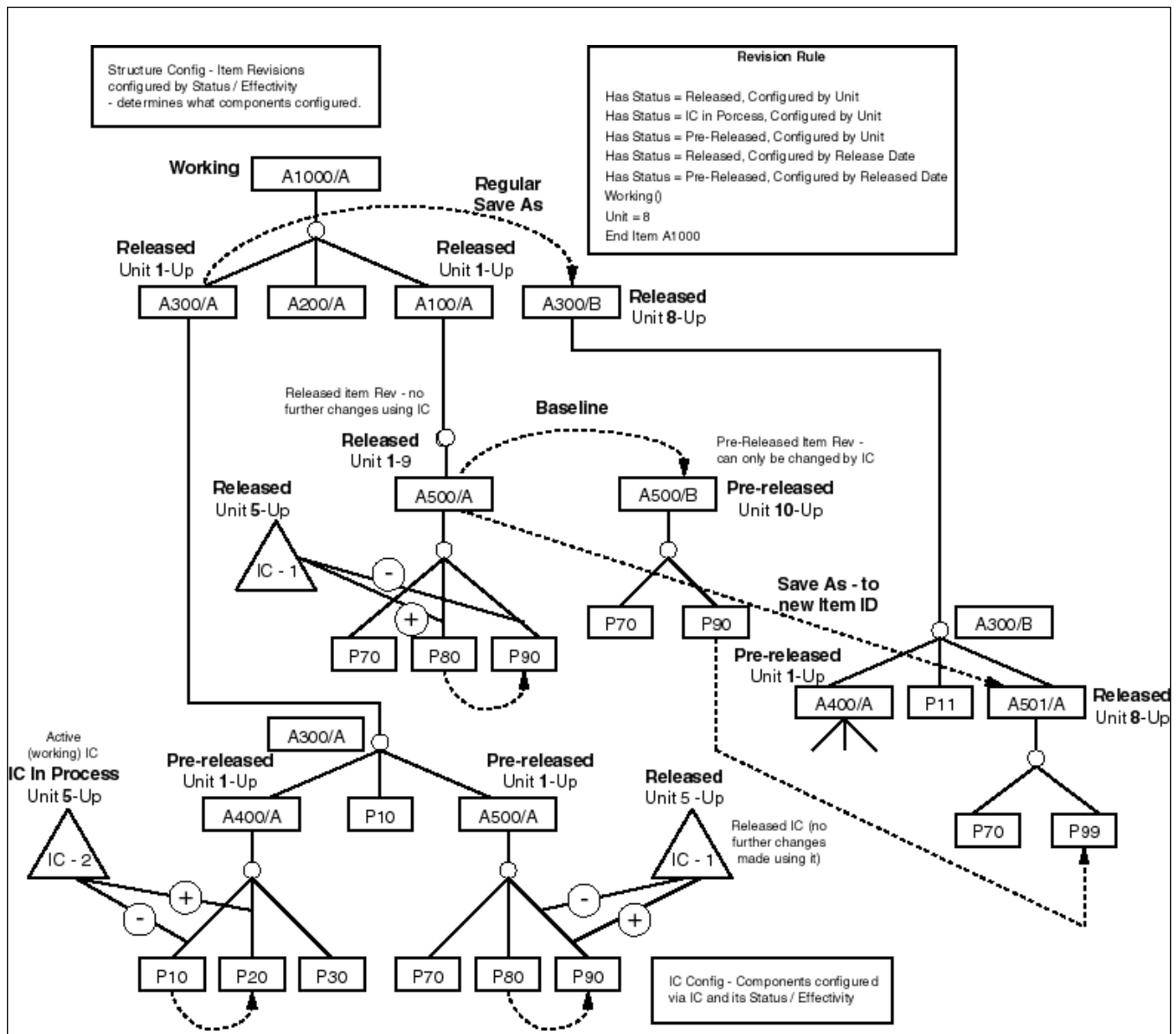
Menu command	Function
	• Current Context • All Contexts • Hide Remove Icons If you are not showing unconfigured changes and are not interested in changes that are not actually configured, select the Hide Remove Icons option. Tip: Consider adding these icons to the toolbar to allow you to more easily change the context. To do this, right-click the toolbar, choose Customize from the shortcut menu, and choose the incremental change icons.

Using incremental change with revision configuration

The following example illustrates how incremental change and revision configuration work together in a baseline. In this scenario, the upper levels of the structure are configured by the revision and the lower levels are configured by incremental change. It is also possible to configure the upper or middle levels of the structure with incremental change to control structure changes, and configure the lower level components by revision; the lower levels may contain CAD design files.

In the example:

- The upper structure (including items A100, A200 & A300) uses standard revision configuration. The revision rule selects the revision of an assembly that is loaded according to release status or effectivity. This in turn determines the components that are configured.
- The lower structure (including items A400 and A500) uses incremental change configuration to determine the loaded components. Any new revisions you create at this level are for incremental change baselines only.



Example of incremental change and revision configuration

Turn off incremental change tracking

Click the  button in the incremental change toolbar.

Teamcenter changes the **Active IC** box to display **No Active IC**. No edits are tracked.

Customize buttons

Incremental changes are displayed by icons at the beginning of a structure line. When you add or remove a structure line, Teamcenter displays a plus or minus icon in front of the respective line.

- Customize when incremental change icons are displayed by choosing **Tools→Incremental Change→Display Icons** and selecting the contexts in which you want to see the icons.
- Choose **Tools→Incremental Change→Display Icons→Hide/Remove Icons** to always hide the display of the icons in the tree structure.

Create a new incremental change

1. Click the **Create Incremental Change** button .

Teamcenter displays the **Create/Revise Incremental Change** dialog box.

2. Click the **IC Attributes** tab and set the following incremental change attributes:
 - Type an ID and revision for the change object. Alternately, click **Assign** to let the system assign this information for you.
 - (Optional) Type a description for the incremental change.
 - Select a change type from the **Incremental Change Type** list. Note that some of these types may be for general changes, not incremental changes.
3. Click the **Effectivity** tab and specify whether to set effectivity for the incremental change using unit serial numbers or dates by doing one of the following:

Note:

You cannot specify an effectivity until the incremental change is released. An incremental change may be released by a workflow process that is specific for your company or site.

If you do not specify an effectivity, Teamcenter creates the change object without a status.

The administrator determines the initial release status of all new incremental changes by setting a site preference. If the preference is not set, you cannot set effectivity while creating the incremental change. You must release the incremental change (revision) separately with the appropriate process. Once the release status is attached, you can set the effectivity on the incremental change.

- Click **Units** and specify the range of serial numbers to which the effectivity is to be applied. You can also click one of the following buttons:
 - **UP** button to define an unlimited effectivity from a starting number. For example, typing **1-UP** means the change is effective from unit 1 upward.
 - **SO** button to define an effectivity until all stock is exhausted. For example, typing **1-SO** means the change is effective from unit 1 until no stock remains.

Tip:

The tooltip provides you with more information about the formatting for this entry.

- Click **Dates** to set effectivity based on calendar dates. Multiple date ranges can be entered. To set a date:
 - Type the start and end dates for the effectivity period into the **From Date** and **To Date** cells in the date table.
 - Select a date in the calendar table and click **Set Date** to specify both the **From Date** and the **To Date** entries.

When the correct effectivity is shown, click **OK**.

4. If unit effectivity is set, populate the **End Item** box on the **Effectivity** tab using one of the following methods:
 - From the list of most recently used end items
 - Using the **Search** function to open an item by name or ID
 - By pasting an item from the clipboard
5. Click **OK** to finish creating a new incremental change and close the dialog box, or click **Cancel** to cancel the operation.

Teamcenter creates a copy of the new incremental change in your **New Stuff** folder.

6. At an appropriate time, the designated user or a workflow process approves the change object by adding the release status. The change object is now *locked* and you cannot use it to track further changes to the process or operation.

Note:

You can use a Workflow handler that renames the status and retains the effectivity, for example, the **add_status** handler with a **-remove** option.

Showing unconfigured changes

You can configure the display of the tree table to show the following:

- All components and attachments.
- Only those components and attachments that are configured by the current revision rule.

To control the display of unconfigured changes:

- Choose **View→Show Unconfigured Changes** to toggle between showing all lines or only those set by the current revision rule.

Note:

You can add a button to implement this function to the toolbar, allowing you to easily see the current mode. To do this, right-click the toolbar, choose **Customize**, and click the required button.

To identify changes made in the current context, click the **Changed by Current IC Edit Context** column header to re-sort the structure into changed and unchanged lines. This allows you to more easily identify the changes made to the structure in the current context.

Find and make active an existing change object

When an incremental change is active, all edits are made in the context of that incremental change. Teamcenter shows the ID and name of the incremental change in the incremental change toolbar. If the **Incremental Change** pane states **No Active IC**, no incremental change is active.

1. Click the **Select an Incremental Change context** button .

Teamcenter displays the **Select an Incremental Change context** dialog box.

2. Type either the name or ID of the change object to be displayed. You can use wildcard search characters, if necessary.
3. Click **Find**.

All change objects matching your selection criteria are displayed in the dialog box. Use the navigation buttons at the bottom of the dialog box to navigate the list.

4. To select an incremental change object for display, double-click the change object in the dialog box list.

View or edit information about an incremental change

Do one of the following:

- Click the **View/edit current IC information** button .
- Click **More IC Info** in the **Incremental Change** data tab.

Teamcenter displays the **View/edit Change** dialog box, which includes the following tabs:

- **IC Attributes** shows the change object name, description, and tag type.
- **Incremental Changes** shows the individual changes to components, attachments, created/deleted data, and occurrence notes that are tracked against this incremental change.
- **Effectivity** allows you to view and edit the effectivity of the change object if you have the access permission to do so. Double-click a specific release status to open a dialog box containing all the effectivity information for the selected release status.
- **Intents** displays the intents for which the incremental change is valid.

You can create a new intent by clicking the **Intent** button and typing the appropriate information in the **Create Intent** dialog box. You can then add the intent to the incremental change by ensuring it appears in the **Intent to add** box and clicking **+**. You can also search for existing intents and add them to the incremental change.

Note:

To make the **Intents** tab visible, set the **EnableIntents** preference to **true**.

You can also use the icons on a structure line to identify adds, removes, and absolute occurrences. For attachments, these icons are displayed in the **Attachments** pane, not the main pane.

View incremental changes for a structure

View incremental changes for a structure

To view all the incremental changes associated with a structure, select a line in the structure and click the **Incremental Change Info** data tab. For each line, this pane lists:

- **Type**

For attachments only, specifies the type of incremental change, **create**, **delete**, **add**, or **remove**. Note that edits to attachments are shown as **create** types.

- **IC Context**

Specifies the incremental change objects affecting the structure, listed in the order they are applied.

- **Release Status**

Specifies the release status of the incremental change object, for example, **Production**.

- **Effectivity**

Specifies the date or unit number effectivity of the incremental change.

• IC Configured By

Specifies the revision rule that configures the incremental change for this structure. This allows you to see if an incremental change is configured and, if so, how it is configured.

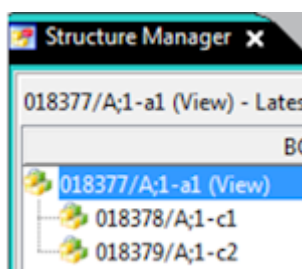
For attachment changes, the affected lines and changed relationships are also listed. For occurrence attribute changes, the affected attributes and changed values are also listed.

To see more information about an incremental change, double-click the line in this pane; Teamcenter displays the changes made by the incremental change.

Example: View incremental change elements for multiple incremental changes

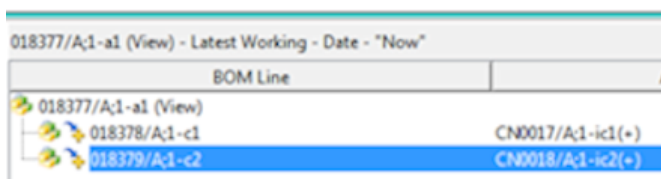
The following example shows the behavior of a structure when one incremental change is in context and the structure also has incremental change elements (ICEs) in context of another incremental change.

1. Create a structure, as shown in the following example:



2. Create two incremental changes:

- IC1 with unit effectivity of 1-5 and an end item of **enditem**.
- IC2 with unit effectivity of 6-UP and an end item of **enditem**.



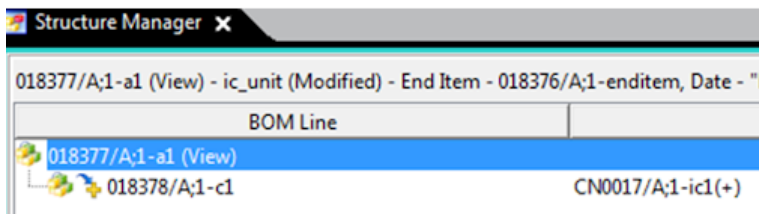
3. Add item c1 in the context of IC1 and then add item c2 in the context of IC2.
4. Create a revision rule of **ic_unit** containing the following:

Working ()

Has Status(Pending, Configured Using Unit Number)

5. Choose **Tools**→**Revision Rule**→**Set Date/Unit/End Item** and make IC1 active, for example, by setting unit effectivity of 3 and an end item of **enditem**.
6. Choose **View**→**Show Unconfigured Changes**.

Teamcenter does not show the item added by IC2 because, in the context of IC1, you added only c1. Specifically, you added c2 in the context of IC2, which is not active.



Similarly, if you make IC2 active, Teamcenter only shows c2.

Teamcenter displays the results of remove and override actions differently. For example, if you *remove* c3 in the context of IC2, it shows the following structure.

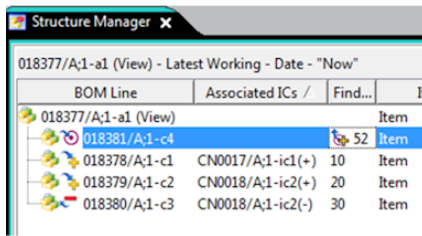
018377/A;1-a1 (View) - Latest Working - Date - "Now"		
BOM Line		
018377/A;1-a1 (View)		
018378/A;1-c1		CN0017/A;1-ic1(+)
018379/A;1-c2		CN0018/A;1-ic2(+)
018380/A;1-c3		CN0018/A;1-ic2(-)

If you then make IC1 active, Teamcenter:

- Shows c1, which was added in the context of IC1.
- Does not show c2, which was added in the context of IC2 and should not be shown when IC1 is active.
- Shows c3, which is removed in the context of IC2 but is not removed in the context of IC1.

018377/A;1-a1 (View) - Latest Working - Date - "Now"			
BOM Line	Associated ICs /	Find...	It
018377/A;1-a1 (View)			Item
018381/A;1-c4			Item
018378/A;1-c1	CN0017/A;1-ic1(+)	10	Item
018379/A;1-c2	CN0018/A;1-ic2(+)	20	Item
018380/A;1-c3	CN0018/A;1-ic2(-)	30	Item

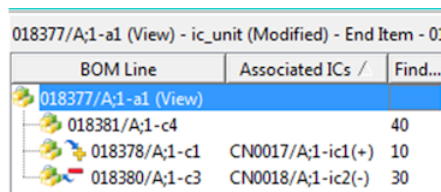
If you now add c4 with an override in the context of IC2, Teamcenter shows the following structure.



BOM Line	Associated ICs /	Find...	It
018377/A;1-a1 (View)			Item
018381/A;1-c4			Item
018378/A;1-c1	CN0017/A;1-ic1(+)	10	Item
018379/A;1-c2	CN0018/A;1-ic2(+)	20	Item
018380/A;1-c3	CN0018/A;1-ic2(-)	30	Item

If you make IC1 active, Teamcenter:

- Shows c1, which was added in the context of IC1.
- Does not show c2, which was added in the context of IC2 and therefore should not be visible when IC1 is active.
- Shows c3, which was removed in the context of IC2 but is not removed in the context of IC1.
- Shows c4 without the override because c4 was added in the context of IC2.



BOM Line	Associated ICs /	Find...
018377/A;1-a1 (View)		
018381/A;1-c4		40
018378/A;1-c1	CN0017/A;1-ic1(+)	10
018380/A;1-c3	CN0018/A;1-ic2(-)	30

That is, if IC1 is active, Teamcenter shows only components that are active for IC1. It does not show the added components from IC2, but it does show the removed components from IC2. It shows the BOM lines for the overrides for IC2 but not the overrides themselves.

Find recently used change objects

Click the **Most Recently Used** button () to display a list of previously used incremental changes from which you can choose.

Track attachments with incremental changes

You can create an attachment to an item revision and track its status with an incremental change object, as follows:

1. Ensure you have created the appropriate incremental change object and that it is active. The active incremental change is shown in the **Incremental Change Edit Context** box in the incremental change toolbar.
2. Click the **Attachments** pane.

3. Select the structure line corresponding to the *item revision* under which you want to create the attachment.
4. Select the root node (item revision) in the **Attachments** pane.
5. Create a new attachment by choosing **File→New→Dataset/Form**.

Alternatively, you can attach an existing object by copying the dataset or form to the clipboard, then pasting it to the root node (item revision) in the **Attachments** pane.

Note:

- If you open, check out, and then close a form associated with an item revision in the context of an incremental change, the checkout not retained on the form.
- When open, check out, save, and then close a form associated with an item revision in the context of an incremental change, the checkout is retained on the form.

Track changes retrospectively

If you forgot to activate an incremental change, you can retrospectively track changes by making the incremental change active and doing one of the following:

- Select the item or attachment that you wanted to track as *added* and choose **Tools→Incremental Change→Add**.
- Select the item or attachment that you wanted to track as *removed* and choose **Tools→Incremental Change→Remove**.

Teamcenter saves edits immediately to the database. It is not necessary to choose the **Save Changes** command.

You can only make changes to the *active* incremental change, that is, the one shown in the **Incremental Change Edit Context** box in the incremental change toolbar. If you try to edit an incremental change that is not configured by the current revision rule, Teamcenter displays an error message.

Remove incremental changes

Remove incremental changes

You can remove individual incremental changes one of two ways, from the **Incremental Change Information** pane or with an **Incremental Change** menu command.

Note:

You require write access to edit structures with incremental changes in this way.

For structure and attachment changes:

- If the corresponding change is a remove, Teamcenter deletes it.
- If the corresponding change is an add and the user has write access to the parent BVR, Teamcenter deletes the add but not the occurrence. If you want to remove the occurrence, choose **Edit→Remove**. If the user does not have write access, the deletion request fails.

For occurrence attribute changes, if the change to undo is an add and it is the only change to the attribute, the change and the override value are both deleted. In other cases, only the change is deleted.

Remove an individual change from the incremental change information pane

1. In the **Incremental Change Information** pane, select the structure line of the occurrence or attachment whose changes you want to remove.
2. Select the change to undo and click **Undo Change**, depending on the change type that you want to remove. You can undo multiple changes in a single operation.

Remove changes from an item with the Remove Changes command

1. To remove changes to an occurrence, select the corresponding structure line.

To remove changes to a dataset or form, select it in the **Attachments** pane.

2. Choose **Tools→Incremental Change→Remove Changes**.

Teamcenter displays the **Remove Incremental Changes** dialog box.

3. Select the check box next to each change you want to remove, or click **Select All** to remove all changes, then click **OK**.

Note:

Occurrence attributes are not displayed in the **Remove Incremental Changes** dialog box; you can only undo them from the **Incremental Change Information** pane.

Split an incremental change

You may want to change the effectivity of some of the incremental change elements in an incremental change. As all elements of an incremental change have the same effectivity, you can only accomplish

this by moving some of the incremental change elements into a different incremental change. To do this, choose **Tools→Incremental Change→Split**. You can move the incremental changes to an existing change object or create a new change object for the purpose.

About exporting and importing incremental change data

About exporting and importing incremental change data

You can export changes (deltas) to the structure if they are tracked by incremental changes in two formats—TC XML using a briefcase file or PLM XML. Teamcenter allows you to export the structure changes alone (not the entire structure) without needing to create a new revision. The exported changes contain all the relevant data required by the importing site to achieve the same structure configuration as exists at the exporting site. You can export multiple independent, dependent, or overlapping incremental changes in a single action.

When you use this feature, you must ensure the structure is configured with the required effectivity and revision rules before initiating the export. Effectivity and revision rules are not exported with the changes; you must ensure they are identical in the exporting and importing sites separately.

Teamcenter tracks and exports the following changes when they are tracked by incremental changes:

- Adding a new or existing line to the structure
- Adding a new or existing subassembly to the structure
- Removing a line or subassembly from the structure
- Modifying relative occurrence properties
- Creating or modifying absolute occurrence properties
- Adding a new or existing attachment to a line, for example, a form or dataset
- Deleting an attachment
- Modifying an attachment

When exporting incremental change data using PLM XML:

- The structure must be fully configured.
- Any related changes that are not tracked by an incremental change are not considered for export.
- Changes in the context of incremental changes are considered as export candidates. For example, if you add, modify or remove a structure line in the context of an incremental change, all of its parents

up to the top level are exported in addition to the affected line. However, the siblings of lines affected by the incremental changes are not exported.

- If you add, modify, or remove a subassembly under an incremental change, its children exported even though they are not directly affected under the incremental change.

You can create an incremental baseline for a structure that was already exported. This action creates a new revision of the structure. As active changes are carried forward into the new incremental change baseline revision, you may add new incremental change elements (ICEs) affecting the new structure revision to the incremental change revision that is the parent of the original active ICEs. (This incremental change revision may already be exported for the original structure.) Because the new ICEs do not affect the revision of the structure that was exported when you perform a TC XML export, they are exported as a stub. The incremental baseline action has no additional effect on the export of the original structure and the incremental change revisions that affect it.

Export incremental change data using a briefcase file

1. Choose **Tools**→**Export**→**To Briefcase**.

Teamcenter displays the **Export To Briefcase Via Global Services** dialog box.

2. Click the **Display/Set export options** button  in the bottom right-hand corner of the dialog box.

Teamcenter displays the **TIE Export Configured Export Default** dialog box.

3. Select the check box corresponding to each of the export options you want to use and then click **OK**.

Teamcenter closes the **TIE Export Configured Export Default** dialog box.

4. In the **Export To Briefcase Via Global Services** dialog box, enter all the required information including **Reason**, **Target Sites**, **Option Set**, **Briefcase Package Name**, **Revision Rule**, and **Variant Rule**, and then click **OK**.

Note:

Ensure you select the **TIEConfiguredExportDefault** transfer option set to export incremental change based deltas.

Teamcenter displays the **Remote Export Options Setting** confirmation dialog box.

5. Click **Yes**.

Teamcenter starts the export of the product structure using the options you entered.

Import incremental change data using a briefcase file

1. Choose **Tools**→**Import**→**From Briefcase**.

Teamcenter displays the **Import from Briefcase Without Global Services** dialog box.

2. Navigate to or type the path and file name of the briefcase file in the **Briefcase File** box. Select **TIEConfiguredImportDefault** from the **Option Set** list.
3. Click the **Display/Set export options** button  and select the desired options.
4. (Optional) Select the **Site Check-In after import** box. If you select this box, all objects that are checked out to the unmanaged site are checked in during the import process. Otherwise, you must check them in individually after they are imported.
5. Click **Yes** to begin the import.

Note:

The importing site does not verify it has the same base structure against which the delta was calculated.

If you select a collaboration context for export of incremental change deltas, the export file includes the structure context and configurator contexts contained in it, as well as the configured incremental change data.

Export incremental change data using PLM XML

1. Choose **Tools**→**Export**→**To PLMXML**.

Teamcenter displays the **PLMXML Export** dialog box.

2. Enter the required export directory, file name, choose the appropriate IC delta transfer mode (for example, **ConfiguredDataExportDefault**), and then click **OK**.

Teamcenter displays a confirmation message if the export is successfully completed. It generates the output PLM XML file in directory the location shown in the **PLMXML Export** dialog box.

Import incremental change data using PLM XML

1. Choose **Tools**→**Import**→**From PLMXML**.

Teamcenter displays the **PLMXML Import** dialog box.

2. Enter the name of the PLM XML file to import, choose the appropriate IC delta transfer mode (for example, **ConfiguredDataImportDefault**), select the required incremental change context, and then click **OK**.

Teamcenter displays a confirmation message if the import is successfully completed. It imports only changes to the structure, as captured in the exported PLM XML file.

14. Configuring structures by occurrence effectivity

About occurrence effectivity

The effectivity of an occurrence can be expressed as a date range or a range of units with respect to an *end item*. An occurrence can have multiple expressions comprising date effectivity, unit effectivity, or both. Multiple unit effectivity expressions may reference the same end item or different end items. If no occurrence effectivity is specified, the occurrence is considered to be always effective; that is, it is not constrained by any effectivity definition.

Occurrence effectivity is used principally for two purposes:

- To reflect changes to the structure over time as new parts replace old ones.
- To explicitly state the content of a unit or range of units as a means of managing the variability of the product. This technique is an alternative to using options and variants to configure the parts needed to fulfill a particular offering.

Occurrence effectivity is frequently used by manufacturers of military and aerospace products. The end item may correspond to a serial number or the tail number of an aircraft.

For example, there may be different hydraulic cylinders in the landing gear of an aircraft, depending on whether the aircraft is certified for unimproved runways. There may be additional differences to the aircraft to meet this purpose, such as debris deflectors, wheels, and tires. Using options and variants, you could define an option called **RW_Class = Paved or Gravel**, and there would be a variant rule on stouter cylinder to configure it in for the **Gravel** option. Using occurrence effectivity, the unit number of each aircraft unit that is certified for operation on gravel runways (for example, units 3-6, 17, 33-45) would be used in the effectivity specified for parts such as stouter cylinders. The effectivity of the regular cylinder would be specified using the other units (unit 1-2, 7-16, 18-32, 46-up).

Understanding occurrence effectivity

Understanding occurrence effectivity

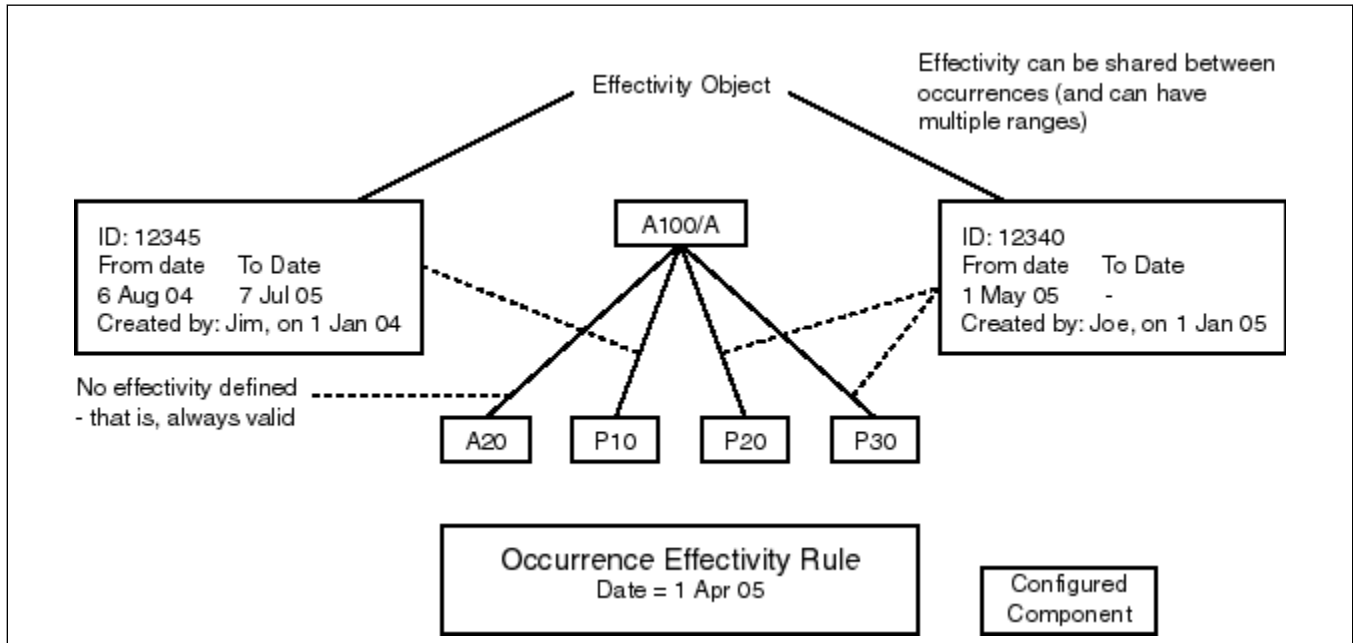
Several occurrences may share an effectivity. When you edit the effectivity range on one occurrence, Teamcenter applies the change to all occurrences. (This is generally the reason for sharing effectivity.)

You can also pack occurrences if they share the same unit or date range and access protection status. Packed occurrences are displayed in a similar way to packed structure lines.

You cannot import or export structures containing occurrence effectivity. If you require individual structure nodes to have effectivity, consider the use of incremental change.

If an occurrence does not have an associated effectivity object, Teamcenter assumes it is always effective and it is configured regardless of the date or unit number set by the revision rule, as shown in the following figure.

If you do not split effectivities, you can optionally use the **Configuration Item** check box to indicate the end item, although Teamcenter does not enforce this use.



Occurrence effectivity rule

When you create an effectivity condition on an occurrence, you change the parent BOM view revision. Consequently, you must have write access to the BOM view revision. However, you can make subsequent changes to the effectivity range if you have write access to the effectivity object, allowing you to edit effectivity data after the structure is released.

Note:

The import or export of a structure containing legacy occurrence effectivities is not supported. If you require individual structure nodes to have effectivity, consider using incremental change instead of occurrence effectivity. Structures managed with incremental change can be imported and exported using Multi-Site Collaboration.

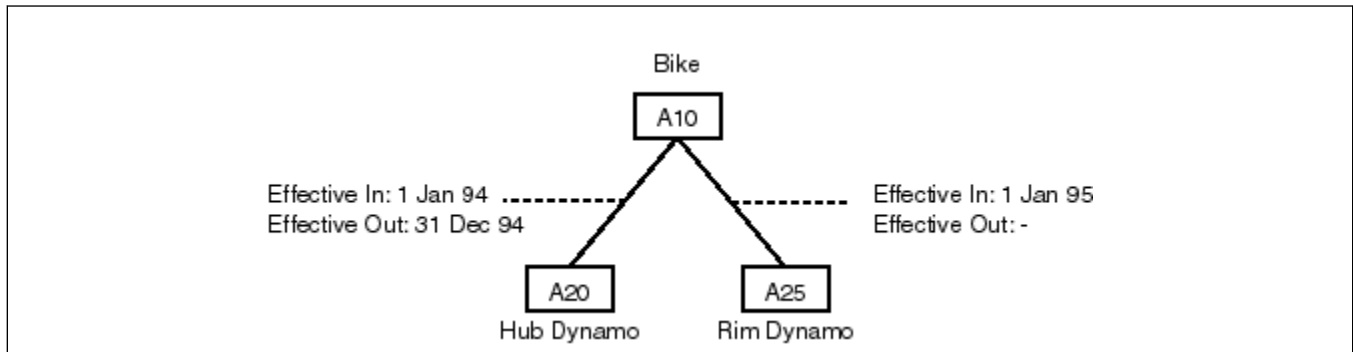
Validating effectivity

You should check that effectivity ranges are consistent within the whole structure, ensuring that effectivity ranges lower down the structure lie within ranges higher up. You may not be aware of the constraints higher up the structure when you initially specify effectivity ranges at lower levels.

Teamcenter does not perform this validation automatically but you can include it as part of a workflow process that approves the effectivity ranges. In certain cases, this validation may not be appropriate, for example, when the structure is shared between different products.

Defining mutually exclusive effectivity ranges

If you intend to define occurrences as mutually exclusive, manually check that they do not have overlapping effectivity ranges. For example, in the following figure, there are two different types of dynamo and it would be wrong to configure two dynamos at the same time.



Mutually exclusive effectivity ranges

When specifying effectivity, you can make the association between the occurrences clearer by using the same find number or attaching a special effectivity note to each.

Understanding unit net effectivity

For a large and complex structure, it is useful to understand the net effectivity of components within the structure. A lower level component may have been originally specified for any effectivity or a large range, but a narrower range applied at a higher level in the structure can reduce the net range for that component line.

Unit net effectivity can be considered as the intersection of an occurrence's unit occurrence effectivity with its parent's calculated unit net effectivity, from the specified structure line up to the top of the structure. For a line without an underlying occurrence (top line of a structure), there is no occurrence effectivity. This line is considered unconstrained and always configured. The unit net effectivity of a line that has no unit occurrence effectivity is equivalent to its parent's calculated unit net effectivity.

- If the line has only date effectivity expressions, these are ignored and the unit net effectivity is the same as its parent's calculated net effectivity.
- If there are multiple unit effectivity expressions with the same end item, these expressions are merged before intersection with the parent's calculated net effectivity.

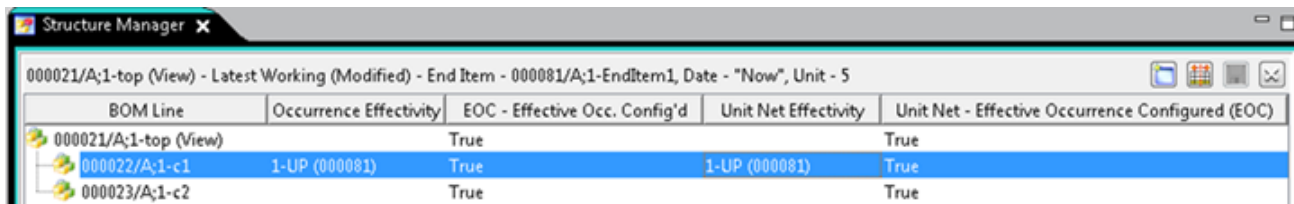
- The intersection is taken with respect to the end item designations of the parent's unit net effectivity expressions. Unit effectivity expressions whose end items do not match any in the parent's unit net effectivity are ignored.
- If there is no intersection of the line's unit occurrence effectivity and the parent's unit net effectivity, the line's unit net effectivity is set empty (fully constrained).
- The unit net effectivity of a line whose parent's unit net effectivity is empty also has an empty unit net effectivity, regardless of the line's unit occurrence effectivity.
- The unit net effectivity of a particular component line is calculated when you display the line and is not persisted in subsequent sessions.

Effectivity flow-down reporting helps the user understand effectivity ranges and the impact of changes, especially as the complexity of the effectivity increases through the structure.

Calculate unit net effectivity

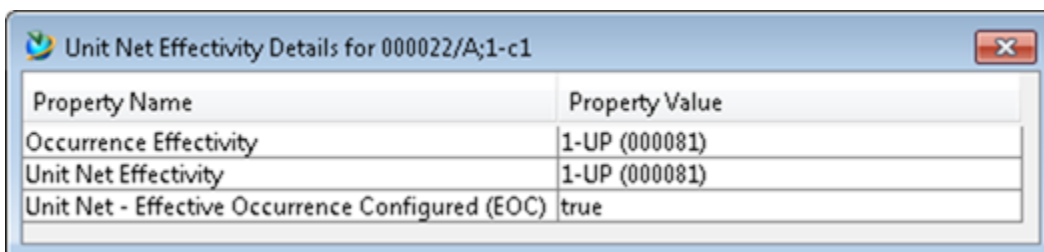
To calculate the net occurrence effectivity of a selected structure line, choose **Tools→Effectivity→Occurrence Effectivity→Calculate Net Effectivity**.

Teamcenter displays the occurrence effectivity, unit net effectivity, and net effective occurrence configured (EOC) information for the selected line.



BOM Line	Occurrence Effectivity	EOC - Effective Occ. Config'd	Unit Net Effectivity	Unit Net - Effective Occurrence Configured (EOC)
000021/A;1-top (View)	True	True	True	True
000022/A;1-c1	1-UP (000081)	True	1-UP (000081)	True
000023/A;1-c2	True	True	True	True

The unit net EOC is set to **true** if the occurrence would be configured in based on the comparison of its calculated unit net effectivity with the revision rule occurrence effectivity entry. Teamcenter performs this comparison at run time and it is not persisted.



Property Name	Property Value
Occurrence Effectivity	1-UP (000081)
Unit Net Effectivity	1-UP (000081)
Unit Net - Effective Occurrence Configured (EOC)	true

Note:

If you select a root line or more than one line, an error message is displayed.

Configuring by occurrence effectivity

If the revision rule controlling the configuration of a structure contains an entry for occurrence effectivity, occurrences for which no occurrence effectivity is specified are configured, together with occurrences whose effectivity expressions match some part of the revision rule occurrence effectivity entry. If **Show Unconfigured By Occurrence Effectivity** is selected, an occurrence may be shown or hidden, depending on occurrence effectivity (which may be a greater range than unit net effectivity).

The calculated net effectivity is also compared with the revision rule occurrence effectivity entry.

- If the unit net effectivity of a line is unconstrained, the unit net-EOC is **true**, regardless of any occurrence effectivity entry in the revision rule.
- If the unit net effectivity of a line is empty, the unit net-EOC is **false**, regardless of any occurrence effectivity entry in the revision rule.
- For a line whose unit net effectivity is not unconstrained or empty, its unit net-EOC is **false** if there is no occurrence effectivity entry in the revision rule.
- If there is an occurrence effectivity entry in the revision rule, the unit net-EOC is **true** only if the unit net effectivity matches some part of the revision rule occurrence effectivity entry.
- Any date effectivity expressions in the revision rule occurrence effectivity entry are ignored for the unit net-EOC comparison. A date range is not considered as a scope for unit net effectivity,

You may explicitly set an occurrence effectivity entry in the existing revision rule by choosing **Revision Rule → Set Date/Unit/End Item....** You can then set a unit range defining the scope of effective occurrences you want to review. The **Unit Net-EOC** property shows whether the computed net effectivity is in that scope.

Using effectivity cutback

While defining a product managed with occurrence effectivity, the effectivity decisions evolve as the product content itself is developed. The design engineer makes decisions for effectivity ranges that reflect the implementation plan for when additional or replacement parts should be included in the bill of materials.

In general, there are many technical and logistical decisions that go into setting the date or unit range of the effectivity. To support this process, the engineer must understand the chain of effectivity for a given part. The engineer may choose to adjust the effectivity ranges when necessary. Over the life cycle of development and service of the product, customers using occurrence effectivity replace parts with other parts. As these changes are made, the historical chain of effectivity must remain consistent.

When a new occurrence of a part is specified as a replacement for an existing occurrence in a structure, the effectivity of the replaced part should be reduced (cut back) so that it does not overlap with the effectivity of the replacing part.

When a part with occurrence effectivity is replaced and cut back, prior generations that were replaced by the cutback part should also be considered for cutback, if the range of the newest replacement overlaps effectivity.

Note:

Effectivity cutback is only supported with unit effectivity, not with date effectivity.

The following actions are supported by effectivity cutback:

- Replacing N parts with M replacements and updating ranges of effectivity. The historical chain of effectivity retains the N:M relationship, in case a future cutback operation needs to fully span the content of a link in the chain to cut it back.
- Validating prior replacements in the history of effectivity and updating accordingly.
- Enabling efficient updates to effectivity ranges after a replacement.

The following example shows how effectivity cutback occurs when an engineer modifies an assembly that is managed with occurrence effectivity.

1. The engineer specifies replacement parts P21, P22, and P23 for parts P11 and P12 with a unit range of 10-up.

The system adds the occurrences P21, P22, and P23 effective unit 10-up. The effectivity of P11 and P12 is cut back to the portion of the range not set on the replacements, namely units 1-9.

2. The engineer indicates parts P31, P32, and P33 are specified as replacements to P21, P22, and P23 for a range starting at unit 5.

The system determines from the chain of effectivity and replacements that P21, P22, and P23 are replacements.

The full range of effectivity is overlapped, so P21, P22, and P23 are no longer in effect. The span of replacement is complete, so the parts previously replaced are considered and P11 and P12 are cut back accordingly to 1-4.

3. The engineer specifies P42 as a replacement for P32 for a range within the span of effectivity of P32.

P42 is effective for the range specified (units 20-30) and the replaced occurrence split to 5-19, and 31-up.

4. The engineer adjusts the effectivity range of P42 to units 22-32.

The effectivity of P42 is updated to the new range.

5. A reviewer or the engineer validates the effectivity chain of P42.

The system evaluates the effectivity of P42 against the parts it replaced or is replaced by. It identifies:

- A gap

Unit 20,21 does not include replaced (P32) or replacing (P42) parts.

- An overlap

Units 31 and 32 include both replaced (P32) and replacing (P42) parts.

6. The engineer replaces a part where only a portion of the historical replacement chain is changing.

While a cutback of P33 by replacing part P43 is unambiguous, there is not an unambiguous action to take on P11 and P12 because P33 is only a subset of the historical chain:

(P11,P12):(P21, P22, P23):(P31, P32, P33)

After replacing an occurrence and performing a cutback of the replaced part, the effectivity range of a part can be adjusted. If the new range overlaps with the effectivity of any parts in the historical chain of effectivity, the system issues a warning.

The following table shows how effectivity cutback occurs in this scenario.

Step	Task	Part P11	Part P12	Part P21	Part P22	Part P31	Part P32	Part P33	Part P42	Part P43
1	Initial state	1-up	1-up							
2	Replace P11 & P12 with P21, P22,P23 at unit 10	1-9	1-9	10-up	10-up					

Step	Task	Part P11	Part P12	Part P21	Part P22	Part P31	Part P32	Part P33	Part P42	Part P43
3	Replace P21, P22, P23 with P31, P32, P33 at unit 5	1-4	1-4			5-up	5-up	5-up		
4	Replace P32 with P42 for units 20-30	1-4	1-4			5-up	5-up	5-up	20-30	
5	Adjust effectivity of P42 to units 22- 32						Warning		22-32	
6	Replace P33 with P43 for units 3-7	Error	Error					8-up		3-7

When a link in a chain of occurrence effectivities is completely overlapped (that is, a complete cutback is made of its entire range) it is logically removed from the structure. The system informs the user there is no effectivity for that occurrence. A logically removed occurrence can be removed from the structure and removed from historical chains of effectivity used for evaluation of future cutback operations. In this situation, the change history is the only way to know the part ever existed in the structure.

Editing occurrence effectivity

To edit occurrence effectivity data, your Teamcenter user name must be included in the appropriate effectivity user group and role that the administrator defines.

Associate existing effectivity to an occurrence

Note:

Use this approach only when you want the effectivity to be the same for all occurrences sharing this effectivity object. If you edit the effectivity object's date or unit number ranges, Teamcenter applies this change to all occurrences that reference it.

1. Select the line in the structure representing the occurrence with which you want to associate effectivity.
2. Choose **Tools→Effectivity→Occurrence Effectivity→View, Create and Edit**.

Teamcenter opens the **Occurrence Effectivity** dialog box.

3. In the **Effectivity ID** box, type the identifier of the effectivity object you want to associate with the occurrence, and press the Enter key. Alternatively, you can search for the effectivity object by clicking **Search**  adjacent to the **Effectivity ID** box.

Teamcenter populates the date or unit number table with the ranges from the effectivity object.

4. Click **OK** and Teamcenter associates the effectivity with the occurrence.

Create effectivity on multiple occurrences

Create and associate the same effectivity with several occurrences by selecting the appropriate line in the structure and choosing **Tools→Effectivity→Occurrence Effectivity→Create on Multiple BOM Lines**. The effectivity may be:

- Shared

Shared effectivity must have an ID. If you are creating shared effectivity, ensure the **Use shared effectivity** check box is selected.

- Unshared

Unshared effectivity has no ID. If you are creating unshared effectivity, ensure the **Use shared effectivity** check box is cleared.

Modify the effectivity of an occurrence

Note:

Any changes you make affect all occurrences sharing the same effectivity object.

1. Select the line in the structure representing the occurrence whose effectivity you want to modify.
2. Choose **Tools→Effectivity→Occurrence Effectivity→View, Create and Edit**.

Teamcenter opens the **Occurrence Effectivity** dialog box.

3. In the **Occurrence Effectivity** dialog box, choose **Units** or **Dates** effectivity, as appropriate, and define the effectivity range.
 - If defining unit effectivity, type the desired effectivity range in the **Units** box. Use the - character within a continuous range, and the , character to separate discontinuous ranges. For example, the unit range **1-5,7-9** defines effectivity for units 1 through 5, and 7 through 9 (but not effective for unit 6).
 - If defining date effectivity, select a cell in the **From** or **To** column, select a date from the calendar (and optionally type a time), and click **Set Date** to place that date in the selected cell. Click the **Clear Date** button to remove the date from the currently selected cell. Repeat this step for additional cells until you have entered all the desired date ranges.
 - Click the **UP** button to add the **and up** (open-ended effectivity) condition to the end of the unit or date effectivity range. If you are defining date effectivity,
 - Click the **SO** button to add the **stock out** condition to the end of the unit or date effectivity range.

Note:

Teamcenter interprets **UP** and **SO** conditions as open-ended for revision configuration purposes. The revision is considered effective for any value greater than or equal to the unit or date value immediately preceding the **UP** or **SO**. *Stock out* indicates that existing stocks of a component revision should be used up before the next revision.

- Check the **Apply Access Manager effectivity protection** check box to apply the predefined access rules to this effectivity.
- (Optional) For date effectivity, use the **End Item** dialog box to define an end item to qualify the effectivity range. You *must* use this with unit effectivity to specify a product, module, or subsystem that carries the unit number to which this effectivity refers. You can select an end item in one of the following ways:

- Clicking **Open by Name**  adjacent to the **End Item** box and searching for an item by identifier and/or name.
- Copying an item to the clipboard before opening the **Occurrence Effectivity** dialog box and clicking **Paste**  adjacent to the **End Item** box.
- Clicking **MRU**  adjacent to the **End Item** box.

Note:

If you want to remove the entered end item, click **Clear**  adjacent to the **End Item** box.

4. Click **OK** to save the occurrence effectivity data you entered.

Remove effectivity from an occurrence

1. Select the line in the structure representing the occurrence whose effectivity you want to remove.
2. Choose **Tools→Effectivity→Occurrence Effectivity→View, Create and Edit**.

Teamcenter displays the **Occurrence Effectivity** dialog box.

3. Click **Remove** to clear all boxes, including the identifier.
4. Click **OK** and Teamcenter removes the effectivity object from the selected occurrence. Any other occurrences sharing this effectivity retain their references to the effectivity object.

Copying occurrences with effectivity

When you save a BOM view revision with a different name (perform a **Save As** action), Teamcenter copies any occurrences that reference an effectivity object to the new BOM view revision. Thus, the same effectivity ranges apply to the copied structure.

When you copy, cut or paste, Teamcenter does not reproduce any references to effectivity objects in the copy occurrences.

Setting the date for occurrence effectivity

Teamcenter configures the occurrence effectivity by the date defined in the current revision rule. Teamcenter uses an explicit date entry, if the current rule contains one. If the rule has no date entry, the effective date defaults to **today**, but you can manually set a different date using the **Tools→Revision Rule→Set Date/Unit/End Item** menu command.

You can choose to show only the configured occurrences, or all occurrences. You can toggle this setting by choosing **View→Show Unconfigured by Occurrence Effectivity**. If you display the **EOC - Effective**

Occ. Config'd column in the structure properties, occurrences that are configured show a **Y**. If the occurrences are not configured, the column is blank.

Occurrences are configured if:

- The effectivity range encompasses the date specified by the current revision rule.
- They have no effectivity object. Such occurrences are always configured, regardless of date.

Combining occurrence effectivity and variant configuration

Variant and occurrence date effectivity are occurrence-based configuration methods that operate independently. The **View** menu includes separate commands to show or hide occurrences that are unconfigured by the two methods. In some cases, you may want to view a specific variant of the product at a particular effective date. In this case, you hide occurrences that are unconfigured by *both* date and variants. Similarly, you may want to view a generic product at a particular date, in which case, you would hide occurrences unconfigured by date only. To show how a single variant changes with effective date, you can hide unconfigured variants only.

Configuring occurrences with multi-unit configuration

About multi-unit configuration

Teamcenter allows you to configure product structure occurrences of an assembly based on specified multiple end items and the unit effectivity ranges for each of those end items. You can do impact analysis and eliminate the duplicate work required to maintain different product structures and complicated manual reconciliation.

A combination of multiple end items and range of units for each end item used to configure product structure occurrences is referred to as a *multi-unit configuration*.

The administrator at your site enables this feature. It allows you to:

- Specify multi-unit configurations and save them as effectivity groups.
- Save a combination of effectivity groups and revision rule as a configurator context. You can use the saved configurator context to apply the effectivity groups and revision rule to configure occurrences.
- View the configured structure in Lifecycle Visualization, CAD tools, and the embedded viewers of appropriate rich client applications.
- Configure occurrences by matching the occurrence effectivity with the multi-unit configuration.
- Configure occurrences that are added and deleted by incremental changes by matching the incremental change effectivity with the multi-unit configuration.

Note:

Teamcenter displays the **Revision Rule Entry** value for an incremental change (IC) configured by a multi-unit configuration as **Effectivity Group**. Therefore, ignore the status of this check box in the **IC Information** pane.

When an occurrence has occurrence effectivity and it is removed in the context of an IC, the occurrence is not configured if the multi-unit configuration matches the effectivity of the removing IC. This occurs whether the occurrence effectivity matches partially or completely with the multi-unit configuration.

Multi-unit configuration does not support nested effectivity and effectivity mapping.

Create a new effectivity group

1. In My Teamcenter, choose **File→New→Item**.

Teamcenter displays the **New Item** dialog box.

2. Select **Effectivity Group**, enter the necessary name, description, and identifier, and then click **Finish**.

Teamcenter creates the base revision of the new effectivity group. (Effectivity groups cannot be revised, and you are unable to create further revisions of the new group.)

Capture a multi-unit configuration and save it to an effectivity group

1. In My Teamcenter, right-click an effectivity group revision and choose **View/Edit Multi-Unit Configuration**.

Teamcenter displays the **View/Edit Multi Unit Configuration** dialog box with the **View/Edit Multi Unit Configuration** pane visible.

Note:

The **Most Recently Used** option is not available in this dialog box. Also, the **Open By Name** box is not available on the **Effectivity Groups** pane in this dialog box.

Caution:

This is a modeless dialog box. It allows you to copy items from other locations, such as your **Favorites** folder, and paste them into the dialog box. However, it also allows you to perform other actions, such as **Revise** and **Close** commands in My Teamcenter with the dialog box open.

If you open this dialog box using **View/Edit** in the **Set Date/Unit/End Item** dialog box (**Effectivity Groups** tab), the dialog box is modal and does not allow you to paste between applications.

2. Enter the necessary end item and unit range information, and then click **Add**, **Edit**, **Remove**, or **Undo** to update the effectivity group, as follows:
 - To add an end item unit range, enter the end item ID and the effective unit range and click the **Add** button. You can also search or browse for an end item to populate the **End Item** box. You can also copy the end item from your **Favorites** folder in My Teamcenter and paste it here. You can specify a combination of units or unit ranges in comma-separated format.
 - To remove an end item unit range, select it in the table and click **Remove**.
 - To edit an end item unit range, select it in the table and the system populates the **End Item ID** and **Unit Range** boxes from the selected entry. After you make the required changes, click **Modify**.
 - To revert the last change made in the dialog box, click **Undo**.

Note:

Undo allows you to go back one level to the previous state in the dialog box. Thereafter, any subsequent clicks on the **Undo** button cause the dialog box to toggle between its current state and previous state.

Note:

You can view and edit effectivity groups with certain limitations. Use the **View/Edit** button in the **Effectivity Groups** pane of the **Set Date/Unit/End Item** dialog box to add or modify the end items by manually typing the necessary data. You cannot search for or copy and paste end items here.

Set an effectivity group to configure occurrences

You set an effectivity group or groups to configure the product structure occurrences in addition to the revision rule.

1. Load the assembly to configure and choose **Tools**→**Revision Rule**→**Set Date/Unit/End Item**.

Teamcenter displays the **Set Date/Unit/End Item** dialog box.

2. Enter the effectivity group identifier in the **Effectivity Group** box, and then click **Replace**, **Insert**, or **Append** to update the list of groups.

Note:

To remove an effectivity group from the list, select it and click **Remove**.

3. (Optional) To view the multi-unit configuration on an effectivity group, select it and click **View/Edit**. The system displays the **View/Edit Multi Unit Configuration** dialog box, as described previously. If you have the necessary access privileges, you can also modify the configuration.

When you apply the configuration, the system matches the occurrence effectivities configured for each occurrence with the multi-unit configuration set in the effectivity groups. Any occurrence whose occurrence effectivity is valid for any of the end item and unit range entries in the effectivity groups is displayed. An occurrence is loaded only once even if its effectivity matches more than one end item entry in the effectivity groups set in the session.

Caution:

You can configure product structures with incremental changes using effectivity groups. However, only limited support is provided to configure occurrences with incremental changes using multi-unit configuration and the following limitations apply.

- You can configure only the addition and deletion of occurrences using effectivity groups. Other edits in the context of incremental change cannot be configured.
- An **add** occurrence edit is effective if the multi-unit configuration partially overlaps the effectivity of the incremental change.
- A **remove** occurrence edit is effective if the multi-unit configuration completely overlaps or is within the limits of the effectivity of the incremental change. That is, a partial overlap is not sufficient to configure the **remove** edit. If there are multiple **remove** incremental changes, Teamcenter compares each of them with the multi-unit configuration separately. (It does not calculate the total **remove** effectivity and compare a single value with the multi-unit configuration.)
- Teamcenter evaluates the configuration of an occurrence based on an incremental change independently of its occurrence effectivity.
- If Teamcenter finds competing incremental changes (one adding the occurrence and the other removing it) and both can be configured with effectivity groups, it gives precedence to the **add** occurrence edit.

The following examples show how occurrence effectivity and incremental change interact.

Structure line number	Type	Occurrence effectivity (explicit or implied)	Effectivity on removing IC1 and removing IC2	Multi-unit configuration set on BOM window	Result
1	Component	EndItem(1-20)	IC1(-) → EndItem1(1-9) IC2(-) → EndItem(10-20)	EndItem1(1-9)	Occurrence <i>not</i> configured.
2	Component	EndItem(1-20)	IC1(-) → EndItem1(1-9) IC2(-) → EndItem(10-20)	EndItem1(1-20)	Occurrence configured as Teamcenter checks occurrence effectivity, multi-unit configuration, and each incremental change individually.

Customizing occurrence effectivity

You can customize Teamcenter behavior when the user applies or sets occurrence effectivity on a BOM line.

To allow customization of the behavior when setting effectivity on an occurrence, the **bl_occ_effectivity** BOM line property is modifiable, and a setter method is provided on this property. Use the setter method of the property to attach an extension point if required.

15. Configuring structures by classic variants

Configuring structures by classic variants

Teamcenter supports three methods of variant configuration, classic variants, modular variants, and Product Configurator variants.

Siemens Digital Industries Software recommends that you do not create both classic variants and modular variants in the same product structure, as this may cause in unpredictable results.

Classic variant configuration allows you to create options (for example, color) and allowed values for each option. You can then associate these options with an item revision. For example, you might create an option called **color** with allowed values of **red** and **blue**. You usually implement variant configuration against a top-level assembly, but it is possible to implement them anywhere in the structure. You can then define a variant condition on those occurrences subject to variant rules. A variant rule is a set of options and values (for example, **color = red, material = cotton**) that is stored in the database. For example, you can specify **only load IF option color = value red** in the variant rule for the example option and allowed values. To configure a particular variant of the assembly or product, you must set the appropriate variant rule.

To prevent users from specifying illegal option values or combinations, you can set *default* option values, for example, **color = blue**, in the variant rule. You can also create variant rule checks, for example, **error if color = green AND material = cotton**.

If you install the Teamcenter Integration for NX, classic variants do not synchronize with NX expressions. However, you can configure saved variant rules from NX, although you cannot interactively set variant rules. Also, like configuration in Structure Manager, you can apply multiple saved variant rules from NX. Classic variants suit situations where the user chooses one or more option values from a set of values. Only text option types supported.

Classic variant configuration supports:

- Options that are a mandatory choice or an accessory.
- Components that may be configured by more than one option.
- Variant assemblies that may be shared between products.
- A 120% BOM, allowing users to select multiple values for an option. This contrasts with the 100% BOM that represents the buildable product, in which users may select only one value for each option.
- Overlay configurations, allowing users to apply multiple saved variant rules (SVRs) to the product structure.

Classic variant configuration does not support:

- Automatic creation of variant item.
- Updating of existing variant items.

Caution:

If you migrate from one variants technique to the other, be aware that Teamcenter evaluates the same variant condition differently in modular variants and classic variants. In some circumstances, this may result in different product structure configurations. For example, Teamcenter evaluates classic variant conditions from the left, giving all operators the same precedence. When it evaluates modular variant conditions, it automatically gives **AND** clauses precedence over **OR** clauses.

If you authored a line within a product structure using Product Configurator variants, you cannot update that line using classic or modular variants.

Elements of classic variants

The following table lists elements that may appear in a structure that is managed by classic variants.

Element	Purpose
Constraint	An expression that sets an option value according to the values of other options, that is, derived defaults.
Derived default	A default value that depends on a certain condition (for example, radio = stereo IF car type = GLX). A derived default is attached to an item revision but applies globally to a loaded structure.
Option	A parameter of variability. Options have a string type or a numeric type and a name.
Variant (structure)	A specific structure that is configured by applying a variant rule.
Variant condition	A condition that an engineering user sets on an occurrence to specify the option values that configure the occurrence (for example, Load IF engine = 1200). More complex condition statements may also be defined.
Variant rule	A collection of option values, typically set by a marketing user, to determine the variant of the structure to configure (for example, car type = GLS, engine = 1200, gearbox = manual). A saved variant rule is a persistent database object.
Variant rule check	A condition that specifies any option values or combinations of values that are not allowed. A variant rule check is attached to an item revision. Also called an <i>error check</i> .

Placing variant data on a structure

When populating a structure with variant data, you must decide where to place options, defaults, and variant rule checks; typically, you attach this data to assembly items. The following types of variant data may be placed on a structure:

Type of variant data	Purpose	Best practice
Marketing variant data	Set by marketing or customers to specify the required variant of the product.	Stored at the product level.
Engineering variant data	Set by design engineers to control detailed variant information that does not concern customers.	Stored at lower levels, attached to specific modules or assemblies.

Note:

Option identification names are not unique in the database; they are unique only to the owning item. You must specify an item when the option is not unique. Options are generally displayed with their owning item.

View and edit variant data

To view and edit classic variant data, display the data pane by clicking the **Show/Hide Data Panel** button , and then click the **Variants** tab.

Note:

Ensure the **PSEVariantsMode** user preference is set to **legacy** if you want to work only with classic variants or to **hybrid** if you want to work with both legacy and modular variants.

The upper part of the **Variants** pane shows the variant data tree, presenting any variant data stored on the item revision represented by the structure line currently selected in the structure. The tree has three branches:

- Options
- Option defaults
- Rule checks

If the item revision has variant data, the branch has a + (plus) icon and you can expand the branch to view the data.

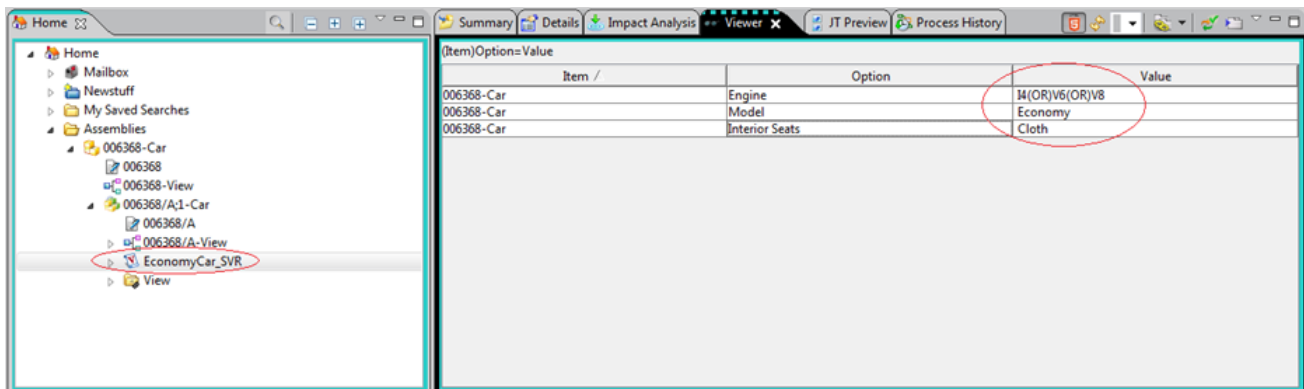
The lower part of the pane allows you to create and edit variant data for the selected data, if you have write access to the item revision. You can also view further details of specific variant data, for example, the allowed values of an option.

Tip:

Use the **PSE_show_option_item_prefix** user preference to show or hide the owning item ID as a prefix to the option name.

If you expand an item revision and then select a saved variant rule, the viewer pane displays its details. For example, if you are working with a 120% BOM, the viewer pane displays multiple values in an **(OR)** expression, as shown.

An **(OR)** expression is the default value. Your administrator can change this by setting the **PS_option_value_delimiter** site preference.



Configure to load

You can eliminate the loading of unconfigured variants and consequently complete loading of the structure more quickly.

1. Choose **View→Enable Filtering Unconfigured due to Classic Variants**.

Teamcenter enables configure to load filtering.

2. Send the structure to Structure Manager.

If the **PSEVariantsMode** user preference is set to **hybrid** or **modular**, Teamcenter displays the **Configure** dialog box. If it is set to **legacy**, it displays the **Variant Rule** dialog box.

3. Enter an option value for any item.

Teamcenter activates the **Filter unconfigured BOM lines due to Classic Variants** check box.

4. Select the **Filter unconfigured BOM lines due to Classic Variants** check box.

When the structure is subsequently loaded, Teamcenter does not load lines that are unconfigured by the selected variant rule. The title bar of the structure tree pane is colored blue to indicate that filtering is applied.

Note:

You cannot disable this selection when the structure is loaded and it persists each time the structure is loaded. To change it, you must follow the previous steps and clear the **Filter unconfigured BOM lines due to Classic Variants** check box.

The configure to load feature is available if you configure a 100% BOM, a 120% BOM, or an overlay BOM. After you apply a variant rule to a structure that is configured to load, you can no longer reconfigure the structure with a different variant rule.

Configuring a 120% BOM

Configuring a 120% BOM

A 120% BOM allows users to select multiple values for an option. Teamcenter evaluates the multiple values as an **OR** expression. For example:

Option: Color

Valid values: Green, Yellow, Red

If the user selects all the valid values to configure the BOM, Teamcenter evaluates the values as:

Color=Green OR Color=Yellow OR Color=Red

In 120% BOM, defaults, derived default values and variant rule checks are not evaluated.

When you load the BOM, Teamcenter does not change the active BOM mode unless you choose **Allow multiple option values for option**. In this case, it changes the mode to **Single Rule-Multiple Values** (generally called 120% BOM); otherwise, the selected variant rule is loaded in the default mode, that is, **Single Rule-Single Value** (generally called 100% BOM).

You can change from a 100% BOM to a 120% BOM configuration at any time. When you change the mode from 100% to 120% and defaults or derived defaults exist, Teamcenter displays a message to ask if you want to carry over the defaults or derived default values as user set values in 120% mode. If you click **Yes**, Teamcenter carries these values over in 120% mode. If you click **No**, Teamcenter clears these values. Any modifications to the values while in 120% BOM configuration do not cause Teamcenter to evaluate default checks, derived default checks, or rule checks. Option values can only be set by a user, set by a rule, or unset.

Configure 120% BOM

1. Click the **Variant Rule** button  on the toolbar or choose **Tools→Variant Rule**.

Teamcenter displays the **Variant Rule** dialog box.

2. Select the **Allow multiple values for option** check box.

Note:

Clearing this check box exits 120% BOM mode. If you return to 100% mode by clearing the 120% mode check box, Teamcenter displays the following message.

You are about to disable multiple values for an option.
This will automatically clear and apply the variant rule
to the BOM. Defaults, derived defaults and variant rule
checks will be evaluated. Do you want to continue?

If you click **No**, the mode remains at 120%. If you click **Yes**, the mode reverts to 100% and Teamcenter applies the default variant rule to the BOM. If you select **Don't show this message again**, Teamcenter applies the default variant rule when you exit 120% mode without prompting.

If defaults or derived defaults exist, Teamcenter displays the following message. You can carry over the defaults and derived default values as user set values if you want; otherwise, they are cleared.

Do you want to carry over the default and derived default value(s)
as
user set? If you select No, these values will be automatically
cleared.

☒ Allow multiple values for option

Note: Defaults, derived defaults and rule checks are not evaluated.

Item	Option	Description	Value	State
006368-Car	Engine	Car Engine		Unset
006368-Car	Model	Car Model		Unset
006368-Car	Interior Seats	Car Interior Seats		Unset

Clear Copy Load... Reload Save Save As... Apply

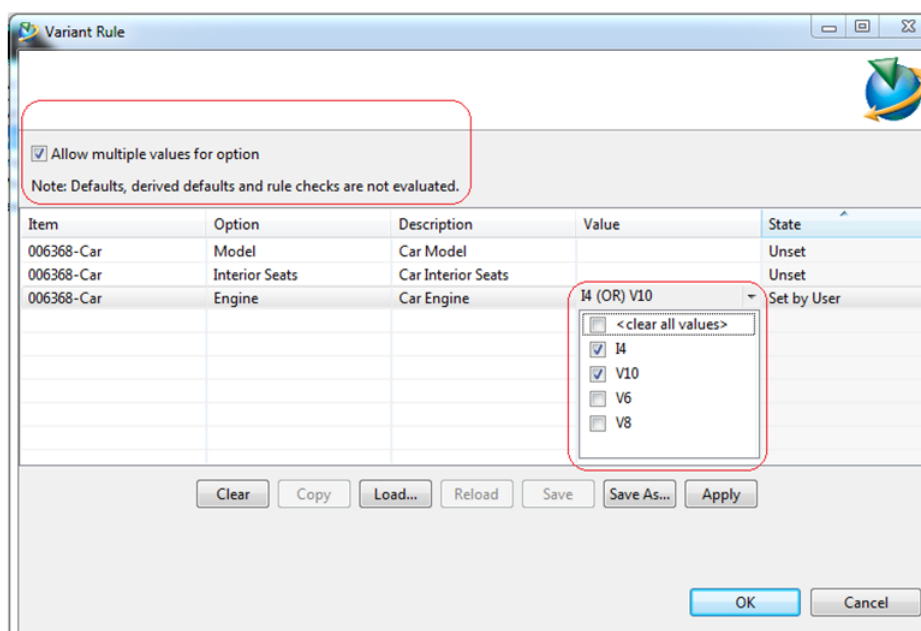
OK Cancel

If you want to carry over the default and derived default values into the 120% BOM, you must click **Yes**, and Teamcenter carries over the option values to a new variant rule as **user set**. If you click **No**, default and derived defaults are cleared in 120% BOM mode.

Note:

If you click **Cancel** without applying the changes, Teamcenter reconfigures the BOM to its last applied state. If you have a large BOM, this action may take a little time and a working indicator displays in the progress bar until it is complete.

- To select multiple option values, click the required values one at time in the drop-down list. Each selected value is highlighted, as shown.



The selected values are displayed in the table as an **(OR)** expression, for example, **I4 OR V6**. The **(OR)** expression is the default value and may be changed by editing the **PS_option_value_delimiter** preference.

To clear a value, click it a second time.

Note:

In the previous example, there are two values set for **Engine** but only one value for **State**.

When you exit 120% mode by clearing the **Allow multiple values for option** check box, Teamcenter prompts you to confirm if you want to proceed. If you click **No**, Structure Manager remains in 120% mode. If you click **Yes**, Teamcenter applies the default variant rule in 100% mode. If you have a large BOM, this action may take a little time to complete and a working indicator displays in the status bar until it finishes.

If you also select the **Do not display this message again** check box, you are no longer prompted for confirmation when you switch from 120% mode to 100% mode.

Note:

Variant items are not supported in 120% BOM mode.

Configuring an overlay BOM

Configuring an overlay BOM

An overlay BOM allows users to select multiple saved variant rules to configure the BOM. Teamcenter evaluates the multiple saved variant rules as an **OR** expression of values from the same option. For example:

```
Saved Variant Rule1: Color=Red AND Engine=V4
Saved Variant Rule2: Color=Blue AND Engine=V6 AND Transmission=Auto
```

If you select these rules to configure the overlay BOM, Teamcenter evaluates the values as:

```
Overlay Variant Rule: (Color=Red OR Color=Blue) AND (Engine=V4 OR
Engine=V6) AND Transmission=Auto
```

In an overlay BOM, Teamcenter does not evaluate default values, derived default values, and variant rule checks.

Overlay mode requires at least two SVRs to load. Individual SVRs in an overlay configuration may have multiple values for their options.

If the BOM is configured in overlay mode, you cannot edit options, option defaults (that is, defaults and derived defaults) and rule checks from the data pane. If you attempt any of these actions, Teamcenter shows the following error message:

```
The selected operation does not support the usage of the BOM Window
Variant
configuration mode 2 (Overlay). Please change the BOM window variant
configuration mode to 0 (Single rule - single value) or 1
(Single rule- multivalue)
```

Note:

Overlay mode is intended to allow configuration based on multiple saved variant rules. Therefore, when the BOM is in overlay mode, the following functionality is not available and results in an error if selected:

- Reloading of saved variant rules.
- Editing the variant rule configuration
- Creating, editing, and deleting of options and values.

- Creating, editing, and deleting of option defaults.
- Creating, editing, and deleting of variant rule checks.

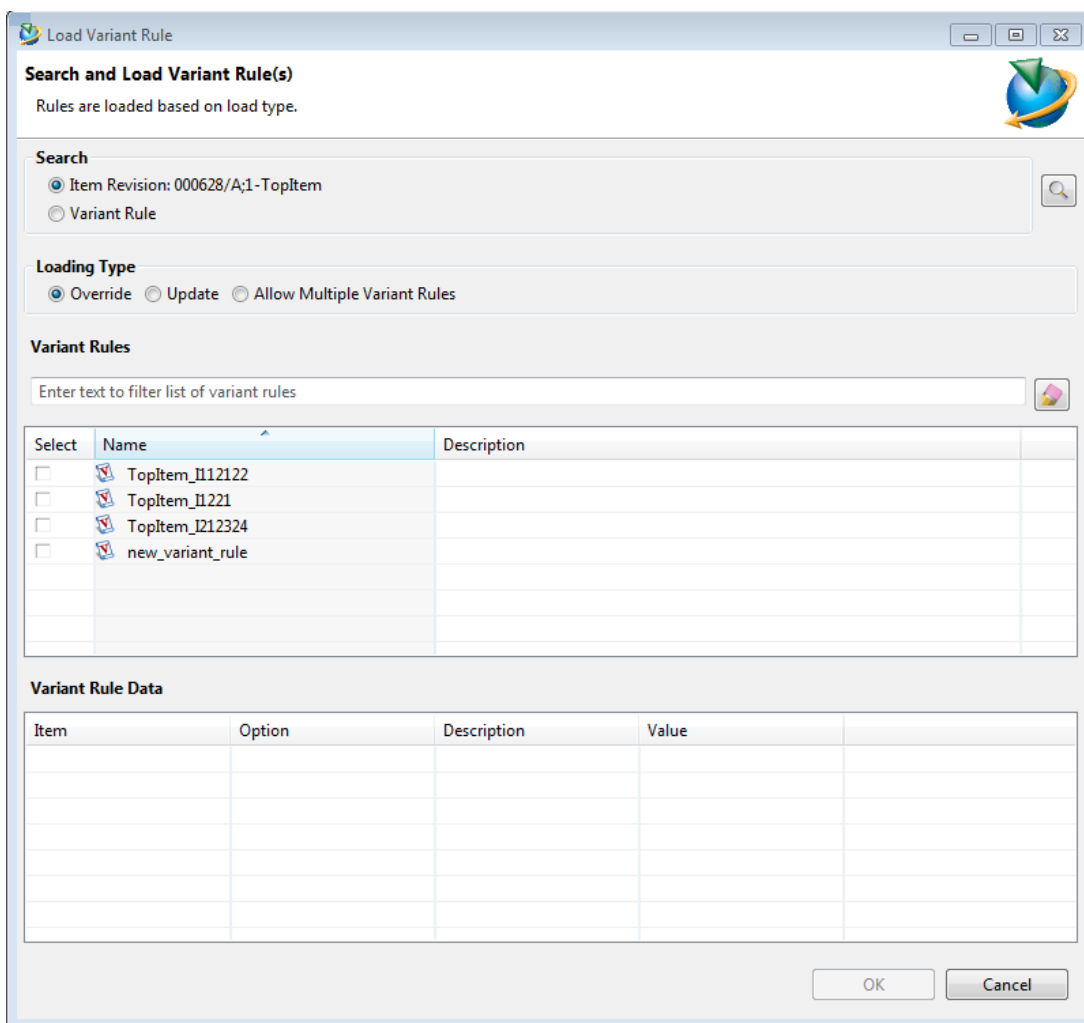
Configure an overlay BOM

1. Click the **Variant Rule** button  on the toolbar or choose **Tools→Variant Rule**.

Teamcenter displays the **Variant Rule** dialog box.

2. Click **Load**.

Teamcenter displays the **Load Variant Rule** dialog box.



Load Variant Rule

Search and Load Variant Rule(s)
Rules are loaded based on load type.

Search
☒ Item Revision: 000628/A1-TopItem
☐ Variant Rule

Loading Type
☒ Override ☐ Update ☐ Allow Multiple Variant Rules

Variant Rules
 Enter text to filter list of variant rules

Select	Name	Description
☐	 Topitem_I112122	
☐	 Topitem_I1221	
☐	 Topitem_I212324	
☐	 new_variant_rule	

Variant Rule Data

Item	Option	Description	Value

OK Cancel

3. Select the **Allow Multiple Variant Rule** loading type and then select two or more SVRs from the **Variant Rules** list to include in the overlay configuration.

Optionally, you can search for SVRs to select and you can select multiple SVRs from a list of SVR search results. You can also append selected SVRs from the search results to the **Variant Rules** list, if the search type is **SVR**. However, if you search by item revision, you can make only one selection and you cannot append additional selections.

Tip:

You can highlight a row in the **Variant Rules** list to show its option values in the **Variant Rule Data** table. You cannot edit the entries in this table.

If you select the **Override** or **Update** loading type, you can select only one SVR at a time.

4. Click **OK**.

Teamcenter displays the **Variant Rule** dialog box containing the selected SVRs.

Tip:

The **Add** and **Remove** buttons allow you to add SVRs to the overlay or remove SVRs. However, the **Remove** button is disabled if there are only two SVRs loaded in the overlay because an overlay requires at least two SVRs.

5. If necessary, you can exit overlay mode by clicking **Exit** in the **Variant Rule** dialog box.

Teamcenter displays a warning message that it will remove all loaded variant rules in the current configuration. Click **Yes** and it applies a single empty variant rule to the BOM.

Note:

When you exit overlay mode and have a large BOM, this action may take a little time to complete. A working indicator displays in the status bar until it finishes.

Using classic variants

Classic variant principles

Variants allow you to create options (for example, **color**) and allowed values of those options (for example, **red** and **blue**) and associate them with an item revision. You usually do this at a top-level assembly, but you can implement variants anywhere in the structure. You then define a variant condition (for example, **only load IF option color = value red** is specified in the variant rule) on those occurrences that are subject to variant rules.

To configure a particular variant of an assembly or product, set a variant rule (a group of options and values such as **color = red, material = cotton**). This can be stored in the database and retrieved later.

To specify option values or combinations that are not allowed, you can also set default option values (for example, **color = blue**) for the variant rule and create variant rule checks (for example, **error if color = green AND material = cotton**). This functionality supports:

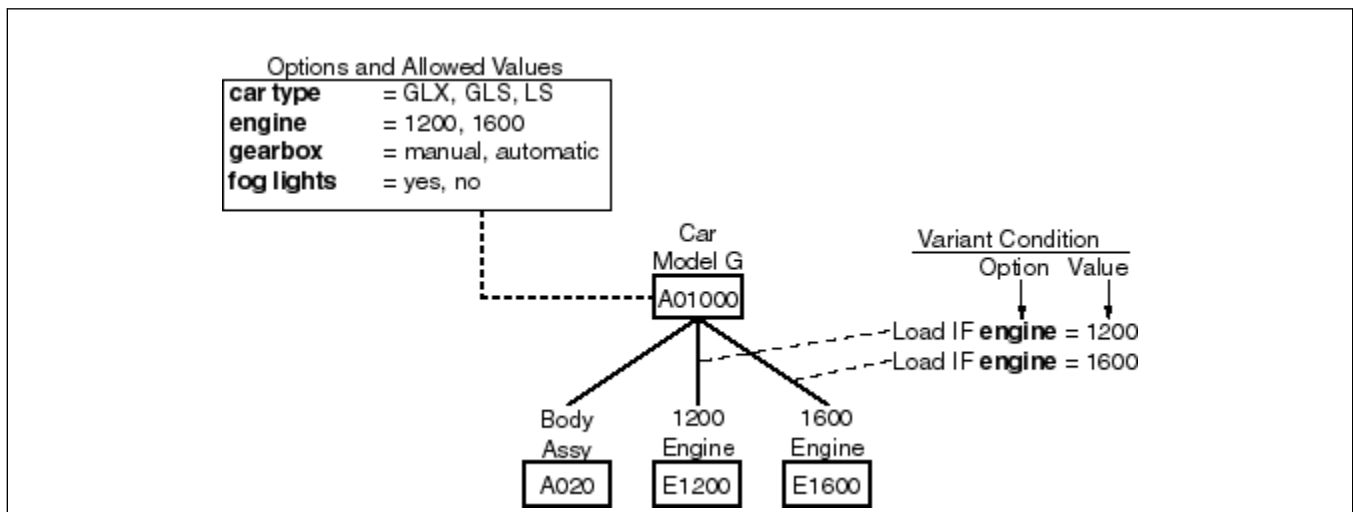
- Options that are a mandatory choice or an accessory.
- Components that are configured by more than one option.
- Variant assemblies that are shared between products.
- A 120% BOM configuration, allowing users to select multiple values for an option.
- Overlay configurations, allowing users to apply multiple saved variant rules (SVRs) to the product structure.

Changes to variant data are controlled by association with item revisions and BOM view revisions.

You can save a variant rule in Structure Manager as a persistent workspace object, then use it in the Multi-Structure Manager application or NX. You can also send the object to another user.

Example of using classic variants

In this basic example of how to use variants, a top-level assembly is identified as **Car Model G**. It includes a body assembly and two choices of engine (**1200** and **1600**), as shown in the following figure. You create variant data on the structure to allow configuration of one or the other engine.



Creating variant data on the structure

Creating basic variant data

To create the necessary basic variant data, do the following:

- Define options

Create an engine option on the item **Car Model G** with allowed values **1200** and **1600**. You can later create other necessary options and allowed values. These options configure components lower in the structure.

- Add variant conditions

Having defined the options that determine different configurations of the car, you now specify a variant condition on each engine component to configure it appropriately. For the **1200 Engine** component, you define a condition that loads this component only if the option engine is set to a value of **1200** (that is, **Load IF engine = 1200**). Similarly, define a condition for the **1600 Engine** (that is, **Load IF engine = 1600**).

You have now created all the static variant data necessary to configure a variant BOM. These steps are typically performed by design engineers or a specialized configuration department.

Note:

A specific option value does not necessarily relate to a single component. Variant conditions including a single option value can cause any number of components at different places in the structure to be configured or not configured.

Setting a variant rule

To configure a particular variant of a structure, you use a variant rule. The variant rule defines the options in the structure for which you can set values. The marketing and sales organizations typically use the variant rule to configure a particular variant of the product. However, such configurations are limited to those that the design engineer allowed when creating the variant data on the structure.

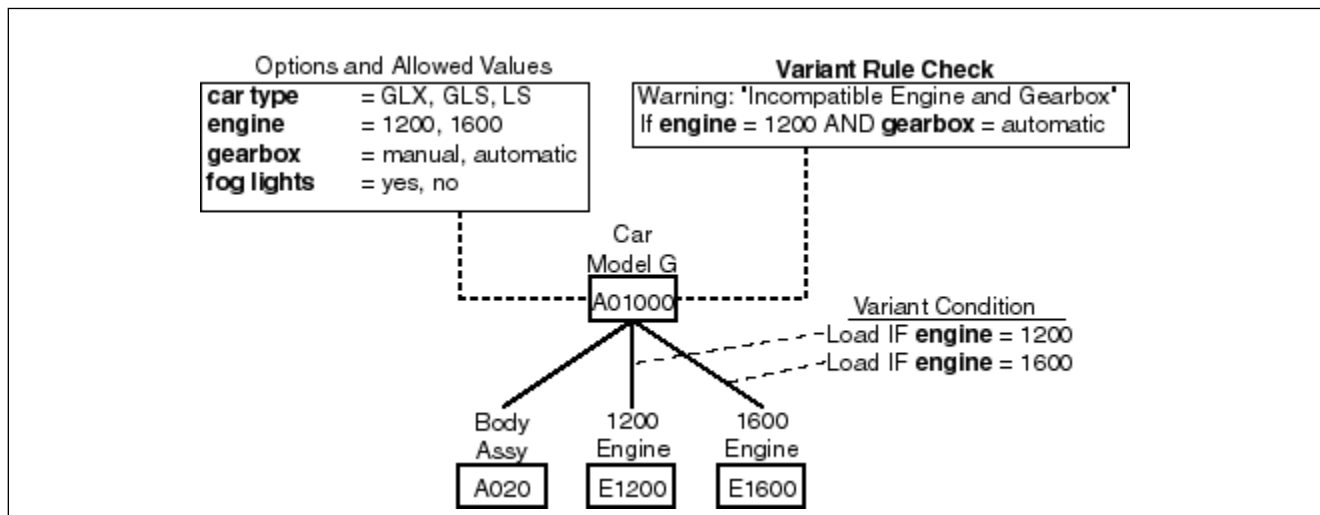
Note:

Some options may already have default or derived values set as part of the basic variant data. The rules define further variant data that can be created on the structure.

There are three ways of setting a valid variant rule that configures an allowed variant of the product. This additional variant data is stored on an item revision.

- Variant rule checks

Variant rule checks prevent the designer from defining option values or combinations of option values that are not allowed, as shown in the following figure.



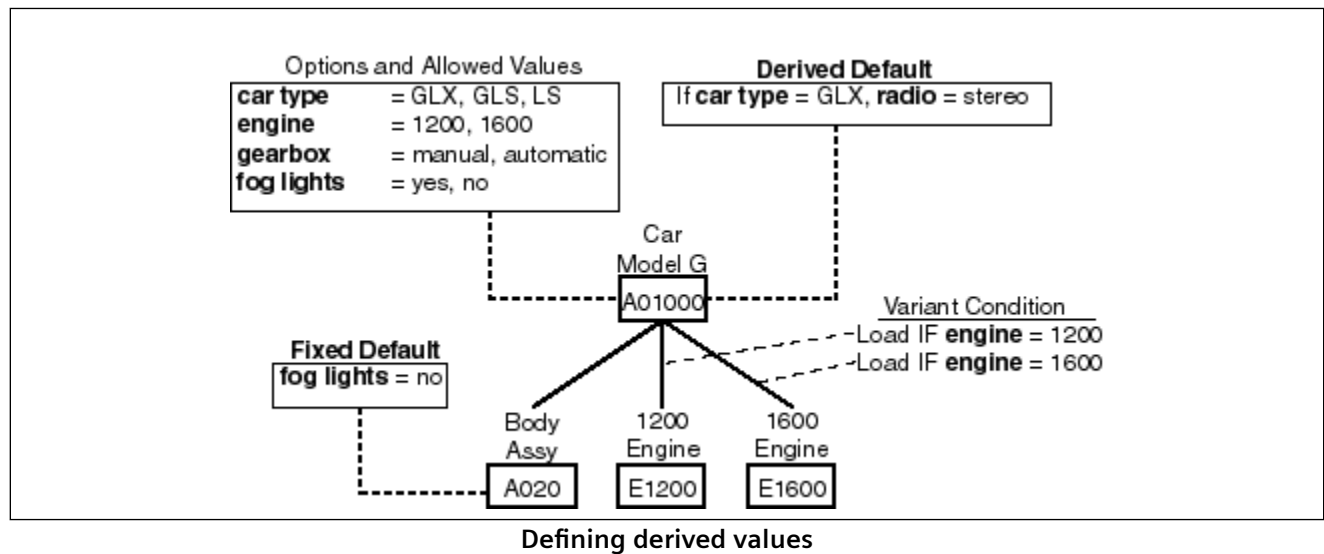
Defining a variant rule check

A variant rule check consists of a condition (for example, **engine = 1200 AND gearbox = automatic**) and a warning message (for example, **Incompatible engine and gearbox**). Both the condition and the warning message are displayed if the condition is met when a user attempts to set values in the variant rule. Teamcenter displays the error when the user tries to specify the condition, rather than allowing the user to set a number of values and then displaying a number of error messages.

There are two main uses of checks:

- To prevent incompatible option values. For example, you want to prevent users from configuring a 1200 engine with an automatic gearbox if this combination is not allowed for technical reasons.
- To limit the range of allowed values for a specific option in a particular product. This may be necessary when assemblies are shared between different products in which there are different allowed option value ranges.
- Derived defaults

Derived defaults allow one option value to set any number of other related option values. Options that potentially have derived values are indicated in the variant rule as potentially derived and must be completed last. In the example in the following figure, if the option car type is set to **GLX**, the option **radio** is set to **stereo** by default.



- Fixed defaults

Fixed defaults allow an option to be set to a specific value. In the example in the previous figure, the default value for fog lights is **no**; unless specified, fog lights are not fitted. The fog light components are not shown at this level of the structure.

Storing variant data

Variant data can be stored on the following objects:

- Item revision:
 - Options and allowed values
 - Fixed and derived default values
 - Variant rule checks
- Occurrence:
 - Variant conditions
 - Controlling changes

Changes to variant data can have a dramatic effect on variant configuration. You can control changes with techniques such as access control lists (ACLs), locking, and release procedures.

Any user can set the variant rule to configure a particular variant. Users creating variant data must ensure that the necessary variant rule checks exist so that only valid rules can be set. You can use menu entry suppression to hide the variant rule entry from certain users and groups.

Variant data is owned by a specific revision of an item. As the item evolves, it may be necessary to change the set of allowed values for a particular option or possibly to add further options. Existing values must not be referenced anywhere in the structure or you cannot remove or replace them.

Configuring mandatory choices and accessories

In most structures, there are generally two categories of options:

- Mandatory choice

In certain cases, the user must make a choice, for example, of an engine or radio. The user must choose one of many, mutually exclusive, options. You can set a default option, for example, **radio = mono**.

When setting variant conditions on a set of mutually exclusive occurrences in this way, the product design engineer must ensure the conditions have the desired effect.

One way to indicate mutually exclusive components is to set them all at the same find number in the structure. You could also create a special note type to give further information about variant data, for example, the associated occurrences.

Note:

Teamcenter does not *enforce* mandatory selections of options.

The APICS term *option* corresponds to *mandatory choice* in Teamcenter.

- Accessory

Accessories are options for which the user does not have to make a choice. They are additional components and the user can select none, some, or all of the accessory options. By default, no accessories are configured. For example, fog lights may be offered as an accessory option.

Tip:

Siemens Digital Industries Software recommends the following strategies:

- Use **yes** and **no** values for an accessory option.
- Set a **Load IF <accessory option 1> = yes** variant condition on the component occurrence or occurrences that are loaded if the accessory is chosen.
- Set an **<accessory option 1> = no** fixed default. As a result, Teamcenter displays **No** in the **Variant Rule** dialog box for the option, making clear that the option is an accessory and is not provided unless specifically requested (that is, set to **Yes** in the variant rule).

Identifying unique variant data

Teamcenter prevents you from entering inconsistent data when defining variants. These checks are especially significant if you have a large volume of data to specify on a variant BOM. For example, Teamcenter makes the following checks:

- You cannot specify a value for an option that you have not defined.
- If the option name is not unique, Teamcenter prompts you to specify an owning item when you author the variant condition.
- When you specify defaults, Teamcenter warns if you attempt to specify a default that would trigger an existing variant rule check.

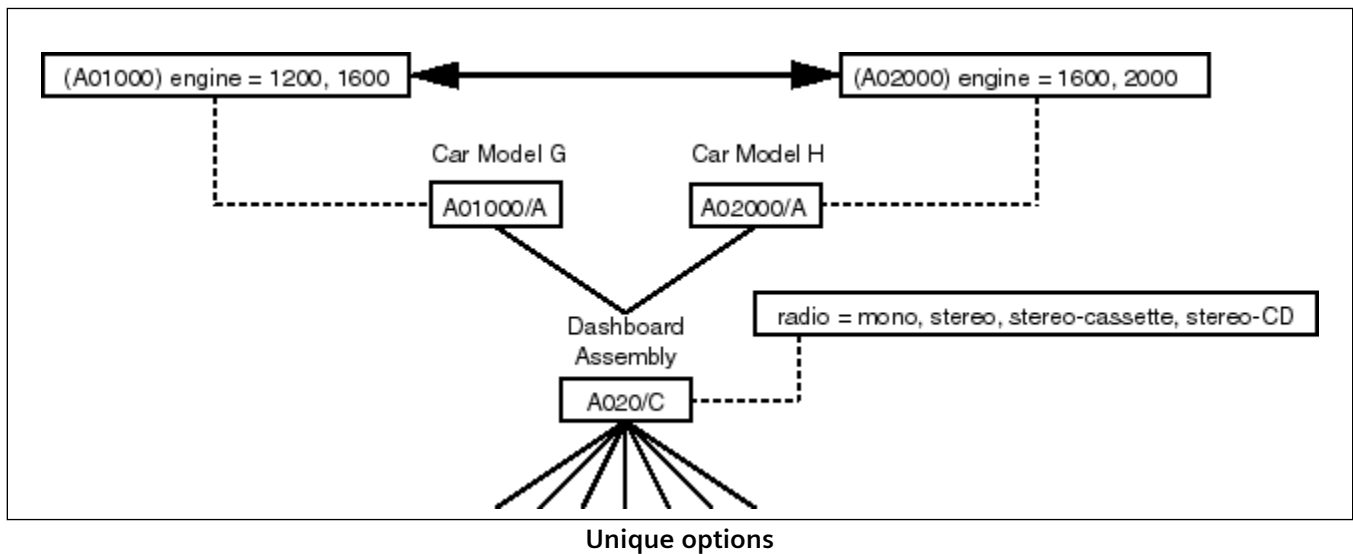
If the variant rule check is not currently loaded (because the item to which it is attached is not loaded), Teamcenter prompts you to load the item with the variant rule check when you expand the structure.

Identifying unique options

Option names are not unique in the database; they are unique to a particular owning item. Thus, an option is only fully identified when you also specify the owning item.

Teamcenter does not force you to define unique option names, allowing more than one item (product) to use the same option name, for example, **engine**. The set of allowed values for a particular option are unique to the owning item, for example, **engine** in owning item **Car Model G**, as shown in the following figure. With this owning item, the option has allowed values **1200** and **1600**, but **engine** in owning item **Car Model H** may have different values, for example, **1600** and **2000**.

When you define an option name, Teamcenter prompts for the owning item. In dialog boxes and data displays, it then prefixes the option with the owning item to avoid any ambiguity.



Placing variant data

When you populate a structure with variant data, you decide the items to which options, defaults, and variant rule checks are attached.

Guidelines for the location of variant data follow:

- Options

Most often, you attach options to the top-level item in the product.

However, if **an assembly is shared between products**, you must attach any options directly to the assembly.

- Default option values

Generally, you attach default option values to the assembly item to which they apply. For the same option, defaults set at the top of the structure take precedence over any defaults lower down the structure tree.

If you load the top-level structure, any defaults are always configured if there is conflict of option values.

If option values are specified at lower levels of the structure, the option value that takes precedence. In this case, users who set defaults at lower levels in the structure may also have to duplicate them at the top level to ensure they take effect.

- Variant rule checks

You can attach variant rule checks to the top-level item in the product. However, Teamcenter does not make these checks if the item to which they are attached is not loaded, as would happen if you open an assembly lower down the structure. If this occurs, you can duplicate the variant rule checks on assemblies lower down the structure, where relevant. If you duplicate many checks, they may only be meaningful in the context of the top-level item.

The arrangement of variant BOMs always depends closely on the product type. The structure of the BOM also influences your approach to variant management, for example, the modularity of the structure with respect to the options and structure reuse in other products.

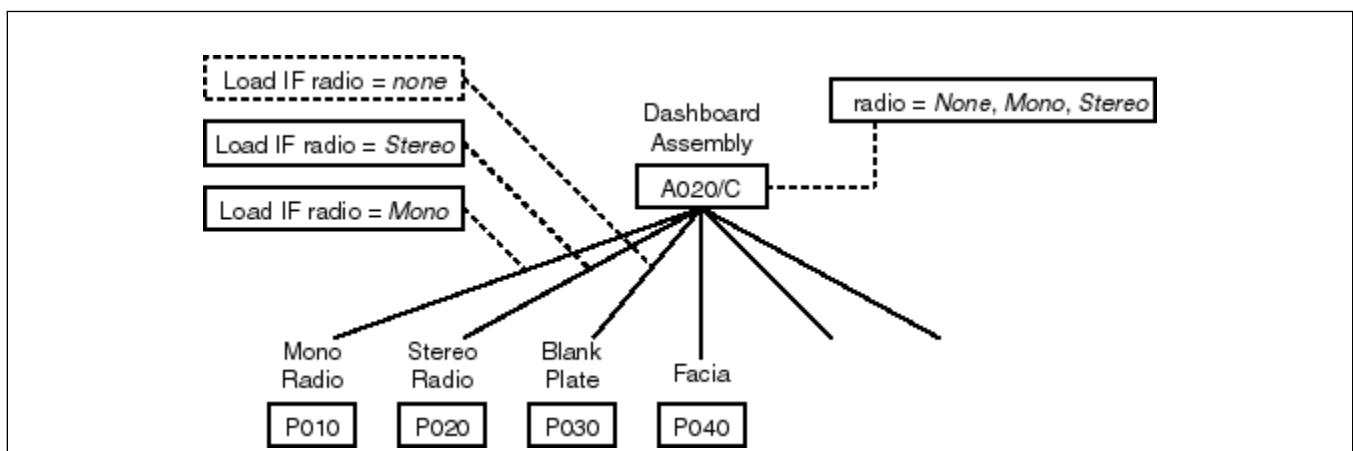
Managing variant data by control change

An option is owned by a specific revision of an item. As the item evolves, you may change the set of allowed values of a particular option, or add or remove options and their allowed values. These changes affect the variant configuration and should be subject to the same change controls as any other structure modification.

You can control changes to variant data with Teamcenter release procedures implemented with Workflow. When an item revision and its associated BOM view revision are released and locked, you cannot make changes to the variant data.

Changing the allowed values of an option

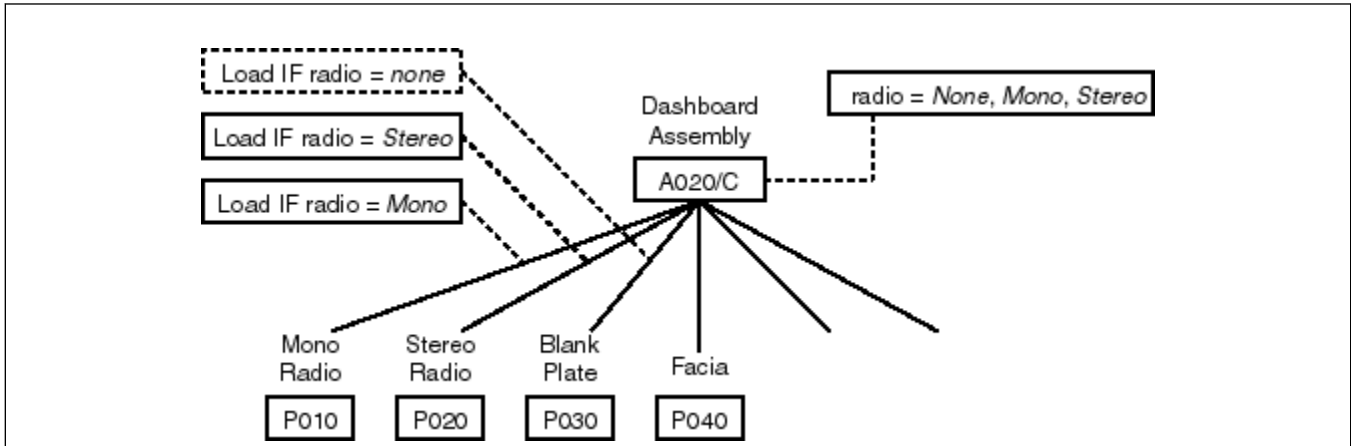
When an assembly is released, both the item revision and the BOM view revision are locked to prevent change. For example, dashboard assembly revision **A020/A** is released to production and offers the choice of **none**, **mono**, or **stereo** radio, as shown in the following figure.



Allowed values of an option

Subsequently you withdraw the radio option and add a **stereo-cassette** option. The following figure shows the necessary changes:

- You change the allowed value of the **radio** option, removing the **none** value and adding the **stereo-cassette** value. As a result of this change, you revise the owning item **A020** to revision B.
- You revise the dashboard assembly and to add a new component **P25 - Stereo-Cassette** and the appropriate variant condition. You also remove component **P30 - Blank Plate**.



Changing option allowed values

If a revision rule configures revision A of the dashboard assembly, you see the original set of components. Teamcenter presents **none**, **mono** and **stereo** values of the **radio** option in the variant rule.

If revision B of the dashboard assembly is configured, you see the modified assembly and are presented with the modified **mono**, **stereo**, and **stereo-cassette** values of the **radio** option.

Depending on your business practices, you may also revise the body assembly to:

- Remove the component, **P080 - Wing Without Hole**, which is no longer necessary.
- Remove the redundant variant condition from the occurrence of **P085 - Wing With Hole**.
- Optionally, modify the variant conditions on the aerials. This modification is not essential and the audio system still behaves correctly if the change is not made.

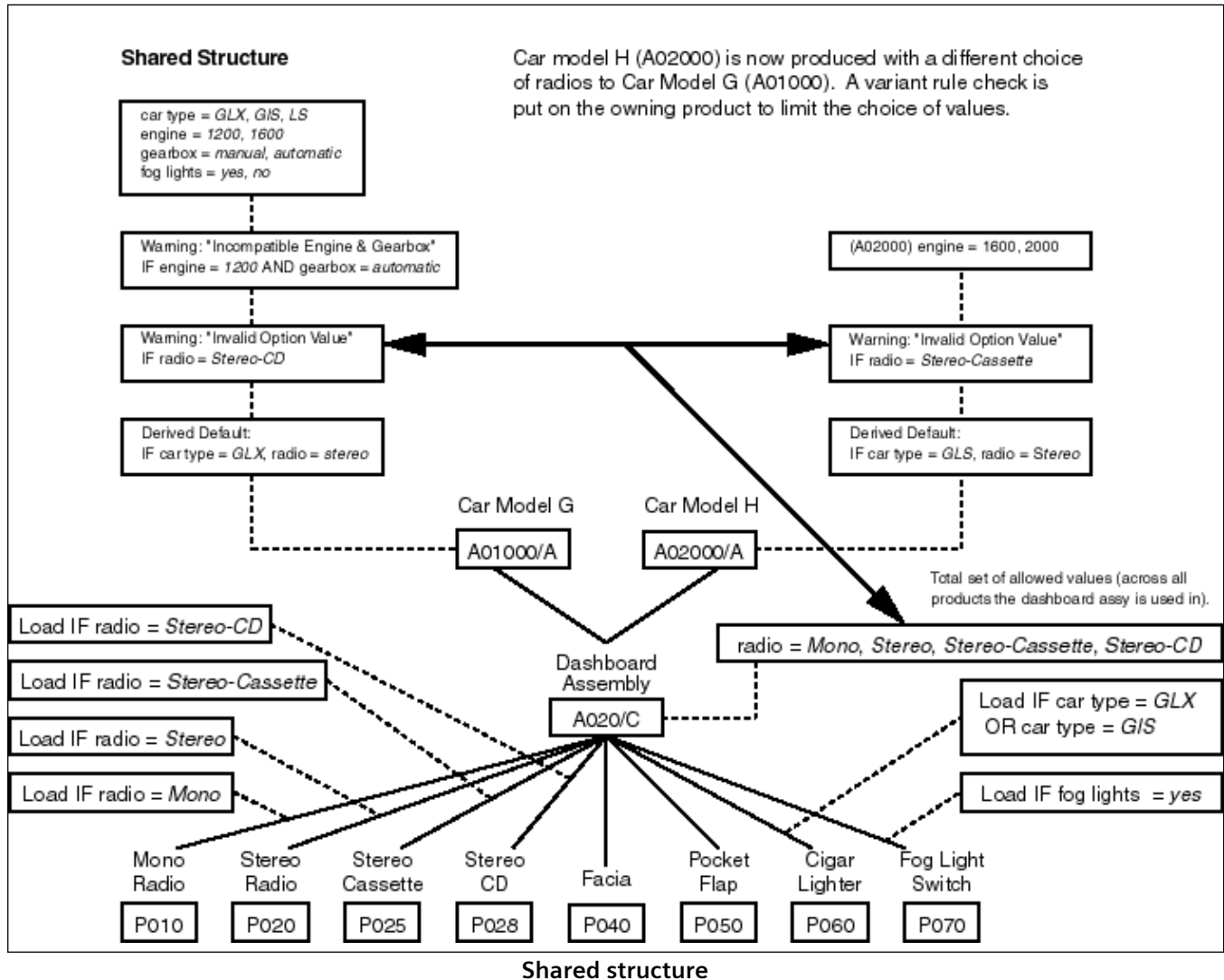
Sharing structure

Classic variants supports sharing of variant structures between products.

For example, a dashboard assembly is used in two different products **Car Model G** and **Car Model H**, as shown in the following figure. Because the dashboard assembly is shared between products, you should place options that control variants of the assembly (for example, **radio**) on the assembly item and not higher up the structure. The **radio** option must have the entire range of values that are allowed in all products in which the assembly is used, that is, **mono**, **stereo**, **stereo-cassette** and **stereo-CD**.

Teamcenter applies a variant rule check to each product, preventing you from specifying a variant rule for the **radio** option that is not allowed within the product, for example, **stereo-cassette** for **Car Model G** and **stereo-CD** for **Car Model H**.

You must revise the dashboard assembly item, if the relevant parts are released and locked to add the extra allowed values to the option. You can change the structure at the same time to add the new variational components.



Configuring complex variant conditions

Although you can define variant conditions only from simple Boolean expressions (for example, **Load IF car type = GLX OR car type = GLS**), you can construct more complex conditions when configuration depends on more than one option.

For example, a special facia may be required if the customer chooses car type option **GLX** or **GLS** and also chooses the **Fog Lights** option. (Additional switches are necessary on the dashboard to control the fog lights, so the special facia is required.)

The special facia requires the following variant condition to meet this requirement:

```
Load IF fog lights = yes and (car type = GLX or car type = GLS)
```

You can construct the following variant condition in the **Variant Condition** dialog box to define this requirement:

```
fog lights = yes
AND car type = GLX
OR car type = GLS
```

When you have built this basic condition, select the GLX and GLS lines and click the **(..)** button. Teamcenter places brackets around the selected clauses, as follows:

```
fog lights = yes
AND ( car type = GLX
OR car type = GLS
)
```

To remove the brackets, select the range of lines between the opening and the closing brackets (including the intervening lines) and click **(..)** again.

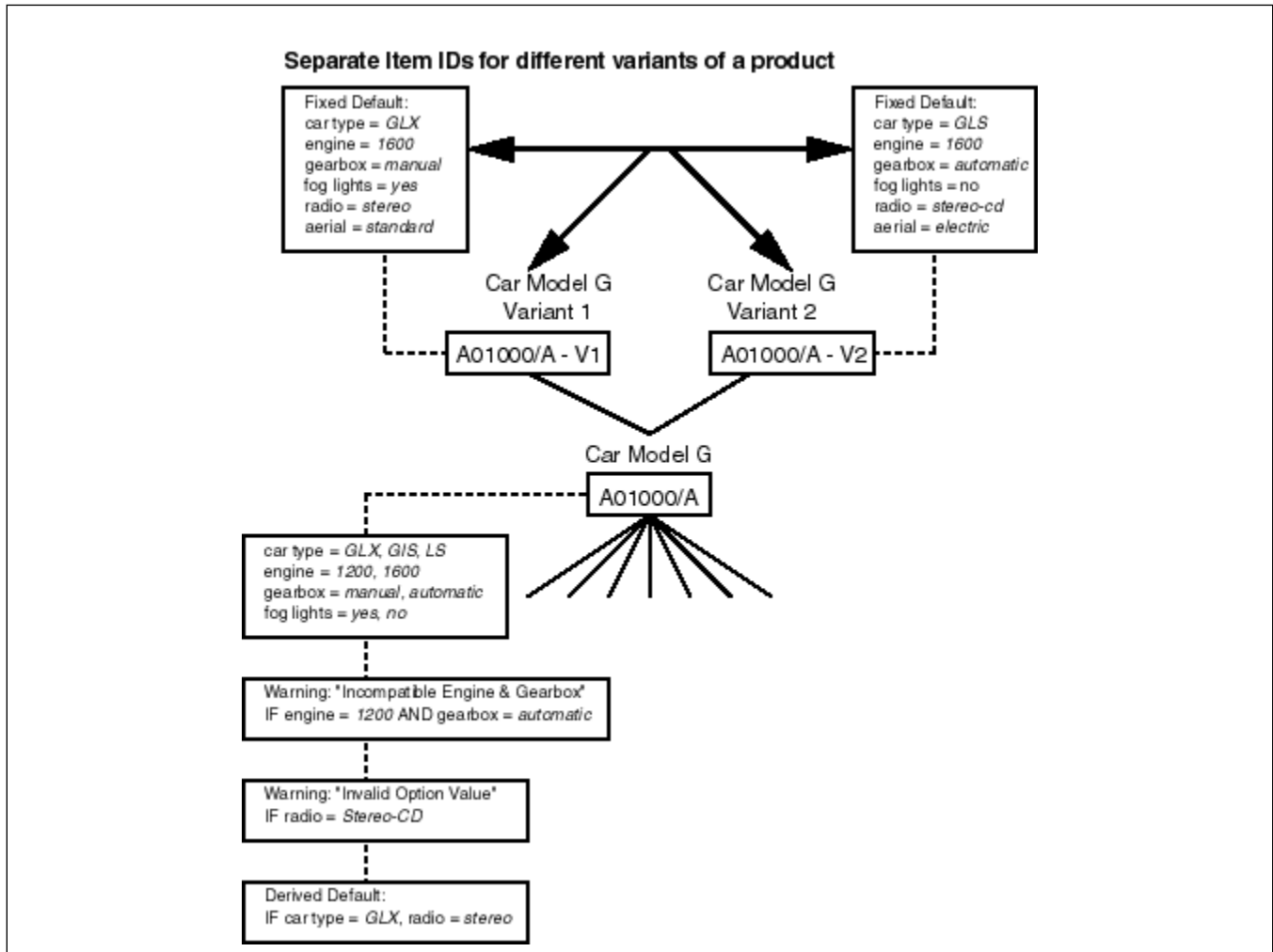
If a value is obsolete but is still referenced by the expression, it is represented by a **<?>** icon.

Creating a separate item for a particular variant

You can create items with specific part numbers for a particular variant. You can then include the generic structure as a single component of the particular variant assembly of the product. You can do this for the top-level product and also for any subassemblies in it that have their own set of options.

On the new item for the particular variant, you set fixed default values for all the options, as shown in the following figure (for example, **A0100 Car Model G - Variant 1**). These fixed defaults override any other defaults that are set lower down the structure at the generic item level or lower. You are therefore certain of the settings resulting from these defaults for a particular variant.

Alternatively, you could use a saved variant rule instead of fixed default values, as this approach is easier to set up. The saved variant rule contains the list of default option values.



Creating an item for a variant

Using saved variant rules or default and derived values

You can use both saved variant rules and default and derived option values to configure a bill of materials from a single high level entity. In the case of saved variant rules, this entity is a variant rule workspace object. In the default/derived values case, this entity may be a single option that is defined on the top level assembly from which all other option values are derived. Alternatively, you can create a separate item for a particular variant.

The derived defaults method allows you to define dependencies as an integrated part of the structure. Its main disadvantage is the complexity of setting up derivation rules.

Saved variant rules are simpler to set up, but they are not as tightly coupled with the structure.

Siemens Digital Industries Software recommends you use saved variant rules when initially building your structure. You can then convert to default and derived values once you have fully analyzed the interactions.

Saved variant rules may provide a useful configuration mechanism to store marketing packages after the structure is released.

Note:

If a default or derived default value exists and you try to save the variant rule, Teamcenter displays the **Save As...** dialog box and you can select the **Save default and derived default values as user set** check box to save the default and derived default values in the SVR. If no default or derived values exist, it does not display the **Save As...** dialog box.

Creating substitutes of a variant component

You can **create substitutes** of variant components in the same way as other components that do not have a variant condition.

Populating variant data

There are many different ways to apply variant data that affect the ease of maintenance of the product and the use of shared subassemblies. If you populate the structure with variant data that is stored on the optimal item revisions, you make future changes easier to manage. Some of these considerations are discussed in *Placing variant data*.

The following procedures for populating variant data all reference the same example. In this example, the product **Car Model G** shown in the following figure has a variant structure that depends on the values the customer chooses for the following mandatory and nonmandatory options:

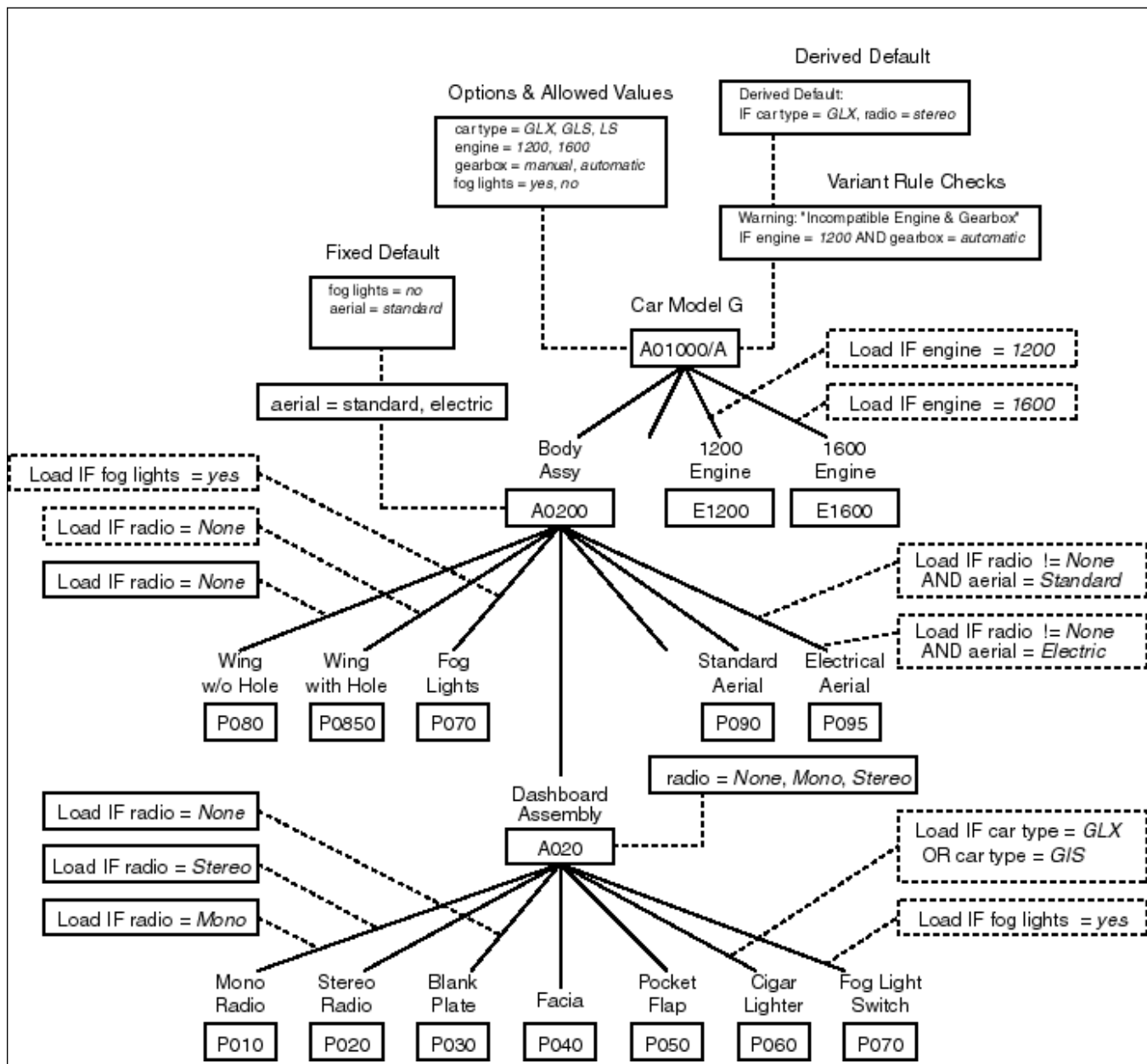
- Car type – **GLX**, **GLS** or **LS**
- Engine – **1200** or **1600**
- Gearbox – **manual** or **automatic**
- Radio – **none**, **mono**, or **stereo**
- Aerial type – **standard** or **electric**
- Accessory option fog lights – **yes** or **no**

The following considerations also apply, depending on customer selections:

- If the customer does not want a radio (**radio = none** in the variant rule) and a blanking plate is fitted. Teamcenter configures the wing (fender) with no hole and no aerial.
- If the customer chooses one of the radio options, Teamcenter configures the wing with the hole (for an aerial), and the standard aerial or the electric aerial.

- If the customer does not specify a particular type of aerial, the standard aerial is fitted. This is the fixed default.
- If the customer specifies car type **GLX**, Teamcenter configures a stereo radio. This is the derived default.
- The **1200** engine cannot be fitted to an automatic gearbox. This combination is excluded by a variant rule check.

The **radio** option is stored on the dashboard assembly for later use in another product, **Car Model H**.



Populating variant data

Before applying variant data, you should create the necessary items and structure. To add the variant data, you may want to open the whole structure in a Structure Manager window to make navigation of the entire structure more straightforward.

Caution:

Whenever you author the option in a child assembly, ensure the derived default is at the same level in the same item.

Find the location of variant data

As you create variant data, you may want to check the location of variant data that already exists. To do this, check the **HVD - Has Variant Data** column in the structure navigation tree—each item that has associated variant data shows a **Y** in this column.

The node of any item that has variant conditions displays the **Variant Data** image  in the **Variant Conditions** column in the structure tree.

Working with options

Working with options

You can create, modify, rename, remove or delete options for variants.

Create options

Define the options of the structure, as follows. The examples refer to **the structure of A01000 - Car Model G**.

Options have a string type or a numeric type and a name. The type of option you can create depends on the settings of the **PSM_classic_variants_text_families** and **PSM_classic_variants_numeric_families** preferences.

Note:

Ensure the **PSEVariantsMode** preference is set to **legacy** if you want to work only with classic variants or to **hybrid** if you want to work with both legacy and modular variants.

1. Choose **View→Show/Hide Data Panel** or click the **Show/Hide Data Panel** button  on the toolbar.

Teamcenter opens the data pane.

2. Click the **Variants** tab and select the line representing the owning item revision that stores the variant data. Typically this is the top-level item in the structure, in this example, **A01000 - Car Model G**.
3. Click the **Options** branch in the variant data tree.

Teamcenter displays the **Option** dialog box.

4. In the **Option** dialog box, enter the necessary options, for example:
 - In the **Name** box, type **engine**.
 - Optionally, enter the engine size in the **Description** box.
 - Type an allowed value (**1200**) and press Enter or + (plus). Teamcenter now displays the allowed value **1200** in the list of allowed values.
 - Type the other allowed value (**1600**) and press Enter.
5. Click **Create**  to create the option. A + (plus) icon appears against the **Options** branch in the variant data tree indicating that Teamcenter created the options.
6. Repeat steps 4 and 5 to define the other options on the same assembly, for example:

Option	Allowed values	Owning item
car type	GLS, GLX, LS	A01000 - Car Model G
gearbox	automatic, manual	A01000 - Car Model G
fog lights	yes, no	A01000 - Car Model G

7. Repeat steps 2 through 6 to define the options on other assemblies, for example, the following body and dashboard assemblies:

Option	Allowed values	Owning item
aerial	standard, electric	A0200 - Body Assy
radio	none, mono, stereo	A020 - Dashboard Assy

8. Click **Save**  to save the changes. If you forget to do this, Teamcenter prompts when you select another BOM line. A Y appears in the **Has Variant Data (HVD)** column for **Car Model G**.

Change option values

1. If necessary, choose **View→Show/Hide Data Panel** or click the **Show/Hide Data Panel**  button on the toolbar.

Teamcenter opens the data pane.

2. Click the **Variants** tab and select the structure line with the item revision that owns (stores) the option whose values you want to change. If you are unsure of the owning item, you can identify this from the **Variant Rule** dialog box.

3. Expand the **Options** branch in the variant data tree.

4. Select the option whose values you want to change.

Teamcenter displays the allowed values in the **Option** dialog box.

5. In the **Option** dialog box, do one of the following:
 - Enter another allowed value and press the Enter key.
 - Select the value and click – (minus button) to remove an allowed value from an option.
6. Click **Modify**  and Teamcenter updates the contents of the selected option.
7. Click **Save**  to save the changes.

Note:

Any variant data that references removed option values can no longer be set as these values are not available for selection. You typically create a new revision of the item if you need to preserve the historic data.

You can set the **PS_variant_value_protect** preference to protect variant values from unauthorized modifications.

If a value is obsolete but is still referenced by a variant rule, default, derived default, or variant condition, it is represented by a <?> icon.

Create new options from existing options

When an option has values similar to those on an existing option, it may be quicker to create the new option values from those of the existing option:

1. If necessary, choose **View→Show/Hide Data Panel** or click the **Show/Hide Data Panel**  button on the toolbar.

Teamcenter opens the data pane.

2. Click the **Variants** tab and select the option to copy in the **Options** branch of the variant data tree.

Teamcenter displays the **Option** dialog box, prepopulated with the values and name of the original option.

3. In the **Option** dialog box, type a new name for the option (duplicate names within an item are not allowed) and modify the values as required.
4. Click **Create**  to create the new option.
5. Click **Save**  to save the changes.

Rename an option

1. If necessary, choose **View→Show/Hide Data Panel** or click the **Show/Hide Data Panel**  button on the toolbar.

Teamcenter opens the data pane.

2. Click the **Variants** tab and select the option to rename in the **Options** branch of the variant data tree.
3. Type a new name and click **Modify**  to modify the option.
4. Click **Save**  to save the changes.

Note:

You cannot rename an option that is used in more than one revision of the item or in any expression.

Also, you cannot rename an option that is shared between sites in a Multi-Site Collaboration environment.

Remove an option

To remove an option from its owning item revision:

1. If necessary, choose **View→Show/Hide Data Panel** or click the **Show/Hide Data Panel**  button on the toolbar.

Teamcenter opens the data pane.

2. Click the **Variants** tab and select the option to remove in the **Options** branch of the variant data tree.
3. Click **Delete**  in the **Option** dialog box.

Note:

You cannot remove an option that is used in any expression.

Deleting an option

When you delete (remove) an option, you remove it only from the item revision. When you remove the option from the last item revision that owns it, you are (in effect) deleting the option.

- You cannot remove an option from an item revision that is released or to which you do not have write access.
- You cannot delete an option that is used in a variant condition. If you attempt to do this, Teamcenter displays an error message that lists all the BOM view revisions that have occurrences with variant conditions referencing that option.

Working with variant conditions

Working with variant conditions

After you define the options, you must create variant conditions on the variant components.

Examples refer to the **dashboard assembly use case**.

The following procedures assume you are using the new variant model. If you use the old variant model, use the **Variant Conditions** property instead of the **Variant Formula** property. When you implement the new variant model, Teamcenter evaluates variant conditions using the new data model, even if they use the old **Variant** object model. The **Variant Rule** and variant condition editor dialog boxes continue to show available **Variant** objects. However, when you save an expression in the editor, it is converted to the new data model.

You create variant conditions in the scope of a specific option. If you move the structure line out of the scope of the option referenced in the variant condition, the variant condition is not retained.

Create variant conditions

Note:

You cannot create variant conditions on a subassembly, item or item revision if the revision rule is set to **Precise Only**. If you use this revision rule, you can only create variant conditions on the top

line of the structure. If you use another revision rule, for example, **Latest** or **Has Status**, you can create variant conditions at any level of the structure.

Ensure you have displayed the **Variant Formula** property in the structure tree in Structure Manager.

1. Select the structure line for the option for which you want to create variant conditions, for example, **P060 - Cigar Lighter**.
2. Click the **Variant Condition** button  on the toolbar, choose **Edit→Variant Condition**, or double-click the **Variant Formula** property cell.

Teamcenter displays the **Variant Condition** dialog box. The upper part of the dialog box shows the individual clauses that comprise a variant condition. You can use the buttons to move clauses up or down, delete a clause, or bracket clauses. The lower part of the dialog box allows you to define a clause and you can use the following buttons to control how a clause is added to the list in the upper area:

- Replace 
- Insert 
- Append 
- Clear 

3. Enter the option, for example, **car type**.

To view available options, click the list of values to display a list of options. Click the desired option to select a value and automatically populate the **(Owning) Item** box.

Teamcenter lists only options that are loaded in the current Structure Manager window because their owning item is loaded or they are used in a variant condition in the structure.

Note:

You can type in an option name that is not loaded. If the option name is not unique, the owning item is not populated. You must populate it by clicking the list of values in the **Item** box and selecting the one you require. If you forget to do this, Teamcenter displays an error message when you click the list of values when trying to enter a value for the option.

4. Use the following operators to construct a variant condition:

=	Equal to
!=	Not equal to
>	Greater than
>=	Greater than or equal to
<	Less than
<=	Less than or equal to

Note:

If you use >, >=, <, or <= operators, the values of the associated option must be numeric and only decimal values are permitted.

Not (!) is higher than **AND (&)**; **AND (&)** higher than **OR (!)**. That is, **A OR B AND A = A OR (B AND A)**.

- Enter the value of the option, for example, **GLS**.
- Select **List of Values** to display the allowed values for the **radio** option and click the required value.
- Press the Enter key or click **Append** .

Teamcenter adds the condition to the list. It clears the **Value** box and shows the option's owning item, for example, **[A01000]**.

Note:

The Enter key provides a shortcut for the selected button—**Clear**, **Replace**, **Insert**, or **Append**). By default, this button is **Append** . However, if the last button you clicked was **Clear** , Teamcenter clears all the necessary boxes.

- Click **OR**.

Teamcenter constructs a variant condition from the defined clauses joined by **AND** and **OR** operators.

- Enter the value of another option, for example, **GLX**, and click **Return** or **Append** .

Teamcenter displays the second clause in the list in the upper part of the dialog box.

Note:

If you are only specify one clause (for example, **radio = mono**) in a condition, you can set the **AND** switch or the **OR** switch.

10. Click **OK** to create the variant condition on the occurrence.

If a line is packed, Teamcenter applies the condition to each of the packed occurrences.

Modifying variant conditions

Modifying variant conditions

A variant condition is made up of one or more clauses, for example:

```
aerial = standard
AND aerial = electric
```

You can modify a condition by inserting, replacing or removing clauses.

Insert a clause before another clause

1. Specify the new clause.
2. Select the clause before which you want to insert the new clause.
3. Click **Insert** .

Teamcenter inserts the new clause above the selected clause.

Replace a clause

Replacing a clause can be very useful with large compound conditions containing many clauses because this action does not change the order. Preserving clause order maintains the algebra and makes scanning for occurrences with similar conditions easier.

1. Specify the replacement clause.
2. Select the clause to replaced in the list.
3. Click **Replace** .

Teamcenter replaces the original clause with the new one.

Copy a clause

1. Select the clause to copy and click **Copy** . You can also double-click the clause. This action copies the option name, value, and operator setting to the boxes and sets the **And / Or** button in the lower part of the dialog box.
2. Edit the value and/or operator, set the appropriate **AND** or **OR** button, and append the clause.
3. Select an existing clause and click **Replace**  to replace the existing clause. You can also click **Insert**  to place the clause above the selected clause.

Note:

You can use **Copy** in conjunction with **Replace**, as a convenient way to edit variant conditions.

Remove a clause

To remove a clause, select the clause and click **Delete** .

Move a clause

To change the position of a clause within a condition, select the clause and click **Up**  or **Down** .

You can move multiple clauses in a single operation by selecting a range of clauses before clicking the appropriate arrow button.

Group a clause

You can change the grouping of clauses by adding and removing brackets, as follows:

Note:

Teamcenter supports multiple levels of grouping.

To add brackets around a range of clauses, select the range of clauses and click (...).

To remove brackets from around a range of clauses, select the range of clauses, including the lines that contain both the opening and closing brackets, and click (...).

Copy variant conditions to other occurrences

You may want to add the same or similar variant condition to many occurrences, for example, the standard and electric aerials. You can do this by copying an existing variant condition and modifying it for another occurrence.

1. Right-click the structure line containing the existing variant condition. You can select any point on the line, not necessarily the variant condition cell.

Teamcenter displays the structure line shortcut menu.

2. In the shortcut menu, choose **Copy** or press the Ctrl+C shortcut keys.

Teamcenter copies the contents of the occurrence to the clipboard.

3. Move the cursor over the **Variant Condition** cell on the target line to which you want to copy the variant condition and right-click to display the structure line shortcut menu.

Note:

The **Variant Condition** property is used with the old variant model. This action is not available with the new variant model.

4. In the shortcut menu, choose **Paste Property**. (There are no shortcut keys; you cannot use Ctrl+V.)
5. Click **Edit Variant Condition**  on the toolbar.

Teamcenter displays the **Variant Condition** dialog box containing the variant condition for the standard aerial.

Note:

This action is not available

6. Select **aerial = standard** and click **Remove**.

Teamcenter removes the clause from the dialog box.

7. Click **AND**, and then define the **aerial = electric** clause.

8. Select the structure line for the electric aerial and click **OK** in the **Variant Rule** dialog box.

Teamcenter adds the newly defined condition to the occurrence for the electric aerial.

Remove a variant condition from an occurrence

1. Select the structure line representing the occurrence and click **Edit Variant Condition**  on the toolbar.

Teamcenter displays the **Variant Condition** dialog box.

2. Select all of the clauses in the **Variant Condition** dialog box and click **Delete**  to remove all the clauses.
3. Click **OK** to apply the change to the occurrence (that is, effectively remove the variant condition).

Working with variant rules

Working with variant rules

You use a *variant rule* to configure a particular variant of a structure. The variant rule contains all the options that are used in the structure. You can set and unset variant rules to manage variability.

The current variant rule is not copied to any further Structure Manager windows that you open on the same structure.

Setting variant rules

You set the appropriate variant rule to obtain the required values for applicable options. You do not have to specify a value for every option and some options may remain unset; typically, you would set all options to completely configure a variant structure.

Some options may appear already set because they have a default value that Teamcenter automatically sets. Structure Manager shows the item to which the specified default is attached.

If you specify a derived default on an item, Teamcenter sets the default value once you enter a value for the primary option from which the default value is derived. Derived defaults are marked as *potentially derived* and, where possible, you should specify these values last.

If you specify an option value that is disallowed by a variant rule check, Teamcenter displays an error message that states the problem and the applicable variant rule.

Teamcenter only sets default values if the item to which the default is attached is loaded.

Showing and hiding unconfigured components

Showing and hiding unconfigured components

You can show or hide all unconfigured components by choosing **View→Show Unconfigured Variants**.

When you choose this command, Teamcenter toggles between showing and hiding all unconfigured components in the structure.

You show or hide unconfigured components by setting the **PSEShowUnconfigdVarPref** preference.

Showing unconfigured components

You can display all components in the structure by choosing the **Show Unconfigured Variants** menu command. You can then use the **VOC - Variant Occ. Config'd** column in the properties table to identify the configured components. This column shows a **Y** if the component is configured, is blank if it is not configured, or **?** if Teamcenter cannot determine if it is configured. The **?** indicator appears when a variant condition contains options that are unset in the variant rule.

Teamcenter displays only options that are loaded. To ensure you see all used options, you must completely expand the structure.

Hiding unconfigured components

You can hide all unconfigured variant components in the structure display by choosing the **Show Unconfigured Variants** command again. Components marked **?** in the VOC column are displayed when unconfigured components are hidden.

Set or unset the required variant rule

Set or unset the required variant rule

To set a variant rule and configure a particular variant of the structure, click the **Variant Rule**  button on the toolbar or choose **Tools→Variant Rule**.

Teamcenter displays the **Variant Rule** dialog box. You can sort the options in the dialog box by any of the columns, such as **Option (name)** or **State**, by clicking the column header.

Note:

If you use an overlay, you can apply multiple saved variant rules (SVRs) to a BOM. Teamcenter evaluates these multiple values as an **OR** expression. For example:

```
SVR1:  Engine=V6 AND Color=Red
SVR2:  Engine=V8
```

In this example, you can load both SVR1 and SVR2, and then configure the BOM using both rules. The values are evaluated as:

```
(Engine=V6 OR Engine=V8) AND (Color=Red)
```

Default checks, derived default checks, and rule checks are not evaluated in an overlay configuration. Any value not set by a rule are shown as empty.

Set a variant rule

1. Click the **Value** box of the option you want to set (for example, **engine**).

Teamcenter displays the allowed values for that option.

2. Click the required value (for example, **1200**).

Teamcenter displays the selected value in the box and changes the state of the option from **Unset** to **Set by User**.

Note:

If you use an overlay, you can apply multiple saved variant rules (SVRs) to a BOM.

Unset an option value

1. Click the **Value** box of the option whose value you want to unset.
2. Click a blank value.

Teamcenter clears the value of the option and changes the state of the option to **Unset**.

Note:

If the option has a default value, it returns to that default, allowing you to easily return to the default value after you have overridden it.

Working with derived default values

You can only observe the effect of derived default values when you have set the option defaults.

For example, if you select the **car type** option and set the value to **GLX**, you notice the **radio** option is set to **stereo** as a result of the derived default **IF car type = GLX, radio = stereo**.

Teamcenter shows the state of the **radio** option as potentially derived. It does not indicate the item the value is potentially derived from, as it could be derived from several items, depending on the option set first.

Working with variant rule checks

You can only observe the effect of a variant rule check when you specify the variant rule checks, for example:

1. Select the **engine** option and set it to **1200**.
2. Select the **gearbox** option and set it to **automatic**. Teamcenter displays the following error message:

Incompatible engine and gearbox IF engine = 1200 AND gearbox = automatic

Working with variant rules in the database

Working with variant rules in the database

You can store variants rules in the database and retrieve them later.

When you have **set a variant rule** with the **Variant Rule** dialog box, you can store the variant rule in the database. You may want to store a variant rule for one of several reasons, including:

- To store the current state of the variant rule, because you want to exit Teamcenter and do not want to reenter the variant rule when you return.
- To store specific structure configurations, typically for analysis, testing, or marketing purposes. For example, you can store a variant rule that defines the structure configuration you use for a certain test. Similarly, you can store a variant rule that defines the standard **1600 GLS** car package for marketing.

Teamcenter stores variant rules as workspace objects, allowing any application access to them. You can cut, copy, and paste variant rules between applications, or apply release procedures and access control to them.

Store variant rules in the database

To store the variant rule that is current in Structure Manager, click the **Variant Rule** button on the toolbar or choose **Tools→Variant Rule**.

Teamcenter displays the **Variant Rule** dialog box. The dialog box contains the following buttons that allow you to store and retrieve variant rules.

Button	Purpose
Clear	In 100% mode, this clears the option values. Defaults, derived defaults, and rule checks are evaluated. In 120% mode, this clears the option values. Defaults, derived defaults, and rule checks are <i>not</i> evaluated. Disabled in overlay mode (allow multiple variant rules).
Copy	If the loaded variant rule is a saved variant rule (SVR), this copies the selected variant rule to the clipboard. You can also copy multiple loaded SVRs.
Load	Opens the Load dialog box, allowing you to load a variant rule in override, update, or overlay mode.
Reload	If the loaded variant rule is an SVR, this action reloads the current variant rule. Disabled in overlay mode.
Save	If the loaded variant rule is an SVR and its values are modified, this action saves changes to the current variant rule. Disabled in overlay mode.
Save As	Allows you to save the current variant rule under a different name. Disabled in overlay mode.
OK	Applies the current variant rule or rules to the active structure and closes the Variant Rule dialog box.
Apply	Applies the variant rule or rules to the active structure without closing the Variant Rule dialog box.
Exit	Allows you to exit overlay mode if it is active. This action removes all the loaded variant rules from the configuration and applies a single empty variant rule to the BOM. Default and derived default rules are then evaluated.
Cancel	Closes the Variant Rule dialog box without saving changes and the BOM window reverts to last applied rule.

Save a variant rule in the database

1. Set the options on the structure to the required values.
2. Click the **Save As** button.

Teamcenter displays the **Save As Variant Rule** dialog box.

3. In the dialog box, enter:

- The name of the new variant rule.

Siemens Digital Industries Software recommends you choose a name that clearly defines the purpose of the rule. For example, if the variant rule configures the **1600 GLS** car, name the rule **1600 GLS** or a similar name.

Note:

The name is visible in other applications, including NX, where users can view and configure variant structures. It is also displayed in the **Manipulate Windows** dialog box to indicate the configuration set in the window.

- (Optional) A more detailed description.
- The relation type.

Teamcenter stores variant rules on the top-level item revision of the structure in the current window. You can choose the relation type by which the variant rules are attached.

4. (Optional) Select **Save default and derived default values as user set**.

If selected, Teamcenter saves the default and derived default values to the SVR.

5. Click **OK**.

Teamcenter displays the name of the variant rule in the title bar of the **Variant Rule** dialog box, indicating it is the current variant rule.

6. Click **Apply** or **OK**.

Teamcenter applies the variant rule to the current structure in the Structure Manager window. It displays the name of the variant rule in the window banner, after the revision rule.

The variant rule is now stored in the database, together with all options listed in the **Variant Rule** dialog box as **Set by User** or **Set by <rule>**.

Note:

Set by <rule> is available only for saved variant rules (SVRs). During SVR creation, Teamcenter saves only rule entries that are shown as **Set by User**; once the rule is persisted, they are shown as **Set by <rule>**. You can optionally save the default or derived default value as a user set value.

Also the variant rule name is not unique for a given item revision or in the database.

7. (Optional) Confirm the variant rule is stored by opening My Teamcenter and expanding the item revision at the top level of the structure. The variant rule object should be visible.

Load variant rules from the database

To retrieve a variant rule from the database and use it to configure the current structure:

1. Click the **Load** button in the **Variant Rule** dialog box.

Teamcenter displays the **Load Variant Rule** dialog box.

- The top section of the dialog box allows you to search by item revision or SVR. By default, it shows SVRs attached to the item revision of the selected BOM line.

The section also allows you to select the loading type. **Override** and **Update** are for 100% and 120% modes. **Allow Multiple Variant Rules** changes the mode to overlay.

- The middle section displays a list of the variant rules attached to the top-level item revision of the open structure open or the SVRs selected from the result of a variant rule search.
 - The lower section displays the details of the variant rule selected in the list of SVRs. You can use this information to preview the rule and ensure it is the rule you want to apply.
2. In the dialog box, select the required variant rule in the list and click **Load**.
 3. Choose how the new variant rule should affect any existing option values that you have set, as follows:
 - Set **Override** and all options not defined by the loaded rule are unset.
 - Set **Update** and only the values of those options listed in the rule are changed. All other options remain in the same state as before you loaded the rule. This allows you to form a complete variant by loading a number of partial rules.
 - Set **Allow Multiple Variant Rules** and you can load multiple SVRs by selecting the check boxes in the leftmost column. You cannot modify variant rules that you load with this selection.

Note:

You must select at least two SVRs if **Allow Multiple Variant Rules** is selected; otherwise, Teamcenter displays an error message.

Load Variant Rule

Rules are loaded based on load type.

Search and Load Variant Rule(s)

Search

☒ Item Revision: 000628/A;1-TopItem
☐ Variant Rule

Loading Type

☒ Override ☐ Update ☐ Allow Multiple Variant Rules

Variant Rules

Enter text to filter list of variant rules

Select	Name	Description
☐	TopItem_I112122	
☐	TopItem_I1221	
☐	TopItem_I212324	
☐	new_variant_rule	

Variant Rule Data

Item	Option	Description	Value

OK Cancel

- (Optional) Select a row in the SVR table and Teamcenter displays its option values in the options table.

If more than one value is valid for an option, the values are separated by **OR** operators.

- Click **OK**.

Teamcenter displays the name of the loaded variant rule in the **Variant Rule** dialog box title bar and sets the options accordingly. The **State** column in the properties table contains **Set by rule-name**, allowing you to identify how these values are set.

If you click **Cancel**, Teamcenter reverts the BOM window to its last applied variant rule state. If you have a large BOM, this action may take a little time and a progress indicator displays in the status bar until it is complete.

Note:

When you exit overlay mode, Teamcenter displays a warning that it will revert to 100% mode and apply a default variant rule to the BOM. Default values, derived default values, and rule checks are evaluated. Click **Yes** to continue.

Modifying saved variant rules

To modify a saved variant rule, you must load it as the current variant rule. If the rule is currently loaded, its name is displayed in the title bar of the **Variant Rule** dialog box. If it is not currently loaded, load the rule with the **Update** switch set.

If you change any option values, the title of the **Variant Rule** dialog box changes to show **(modified)** after the rule name.

To cancel any changes, click **Reload** to unset all the option values and reload the variant rule from the database.

When you have set the options to the required values, click the **Save** button.

Teamcenter writes the new values to the database, overwriting the previous values of the same variant rule. Alternatively, you can click **Save As** to store the values as a new variant rule, which then becomes the current variant rule.

Copy variant rules

Copy a variant rule to the clipboard by clicking **Copy**.

You can paste the copied rule into the required location in My Teamcenter or another application.

View variant rules in My Teamcenter

To view the contents of a variant rule in My Teamcenter, click the **Viewer** tab to display a list of options and values stored in the variant rule.

Working with variant rule checks

Working with variant rule checks

Variant rule checks allow a designer to define combinations of option values that are not allowed. A variant rule check consists of a condition (for example, **engine = 1200 AND gearbox = automatic**) and an error message (for example, **Incompatible engine and gearbox**). Teamcenter displays an error message containing the condition and message if the rule check is triggered when you set values in the variant rule.

Set variant rule check

1. Open the data pane by choosing **View→Show/Hide Data Panel** or clicking the **Show/Hide Data Panel**  button on the toolbar.
2. On the data pane, click the **Variants** tab.

3. Select the line representing the owning item revision on which you want to store the variant data, for example, **Car Model G**.
4. Select the **Rule Check** branch in the variant data tree.

Teamcenter displays the **Rule Check** dialog box.

5. In the **Warning Text** box of the dialog box, enter an error message, for example, **Incompatible engine and gearbox**.
6. Define the relevant variant condition, for example, **engine = 1200 AND gearbox = automatic**.
7. Click **Create** .

Teamcenter creates the rule check.

8. Expand the **Rule Check** branch and verify the new rule check is added below any that already existed, for example:

ERROR Incompatible engine and gearbox IF engine = 1200 AND gearbox = automatic

9. If you need to change the rule check, select it in the **Rule Check** branch of the variant data tree. Teamcenter displays the **Rule Check** dialog box, allowing you to change any of the boxes.
10. Click **Modify**  to apply the changes.
11. Click **Save**  to save the changes.

A **Y** appears in the **Has Variant Data (HVD)** column of the properties table, if variant data was not already created.

Modify a rule check

1. Select the rule check you want to change in the **Rule Check** branch of the variant data tree.

Teamcenter displays the **Rule Check** dialog box containing details of the rule check.

2. In the dialog box, change the appropriate boxes.
3. Click **Modify**  to apply the changes.
4. Click **Save**  to save the changes.

Delete rule checks

1. Select the rule check to delete in the **Rule Check** branch of the variant data tree.

Teamcenter displays the **Rule Check** dialog box.

2. In the dialog box, click **Delete**  and the selected rule check disappears.
3. Click **Save**  to save the changes.

Working with option defaults

Working with option defaults

Default options allow a designer to preset option values in the variant rule. The preset value may be:

- Fixed

A fixed default value is a value that you specify. In the example, the option **aerial** has a default value set to **standard**.

- Derived

A derived default is a value that is set to a value that depends on a condition. In the example, the option **radio** has a value set to **stereo** if **car type = GLX**.

Defaults are owned by an item revision, like other variant data. Use the **Variant Rule** dialog box to identify the item a default was set on and whether the default is fixed or derived.

You can identify if an item has variant data attached by viewing the **HVD - Has Variant Data** column in the structure properties table.

You can override option values or reinstate them as necessary.

Understanding default precedence

The position of a default determines its precedence. You set defaults on a particular item, but Teamcenter applies them globally to the whole currently loaded structure. Derived defaults always take precedence over fixed defaults.

If you move a default up or down the structure, conflicts may occur. If you have set conflicting fixed default values for the same option in a structure, Teamcenter always uses the first default value it finds, according to the following rules:

- A default that is higher up the tree in a direct path takes precedence.

- Defaults at the top level always take precedence.

If you set conflicting derived default values for the same option in a structure, Teamcenter displays an error message when you attempt to save the option default or set the option value in the variant rule that causes the conflicting derived default to apply. The error may also appear when you expand the structure to the point that the conflicting derived default is loaded.

Specify fixed option defaults

To set the fixed option defaults, for example, **aerial = standard** and **fog lights = no** on item **A0200, Body Assy**:

1. Open the data pane by choosing **View→Show/Hide Data Panel** or clicking the **Show/Hide Data Panel**  button on the toolbar.
2. In the data pane, click the **Variant Data** tab.
3. Select the line representing the owning item revision that stores the variant data, for example, **Body Assy**.
4. Select the **Option Defaults** branch in the variant data tree.

Teamcenter displays the **Option Defaults** dialog box.

5. In the dialog box, enter the name of the option in the **Option** box and select a value from the list of possible values. For example, enter **aerial** in the **Option** box and choose **aerial** from the list of values.

Note:

The list of values contains only options that are loaded in Structure Manager.

You can type in the name of an option name that is not loaded. If the option name is not unique, Teamcenter displays an error when you try to enter a value. You must specify an owning item.

6. Enter a value in the **Value** box, for example, **standard**. You do not specify a condition for a fixed option default, so the lower part of the dialog box is not used.
7. Click **Create** to create the option default. Click **List of Values** and click **standard**.
8. Expand the **Option Default** branch and verify the new option default is added below any that already existed, for example:

DEFAULT aerial TO standard

9. Repeat steps 4 through 8 to define any other fixed defaults, for example, **fog lights = no**.

- Click **Save** to save the changes.

A **Y** appears in the **Has Variant Data (HVD)** column of the properties table for the owning item revision (for example, **Body Assy**, if variant data was not already created).

Specify derived option defaults

To specify derived option defaults, follow the same procedure as specifying fixed option defaults, except that you also specify a condition. To set a derived option default, for example, **radio TO stereo IF car type = GLX** on item **A01000, Car Model G**:

- Select the structure line that represents the owning item revision, for example, **Car Model G**.
- Select the **Option Defaults** branch in the variant data tree.

Teamcenter displays the **Option Defaults** dialog box.

- Enter the name of the option in the **Option** box, for example, **radio**.
- Enter the value of the option in the **Value** box, for example, **stereo**.
- Define the condition, for example, **car type = GLX**.
- Click **Create** to create the option default.
- Expand the **Option Default** branch and verify the option default is added below any that already existed, for example:

SET radio TO stereo IF car type = GLX

- Click **Save** to save the changes.

A **Y** appears in the **HVD - Has Variant Data** column of the properties table for the owning item revision (**A01000, Car Model G**), if variant data was not already created.

Modify option defaults

- Select the option default you want to change in the **Option Defaults** branch of the variant data tree.

Teamcenter displays in the **Option Defaults** dialog box.

- In the dialog box, change the relevant boxes.
- Click **Modify** to apply the changes.

4. Click **Save** to save the changes.

Delete option defaults

1. Select the option default to delete in the **Option Defaults** branch of the variant data tree.

Teamcenter displays the **Option Defaults** dialog box.

2. In the dialog box, click **Delete** and the selected option default disappears.
3. Click **Save** to save the changes.

Saving, refreshing, and copying variant data

You should be aware how Teamcenter handles variant data when you select any of the following actions:

- Save

Variant data stored on item revisions (options, defaults and rule checks) is saved only when you click **Save** at the bottom of the **Variants** pane. This button is active only if there are unsaved changes. If you forget to save changes, you are prompted when you select another structure line.

Variant conditions are stored in the BOM view revision. They are saved only when you click **Save**  on the toolbar or choose **File→Save**. If you forget to save changes, you are prompted when you close the Structure Manager application.

- Refresh

To reload the variant data on the item revision for the currently selected line, click the **Refresh** button  in the **Variants** pane. This action discards changes made since the last time you clicked **Save** , and loads any changes made by other users in the meantime.

- Save As

If you select an item revision and choose **Save As**, option and variant data on the first level of the structure does not carry forward because the BVR context changes. At the second and subsequent levels of the structure, the BVR context is the same, and options and variant conditions are therefore carried forward.

- Copy

When you copy an item or item revision, any variant conditions are not copied.

Working with variant items

Working with variant items

You can create variant items in a structure that includes classic variants to specify particular nonvariable elements of the structure. However, Teamcenter does not enforce variability rules in classic variants, and you should implement business practices that ensure all relevant options appear in the interface.

Alternatively, if your product designs permit, consider using modular variants, rather than classic variants.

Creating variant items for classic variants

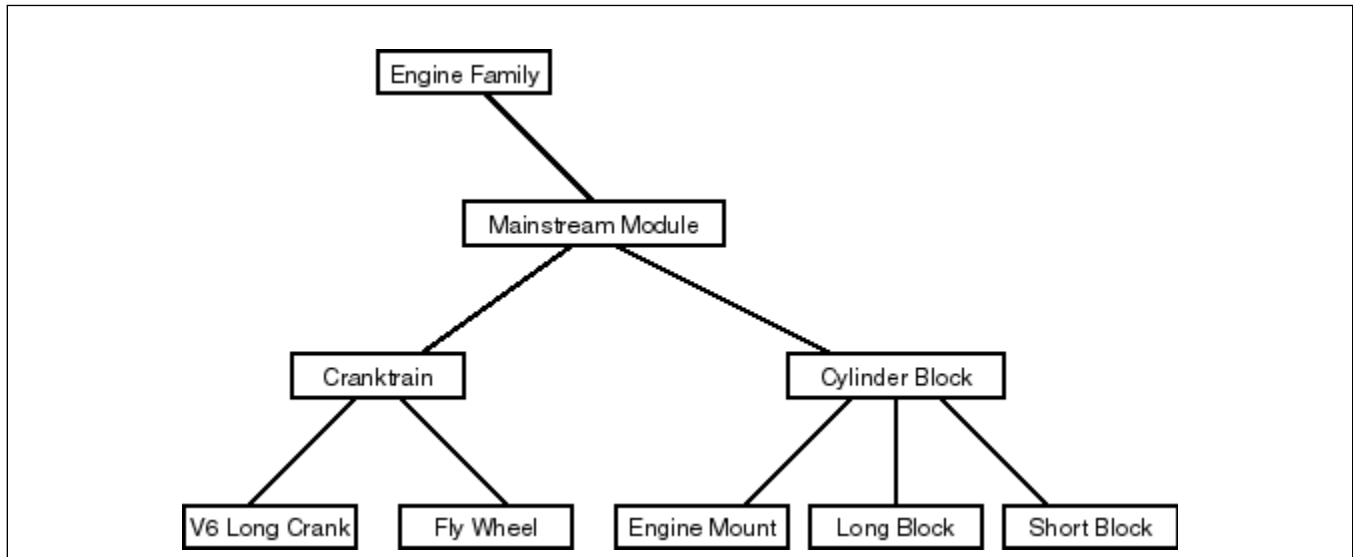
Caution:

Classic variants provides partial support for variant items. You can manually create and link variant items, but you cannot automatically create or update them. Variant items are fully supported (including automatic creation and updating) if you implement modular variants.

If you use a custom item that has a required custom property, the property must have a default value defined or an error occurs. This applies whether you create the variant item automatically or manually.

In many structures that are configured with classic variants, you define all options on the top-level item. This has the advantage of transparency—if all options are defined at the top level and sound business practices ensure consistency, the user can easily ensure the configuration is complete. When you configure the options, you determine the configuration state of all variants throughout the structure, so ensuring that a variant item is a completely configured structure.

The following figure shows a typical structure of an engine.

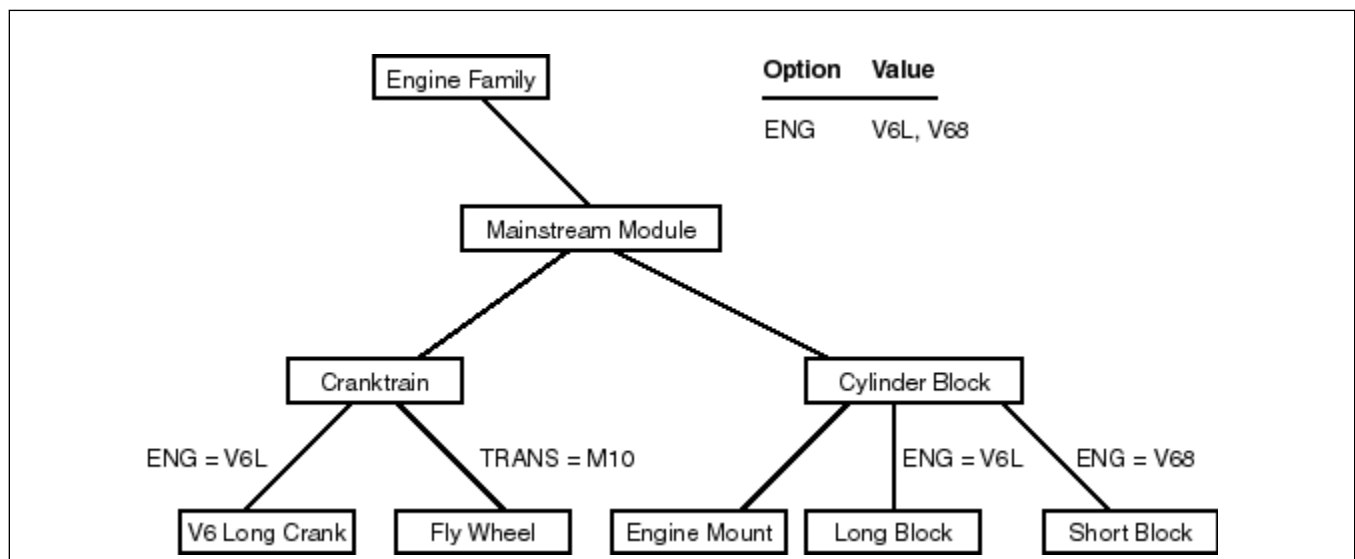


Structure of engine

You can define options on the top-level **Engine Family** item as follows:

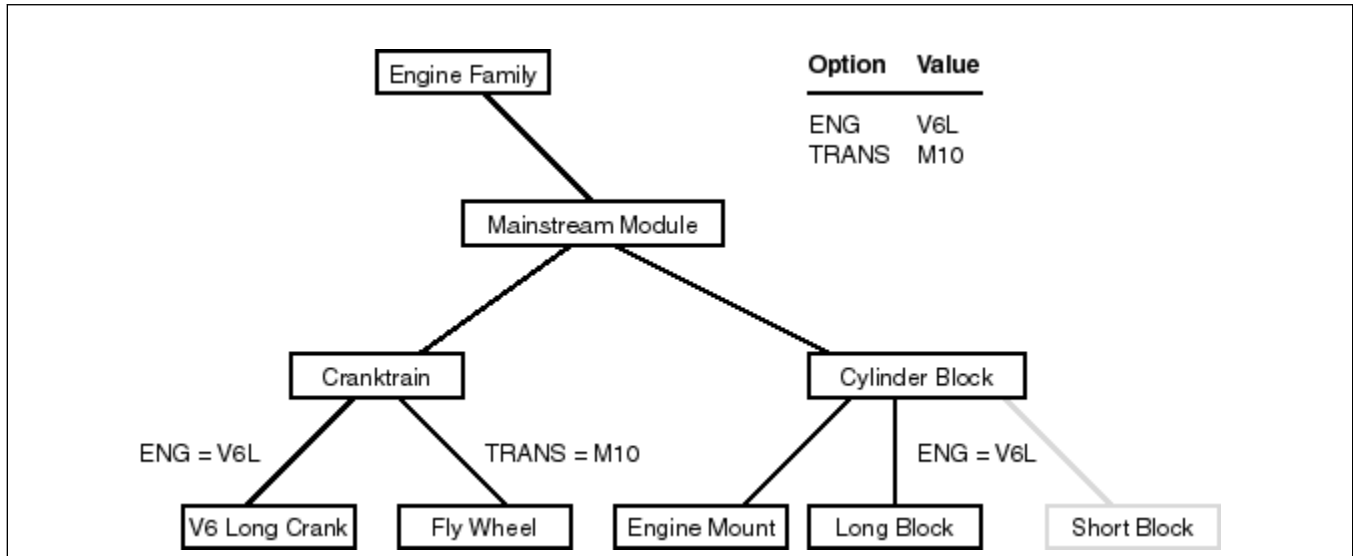
Option	Value
ENG	V6L, V6S
TRANS	M10, M50

These options determine the configuration of the lower levels of the structure through variant conditions, as shown in the following figure.



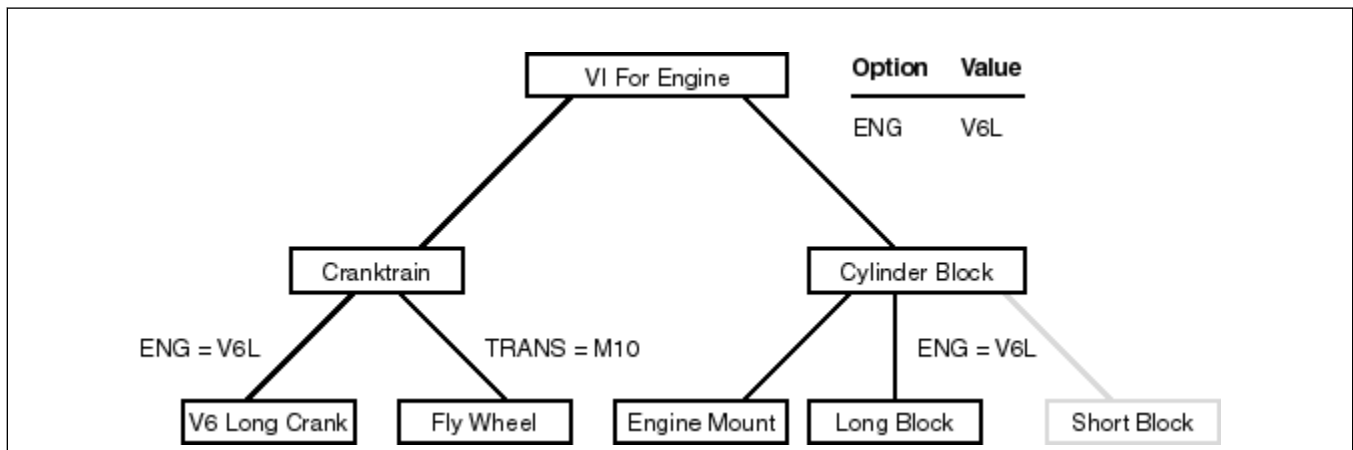
Structure of engine with option values

Before you create the variant item, you must configure the structure manually or with a saved variant rule, as shown in the following figure.



Configured structure of engine

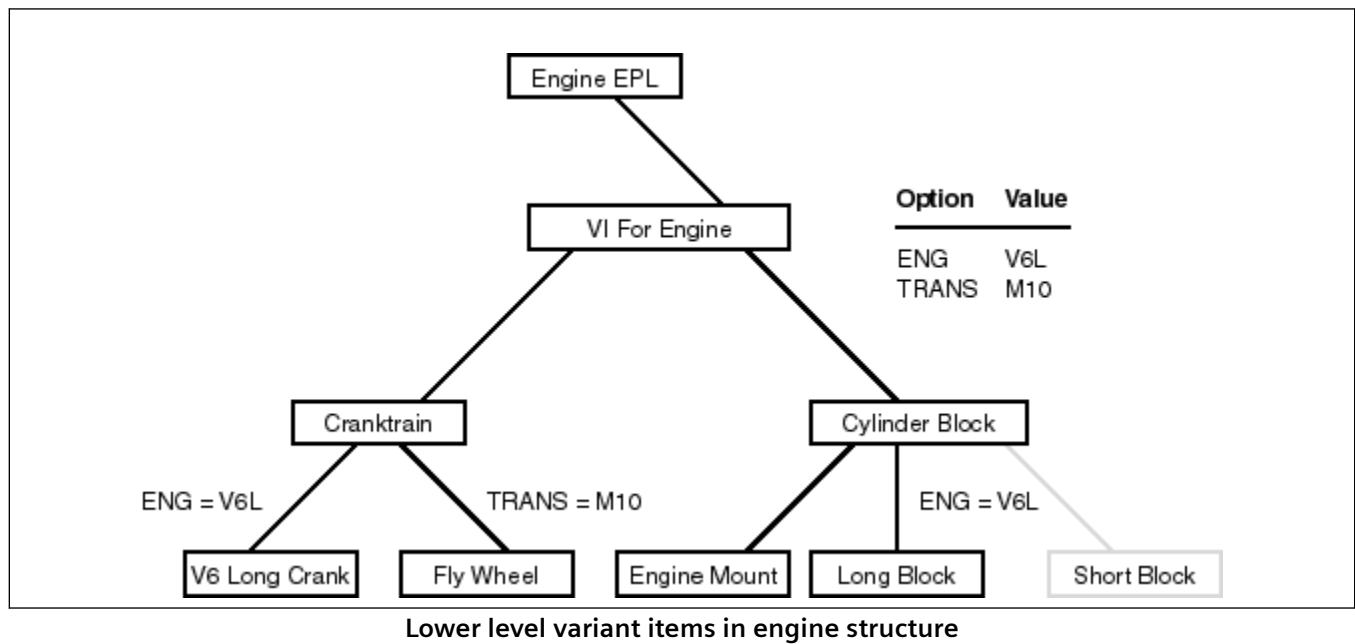
You then create a variant item of **Mainstream Module**, as described later, and the resulting item is a new **VI For Engine** structure, as shown in the following figure.



VI for engine structure

Because the variant item only prunes the immediate children that are unconfigured, the **Short Block** item still exists in the resulting structure, but as an unconfigured item. It may seem advantageous to permanently remove the **Short Block** item, so that you can manage and export a minimal structure. However, this action permanently removes **Short Block** from **Cylinder block**, an item that still appears in the generic **Mainstream Module**. Because the **Short Block** item is still applicable in different configurations of **Mainstream Module**, removal is not an appropriate action.

Another possible course of action is to create variant items at every level of the structure, or at least down to the lowest level that has any variant conditions. For example, you could create variant items for the **Crankcase** and **Cylinder Block** items, as shown in the following figure.



Configuring variant items

To create and manage variant items for classic variant structures, you must set the following preference:

PSEAllowLegacyVICreation

Set this preference to **true** to permit the creation of variant items for structures that include classic variant options. It also permits the creation of variant items from assemblies that are not modules. The default setting is **false**.

16. Configuring structures by modular variants

Configuring structures by modular variants

Teamcenter supports three methods of variant configuration, modular variants (described here), classic variants, and Product Configurator variants.

Siemens Digital Industries Software recommends that you do not create both classic variants and modular variants in the same product structure, as this may cause in unpredictable results.

Caution:

If you migrate from one variants technique to the other, be aware that Teamcenter evaluates the same variant condition differently in modular variants and classic variants. In some circumstances, this may result in different product structure configurations. For example, Teamcenter evaluates classic variant conditions from the left, giving all operators the same precedence. When it evaluates modular variant conditions, it automatically gives **AND** clauses precedence over **OR** clauses.

While it is technically possible to use modular variants with precise structures, unpredictable results may occur. If you want to implement modular variants, consider creating *imprecise* structures.

If you authored a line within a product structure using Product Configurator variants, you cannot update that line using classic or modular variants.

Caution:

The Teamcenter Integration for NX does not fully support modular variants. To exchange variant assembly data between Teamcenter and NX, you must implement classic variants. However, the Teamcenter Integration for NX does support the synchronization of part data for modular variant items. You can synchronize option values with NX expressions when working with geometric options and variants, but you cannot see stored option sets in NX; use variant items instead of stored option sets.

Modular variants make substantial use of temporary table space. The database administrator must ensure sufficient temporary table space is configured in accordance with the database manufacturer's guidelines and deployment recommendations provided by Siemens Digital Industries Software.

Modular variants terminology

Term	Meaning
Derived default	A default value that depends on a certain condition (for example, radio = stereo IF car type = GLX). A derived default is attached to an item revision, but applies globally to a loaded product structure.
Error check	A type of constraint in which a message is generated for a given combination of option values. Error checking is supported at three levels—error, warning and information.
External option	An option that is typically placed at the top-level module and sets the value of options that reference it in lower level modules.
Global option	An option that defines a set of standard allowed values in a central module. These values can be used in other modules.
Module	A container for options and constraints that describes the variability of a given item. A module encapsulates option definition to the area of the structure where it is needed.
Multiple configuration	Unique configurations of specific usages of a module. You facilitate multiple configurations with occurrence names and by configuring paths to modules.
Option	A parameter of variability. Options have a type (real, integer, or logical), visibility (public or private), a name, and a default value. You can save several options in a saved option set (SOS) or saved variant rule.
Presented option	An option in a module that points to a public option in a directly included child module.
Private option	An option that is visible only to the constraints within the module in which it was defined.
Public option	An option that is visible by constraints in a direct parent module and can be presented to a direct parent module. The public interface to the module.
Variant (structure)	A specific structure that is configured by applying a variant rule.
Variant condition	A condition that an engineering user sets on an occurrence to specify the option values that configure the occurrence (for example, Load IF engine = 1200). More complex condition statements may also be defined.
(Variant) Configuration	The values set for all public options in the top-level module that configure a structure.
Variant item (VI)	A specific nonvariant instance of a module.

Using modular variants

Modular variant principles

To minimize engineering and production costs, you can create *modules* in the product—self-contained plug-compatible units that can be *reused*. This technique imposes tight constraints on how the product is designed; Teamcenter supports those constraints when you work with modular variants. When you use modular variants, the options and associated logic are attached to a module item. Variant conditions on the components can only refer to options on the parent module, thus making the module independent of any other parts in the structure with regard to variant logic. This approach requires variant data and option values to be propagated up and down the structure so that end users (customers) can set options on lower level modules when configuring the whole product from the top level.

Manufactured goods are often designed and assembled from modules. For example, consider a company that produces a range of refrigerators and freezers in different sizes and colors. The door assemblies are developed in a department that designs a modular door suitable for use in any refrigerator or freezer. They design a generic door assembly that has all possible components for any use—a sheet steel outer door and two internal covers, one for a freezer and one for a refrigerator. (This is a simplified example; in a real product there would be many more individual components.)

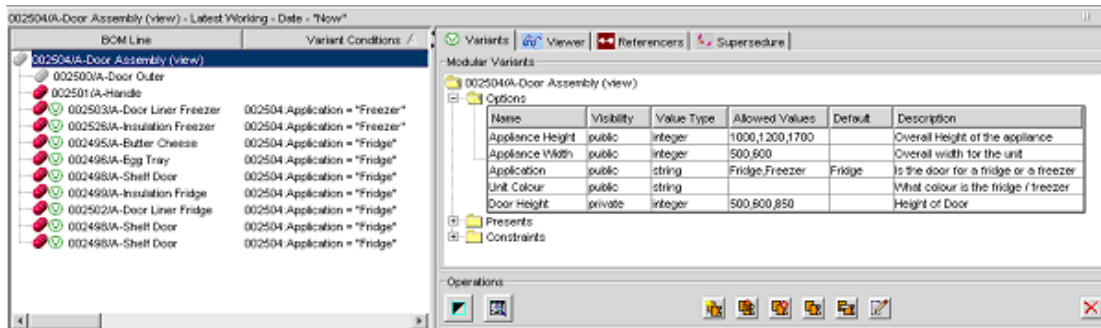
You can then configure the door assembly for a particular use in a refrigerator/freezer by setting various parameters or options that describe it, for example, **door width**, **door height**, **application** (refrigerator or freezer), and **color** (white or stainless steel). This intelligent door assembly is called a *module*.

The door module is completely self-contained and so can be reused in any product by setting its **public interface options**. The public interface options only control the features and components contained in the door module itself, and make no reference to options in higher or lower level modules. The modular variant functionality enforces this linking.

Note:

Teamcenter evaluates options from the top of the structure downwards, so the position of each module is significant.

The structure of the door assembly and its associated options is modeled as follows.



Structure of assembly and options

Configuring a public interface and private options

Public interface options can be set by the *customer* of the module. In the case of the door assembly, the customer is the design department that uses the door module. In the case of the refrigerator freezer module itself, the customer chooses from the public options made available at that level, for example, appliance width, appliance height, freezer at the top or bottom, number of shelves, and so on. Private options are used in constraints.

There may also be some internal options that are not set by the user, but are set according to the values of the public options. For example, the height of the door is set according to the appliance height, allowing for two doors, a 50 mm floor panel, and an LED display at the top. To allow for this, you create a *private* (hidden) option called **Door Height** on the refrigerator freezer module) that is controlled by the public option **Appliance Height** as follows:

$$\text{Door Height} = (\text{Appliance Height}/2) - 50\text{mm}$$

The **Door Height** option on the refrigerator freezer module is used to automatically set the **Door Height** option on the door module. You need not know this relationship, simply enter the overall height of the appliance.

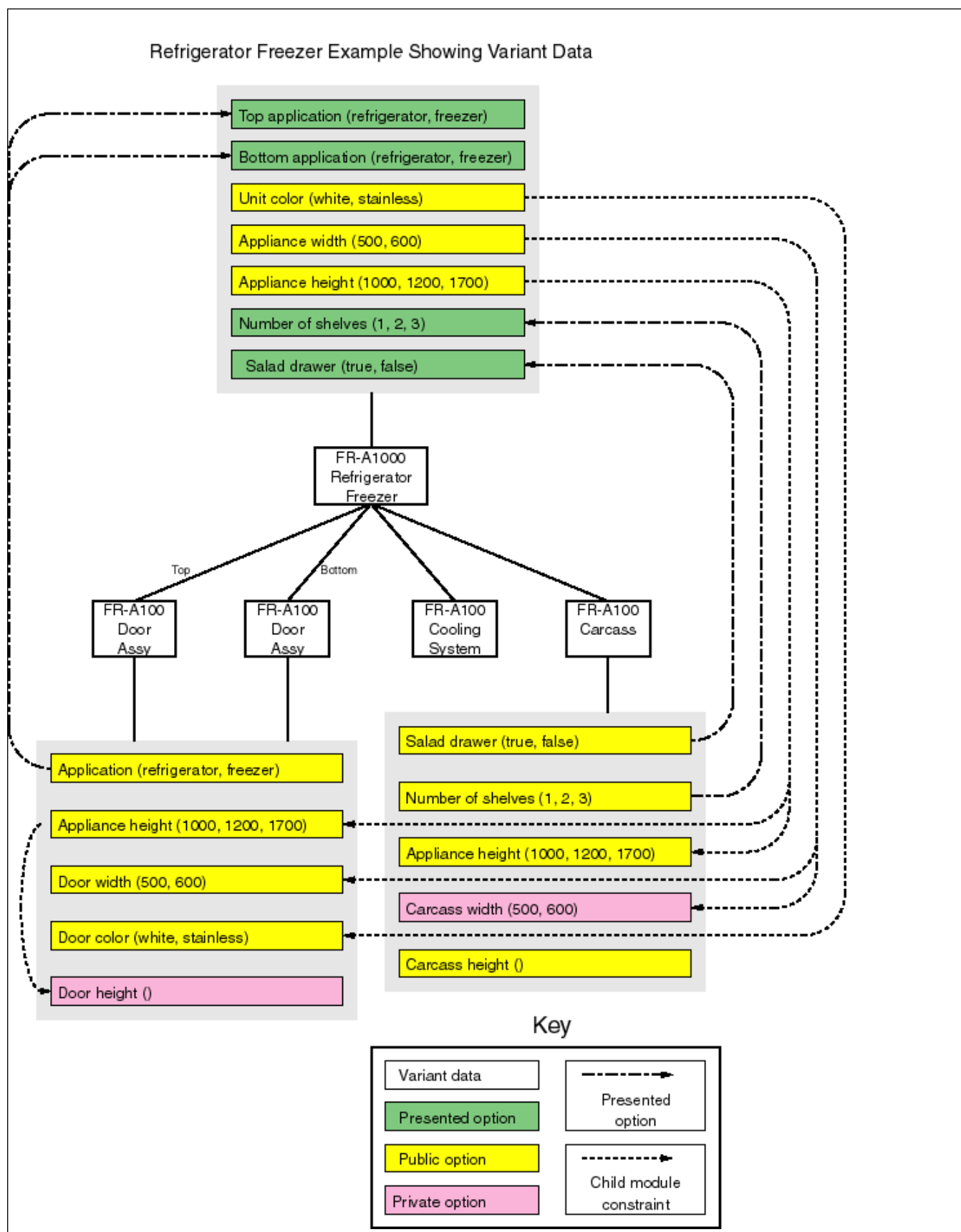
You could use the same principle to define private options for all the assemblies of the refrigerator freezer and bring them together only in the top-level assembly.

Linking options between parent modules and child modules

To configure the refrigerator freezer appliance, you must set the options for each and every assembly. It may take a long time to set all the options, some of which are the same in all submodules. Also, if you consider the width, it would have to be set in the module for the carcass, the door, and the shelves. It may preferable to set the options at only the top level module for the entire appliance and have this value propagate through the structure. To do this, you must create links between the child modules and the current module (the main refrigerator assembly). You can create these links in two ways, as shown in the following figure:

- Options from the child module are presented up into the parent module where they are visible and can be set.

- Options in the parent module can set options in the child module.



Presenting options

Note:

You cannot set the value of a private option from its parent public option. You can only set its public option in this way.

Presenting options

You can configure the same module differently, depending on where it is located.

Options can be presented to a parent module from a child module to make them visible as though they were part of the public interface for the parent module. For example, the **Number of shelves** option is presented up from the carcass module to the refrigerator freezer module, allowing you to choose the value at the parent level. You could also use the `present` method if you want to set options for different occurrences of the same module to different values, depending on their location.

You could place the door module in a refrigerator freezer assembly with this method. In this example, the same door module is used twice, once as a freezer door and once as a refrigerator door. The options created previously control the components of each door and the doors have different components due to their different functions. You can name each occurrence of the door appropriately, for example, **top** and **bottom**. You then present the **Application** option (with possible values **refrigerator** and **freezer**) for each door to the parent refrigerator freezer module. This gives two options to set in the refrigerator freezer module, one for each door; you can set these to different values.

Linking a parent module option to options on child modules

To set the width value, you could **present the options**. However, you must set the width option once for each door. As the doors are identical for any given appliance, it would be better to set this value only once. You could create an **Appliance Width** option in the top level module and link this single option to all width options in the child modules. When the **Appliance Width** is set in the refrigerator freezer module, it propagates to the carcass module, to both door modules, the shelves, and so on. The link is referred to as a *child module constraint*.

Linking public and private options

To enforce modularity, it is only possible to link options between a parent and its immediate child modules; you cannot skip a module level. To cascade down or up more than one level, you must repeat the linking process as necessary. Teamcenter enforces the following restrictions on linking:

- You can only present public options up from the child module. You cannot present them down from the parent module.
- You can only link options from the parent module to public options in the child module, although the option in the parent module can be public or private.

Creating variant items

A *variant item* is a specific variant of a completely configured module. For example, it could be a door assembly with: height of 500 mm, width of 600 mm, application of **refrigerator** and color of **white**.

Variant items are physical parts with no variability, and can be allocated an actual manufacturing part number. Conversely, modules cannot be manufactured. Modules with a large number of options and numeric options (with an infinite range unless allowed values are specified) have a correspondingly large number of permutations; not all of these permutations are manufactured. It is useful to be able to reuse permutations that have previously been sold, as significant engineering work may have been invested in creating technical documentation, drawings, and manufacturing data that is attached to the variant items.

The modular variants functionality allows you to create new variant items when they are required. You can also search for existing variant items to reuse in new products. Variant items are built up into a complete structure for a specific configuration corresponding to a product or customer order; in this structure all modules are replaced by specific variant items.

If you are using NX, you can use the option values on variant items to determine the expression values on an NX CAD part.

Caution:

If a module has variant items linked to it, you cannot change any of the variant data without revising the module. Such changes may invalidate existing variant items linked to the module revision. Disallowed changes include:

- Removing or adding an allowed option value.
- Removing or adding an option.
- Setting or editing a variant condition on a BOM line.
- Changing variant logic such as module constraints, defaults, and rule checks.

To make any of these changes, you must first revise the module. Even after revising, you can only add a new value to an existing option. You cannot add a new option because that invalidates any variant item linked to an earlier generic item or item revision.

You may not want to update existing variant items that are linked to previous module revisions. As an alternative, you could create a new variant item, but Teamcenter then contains two different IDs for variant items that have the same configuration and share the same stored option set (SOS) values; this arrangement does not adequately enforce modularity. The new variant item may also contain additional components and, if so, it would not be appropriate to update the existing variant item.

Caution:

Teamcenter does not support the creation of variant items in products that have both modular variants and classic variants, that is, hybrid mode products.

Creating modular assemblies

You can configure the variant components in a modular assembly by applying a variant condition. For example, for the door module mentioned previously, create the following conditions:

On the **Door Liner Fridge**, **Insulation Fridge** and **Egg Tray** components:

```
Load if Application = fridge
```

On the **Door Liner Freezer** and **Insulation Freezer** components:

```
Load if Application = freezer
```

Note:

The options you can use in the variant condition are limited to the public and private options on the parent module. This limitation enforces modularity.

Creating modular piece parts

You can set options on a piece part to use with a CAD model in NX. You can map these options to an associated expression in NX that determines the geometry of the part; for example, you could map the **Width** option to the geometry of the door. When you create a variant item, Teamcenter copies the model (**UGMASTER** dataset), and automatically sets the option value to the associated expression value in NX, for example, **Width = 500**.

If you design the door assembly module of the refrigerator freezer as a modular assembly, having a different component for each width and height of door, this could lead to a very large number of components for each size of door. It is more efficient to design the piece part for the door itself as a module, with options for width and height. The variability is then catered for by the variant items, which are created on demand as required, without needing to modify the parent door assembly module to add components for every new size of door.

Defining options

What option types are provided?

Teamcenter allows you to create several different option types. You define options in standard variants only and string values are available. The following variant types are provided:

- String
- Integer
- Real

Note:

There are no restrictions on the precision of the value you can enter for real types. However, during evaluation, the value may be truncated to the system limitation.

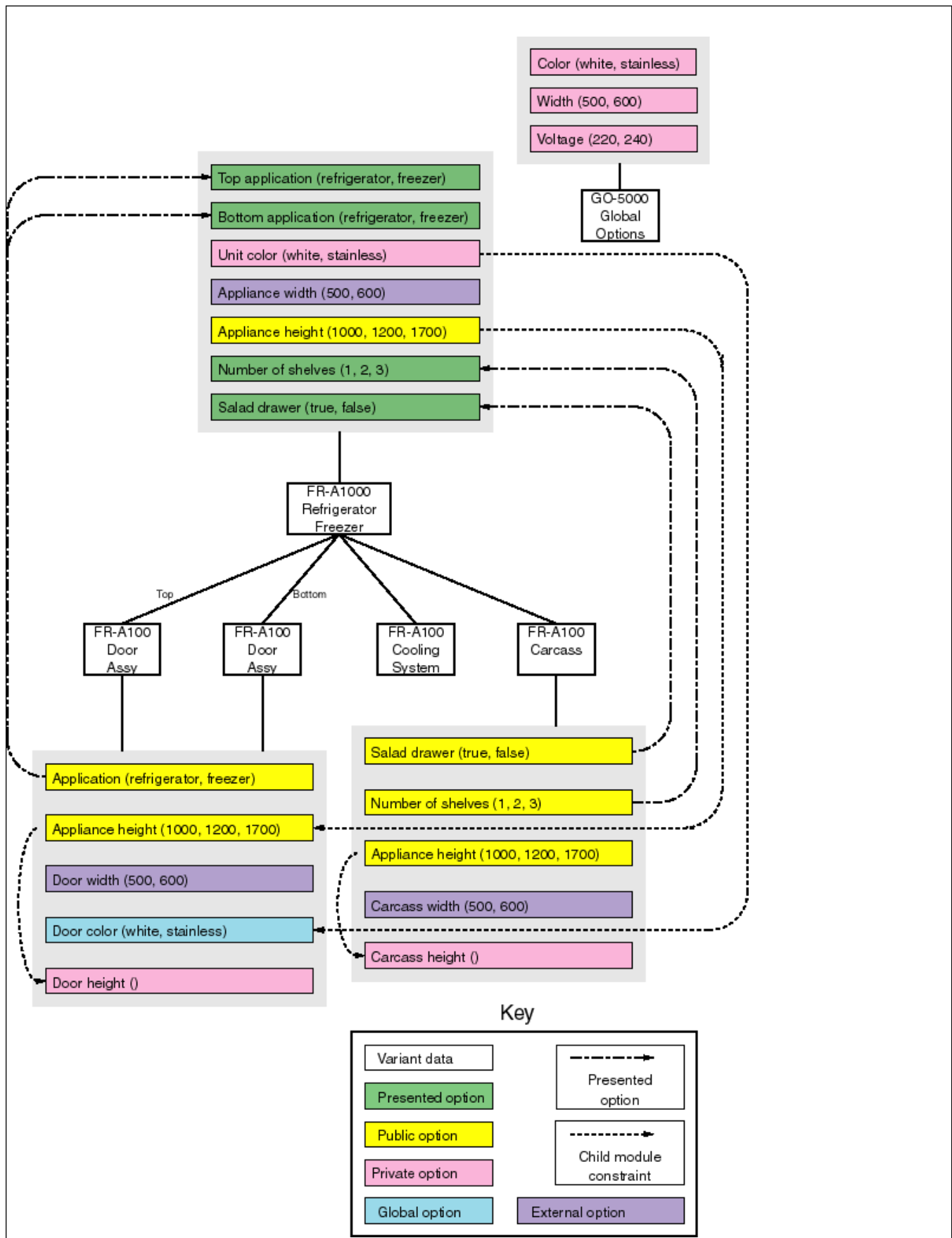
- Logical (true, false)

You can use the `=`, `>`, `<`, `>=`, `=<` and `to` operators with real and integer options, both in the allowed values for an option and in variant conditions and constraints. For example, you can set the door width option to a range of values, such as **400 to 700**. This allows the user to set any value within the range, although there are discrete values allowed for standardization (500 and 600 only).

Defining external options

An external option is typically defined on the top-level module in the structure. Its allowed values are the same as those on the option that references it. In addition, the value set for the external option on the top-level module in the variant rule is propagated to all options that reference the external option.

The following figure shows an extension of the refrigerator freezer example that illustrates this concept.



Create an item called **GO-5000** to define global options. This item is a standalone module and contains three global options for color, width and voltage. Each such global option is specified with standard allowed values.

The color global option is used in the refrigerator freezer and door assembly modules so that the allowed values are controlled from the color master global option in the **GO-5000** module. To set the actual value configured for the unit color on the door module for some variant of the product, you must create a link between the unit color option in the refrigerator freezer and the option in the door assembly, as shown in the previous figure.

The appliance width external option is created in the refrigerator freezer module. It is used by the door width option in the door assembly module and by the carcass width option in the carcass module. Typically, the external option would reference a global option, but this is not mandatory. In this case, the value set for the appliance width for any variant of the refrigerator freezer is automatically propagated to the options that use it lower in the structure (namely door width and carcass width), without needing to create a link.

Setting option defaults

You can set default values for options in the following ways:

- In the option definition. This is the most common and visible place to set a default.
- Using a module constraint to set a default value.
- Using a module constraint to fix a default value that cannot be overridden by the user.

In the refrigerator freezer example, for some models, the freezer may always be at the bottom and the refrigerator at the top. In this case, the value for the application option would be fixed for each path in the refrigerator freezer module.

Note:

When using a global option definition, you can override a default set in the global definition in the module in which the global option definition is used.

Checking for errors

You may not want to allow all possible permutations of a module. For example, in the refrigerator freezer, the top application and bottom application cannot both be set to the same value of **Refrigerator**. You can use error checks to warn about unsupported combinations, by displaying a message when the user attempts to set option value combinations specified in the error check. You can define one of the following messages to warn of unsupported combinations:

- Error

Teamcenter displays the error message, and the user is not allowed to configure the combination specified.

- Warning

Teamcenter displays the warning message, but the user may set the combination specified.

- Information

Teamcenter displays the information message, and the user may set the combination specified.

Note:

Create error checks at the appropriate module, typically at the top level. Do not create them on global items.

Configuring a structure

When you have defined the option modules, configure the structure to simulate the choices that the end user or customer is offered. This process ensures that the structure is correctly and completely configured. The end user or customer can only set values for options on the product itself; for example, for the refrigerator freezer; they cannot set options in lower level modules.

Before doing this, you must design all the lower level modules (door assembly, door, carcass and so on) such that they are completely configured by whatever combination of options is set in the refrigerator freezer module. You should do this following the methods previously described, namely:

- Options from the child module should be presented up to the parent module.
- Options in the parent module may set options in the child module.
- Option defaults should be set where appropriate.

Note:

Checking that the refrigerator freezer product is completely authored is a manual process.

Setting expression values

Modular variants support the capability to set an expression value in NX from an associated option value in Teamcenter; this capability is not available in classic variants. Make the association simply by ensuring the expression name in the NX part is the same as the option name on the item module; the **UGMASTER** dataset for the part must be defined in this item module.

You can use options to set any expression. In a piece part, you typically use expressions for geometric parameters such as length or the number of elements in an array of features. In an assembly, you

typically use option values to control position, for example, by determining the parameters of a mating condition such as the linear or angular offset.

Viewing and creating option and variant data

View variant data

1. In the product structure, select the top-level item of the structure for which modular variant data already exists.
2. Click the **Show/Hide Data Panel**  button on the toolbar.

Teamcenter displays the data pane.

3. On the data pane, click the **Variants** tab.

Teamcenter displays any available variant data that already exists, for example, option definitions and constraints.

An example of variant data for the refrigerator freezer discussed previously is shown in [Modular variant principles](#).

Tip:

Use the `PSE_show_option_item_prefix` preference to show or hide the owning item ID as a prefix to the option name.

Creating variant data

Use the buttons listed next to create or edit variant data. They are located at the bottom of the **Variant Data** pane.

Button	Description	Purpose
	Create a new option	Creates a new option.
	Present a child option in the parent module	Displays options from a child module in the parent module (the current module).
	Create a new error check	Allows Teamcenter to highlight any specified configuration by one of the following methods: • A warning that a combination is not allowed. In this case, you cannot continue with the requested configuration.

Button	Description	Purpose
		A warning message that a combination is not advised. In this case, you can proceed after acknowledging the warning message. When you click this button, Teamcenter displays the Error Checks dialog box, allowing you to define the severity of the error, the message that appears when the specified combination is set, and the condition.
	Create new internal modular constraints	Specifies the setting of an option value based on the values of other options within the module, or the setting or fixing of an option value.
	Create new child option constraints	Sets a child option based on a parent option. The child option must already exist.
	Edit the selected option or constraints.	If you highlight an option or constraint and click this button, Teamcenter displays the Edit dialog box. Double-clicking the option or constraint has the same result.
	Toggle expert mode	Toggles expert mode on or off when editing constraints.
	Delete the selected object.	Removes the highlighted option or constraint.
	Show legacy data.	Displays the legacy (classic) Variant Data pane.

Caution:

Do not rename existing options or values. If you do this, constraints and other data are not updated.

Create new options

Create new options

You can create a new option in one of two ways:

- Click the **New Option**  button.

Teamcenter displays the New Option wizard that guides you through the creation process.

- Click the lower radio button in the New Option wizard.

Teamcenter displays the **Create New Option** dialog box, allowing you to create the new option manually.

Note:

An option must have:

- Visibility (public or private)
- A name and description
- A type (string or logical, integer or real)
- Allowed values or range (if required)
- A default value (optional)

Create options manually

Create options manually

If you use the **Create New Option** dialog box, you can create many similar options more quickly than with the wizard. To create an option in this way, enter the following information in the dialog box:

- Select the visibility of the option, **PRIVATE** or **PUBLIC**.
 - Public options may be set by a user or a parent module option when configuring a module.
 - Private options cannot be set by the user and are not displayed when configuring a module. Private options are set from public options by constraints.
- Enter a name and description for the option.
- Choose a type for the option from the drop-down list, **String** with default, **Real/Integer** or **Logical**. If you choose **String**, you must enter the allowed values in the **Allowed Values** box.
- If the option is based on a global option definition (for example, **Appliance Width**), select the global option from the drop-down list.
- Enter the remaining information required in the dialog box.

Examples of public and private options

In the refrigerator freezer example described previously, the following public and private options are defined:

- The **Appliance Width** option is a public option. It is set by a customer when configuring the product.
- The **Door Height** option is a private option. It is set by a constraint according to the value of the **Appliance Height** public option.

Set external option definitions

You can set external option definitions only with the New Option wizard, which guides you through the following steps:

Note:

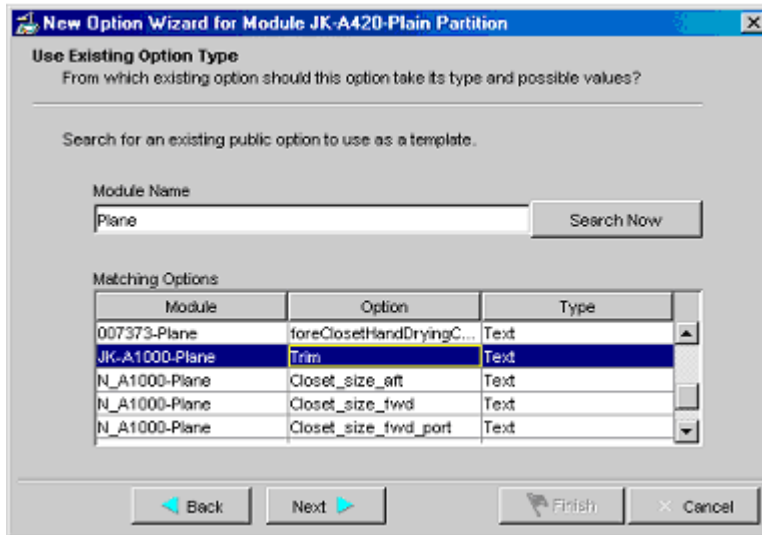
You must create an external option as a global option or variant items fail at lower level modules.

Do not define an external option from an option lower in the structure. Because Teamcenter evaluates definitions from the top down, this configuration fails.

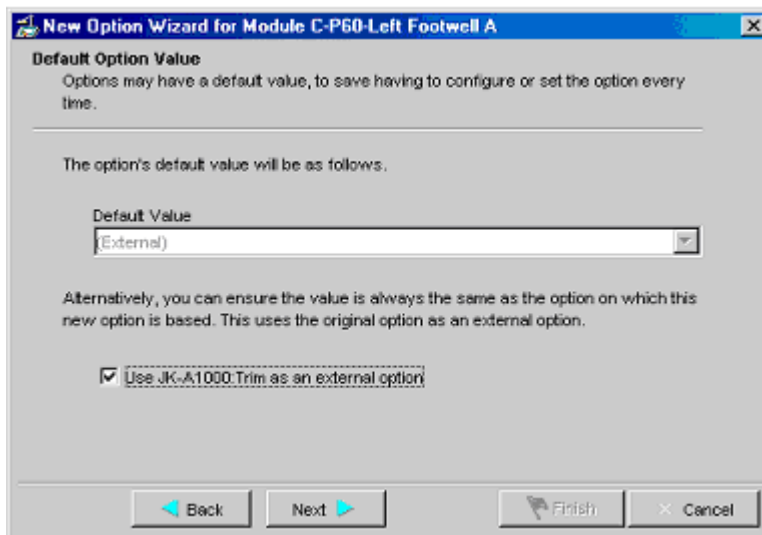
Do not use external options with variant items.

External options are not updated when option values are added to the global option on which they are based. This behavior occurs because the option values are cached.

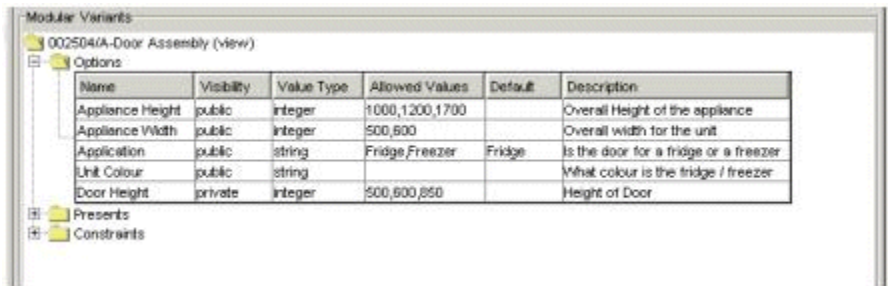
1. Select a public option.
2. Enter a name. You do not need to use the same name as the referenced external option.
3. For option type, select **The same type and restrictions as an existing option**.
4. For derived option type, select **Search for Existing Options**.
5. In the next window, enter the item name (not item ID) of the module on which the external option is defined and click **Next**. You can use wildcards (*) to search for all modules in the database, *not* only those defined as global options. Select the option you require, as shown in the following example.



6. In the next window, select the **Use option as an external option** check box and click **Next**.



This completes the definition of the new option, and you can now view it in the **Variants** pane, as follows.



Name	Visibility	Value Type	Allowed Values	Default	Description
Appliance Height	public	integer	1000,1200,1700		Overall Height of the appliance
Appliance Width	public	integer	500,600		Overall width for the unit
Application	public	string	Fridge Freezer	Fridge	Is the door for a fridge or a freezer
Unit Colour	public	string			What colour is the fridge / freezer
Door Height	private	integer	500,600,850		Height of Door

New option definition

Teamcenter does not indicate that it is an external option here. However, if you view the option in the **Edit Option** dialog box, a check box shows that the option is external, as shown in the following figure.

Note:

You cannot set this option as **external** in this dialog box.



Edit option dialog box

Teamcenter considers that the affected module uses the external option. If you place the cursor over a global option definition, you see a tool tip in the format:

Optionx (on lower level module) uses external *option Y* (on higher level module)

For example:

Public 002508:Trim uses MV-F1000 Trim

Present child options

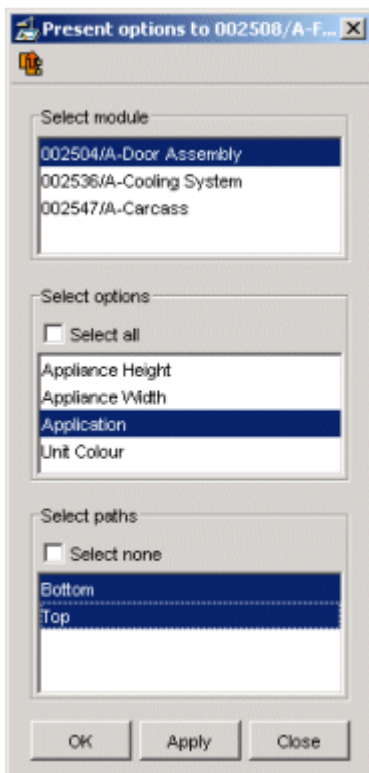
You must *present* options of a child module in the parent so they appear as a public option of the module. For example, in the refrigerator freezer example, the **Application** option of the **Door Assembly** module is presented to the parent refrigerator freezer module. There are two occurrences of the **Door Assembly** module, which have their paths labeled in the **Occurrence Name** structure line property as **Top** and **Bottom**. Each path in the **Door Assembly** module is presented separately, allowing you to configure each occurrence differently.

You cannot set a default value for the presenting option. Any default is inherited from the master, that is, the lowest level module from which the option is presented. If you change the default on the master, Teamcenter propagates the change to all the levels to which the option is presented.

To present a child option:

1. In the product structure, select the parent module to which you want to present the child option and click the **Create Presented Option**  button.

Teamcenter displays the **Present Options** dialog box, as shown in the following figure:

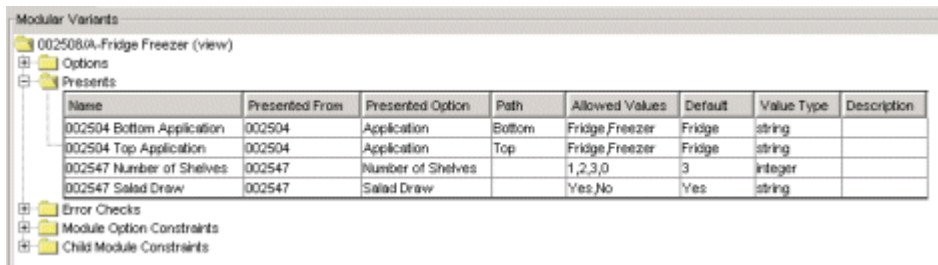


Present option dialog box

2. Make the following entries in the dialog box:
 - In the **Select Module** list, select the module to present from, for example, the **Door Assembly**.

- In the **Select Options** list, select the option to present or check the **Select all** check box to present all options.
- In the **Select paths** list, select the path to present from (or paths if there are many occurrences). By default, the **Select none** check box is checked and you should clear this if appropriate.
- When you have made the appropriate selections, as shown in the previous figure, click **OK**.

Teamcenter displays the result in the data pane, as shown in the following figure.



Name	Presented From	Presented Option	Path	Allowed Values	Default	Value Type	Description
002504 Bottom Application	002504	Application	Bottom	Fridge,Freezer	Fridge	string	
002504 Top Application	002504	Application	Top	Fridge,Freezer	Fridge	string	
002547 Number of Shelves	002547	Number of Shelves		1,2,3,0	3	integer	
002547 Salad Draw	002547	Salad Draw		Yes,No	Yes	string	

Presented child option in data pane

Create a new error check

Not all permutations of option values in a module may be permitted. For example, in the refrigerator freezer example, the **Top Application** and **Bottom Application** cannot be set to the same value of **Fridge**. You should create error checks to warn the user of unsupported combinations when they configure a module. When the user tries to set the option value combinations specified in the error check, Teamcenter displays the defined message.

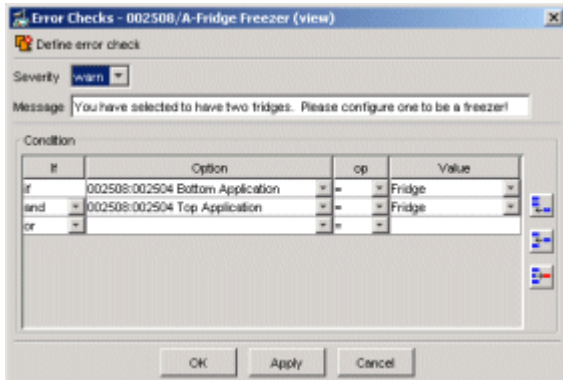
Caution:

Do not create error checks on global options as they will not be executed.

To create an error check:

1. Select the module on which you want to create the error check (typically, the top level) and click the **Error Checks**  button.

Teamcenter displays the **Error Checks** dialog box, as shown in the following figure.



Error checks dialog box

2. Make the following entries in the dialog box:

- Choose the type of error check from the **Severity** list, which may be one of the following:

- Error

If an error condition occurs, Teamcenter displays an error message and the user may not configure the specified combination.

- Warning

If a warning condition occurs, Teamcenter displays a warning message and the user may set the specified combination.

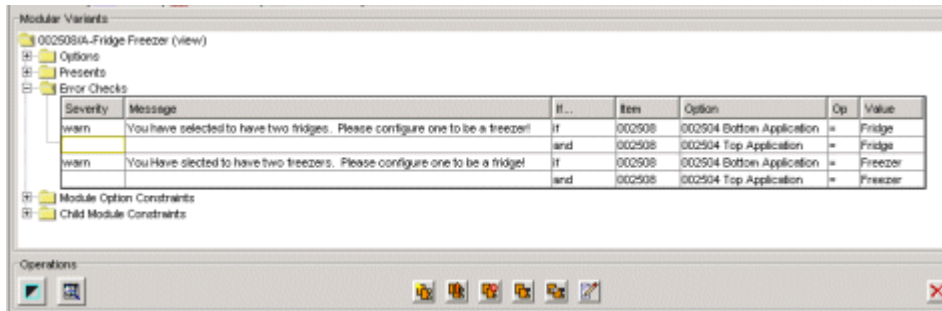
- Information

If an information condition occurs, Teamcenter displays an information message and the user may set the specified combination.

- In the **Message** box, enter the text of the message you want Teamcenter to display.
- In the **Condition** box, specify the combination of option values that triggers the error check, from options on the parent module only.

3. When you have made the appropriate selections, as shown in the previous figure, click **OK**.

Teamcenter displays the result in the data pane, as shown in the following figure.



Error check in data pane

Create module constraints

Use a module constraint to set option values within a module. You may create a module constraint for the following reasons:

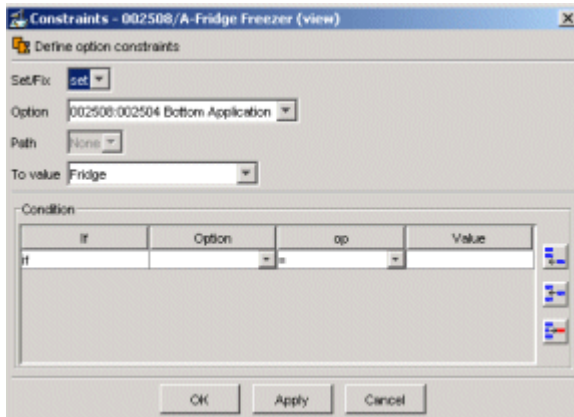
- To set a private option value that depends on a value of the public option in the module. You can use logic and simple mathematical operators to set conditions.
- To set a default option value. The user can override this value when configuring the structure. In this case, there is no condition on other option values and Teamcenter sets a value.
- To set fixed (hard-wired) option values that the user cannot override when configuring the structure. As before, if there is no condition on other option values, Teamcenter sets a value.

In the refrigerator freezer example, you use a module constraint to set the **Door Height** private option in the **Fridge Freezer** module according to the **Appliance Height** public option. This constraint is defined with mathematical operators in MVL (modular variant language), rather than through the user interface.

To define a module constraint:

1. Select the module on which you want to define a constraint and click the **Constraints**  button.

Teamcenter displays the **Constraints** dialog box, as shown in the following figure.



Constraints dialog box

2. Make the following entries in the dialog box:
 - Choose **Set** or **Fix** from the list. Choose **Set** to set a private option from the value of a public option. Choose **Set** or **Fix** to directly associate an option with a defined value in the **To Value** list (do not use the **Condition** box.)
 - Choose an option in the **Option** list and choose its value in the **To Value**. When you do this, you set the option—in this case, the private option, unless you set a value with no condition.
 - In the **Condition** box, specify the constraint condition of the public option that is setting the private option.
3. When you have made the appropriate selections, click **OK** or **Apply**. If you click **Apply**, the **Constraints** dialog box remains displayed and you can create other constraints.

Caution:

Do not click **OK** and **Apply** or you will create two identical constraints.

4. Repeat steps 1 through 3 for each public/private option value combination that must be mapped.

Managing child module constraints

Managing child module constraints

Use this function to set a child module option based on a parent module option that should be mapped to the option in the parent, that is, all values. The child option must already exist.

Create a child module option constraint

1. Select the child module and click the **Child Constraint**  button.

Teamcenter displays the **Constraints** dialog box.

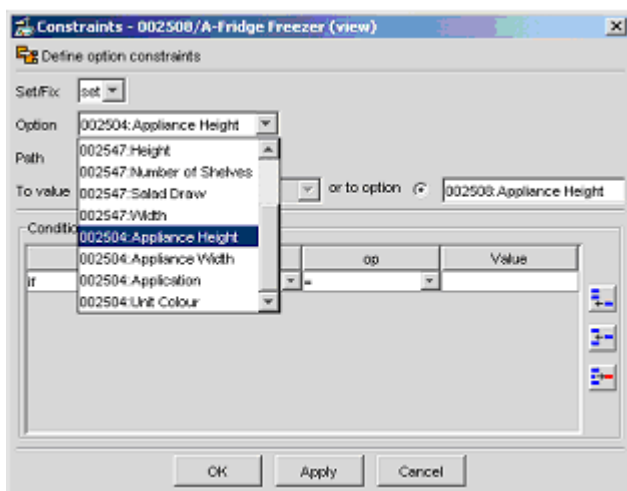
2. Make the following entries in the dialog box:

- Set the type of constraint. Typically, you **set** rather than **fix** the constraint.
- Set the child option. You can display a list of public options for all child modules using the list.
- Select whether to map individual values or all the options. The following figure shows how to map all the options, by clicking the **or to option** button. This is the most common approach to setting child module options.

Teamcenter does not detect if the options have different allowed values. However, if the options are of different types, Teamcenter detects and prevents you setting such values.

- Map specific option values to a specific option value in the child and set the conditions as required.
- Optionally, specify a path in the **Occurrence Name** structure line property if you need to map many occurrences of the child to different option values.

A **Constraints** dialog box with this information fully entered is shown next.



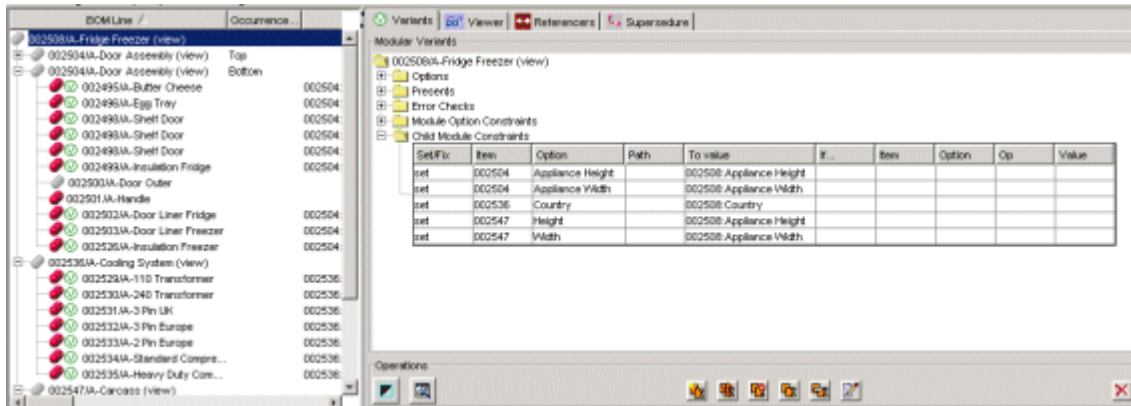
Constraints dialog box

- Click the **Apply** button and repeat step 2 if you want to create several child module constraints. Alternatively, if you only want to create a single child module constraint, click **OK**.

Caution:

Do not click **OK** after clicking **Apply** because this creates two identical constraints.

Teamcenter displays the child option constraints, as shown in the following figure. This example shows all the parent options mapped to the child options without any conditions.



Child module constraints

Edit an option or constraint

To edit a selected option or constraint, click the **Edit**  button or double-click the line in the data pane.

Delete an option or constraint

1. Select the row in the data pane that represents the constraint or option.
2. Click the **Delete** button .

Teamcenter deletes the selected constraint or option.

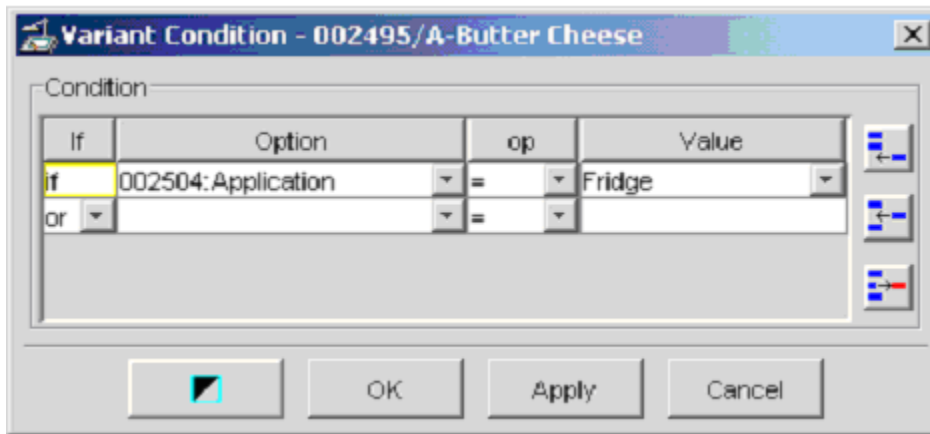
Edit variant conditions

You create variant conditions to control the conditions under which Teamcenter configures an occurrence.

You can create or edit a selected variant condition in one of three ways:

- Display the **Variant Conditions** column in the structure properties table and double-click the relevant cell.
- Choose **Edit→Variant Condition**.
- Click the **Edit**  button.

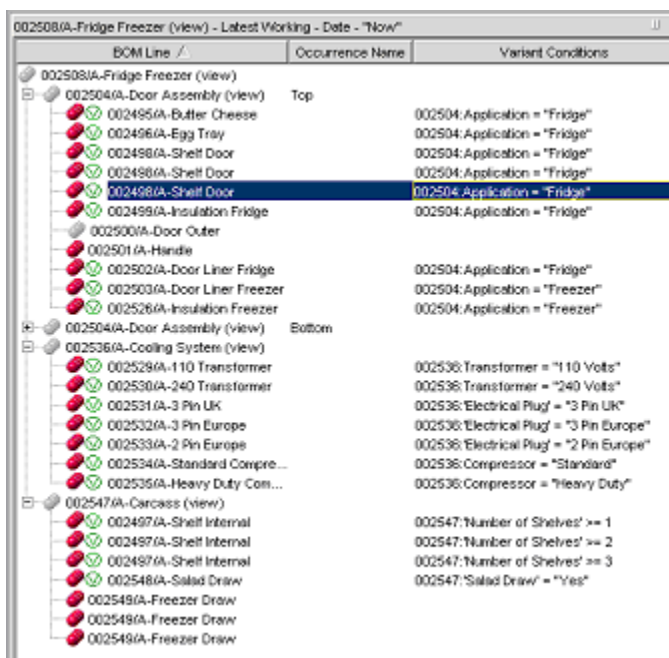
Teamcenter displays the **Variant Condition** dialog box, as shown in the following figure.



Variant condition dialog box

You can only include the options in the parent module in the variant condition. You can create any number of conditions and lines.

Use the buttons provided to manipulate the condition statements and display them, as shown in the following figure.



Condition statements

You can copy existing variant conditions to reuse as follows:

1. Right-click the appropriate structure line and choose **Copy**.

- Right-click the structure line to copy the variant condition onto and choose **Paste Property**. If you select more than one line, the variant conditions apply to all the selected lines.

Note:

If you have existing legacy variant conditions, you can edit them by clicking the **Edit Legacy**  button.

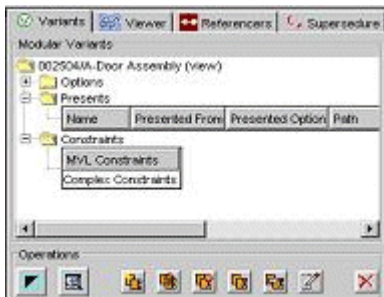
Edit expressions in MVL

There are certain complex conditions that you cannot create or edit in the **Variant Condition** dialog box. In these cases, you must edit the modular variants language (MVL) that represents the condition directly in expert mode.

For example, you may want to set the following condition for the refrigerator freezer:

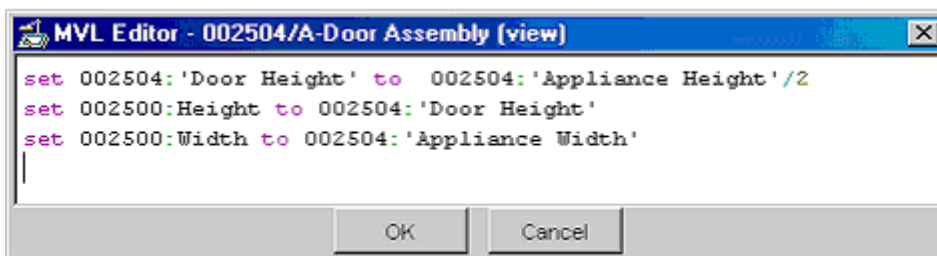
Door Height = (Appliance Height/2)-50mm

- In the **Variants** pane, open the **Constraints** node and double-click the **Complex Constraints** entry node.



Complex constraints

Teamcenter displays a dialog box in which you can edit and save the MVL expression.



Saved MVL expression

- Edit the MVL expression as appropriate. You can use many mathematical operators.

Caution:

If you edit an expression in expert mode in this way, Teamcenter marks the module as an **Expert** module. You can no longer maintain the module with the basic user interface.

You can view the MVL of existing variant data for examples of the required syntax. An example of how to use mathematical operators with options follows:

```
set 002504:'Door Height' to 002504:'Appliance Height'/2*002504:
'Clearance'-002504:@Offset'
```

In this example, '**Clearance**' and '**Offset**' are private options you created to store a variable for use in this logic.

If a name or identifier includes spaces or special characters (for example, -), you must embed them in quotation marks, for example: **set 'MV-2504':'Door Height'**.

To identify the available entries at any point in the expression, Teamcenter utilizes *Intellisense™*. When you create or edit the expression, Teamcenter displays a list of available entries. Select an entry with the mouse or the up and down arrow keys, then press Enter to put the entry into the expression.

Developing complex expressions with MVL

Developing complex expressions with MVL

Use modular variants language (MVL) language to define inherited options and constraints. It allows you to define semantics and expressions that Teamcenter can interpret and evaluate.

You can also use MVL to define interfaces, that is, to define the modules options and how the module derives any options from another module, as described previously. You can also use it to define constraint and conditions.

Determining precedence in MVL

MVL statements comprise the following three elements:

- Error checks, consisting of error, information, or warning messages
- Internal module constraints
- Child module constraints

Teamcenter expects each statement to contain these elements in the order listed. When you use the **Internal module constraints** dialog box and the **Child module constraints** dialog box to construct

constraints or error checks, respectively, Teamcenter arranges the MVL elements into the required order. However, if you develop statements in the MVL editor and enter the elements in an incorrect order, Teamcenter does *not* rearrange them. No error or warning messages are displayed, but the variant structure may not be configured correctly.

Similarly, if your MVL statements contain comments, Teamcenter may not rearrange the elements into the required order.

Also, internal and child constraints are evaluated in the following order, where 1 has the lowest priority and 7 the highest:

1. Default
2. User set
3. Set
4. User fix
5. Fix
6. External
7. Variant item

For example, a user set takes precedence over the default value of an option for a given type of constraint.

Understanding MVL conventions

When coding in MVL, note the following conventions:

- MVL is case sensitive. All statements and keywords are typed in lowercase.
- White space is ignored, except when contained inside single or double quotation marks.
- Single and double quotation marks have semantically different meanings. Single quotation marks are required for some identifiers (IDs) and double quotes are used for string literals.
- Text appearing inside square brackets is optional. However, if the '[' and ']' characters appear inside single quotes, you should type them.
- Words that are in `monospaced` font are keywords and should be typed exactly as shown.
- Words in *italicized* font are primitives, and the most common ones follow.
- Lines preceded with a # character contain comments. If an MVL expression contains comments, you cannot view it in the user interface.

Primitive	Description	Examples
<i>ID</i>	An ID may be:	Car 'My Car'

Primitive	Description	Examples
<i>Module ID</i> <i>OptionName</i> <i>PathName</i>	- A string that starts with a letter and only contains alphanumeric characters, or - A string enclosed in single quotation marks and containing any icons. Inside the single quotes, you can use the \ character to escape a single quotation mark, and itself. Use IDs for module IDs, path names, and option names. Note: Siemens Digital Industries Software recommends that you do not a reserved word as the ID, module ID or path name.	' an option name ' front
<i>Option</i>	An option is a module ID, followed by a : and an option. In certain circumstances, an option can be followed by a path name inside square brackets.	Car:Model 'My Car': 'an option' Wheel:Tyre[front.left]
<i>String</i>	A string literal is any characters enclosed inside double quotes. You can use the back slash character to escape itself and the double quotes character.	"This is a string \ "hello\" "
<i>Integer</i>	An integer literal is any number. Optionally, you can place a - in front of the integer.	34342 -18344
<i>Real</i>	An real number is any floating point number. To distinguish a whole number from an integer, always include the decimal point in real numbers, even if it is followed by a zero. However, Teamcenter attempts to interpret an integer as a real number if the context allows.	1.3432 -2342.1343 67.0
<i>Logical</i>	A logical literal.	true false

Reserved words

Reserved word	Purpose
and	Logical AND of logical expressions.
default	Specifies a default for an option.
elif	Use to construct conditional statements.
else	Use to construct conditional statements.
endif	Use to construct conditional statements.
error	Sends an error message.
false	Logical FALSE literal.
fix	Fixes an option to a given value.
hide	Reserved for future use.
if	Use to construct conditional statements.
implements	Use to implement options.
inform	Sends an informational message.
integer	Denotes the integer value type.
legacy	Reserved for future use.
logical	Denotes the logical value type.
not	Logical NOT of logical expressions.
or	Logical OR of logical expressions.
presents	Use to present options.
private	Specifies a private option.
public	Specifies a public option.
real	Denotes the real value type.
set	Sets an option to a given value.
show	Reserved for future use.
string	Denotes the string value type.
then	Use to construct conditional statements.
to	Use in various places.
true	Logical TRUE literal.

Reserved word	Purpose
unset	Literal UNSET value.
uses	Reserved for future use.
warn	Sends an warning message.

Reserved icons

Reserved icon	Purpose
=	Equal
!=	Not equal
<=	Less equal
>=	More equal
<	Less
>	More
.	Dot
:	Colon
;	Semicolon
,	Comma
(	Bracket open
)	Bracket close
[	Square bracket open
]	Square bracket close
{	Curly braces open
}	Curly braces close
+	Plus
+=	Plus equal.
—=	Minus equals
—	Minus
*	Multiply
/	Divide

Using the expert mode

As mentioned previously, the expert mode editor for complex constraints includes the Intellisense autocompletion feature. If you type a new constraint, the editor displays a dialog box containing suggestions for what you might type next. The contents of the dialog box changes according to any additional characters you type. If your typing does not match any of the suggested entries, the dialog box disappears and the text typed appears in the current cursor position in the text area. However, if you press a tab key or Enter key while the dialog box is open, Teamcenter transfers the current selection in the dialog box into the text area. You can use the up and down arrow keys to scroll through the list of suggestions or you can right-click in the suggestion list to select an entry directly. At any time, you can press the backspace key in the dialog window to hide the menu; you can type a space character, tab or new line to redisplay the appropriately populated dialog window.

The following table shows the suggested value that you can select, depending on the position of the cursor:

	Cursor position	Possible selections	Comments
1	Start of the expression	set, fix, if, warn, error, inform	Variant conditions (as opposed to defining constraints) do not have possible selections. These must be logical expressions that decide whether the selected structure line is loaded. Go to line 2 of this table.
2	Where an option selection is required	Module interface	This selection includes all options of current module and public options of directly included child modules. If an option is being presented as a possible value, only options having the same type as the required value are displayed. If the option directly follows set or fix then go to line 3 of this table, otherwise go to line 5 (in this case, option selected is a value).
3	set or fix following by an option	to	If you selected the option rather than typing it, to appears automatically and you do not need to make this selection. Go to line 4 of this table.

	Cursor position	Possible selections	Comments
4	When a value selection is required	Valid value	If the option requiring a value is an enumeration, a list of allowable values is shown. If the option is logical, true and false is shown. A value may also be another option of the same type from the module interface (see line 2). You must type strings and numbers manually in double quotes. Go to line 5.
5	After value	Appropriate operator or expression end	If the expression already contains a comparison operator, and and or are shown. If you select one of these, go to line 2. If the value is numeric +, -, *, and / are shown. If you select one of these, go to line 4. If the value follows if and precedes a comparison operator, = and !=, as well as <, <=, >, and >= if the value is numeric. If you select one of these, go to line 4. If you are building a constraint and the value follows both an if and a comparison operator, then is also shown. If you select this, go to line 6. If the constraint also contains then, else, else if, and endif are also shown. If you select else, go to line 6. If you select else, go to line 2. If you select endif, Teamcenter disables all buttons other than OK and Cancel. If you are building a variant condition and the value follows both if and a comparison operator, endif is also shown. If you select

	Cursor position	Possible selections	Comments
			this, Teamcenter halts interactive expression building.
6	After then in a derived default	set, fix, error, warning, info	If you select set or fix , go to line 2, otherwise go to line 7.
7	After error, warning, or info	None. You must type the message text.	Teamcenter creates single quotes (open and close) and places the cursor between them. You can place the cursor to the right of the closing quote to make else, else if, and endif available as selections (see line 5).

Example of an expression coded in MVL

In this example, the options in the following product structure are coded in MVL:

```

I0100 – Car
  I0200 – BrakeSystem
    I0300 – Disk Brake Assembly
      I0400 – Standard Pads
      I0410 – Performance Pads
      I0420 – Solid Disk
      I0430 – Vented Disk
    I0300 – Disk Brake Assembly
      I0400 – Standard Pads
      I0410 – Performance Pads
      I0420 – Solid Disk
      I0430 – Vented Disk
    I0310 – Drum Brake

```

Give the first of the I0320 lines the name **front** and the second one **rear**. Do this by modifying the **bl_occ_occurrence_name** occurrence name property. You should then add the following option declarations.

Item	Scope	Name	Type	Values
I0100	public	Model	string	LS, LX, GX
I0200	public	Config	string	Standard, Semi Sports, Sports
I0300	public	Performance	string	Normal, High

Item	Scope	Name	Type	Values
I0300	private	Pads	string	OK, Good
I0300	private	Disk	string	Solid, Vented

Now add the following MVL constraints:

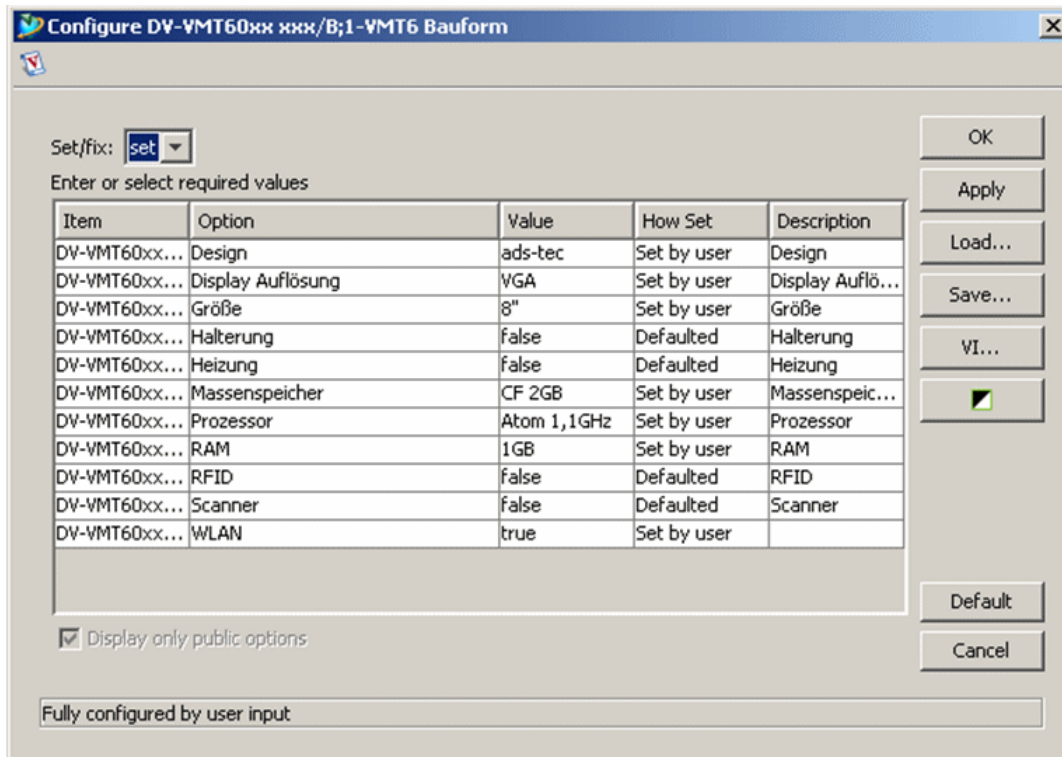
Item	MVL constraints
I0100	<pre> if I0100:Model = "LS" then set I0200_BrakeSys:Config to "Standard" elif I0100:Model = "LX" then set I0200_BrakeSys:Config to "Semi Sports" else set I0200_BrakeSys:Config to "Sports" endif </pre>
I0200	<pre> set I0300:Performance to "Normal" if I0200:Config != "Standard" then set I0300:Performance[front] to "High" endif if I0200:Config = "Sports" then set I0300:Performance[rear] to "High" endif </pre>
I0300	<pre> set I0300:Pads to "OK" set I0300:Disk to "Solid" if I0300:Performance = "High" then set I0300:Disk to "Vented" set I0300:Pads to "Good" endif </pre>

Configuring a variant structure by setting variant rules

Configuring a variant structure by setting variant rules

You configure a variant structure by setting the option values on the top-level module. If the structure is completely authored with variant data, all the lower level modules are completely configured.

For example, users are offered the following public options when they configure the product.



Public options

Defaults are set for all the options and the dialog box contains the default values. However, users can override (set) the default values if they are not fixed defaults when you toggle **Set/fix** to **Set**. This prevents any subsequent programmatic set or fix of the option by MVL from overriding the value set by user.

Configure the variant structure

1. Click the **Variant Rule** button  on the toolbar or choose **Tools→Variants→Configure**.

Teamcenter displays the **Configuration** dialog box (as shown in the previous figure), showing all the options of the top-level module.

2. Set the following option values to configure the structure. You can place the cursor over the **Value** cell to display a tool tip containing further information about the required option value as follows.
 - Public or private
 - Option name
 - Allowed values
 - Implements (a global option definition) or presents (where appropriate)

This information is displayed in modular variants language (MVL), for example:

```
public 'Appliance Width' integer=500,600 default=500
```

Or

```
public '002547 Number of shelves' presents 002547: 'Number of shelves'
Public 'Number of shelves' integer = 1, 2, 3, 0 default 3
```

If you want to restore the original, default settings, click the **Default** button.

Note:

In production use, you would not configure the structure for a lower level module. However, you may want to do this when debugging, to check that all options are set in the lower level modules when the top-level module is completely set (this verifies all options have a value). To do this, set **Tools→Variants→Only Configure Root** to **off**.

For general use, set **Tools→Variants→Only Configure Root** to **on**; the **Configuration** dialog box only displays options for the top-level module, regardless of the structure line selected.

Selecting option values

In the **Configuration** dialog box, you can select option values in one of two ways, as follows:

- If an option has allowed values, Teamcenter displays all the available values.
- You select values for numeric (real and integer) options manually as a single value or a range. To see the allowed range or values, place the cursor over the option and Teamcenter displays a detailed tool tip.

The **Configure** dialog box contains a table of options and any default values set. Options that do not have a default value are blank. The features of the **Configure** dialog box that you can use to select option values are as follows.

Feature	Description
Heading	Identifies and names the module to configure.
Option	Lists public and legacy options for the selected module.
Value	Opens a dialog box containing default values for options.
OK	Configures the structure and closes the dialog box.
Apply	Configures the structure and does not close the dialog box.
Load	Opens a dialog box that enables you to retrieve a saved configuration.

Feature	Description
Save	Opens a dialog box that allows you to save the current configuration.
VI	Opens a variant item search dialog box with values set.
Default	Resets the configuration with option default values.
Clear	Clears all configuration values.
Cancel	Closes the dialog box without applying configuration.
Display only public options	Shows configuration of private options. You cannot set them here.
Configuration	Displays the configuration status.

Test current product configuration

Checking that a product is completely authored is a manual process. You must set all option values for the relevant variant of the module, select each lower-level module (possibly starting at the lowest level modules) and check that all the option values are set correctly.

1. Choose **Tools→Variants→View Child Configurations→On**, allowing the **Configuration** dialog box to display options for the selected BOM line and not the top-level module.
2. Select each lower level module in the structure, then click the **Variant Rule**  button on the toolbar or choose **Tools→Variants→Configure**.

In each case, Teamcenter displays the **Configuration** dialog box, allowing you to confirm all the option values are set. The **Configuration** dialog box is updated dynamically and it is not necessary to redisplay it each time you select a new module.

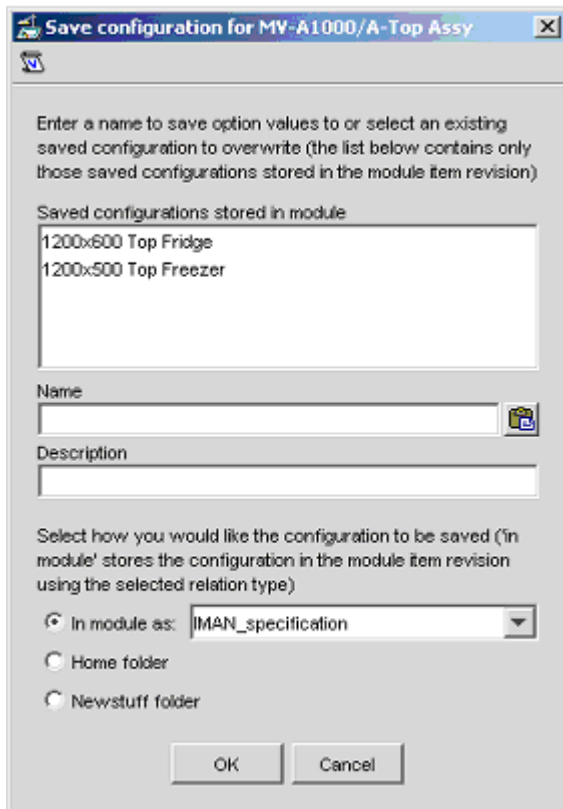
3. If all lower level modules are not completely configured, define further constraints in the higher level modules or present lower level options to the top-level module, as required.
4. Optionally, save the variant configuration tested as a saved configuration.

Create a saved configuration

Save the current configuration to save a configuration of modules with a large number of options for reuse, for example, in a separate session.

1. Click the **Save** button in the **Configuration** dialog box.

Teamcenter displays the **Save** dialog box, as shown in the following figure. Note that two variant rules are already saved and attached to the current module.



Saving a variant configuration

2. In the dialog box, enter a name for the saved configuration, for example, **1200x500 Top Fridge**.
3. Select the location of the saved configuration. By default, it is attached by a **Specification** relation to the current module, but you can select another relation from the list.

You can configure the available relations by setting the **PSESavedConfigRelationTypes** user preference.

Load a saved configuration

You can load a previously saved configuration and apply it to the current module. If the configuration does not have all the option values defined, Teamcenter prompts you with the following message:

Clear values or overlay?
 Not all options are set with this saved configuration.
 Do you want to clear set values before applying this configuration?

Click one of the following buttons to continue:

- Click **Yes** to only set the option values set in the configuration and clear those values that are unset. You also restore defaults if set.

- Click **No** to omit any option values not defined in the loaded configuration as they are currently set.

Caution:

You cannot load variants of modular variant assemblies from NX; you can only load legacy data.

Importing and updating variant data

- You can import or update a stored option set (SOS) from an external system. To do this, your administrator must add the appropriate closure rule to the transfer mode. You must choose this transfer mode each time you import or update an SOS.
- You can export a stored option set (SOS) with a modular variant item in TC XML format by using the **tcxml_export** utility. The exported TC XML file includes the SOS related to the modular variant item assuming the transfer mode includes closure rules necessary for an SOS. An import with **tcxml_import** imports the SOS with a modular variant item and when the TC XML file contains an SOS. The SOS cannot be exported or imported separately.

Creating and searching for variant items

Populate a complete variant structure

There are two approaches to populating a variant structure—*top-down* and *iterative bottom-up*.

The most common approach for simple products is top-down. A customer places an order and the salesman sets the values of the options in the variant rule, then creates a variant item for the top-level item. The variant item represents the customer order. The salesman then substitutes all the lower level modules with variant items, if they exist, or creates new ones if they do not exist.

Alternatively, you can use an iterative bottom-up approach when the customer order can be adjusted to use variants items that are already available, as follows:

- The salesman uses an SOS at the top level of the structure to define the customer order; a variant item is not yet created. This action configures the entire structure.
- The salesman searches for variant items for each module to see if they exist. This is an iterative process-creating variant items and changing values on the SOS until a complete structure of variant items is created. The customer may want to modify the original SOS due to variant items that are available and satisfactory, but did not match the original specification.

Note:

You cannot push values for lower level saved option sets up to higher levels.

- When a complete set of variant items are located, the salesman confirms the top-level SOS option values are correct and verifies the configuration with the customer order.

4. The salesman creates a variant item for the top level by saving the generic item with a unique customer name and prunes unconfigured structure lines. The children that are modules are still generic.
5. Edit the structure by substituting the generic modules with the variant item that works for the SOS at the top level.
6. Repeat step 5 for all other modules at all levels.

Creating and updating variant items

Creating and updating variant items

A *variant item* is a specific variant of a completely configured assembly, for example, a **Door** assembly with **height = 500**, **width = 600**; **application = fridge**, and **color = white**. Variant items are physical parts with no variability. You can allocate a manufacturing part number to a variant item.

You cannot manufacture an unconfigured structure. They may have a large number of options and numeric options; options have a limited number of selections, while numeric options may have an infinite range unless permitted values are specified. This results in a correspondingly large number of product permutations, not all of which are valid. You may want to reuse permutations that have previously been sold, particularly if significant engineering work was invested in creating the associated technical documentation, drawings and manufacturing data. You can attach such associated data to the variant items once they are created.

You can search for existing variant items so that they can be reused. If a suitable variant item does not already exist, you can create new variant items as required. You can then build up variant items into a complete structure for a specific configuration, for example, a configuration that corresponds to a customer order. In this specific configuration, all modules are replaced by variant items.

It is good business practice to release the generic item revision before you generate variant items from it. If you do not do this, the variant items fully correspond to the generic items from which you generated them. Teamcenter does not enforce a release process for generic item revisions.

Teamcenter allows you to manage variant items, as follows:

- Search for existing variant items by entering option values.
- Create a new variant item if no existing variant item is found. You should create new variant item at the lowest possible level of the structure.
- Replace a selected variant item in the associated assembly to build up a complete variant item structure.
- Open a variant item and view it.

After creating a variant item from a generic structure, you cannot make any structure changes to the BOM view revisions of the generic item revision or the variant item revision. Such changes make both the generic structure and the variant item structure invalid. To make any such structural change, revise the generic structure and then make changes to the new revision. These changes are not reflected in previously linked variant items automatically; you must search for the affected variant items and update them individually with the changes.

You cannot make structural changes to the generic item when it is linked to a variant item, including adding or removing a line, and creating a relation. Likewise, you can change the item revision master form attributes on the variant item, but cannot make structural changes. If you make changes to the master form attributes, you should search for other variant items that should be updated.

Search for a variant item

Before starting this process, ensure you have created a variant item for the top level. Typically, this has a completely defined saved option set with a value or a range of values specified for all options. Alternatively, you can start with an incomplete saved option set and use an iterative process to populate the lower level generic items. You should replace all the generic items with variant items.

Note:

You can automatically create variant items for an entire generic structure.

Likewise, relationships such as **Connected To** are carried forward from the generic component to the variant item.

To search for an existing variant item (for example, to make a substitution), open the top-level variant item by clicking the **Open** button and choosing **Tools→Variants→Search**.

Teamcenter displays the **Variant Item Search** dialog box.

When you perform a variant item search, Teamcenter applies the current Structure Manager revision rule to the generic structure and configures the revisions accordingly.

If **Tools→Variants→Only Configure Root** is not selected, the dialog box shows options for the root module only. If it is selected, you can use it to identify reuse for any module represented by a selected line in the structure.

After you specify the search requirements, execute a query for matching variant items by clicking the **Search** button.

Teamcenter displays the search results at the bottom of the dialog box showing the matching variant items. Search results in which one variant item matches the criteria are shown in the following example.

Select required values. To maximize your chance of finding a variant, enter ranges for numeric options and leave less important options unset.

Option	Required Value	Value Found
002504 Bottom Appli...	Freezer	Freezer
002504 Top Application	Fridge	Fridge
002547 Number of S...	3	3
002547 Saled Drawr	Yes	Yes
Appliance Height	1200	1200
Appliance Width	500	500
Country	England	England

Suitable variants (1 found)

Search: 002575-UK Fridge Freezer 1200x500

Suitable variants exist in the module substructure View...

Buttons: Open, Substitute, Apply, New..., Default, Clear, Close

If the query is successful, the identifiers and names of variant items whose values match the search criteria populate the list next to the **Search** button.

The search only finds *linked* variant items—unlinked variant items may have structure changes and would therefore not be applicable.

If the variant item search is successful, Teamcenter loads the first variant item returned by the query and shows its values in the **Value Found** column. If you select a different variant item from the list, Teamcenter loads it and updates the **Value Found** column. You can then click the **Replace** button to replace the selected item with the variant item.

Create a new variant item

If a variant item search is unsuccessful, you can create a new variant item to replace the selected generic item as follows:

Note:

This procedure does not traverse the entire structure and only creates a variant item for the selected generic item. If you want to create variant items throughout the structure, create the variant items automatically, as described later.

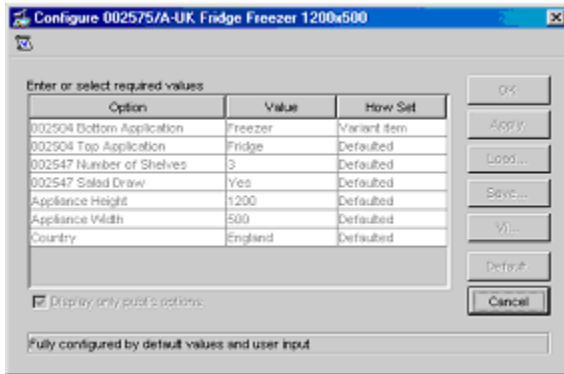
The **PSEIsNewVILinkedToModule** preference determines if variant items are linked to the generic item by default. If it is set to **false**, they are not linked to the generic item. The default value of this preference is **true**.

1. Ensure you specify a single value for each option and each requirement (that is, do not enter ranges or multiple selections), and then click **New**.

Teamcenter displays the **New Variant Item** dialog box. (This dialog box is similar to the **New Item** dialog box but includes an additional tab that shows the configuration values.)

2. Optionally, click **Default** to clear the table and populate the requirements with option defaults.
3. Optionally, click **Replace** to define the new variant item as a replacement for the selected generic item.
4. Click **Apply** to configure the structure with the selected variant item.

A typical variant configuration is shown in the following example.



In this example, all the options and values are unavailable (grayed out) because you cannot modify them for a variant item.

The following example shows a structure in which all the generic modules are not yet replaced with variant items; for example, the cooling system and carcass. The variant structure is complete only when you replace these generic modules with variant items.

BOM Line	Occurrence Name	Generic Component
002575/A-UK Fridge Freezer 1200x500 (view)		002508/A-Fridge Freezer
002564/A-Fridge 1200x500 (view)	Top	002504/A-Door Assembly
002495/A-Butter Cheese		
002496/A-Egg Tray		
002498/A-Shelf Door		
002499/A-Insulation Fridge		
002580/A-door 600x500		002500/A-Door Outer
002501/A-Handle		
002502/A-Door Liner Fridge		
002498/A-Shelf Door		
002498/A-Shelf Door		
002570/A-Freezer 1200x500 (view)	Bottom	002504/A-Door Assembly
002580/A-door 600x500		002500/A-Door Outer
002501/A-Handle		
002503/A-Door Liner Freezer		
002526/A-Insulation Freezer		
002536/A-Cooling System (view)		
002547/A-Carcass (view)		

Variant items are identified by a gray image with a red check mark (); generic modules are identified by a gray image *without* the red check mark ().

Adding a generic item property

You can add the **Generic Item** property as a column in the properties table in the structure. Use this column to see the generic item to which a variant item is linked.

Create variant items automatically

Create variant items automatically

You can create a fully instantiated structure by manually searching for generic items and substituting a variant item for each such generic item, as described previously. However, this process is time-consuming if your structure is large and complex. In this case, consider creating variant item structures automatically as follows.

Note:

Item IDs are generated automatically, according to the naming rule for the item type of the generic structure; however, if you set the **PSEAutoViNewItemPopup** preference to **True**, you are prompted for an item ID during the creation process. If you set this preference to **False**, no prompts are displayed.

If you configure automatic creation, you can set a prefix for the name with the **PSEAutoViNamePrefix** preference.

Note:

Beginning with Teamcenter 10, the order in which variant items are automatically created is changed. Prior to Teamcenter 10, lines were processed according to their position or appearance with respect to the top line. Consequently, children of the first subassembly under the top line were processed before the second subassembly. This is referred to as the *depth-first-search* method. After Teamcenter 10, lines are processed in order of their level in the structure. For example, all subassemblies of an equivalent level are processed together before any of their children. This is referred to as the *breadth-first-search* method.

When the **PSEAutoViNewItemPopup** preference is set to false, all valid modules in a level are processed in bulk to improve performance as well as reduce chattiness. However, when the **PSEAutoViNewItemPopup** preference is set to true, bulk processing is not done.

1. Load and select the generic structure for which you want to automatically create variant items.
2. Click the **Variant Rule**  button on the toolbar or choose **Tools→Variants→Configure**.

Teamcenter displays the **Configuration** dialog box, showing all the options of the top-level module.

3. Click the **VI** button on the dialog box.

Teamcenter displays the **Search** dialog box.

4. Select the required option and click the **Search** button.

If there is not already a variant item for the top line, the search results list is empty and Teamcenter enables the **Auto VI** button.

5. To begin automatic creation of variant items, click the **Auto VI** button.

Teamcenter displays the **Auto Create VI Structures** confirmation dialog box.

6. Click **Yes** in the dialog box.

Teamcenter begins the automatic creation process. It displays a progress bar until all variant items are complete. The dialog box is updated constantly with results as the variant items are created and substituted. The preceding **Search** dialog box also shows feedback as the process continues. This process may take a significant time to complete if you have a large generic structure and particularly if the variant logic is large and complex at the upper levels.

Tip:

If performance is not acceptable, try creating variant items for the upper level manually and automatically populating the generic structure for the lower levels. You can then manually substitute these variant items into the variant item for the top level.

If you request a prompt for each item identifier, item revision identifier, and item name, Teamcenter displays the **New Variant Item** dialog box each time and the process pauses until you enter values in the dialog box and click **Finish**.

Note:

This prompt displays only if the **PSEAutoViNewItemPopup** preference is set to **ON**.

7. When the automatic creation process is complete, Teamcenter enables the **OK** button, and you can click this button to close the progress window.

Setting preferences for automatic variant item creation

You can set the following preferences to determine how variant items are created:

- **PSEAutoViCreateEmptyVI**

This preference determines if the process creates a variant item for each nonmodule that Teamcenter encounters. If set to **True** (on), as the process continues to the bottom of the generic structure, empty variant items (variant items with no variant configuration) are created for each item that is not a module. If set to **False** (off), Teamcenter does not create a variant item for a nonmodule.

- **PSEAutoViStopVICreationForUnconfiguredModule**

This preference determines if the automatic creation process stops as soon as it encounters a module in the generic structure that is not a configured module. If set to **False** (off), the process continues to the bottom of the generic structure, displaying warning messages for each unconfigured module encountered. (This is the best practice for most business environments.) If set to **True** (on), Teamcenter stops the process when it encounters an unconfigured module but does continue to check the other sibling branches.

- **PSEAutoViNewItemPopup**

This preference determines if Teamcenter prompts you for an item identifier, item revision identifier and item name each time the automatic creation process creates a variant item. If set to **False**

(off), Teamcenter automatically assigns values according to the predefined numbering and naming schemes. For example, if you have a generic item called **00100/A Generic Wheel**, Teamcenter may create a generic item called **00200/A VI_Generic Wheel**. If set to **True** (on), Teamcenter prompts you for this information each time a variant item is created.

- **PSEAutoViNamePrefix**

If the **PSEAutoViNewItemPopup** preference is set to **False** (off), this preference defines the naming scheme prefix that Teamcenter uses. For example, if you set this preference to **VI-** and create a generic item called **Wheel**, the name of the variant item is **VI-Wheel**.

- **PSEBypassVISearch**

Set this preference to **true** to add a **Create** button to the **Configure** dialog box as soon as the user sets a value for each option. This allows the user to bypass the requirement to search for similar variant item configurations before creating a new variant item. The default setting is **false**.

Revising variant items and generic modules

Revising variant items and generic modules

When you create a variant item, Teamcenter links it to the generic module item revision from which it is generated. This relationship allows you to search for variant items. It also prevents any changes to the variant items, unless they are unlinked. However, you cannot search for unlinked variant items.

You cannot make changes to the option data, add or remove static components, or apply variant conditions to a generic item if it is linked to a variant item, as these actions would cause inconsistencies. You *must* revise the generic item before making changes.

Caution:

If any option data is changed on the newly-revised generic item, you cannot revise the existing variant items, but must create new variant items.

At this point, there are no longer any variant items linked to the new generic item revision. The changes made are not reflected automatically in any existing variant items linked to previous generic item revisions. You must search for the affected variant items and update them individually with the changes.

However, you cannot make structural changes to the generic item when it is linked to a variant item, including adding or removing a line, and creating a relation.

You can change the item revision master form attributes on the variant item, but you cannot make structural changes. If you make changes to the master form attributes, you should search for other variant items that should be updated.

Update a variant item

When you make structural or option data changes to a generic item, Teamcenter does not automatically propagate such changes to the variant item revisions associated with previous module revisions. You can make such changes manually by creating a new revision of selected variant items to include the structural changes, as follows:

Note:

You can only revise variant items to reflect changes to the generic item if the variability is unchanged, that is, it has the same options and allowed values. You can add static components, but not components that have a variant condition, unless the variant condition refers to the original options and values.

1. Load the structure, select the revised generic item, and choose **Tools→Variants→Update Variant Item**.

Teamcenter displays the welcome window of the **VI Update** wizard.

You can load the structure with the generic item revision as the top-level line or with the generic item at a lower level. If the generic item revision is not the top-level line, you must set **Tools→Variants→Only Configure Root** to **Off** before you can update variant items.

Note:

You cannot update variant items if only one item revision of the generic item exists. You can only update variant items against the second and subsequent item revisions of the generic item.

2. Select the *previous* item revision of the generic item whose variant items you want to update and click **Next**.

The **VI Update** wizard shows the saved option set values against which you can search for applicable variant items.

3. Choose the saved option set values against which you want to search for variant items from the lists and click **Next**.

The **VI Update** wizard shows a list of variant items matching the chosen criteria.

Note:

If you leave any saved option set values blank, Teamcenter includes all possible values in the search criteria. If you leave all saved option set values blank, the results include all available variant items.

4. Select the variant items to update from the list of search results, and click **Update** to create new variant item revisions that include the structure changes.

Teamcenter shows the **Revise** dialog box, allowing you to define a revision, name, description and unit of measure for the new variant item revision.

To view a selected variant item revision before you update it, click **Open**.

5. After you define the new variant item revision and click **Finish**, Teamcenter closes the **Revise** dialog box and updates the **VI Update** wizard with the new variant item revision. The **Update** button is grayed out and you cannot make further changes to the new variant item revision. To inspect the new variant item revision, click the **Open** button.
6. If applicable, you can select another variant item revision from the list and repeat the update procedure. Do this until all the necessary variant item revisions are updated.
7. After you finish updating new variant item revisions, click **Next** and the **VI Update** wizard allows you to select another generic item revision whose variant item revisions require updating.

To update the variant item revisions of another generic item revision, select the **Do you want to update variant items for other revisions of the generic component?** check box and click **Finish**.

To exit without updating additional variant item revisions, click **Finish** without selecting the check box.

Unlink variant items

You may want to unlink variant items from the generic module item so that you can change the variant item. This is desirable if you use the generic structure as a quick way to create variant items for a particular customer order and the generic order is then further customized for the specific order.

To unlink variant items, choose **Tools→Variants→Unlink Variant Item**.

Teamcenter displays the **Unlink Variant Item** dialog box and you can click **Yes** to confirm deletion of the variant item.

When you unlink variant items, they are not found during a variant item search, because they have evolved and may not be appropriate for the purpose. However, if they are still appropriate, you can reuse in the structure for a new order.

Note:

You cannot relink a variant item after you have unlinked it from the generic module.

Synchronizing with NX

Synchronizing with NX

You can use option values to drive NX part expression values from variant items. For variant items, the option values are fixed and hence the geometry of the CAD design also remains fixed. You cannot synchronize generic item modules with NX, as the value may change each time a variant rule is specified.

To enable synchronization, choose the corresponding customer default in NX.

When you create a variant item, Teamcenter performs a **Save As** operation. For correct synchronization with NX, use Business Modeler IDE to set your deep copy rules for **Save As** on the appropriate item type so that Teamcenter copies the **UGMASTER** dataset as an object, not as reference.

Set the Business Modeler IDE rules for deep copies so that, when you choose the **Save As** command for an item revision, the following are copied as objects:

- **UGMaster** datasets
- **UGPart** datasets
- **Altrefs**
- (Optional) **UGScenario** datasets
- (Optional) **DirectModel** datasets

To create JT files for modular piece parts and view them in Teamcenter, you must create the corresponding variant items and persistently store the JT files for the different geometry.

You can drive piece part geometry from an assembly using the options presented to the assembly from the piece parts. To do this, set the value of the option on the assembly, which sets the option on the piece part in the *generic* structure. You then create a variant item for the assembly, which has an option and a value, and the value is the same as for the assembly. You now create a variant item with the corresponding option value, and substitute it into the assembly for the generic part. There is now an implicit link through the variant item structure.

Note:

Creating a variant item of an assembly does not automatically create variant items of the piece parts in the assembly. You must manually or automatically create variant items throughout the structure, as described in the previous paragraph.

The synchronization process matches the option and expression names, so you must take care to ensure they are identical and note the following points:

- Names are case sensitive
- Do not use spaces in option names as expressions cannot accept spaces.
- Do not use underscores.

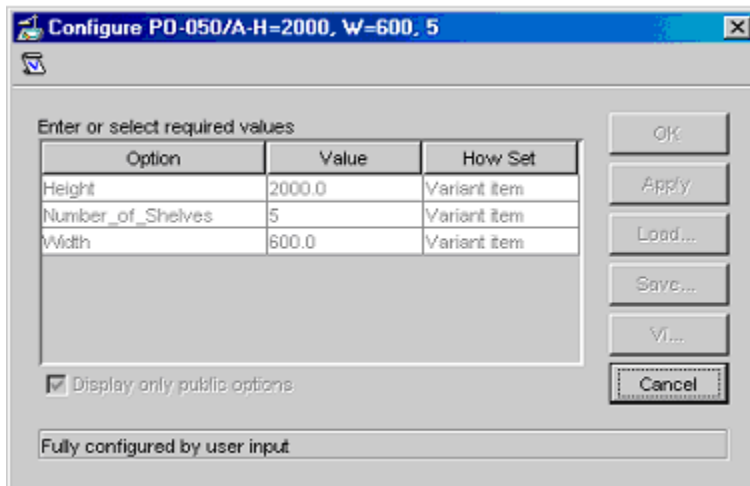
Caution:

NX does not indicate if an expression is synchronized with Teamcenter. If the expression value is changed manually in NX, the manual value is overwritten next time the part is loaded from Teamcenter. You can use naming conventions as an indication of synchronization.

You can optionally create a special item type for variant items. If you do this, ensure the **type** is set to the base type, not the variant item type.

Driving geometry

The following figures shows how a **Height** option in Teamcenter drives a **Height** expression value in NX.





Mapping options to expressions in NX

Driving assembly component position

You can drive assembly component positions with mating conditions by setting the expression value of the mating offset to **linear** or **angular**.

Working with component arrays

You can drive component arrays in NX from Teamcenter options, but should take care in certain situations. For example, you may have a number of holes in a circular array that are controlled by an array in NX. Bolts are located in each hole and consequently the number of bolts needed is determined by the number of holes. Similarly, the positions of the bolts depend on the positions of the holes.

The number of bolts can be determined by a Teamcenter variant condition, for example:

For bolts 7 and 8, variant condition = If No_Bolts>7

For bolts 9 and 10, variant condition = If No_Bolts>8

You may encounter problems if you use the NX array to determine the number of bolts in this situation and, if possible, you should avoid arrays. Alternatively, you can define the location of each bolt as a

mating offset, whose size is determined by a formula, for example, **$360/(\text{No\_Bolts} - 1)$** . Each bolt is then mated to a bolt that is always present, rather than possibly mated to a suppressed and unconfigured component.

Take care to associate the variant condition with the correct component. To achieve this, you can label each occurrence in NX with the component name and make the same name visible in the Teamcenter product structure.

You can control this functionality with the Teamcenter Integration for NX assembly **Variant Item Update** preference.

17. Configuring structures by using Product Configurator variants

Advantages of using Product Configurator variants

In classic or modular variants, the variability data such as families, features, and rules are associated with the structures. However, the task to manage the variability data is independent of the task of managing structures. Therefore, it is advisable to separate out the variability data from the structure. Doing so ensures that any changes to the variability data do not change the structure. The Product Configurator application provides dictionaries and configurator contexts to manage the variability data separately. Therefore, different domains, such as system engineering, design, content management, and manufacturing, can use the same variability data without updating a structure.

You can use the Product Configurator variants once the administrator:

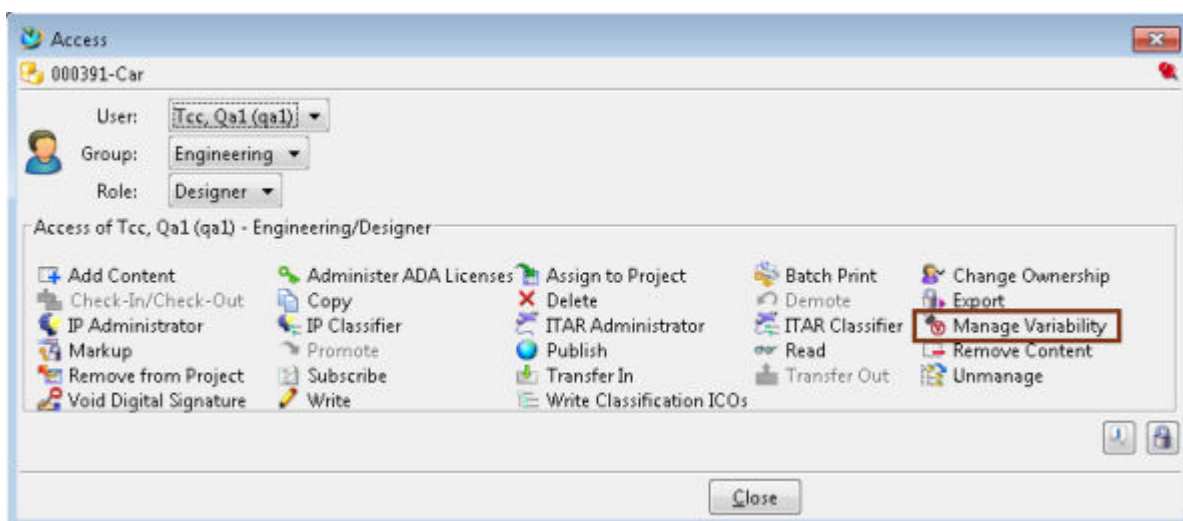
- Installs the solution template to support Product Configurator for Structure Manager.
- Sets the preference to enable the Product Configurator variant mode.

Associate a configurator context with a structure

To obtain the required variability data such as *families*, *features*, and *rules* from a configurator context, you associate the configurator with the product structure.

You can perform this association only if you have the **Manage Variability** privileges. To verify that you do:

1. In My Teamcenter, right-click the topmost item of the product structure and click **Access**.
2. In the **Access** dialog box, verify that the **Manage Variability** privilege is enabled.



Associate a configurator context with a structure

1. In My Teamcenter, search for the structure and the configurator context.
2. Right-click the product structure and choose **Paste**. You cannot associate the configurator context with the item revision of the structure.

To verify if the configurator context is associated with the structure, select the product structure and click the **Details** view. The **Relation** column must show **Variability Scope**.

Summary Details Impact Analysis Viewer JT Preview Process History		
FSC_BVR_DATA-FSC_BVR_DATA		
Object	Type	Relation
FSC_BVR_DATA	Item Master	Item Masters
FSC_BVR_DATA-FSC_BVR_DATA-View	BOMView	BOM Views
FSC_BVR_DATA/A;1	Item Revision	Revisions
FSC_Config_Data-FSC_Config_Data	Configurator Context	Variability Scope

Only the configurator context associated with the topmost line item of the structure is considered for authoring variant conditions.

Tip:

If you are likely to use this configurator context as the basis for several structures, set this as the default context.

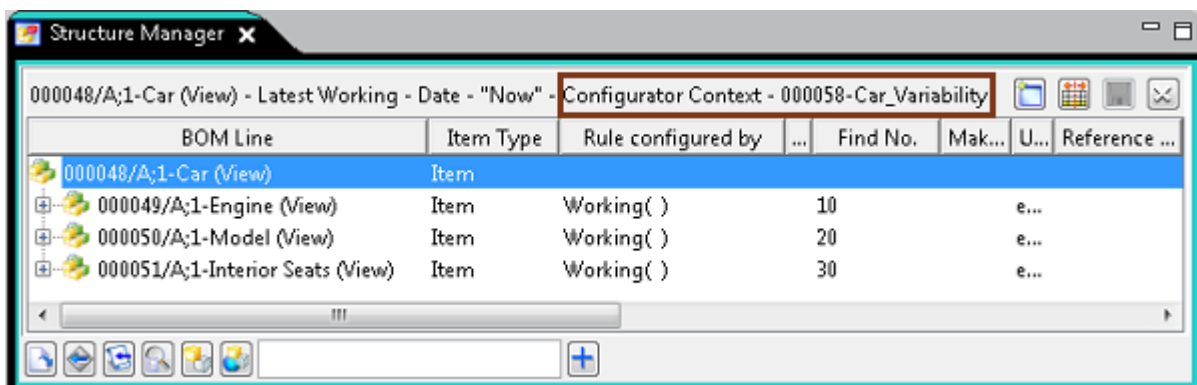
Set the default configurator context

When you set a *specific* configurator context as the default, it acts as the effective configurator context for all structures that you open in Structure Manager.

1. In Structure Manager, choose **Edit→Set as Default Configurator Context**.
2. In the **Set Default Configurator Context** dialog box, search for the relevant configurator context and click **OK**.

After setting the default configurator context, you must close Structure Manager and open it again from the left navigation pane.

To verify whether the default configurator context is set, open a structure in Structure Manager. The Structure Manager view displays the configurator context currently associated with the structure.



Remove the default configurator context

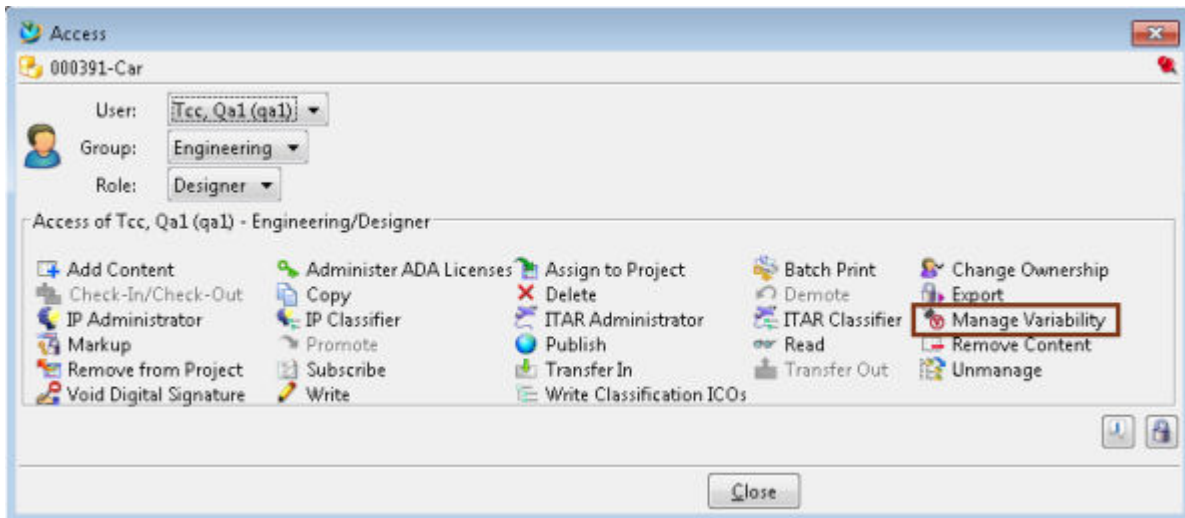
Consider a case where a structure is associated with a configurator context that is not the default configurator context. On opening this structure in Structure Manager, a warning is displayed, specifying that the associated and the default configurator contexts are different. In such cases, the default configurator context is applied to the structure. For the associated configurator context to be applied to the structure, you must remove the default configurator context. To do so, in Structure Manager, choose **Edit→Unset as Default Configurator Context**.

For the associated configurator context to take effect, you must close Structure Manager and open it again from the left navigation pane.

Remove the association between a structure and a configurator context

You can remove the association between a structure and a configurator context only if you have the **Manage Variability** privilege. To verify this:

1. In My Teamcenter, right-click the top item of the structure and choose **Access**.
2. In the **Access** dialog box, verify if the **Manage Variability** privilege is enabled.



To remove the association:

1. In My Teamcenter, search for the structure.
2. Expand the structure, right-click the associated configurator context, and choose **Cut**.

Author variant expressions

You can author variant expressions in **Grid Authoring** or **Formula Authoring** mode. The **Variant Formula Expression Editor** view displays **Grid Authoring** as the default mode. You can switch to the **Formula Authoring** mode by selecting the **Switch to formula authoring mode** toggle. The **Formula Authoring** mode is not available in Product Configurator and 4GD applications.

1. Open the structure for which you want to author variant conditions in Structure Manager.

Ensure that the **Variant Formula** property column is displayed in the product structure tree. This property displays the variant condition and is not visible on the use interface by default.

2. Select any BOM line other than the root node and click **Edit the variant condition**  on the main toolbar.
3. Apply revision rules, assign effectivity, and specify a rule date.

By default, it shows **Any Status; Working (Modified)** for revision rules, **No Effectivity** for effectivity, and the current date and 00:00 hours for rule date. You can:

- Apply revision rules to change the variability information in the expression formula editor for a particular situation. Each revision rule selects the appropriate revision of all the components in the structure for a particular situation. For example, a design engineer may want to see the components specified by the **Latest Working** revision rule, whereas a manufacturing engineer may require the components specified by the **Latest Released** revision rule.
- Assign effectivity to change the variability information in the expression formula editor for a particular situation. The features are configured according to the unit range or the date range you specify.
- Set the rule date to change the variability information in the expression formula editor. You can choose **Latest**, **No Rule Date**, **System Default**, or **Set Rule Date**.



You can set the default rule date by using the **Cfg0DefaultRuleDateForContent** preference. The default value for this preference is **System Default**. For more information about this preference, see *Where can I get a list of preferences?* in *Managing Preferences* on Support Center.

This preference has no impact on rule date in Product Configurator.

The expression formula editor view remains blank if there are no features available for the combination of revision rules, effectivity, and rule date you apply.

Author variant expression in Grid Authoring mode

The **Variant Formula Expression Editor** view displays **Grid Authoring** as the default mode. You can select multiple BOM lines to author the variant expression in this mode.

1. Select the BOM line items for which you want to author the variant condition.

2. In the **Variant Formula Expression Editor** view, select the required options to define a variant condition.

The area at the bottom of the view displays the variant condition based on your selection. This is not available if you select multiple BOM lines.

In the **Variant Formula Expression Editor** view, the first column lists the option values organized by their families. You construct a variant condition by clicking the cells. Selections are indicated by a check mark ✓ or a circle backslash icon ⚡ in a cell. The check mark ✓ indicates that the option is applicable. The circle backslash icon ⚡ indicates that the option is not applicable to the BOM line.

You can also edit an existing variant condition by changing any of the fields. Updated rules are displayed but not saved instantly.

If a BOM line has a variant condition previously authored using classic variants, the older value displayed in **Variant Condition** is replaced with the new condition and is displayed in **Variant Formula**. However, if a BOM line has a variant condition previously authored using a modular variant, you must delete the old condition before creating a new one.

Note:

If you open a BOM line containing classic conditions with the legacy option family, you cannot edit the variant formula. Structure Manager displays an error message saying that some of the selected BOM lines have classic variant expressions with classic variability. In such cases, you must clear the classic variant expression.

3. Click **Save the current content**  on the main toolbar to set the variant condition. You cannot update this variant condition using classic or modular variants.

After you author variant expressions, configure the structure by setting variant rules.

Author variant expression in Formula Authoring mode

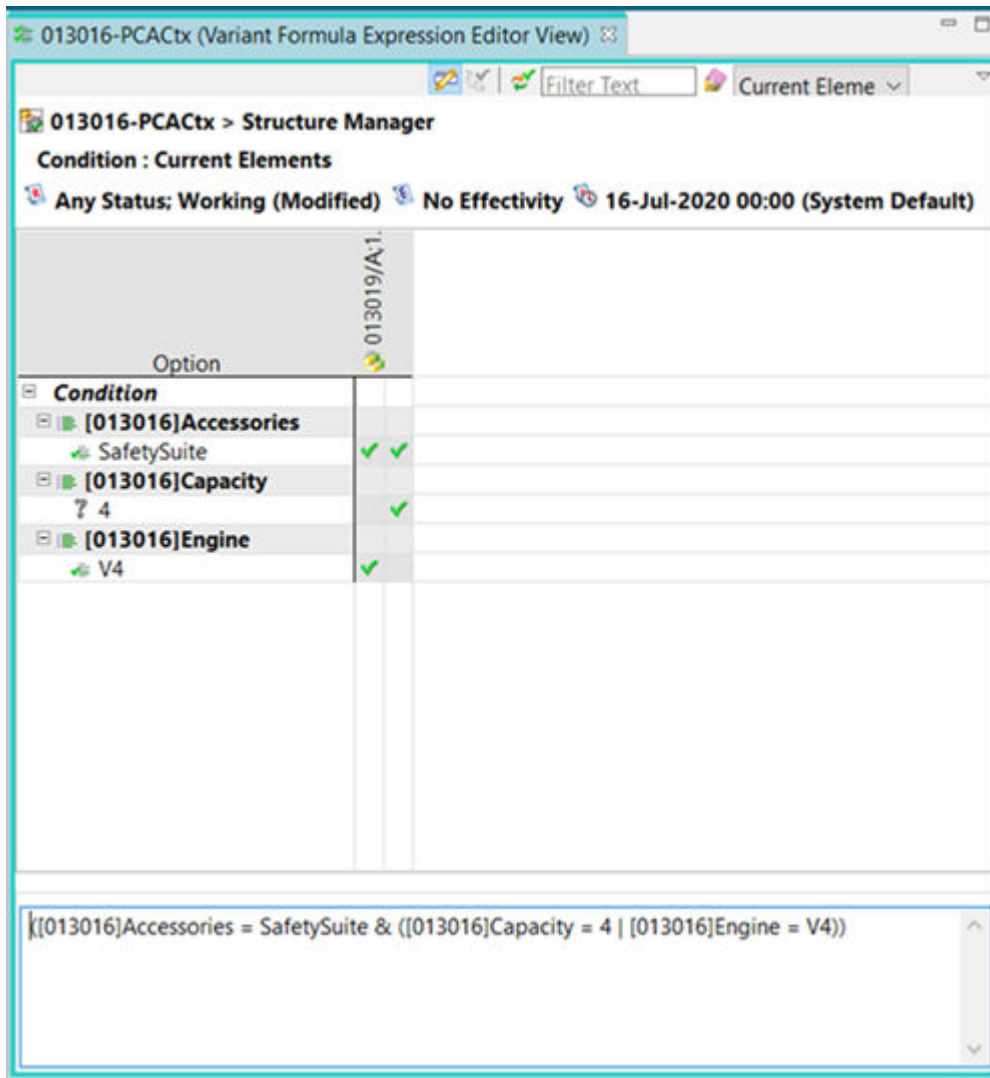
The **Variant Formula Expression Editor** view displays **Grid Authoring** as the default mode. You can switch to the **Formula Authoring** mode by selecting the **Switch to formula authoring mode** toggle. You can select only a single BOM line to author the variant expression in this mode.

If the authored expression is not available in the **Grid Authoring** mode, the system switches automatically to the **Formula Authoring** mode and displays an error message. The **Expression** display area loads the **bl_formula** property and this can be edited to be updated or written from scratch to author a variant condition.

1. Select the BOM line item for which you want to author the variant condition.
2. Select the **Switch to formula authoring mode** toggle.

3. Edit the formula by using the **Variant Formula property**.

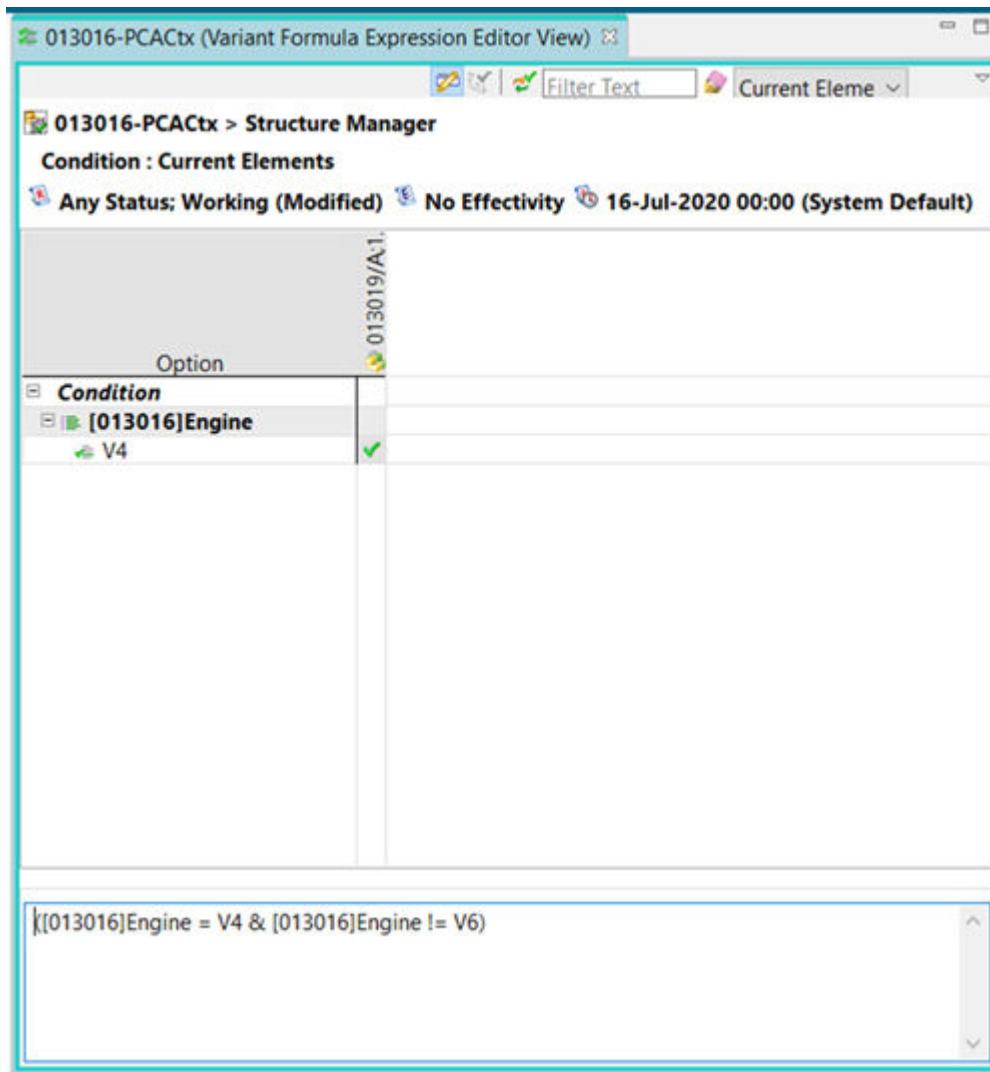
The text editor supports **Cut** (Ctrl+X), **Copy** (Ctrl+C), and **Paste** (Ctrl+V) keyboard operations. In case the expression is large, the text editor can be resized or vertical scroll bars can be used to navigate.



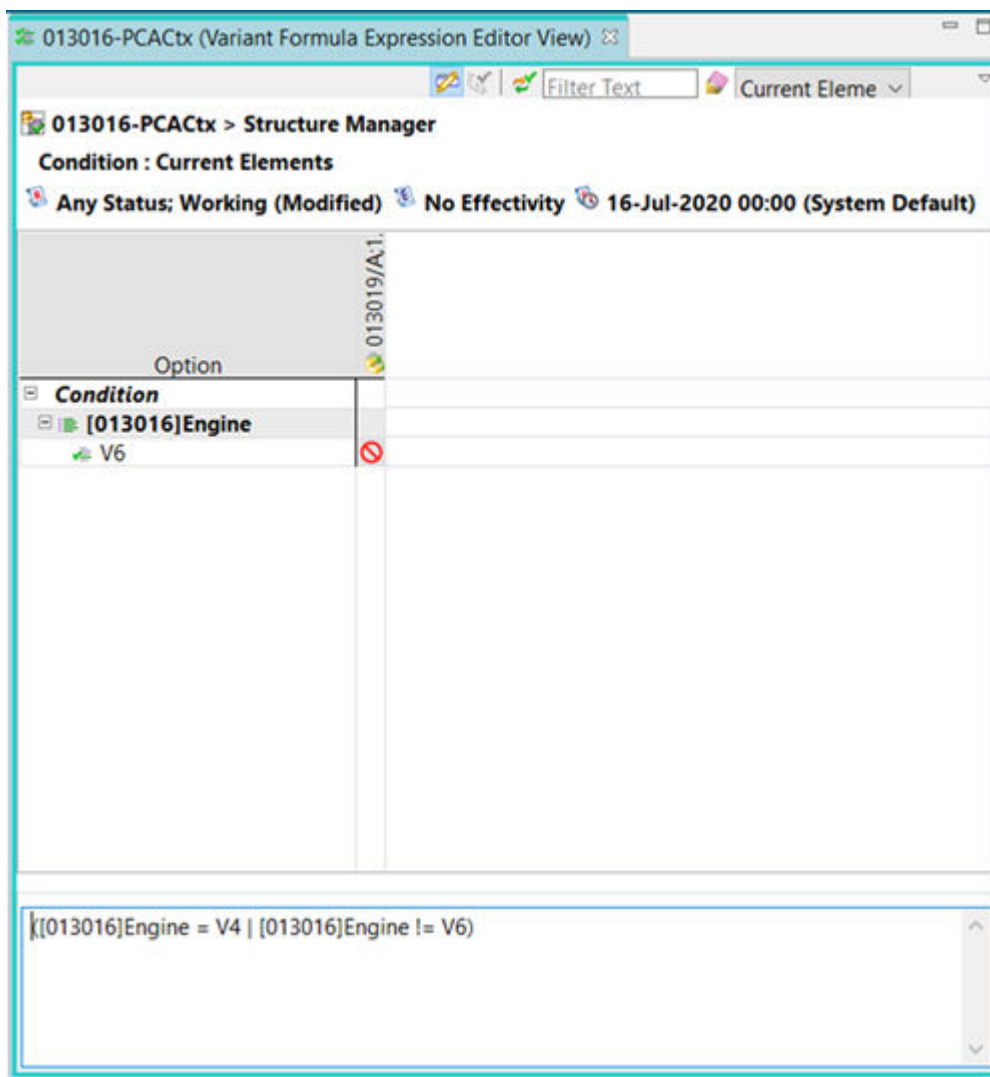
The formula that can be normalized to represent a simpler grid expression is normalized and shown in the grid. This does not affect the formula but only the grid representation of it.

Examples:

(([013016]Engine = V4 & [013016]Engine != V6) is shown in the grid as [013016]Engine = V4.



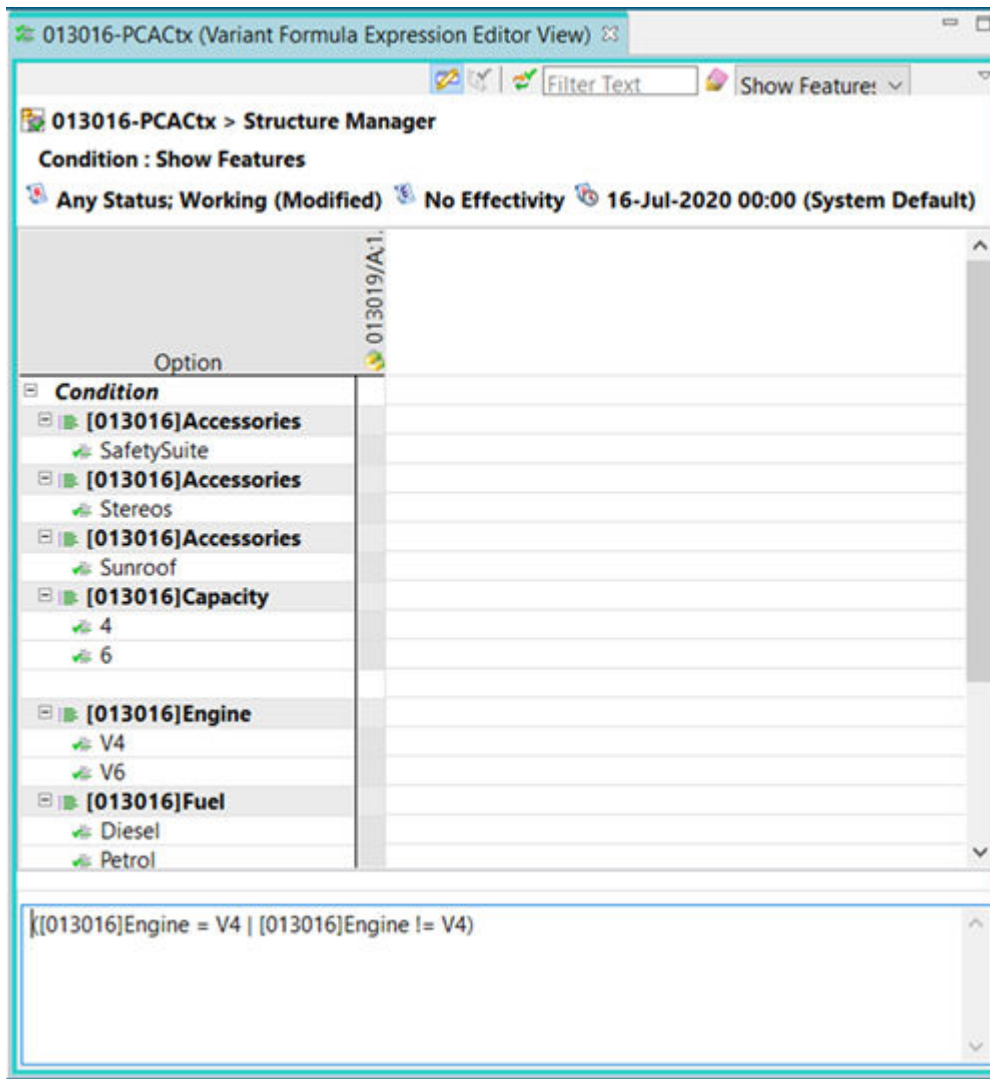
([013016]Engine = V4 | [013016]Engine != V6) is shown as ([013016]Engine != V6



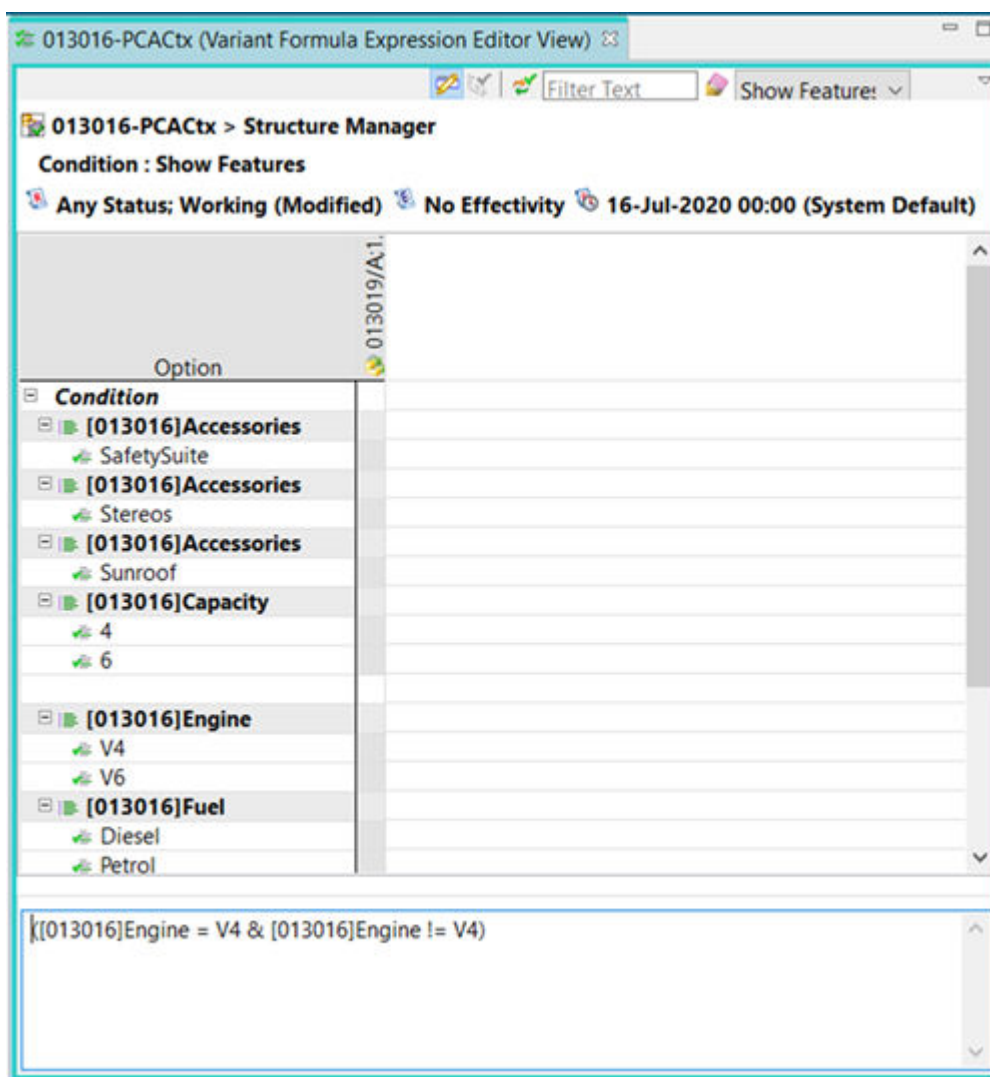
Formula expressions that are logically equivalent to tautology (always **TRUE**) or contradiction (always **FALSE**) are shown as empty in the grid.

Examples:

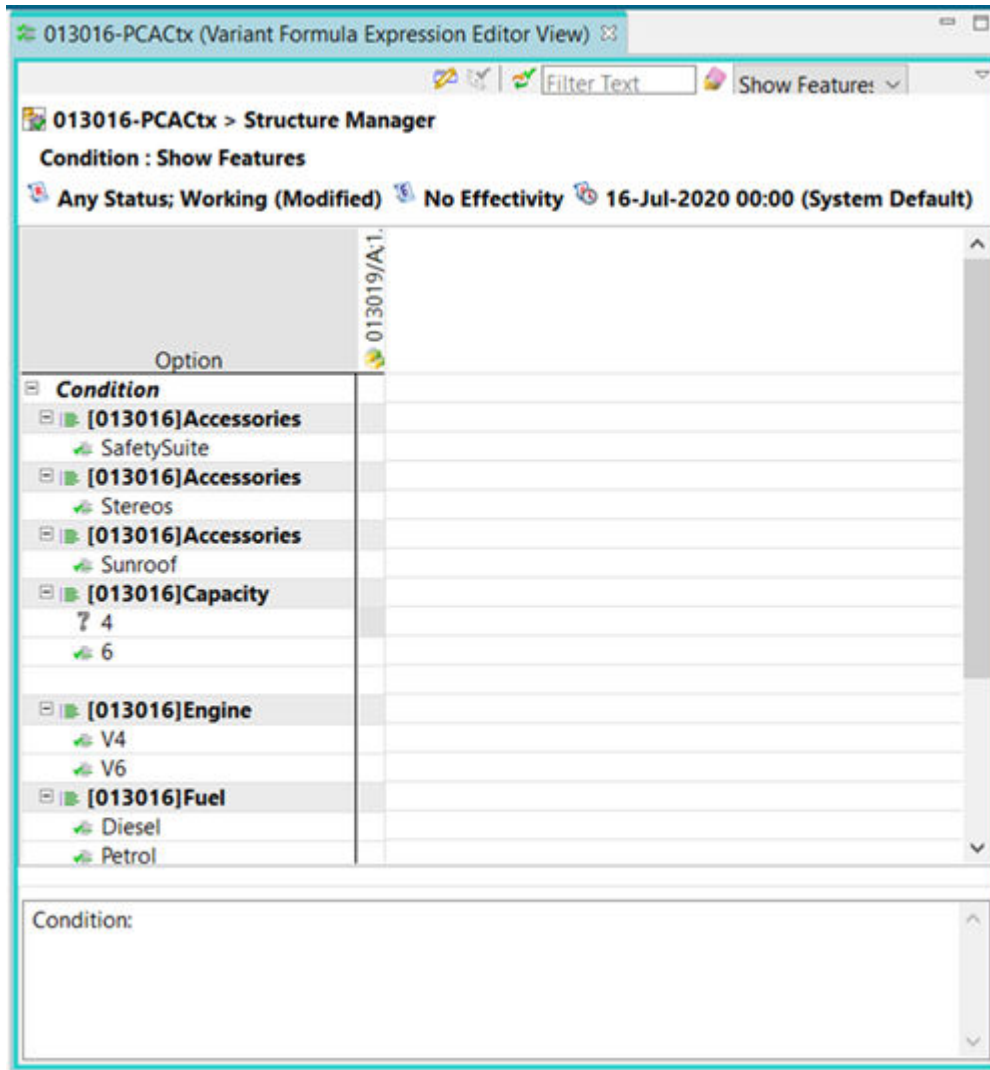
$[013016]Engine = V4 \mid [013016]Engine \neq V4$ that is a tautology and any configuration would satisfy this condition. This is shown as empty in the grid.



([Teamcenter]Engine = V4 & [Teamcenter]Engine != V4) is a contradiction because no configuration would satisfy this condition. Thus, no grid is shown for this kind of expression.

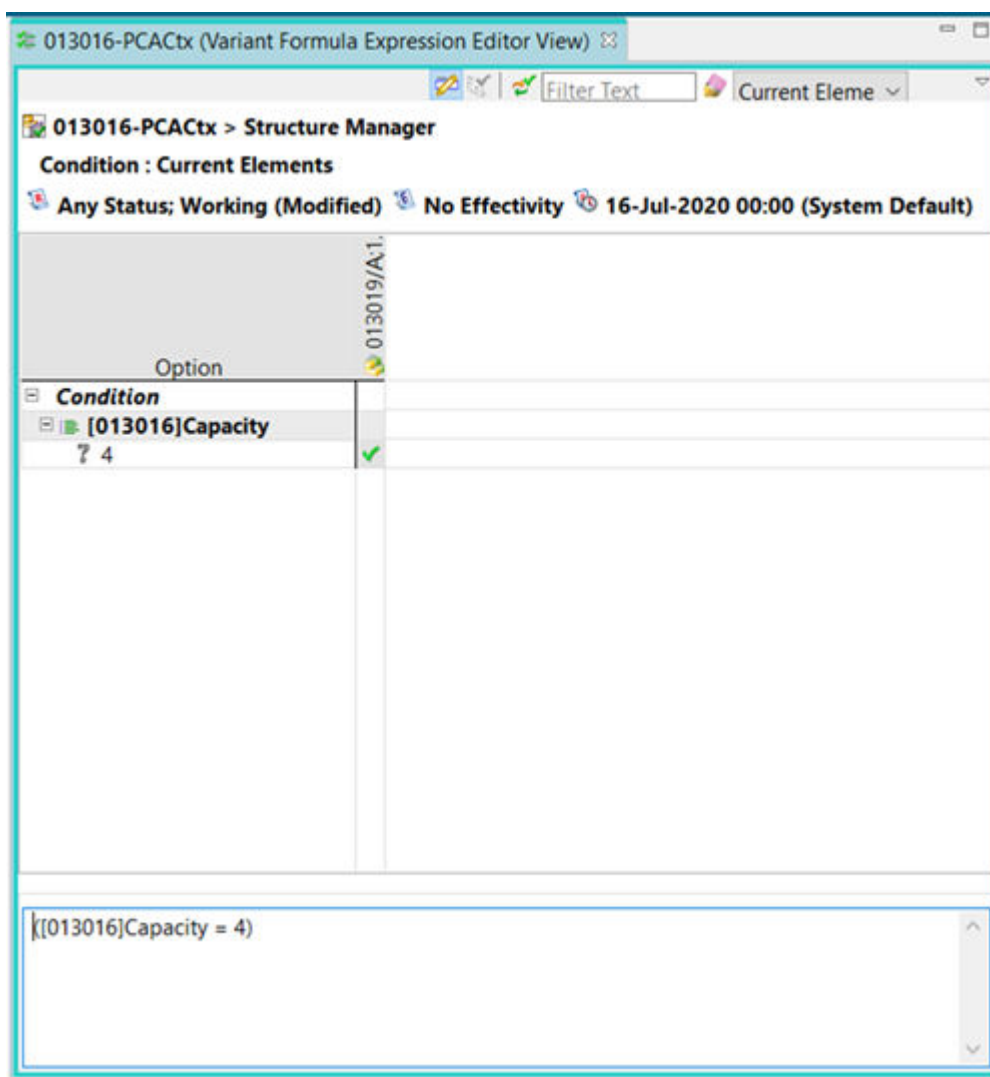


Foreign options are only editable in formula authoring mode by using the text editor in the bottom area. They can be authored, updated, and deleted.

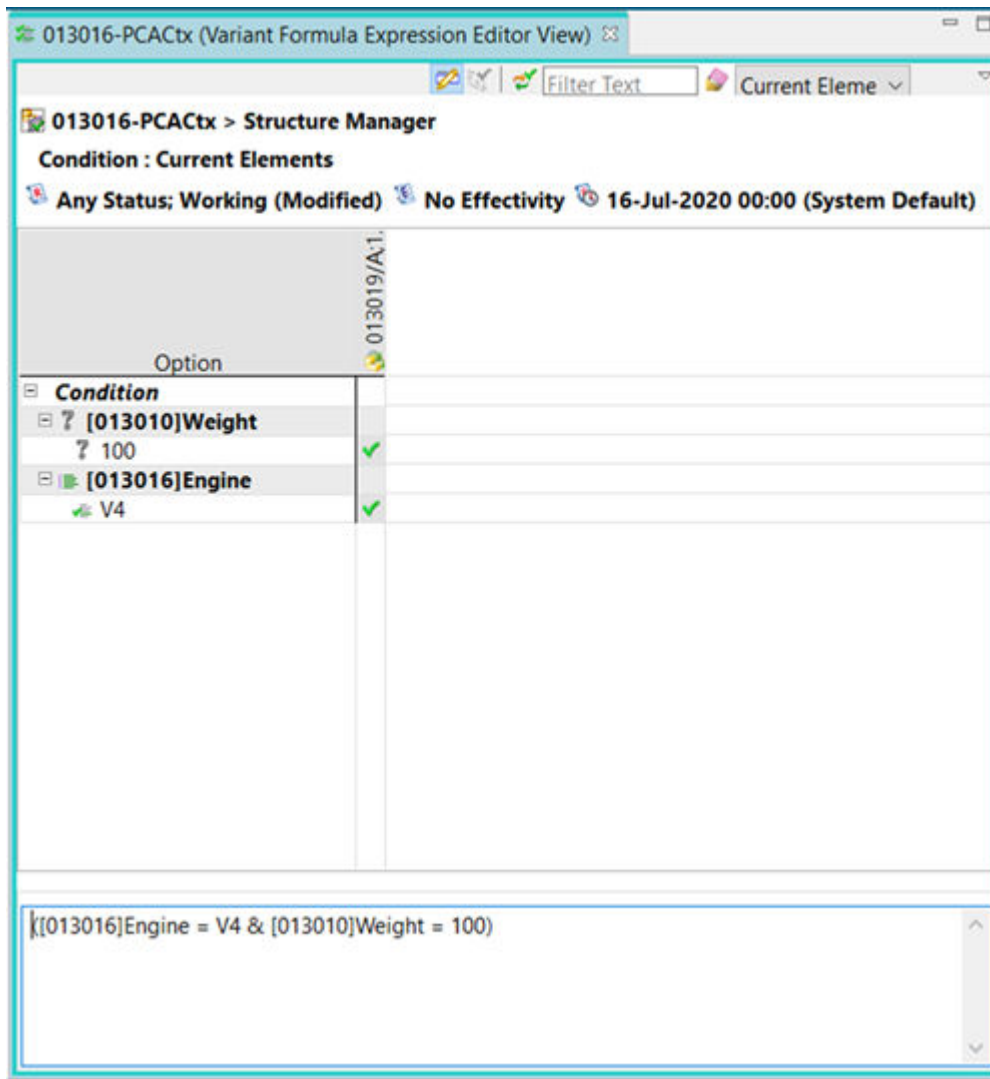


In the above screen, feature **4** is a foreign option in the current configuration. The **?** icon before it tells us that. The selection cell for the feature is greyed out and is not modifiable. If you wish to author or modify it, switch to the formula authoring mode.

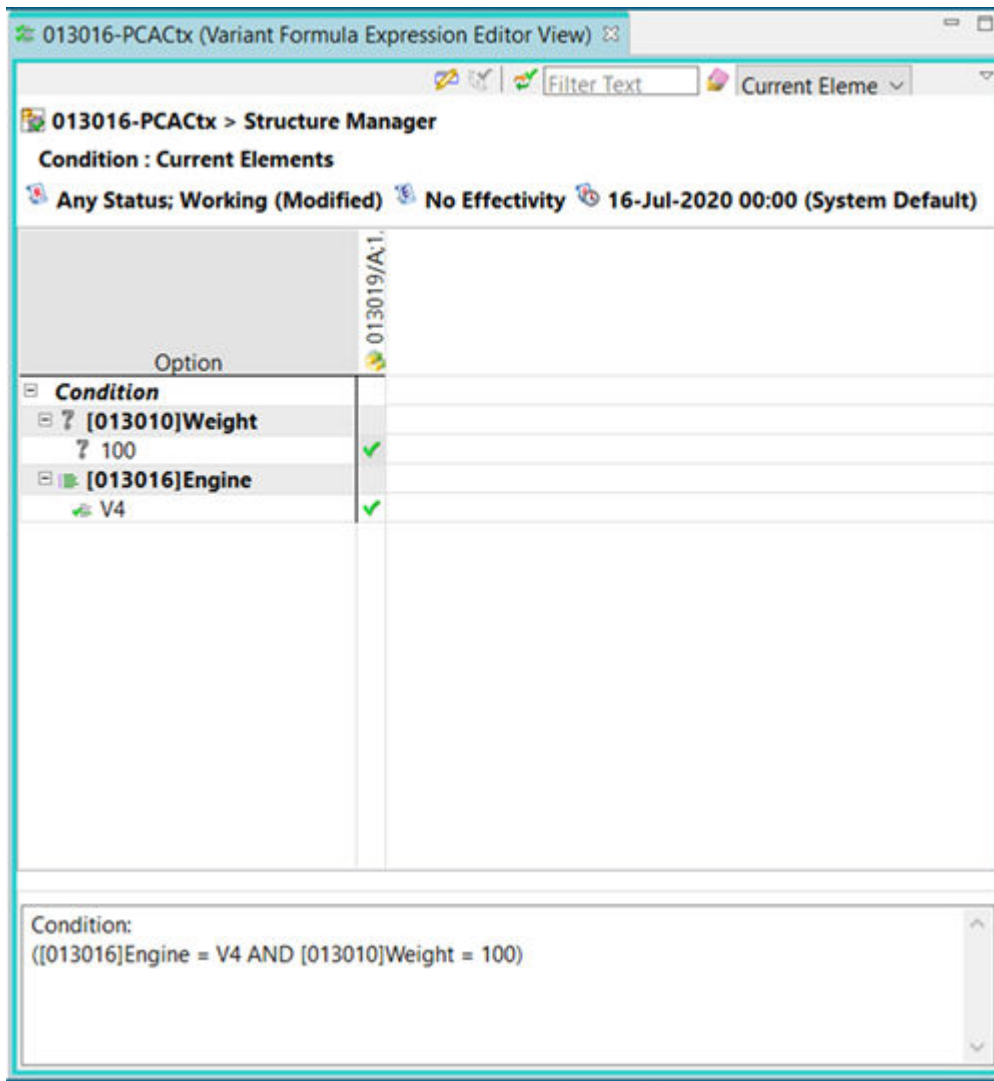
The below screen shows the variant condition with the foreign option authored by using the formula authoring mode.



Variant conditions authored from families and features of a different context are shown as unconfigured variants in the grid. In the following example, feature **100** of family **Weight** belongs to context with ID **013010** and not to **013016**. This is saved as an unconfigured variant or a foreign option.



Changing to **Grid Authoring** mode shows that it is unmodifiable.

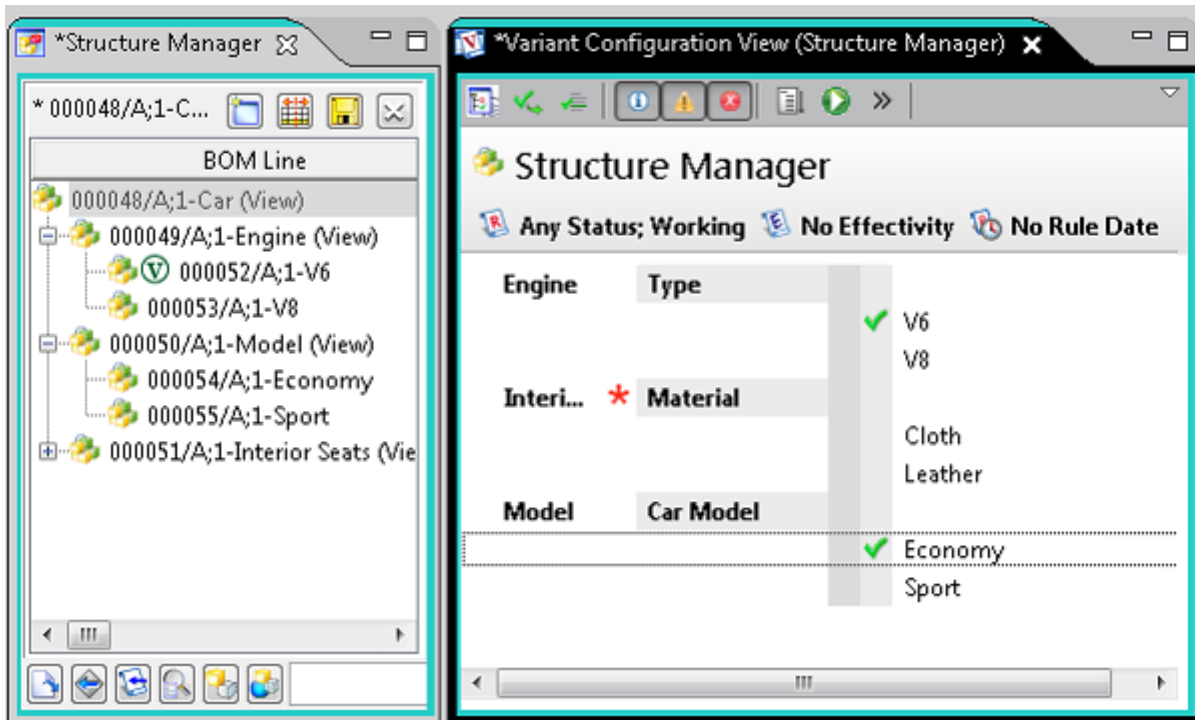


- Click **Save the current content**  on the main toolbar to set the variant condition.

After you author variant expressions, configure the structure by setting variant rules.

Configure a structure by setting option values

- Open the structure that you want to configure in Structure Manager.
- Click **Set option values for selected module**  on the toolbar.
- In the **Variant Configuration View** view, click **Applies default to the configuration**  to set the variant option with their default values.



4. Select the required option values. Selections are indicated by a check mark ✓ or a circle backslash icon ☒ in a cell. The check mark ✓ indicates that the option is included in the product configuration. The circle backslash icon ☒ indicates that the option is excluded from the configuration.
5. (Optional) To clear all the selections you have made, click the **View** ▾ menu and choose **Clear Expression**.
6. (Optional) To clear the saved variant rule you have applied, click the **View** ▾ menu and choose **Clear Variant Rule**.
7. (Optional) To clear unconfigured features, click the **View** ▾ menu and choose **Clear Unconfigured Feature**.

The expression on the unconfigured feature in the view is removed. Also, the row holding the unconfigured feature is removed.

8. To load an existing configuration:
 - a. Click **Replace or overlay existing selections** .
 - b. In the **Load selections from saved configurations** dialog box, select each saved configuration that you want to load and click **OK** to replace the existing selections.

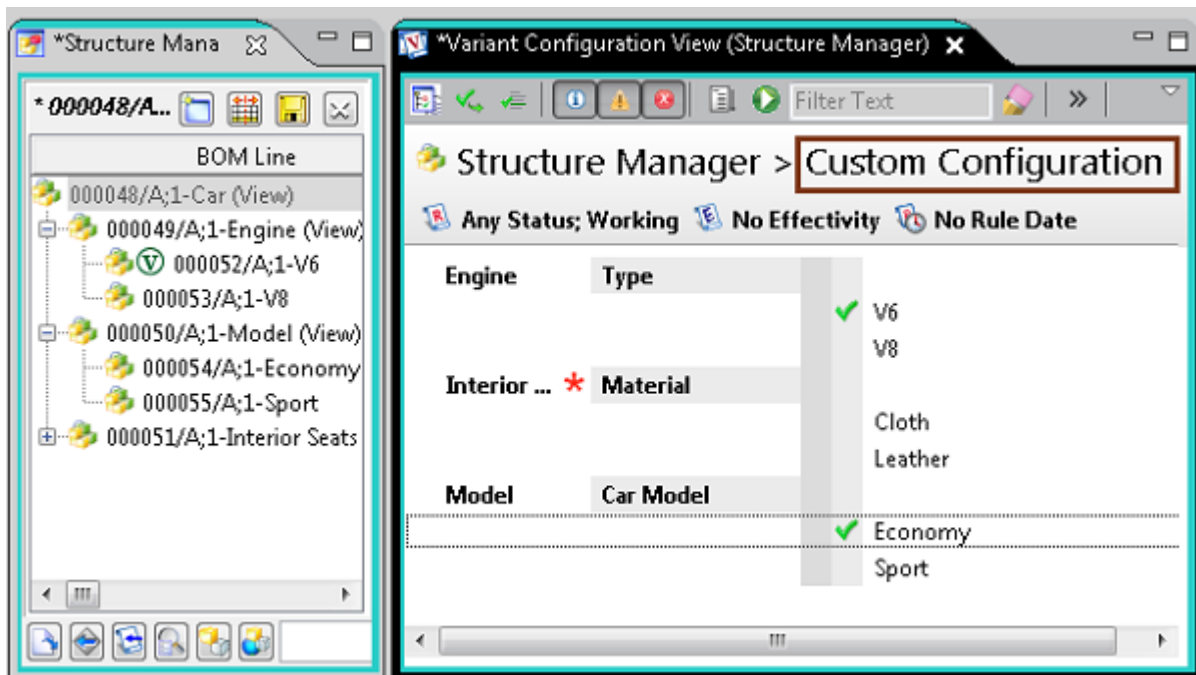
Alternatively, you can select **Add values to existing configuration** to load the configurations in a separate column, preserving the existing selections.

- Click **Validate the Current Configuration**  to validate if the selected options are applicable to the structure.

To view any informational messages, while the configuration is being validated, click **Set Info level violations to be fetched while applying validations** . To view the warnings, click **Set Warning level violations to be fetched while applying validations** .

- Click **Applies the current configuration to the associated structure**  to apply the selected options to the structure.

Applying the selected options to the structure creates a custom configuration.



If the **Apply Constraints** button is deselected while applying the configuration, only user selections are applied on the content. However, if the **Apply Constraints** button is selected and the **Allow Validation Rules to Expand** button is deselected, the validation rules are not considered while applying the configuration. By default, Teamcenter displays the **Variant Configuration** view with the **Apply Constraints** and **Allow Validation Rules to Expand** as selected.

You can save the custom configuration to **create a saved variant rule**, which you can use to configure other structures.

Create saved variant rules

- Click **Save the current contents**  on the toolbar.
- In the **Save As** dialog box, enter the required information and click **OK** to create the saved variant rule.

Save Variant Rule
Select the scope of the Saved Variant Rule

Select Variant Rule Scope

☒ Item Revision
☐ Configurator Context

Provide Variant Rule Information

Name*

Description

Relation Type
References

OK Cancel

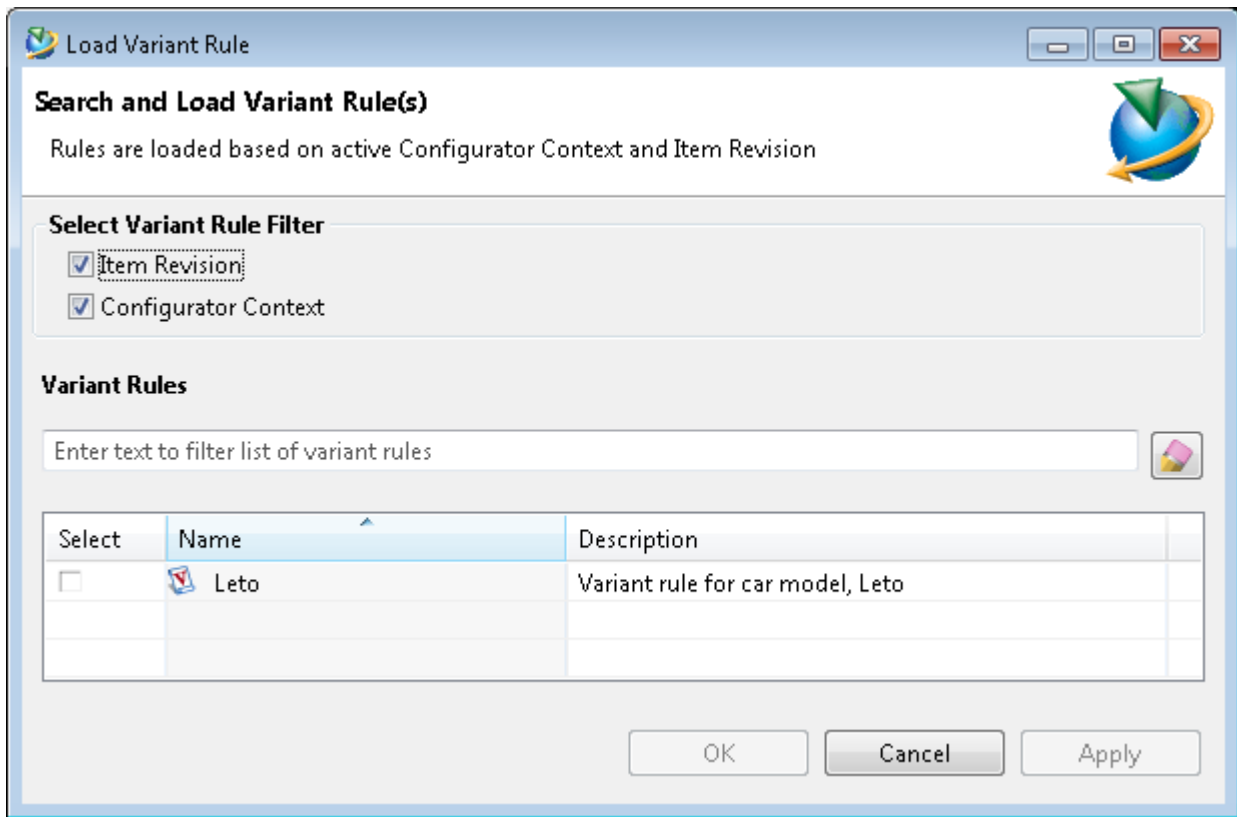
Field	Action to perform
Item Revision	Select this option to create the saved variant rule for the current item revision.
Configurator Context	Select this option to create the saved variant rule for all structures associated with the current configurator context.
Name	Enter the name of the saved variant rule.
Description	Enter a short description for the saved variant rule.
Relation Type	Choose a relation type if you selected Item Revision as the variant rule scope. The variant rules are stored in the top-level item revision of the structure.

Configure a structure by loading saved variant rules

Structure Manager does not support order validation mode and uses overlay validation mode.

1. Open the structure that you wish to configure in Structure Manager.
2. Click **Open saved variant rules dialog**  on the toolbar.

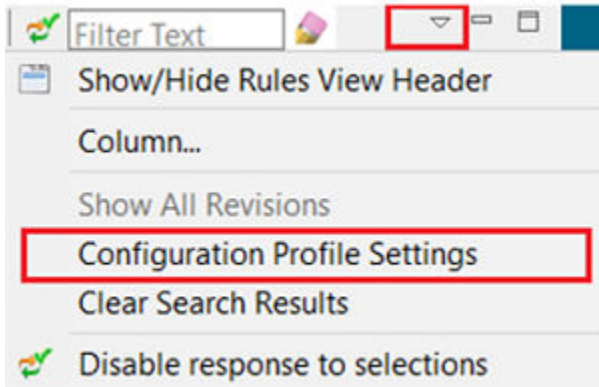
3. In the **Load Variant Rule** dialog box, select the variant rule filter.



- Select the **Item Revision** ☒ check box to apply the saved variant rule to the current item revision.
 - Select the **Configurator Context** ☒ check box to apply the saved variant rule to all the product structures associated with the current configurator context.
4. Enter the text to filter the list of variant rules in **Variant Rules**.
 5. Select the saved variant rule that you wish to use to configure the structure and click **OK**.

Set the session information for new variant rules and variant criteria

You can set the session information for new variant rules and variant criteria in the **Saved Variant Rules** view by clicking **View menu** and then selecting **Configuration Profile Settings**. It displays the **Configuration Profile Settings** for new **Variant Rules** dialog.



Button	Description
Validation mode	Select the validation mode for the new variant rules: Order or Overlay. In Overlay mode, rules greater than or equal to validation severity are evaluated. Rules for validation verdict and expand operations in overlay mode are same. In Order mode, during the expand operation, rules lower than validation severity are dropped if they conflict with rules of higher severity. The validation mode in the dialog defaults based on the value of the Cfg0DefaultValidationMode user preference. By default, it is set to Order mode.
Validation severity	Select the severity of violation for the new variant rules (error, warning and info). The error severity is selected by default.
Apply Constraints	Select if all constraints should be considered while applying the variant rule expression on the content. If deselected, only user selections are applied. By default, it is selected in the dialog.
Allow Validation Rules to Expand	Select if validation rules should participate during criteria expansion. If deselected, only violations are reported, if present. System selections based on validation rules do not occur in the expanded criteria. By default, it is selected in the dialog.

While creating a new variant rule or variant criteria, you can choose the profile settings from the dialog. The selected values are saved as session information on the newly created variant rule or variant criteria.

You cannot modify the profile setting while updating the variant rule or variant criteria in the **Saved Variant Rules** view. To update the profile settings for the variant rule or variant criteria, it should be opened in the **Variant Configuration** view.

Any changes made in the default settings of configuration profile settings dialog are persisted till the **Saved Variant Rules** view is open. When a new instance of the view is opened, the selections are reset to their default values.

Configure variants based on selections

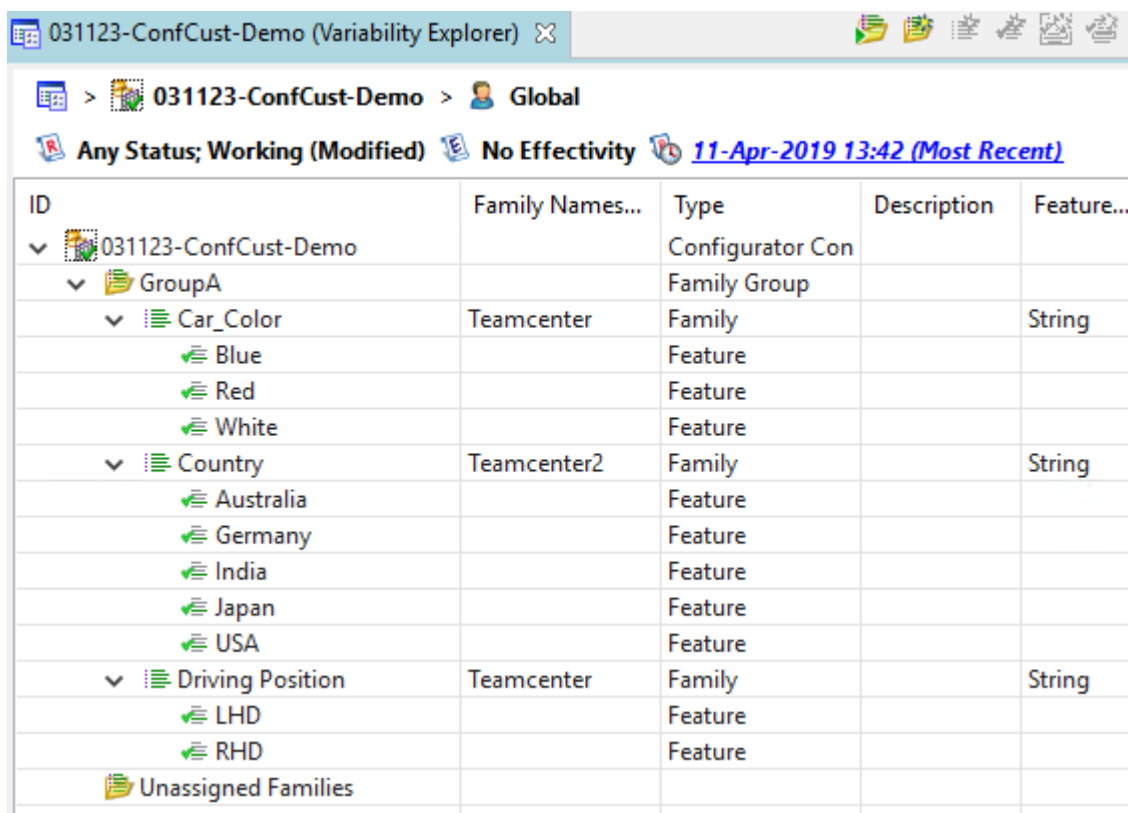
You can configure a structure from the variant expression of one or more BOM lines.

When you configure variants based on selections, the system considers Product Configurator rules such as inclusion, exclusion, and availability and removes BOM lines that are not relevant.

Structure Manager does not support the *order validation* mode and uses the *overlay validation* mode.

An example of configuration based on selection:

1. Create a positive availability biased configurator context as follows:



ID	Family Names...	Type	Description	Feature...
031123-ConfCust-Demo		Configurator Con		
GroupA		Family Group		
Car_Color	Teamcenter	Family		String
Blue		Feature		
Red		Feature		
White		Feature		
Country	Teamcenter2	Family		String
Australia		Feature		
Germany		Feature		
India		Feature		
Japan		Feature		
USA		Feature		
Driving Position	Teamcenter	Family		String
LHD		Feature		
RHD		Feature		
Unassigned Families				

2. Create the structure with the following BOM lines and variant formula.

BOM Line	Variant Formula
001047/A;1-Assy (View)	
001048/A;1-Sub_Assy1 (View)	[Teamcenter2]Country = India
001059/A;1-Child_Assy1	[Teamcenter]'Driving Position' = RHD
001060/A;1-Child_Assy2	[Teamcenter]Car_Color = Blue
001049/A;1-Sub_Assy2 (View)	[Teamcenter2]Country = Australia
001061/A;1-Child_Assy3	[Teamcenter]'Driving Position' = LHD
001050/A;1-Sub_Assy3 (View)	[Teamcenter2]Country = Japan AND [Teamcenter]'Driving Position' = LHD
001062/A;1-Child_Assy4	
001051/A;1-Sub_Assy4	[Teamcenter]Car_Color = Blue AND [Teamcenter2]Country = India AND [Teamcenter]'Driving Position' = RHD
001053/A;1-Sub_Assy5	[Teamcenter]Car_Color = White AND [Teamcenter2]Country = Germany
001054/A;1-Sub_Assy6	[Teamcenter]Car_Color = Blue AND [Teamcenter2]Country = India
001055/A;1-Sub_Assy7	[Teamcenter]Car_Color = Red AND [Teamcenter2]Country = USA
001056/A;1-Sub_Assy8	[Teamcenter2]Country = Germany AND [Teamcenter]'Driving Position' = LHD
001057/A;1-Sub_Assy9	[Teamcenter2]Country = Australia AND [Teamcenter]'Driving Position' = LHD
001058/A;1-Sub_Assy10	

3. Select **Child_Assy1**, right-click, and choose **Configure Variants Based on Selection(s)**.

The **Driving Position = RHD** variant formula is set for **Child_Assy1**.

Therefore, when you configure the structure based on this selection, the system excludes all the BOM lines *not* set for right hand drive (RHD) or India. The following is the result.

BOM Line	Variant Formula
001047/A;1-Assy (View)	
001048/A;1-Sub_Assy1 (View)	[Teamcenter2]Country = India
001059/A;1-Child_Assy1	[Teamcenter]'Driving Position' = RHD
001060/A;1-Child_Assy2	[Teamcenter]Car_Color = Blue
001051/A;1-Sub_Assy4	[Teamcenter]Car_Color = Blue AND [Teamcenter2]Country = India AND [Teamcenter]'Driving Position' = RHD
001054/A;1-Sub_Assy6	[Teamcenter]Car_Color = Blue AND [Teamcenter2]Country = India
001058/A;1-Sub_Assy10	

Note:

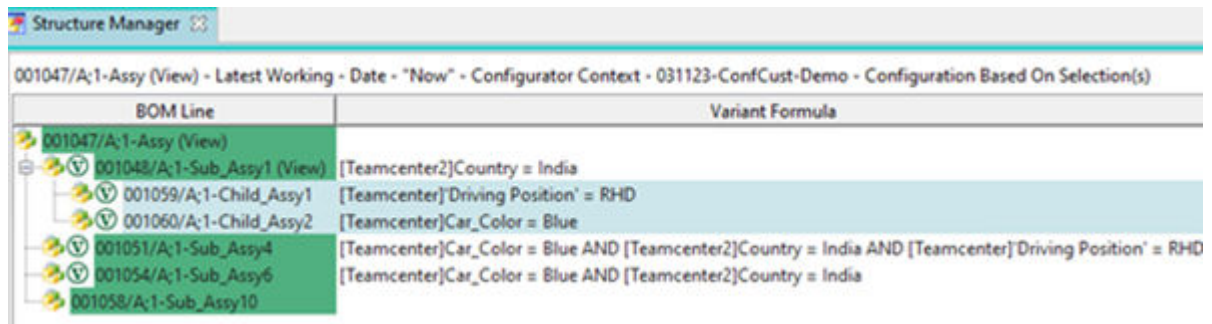
When this action is performed the preference value for **Cfg0DefaultRuleDateForContent** is considered.

4. Select **Child_Assy1** and **Child_Assy2**, right-click, and choose **Configure Variants Based on Selection(s)**.

The **Driving Position = RHD** variant formula is set for **Child_Assy1** and **Car_Color = Blue** for **Child_Assy2**.

Therefore, when you configure the structure based on these selections, the system excludes all the BOM lines set for LHD (countries such as USA, Australia, Germany, and Japan) and all colors other than blue.

The following is the result.



001047/A;1-Assy (View) - Latest Working - Date - "Now" - Configurator Context - 031123-ConfCust-Demo - Configuration Based On Selection(s)

BOM Line	Variant Formula
001047/A;1-Assy (View)	
001048/A;1-Sub_Assy1 (View)	[Teamcenter2]Country = India
001059/A;1-Child_Assy1	[Teamcenter]'Driving Position' = RHD
001060/A;1-Child_Assy2	[Teamcenter]Car_Color = Blue
001051/A;1-Sub_Assy4	[Teamcenter]Car_Color = Blue AND [Teamcenter2]Country = India AND [Teamcenter]'Driving Position' = RHD
001054/A;1-Sub_Assy6	[Teamcenter]Car_Color = Blue AND [Teamcenter2]Country = India
001058/A;1-Sub_Assy10	

Search for and apply saved variant rules

After creating a variant rule, you can save it as a saved variant rule (SVR). You can save an SVR to an item revision or a configuration context. In addition, you can create revisions of the SVR.

After you open a structure and you want to apply a variant rule, you can use the **Search and Load Variant Rules** dialog box to search for the SVR by name, description, revision ID, or ID.

1. In Structure Manager, open a structure.
2. Click the **Open Saved Variant Rules Dialog** button on the main toolbar.

Load Variant Rule(s)

Search and Load Variant Rule(s)

Variant Rules are loaded based on active Configurator Context or Configurable object.

Any Status: Working (Modified) Query Name: Variant Rules

Variant Rules

Find Variant Rules based on given Variant Rule Name, Description, ID and Revision ID.

Name:

Description:

Revision ID:

ID:

0 object(s) are loaded.

Variant Rules

Enter text to filter list of variant rules

Select	Name	Description	Release St...	Object	Type

☐ Append only expressions to the existing configuration in the view.

☒ Load expanded expression only and skip revision rule, effectivity and violation level information

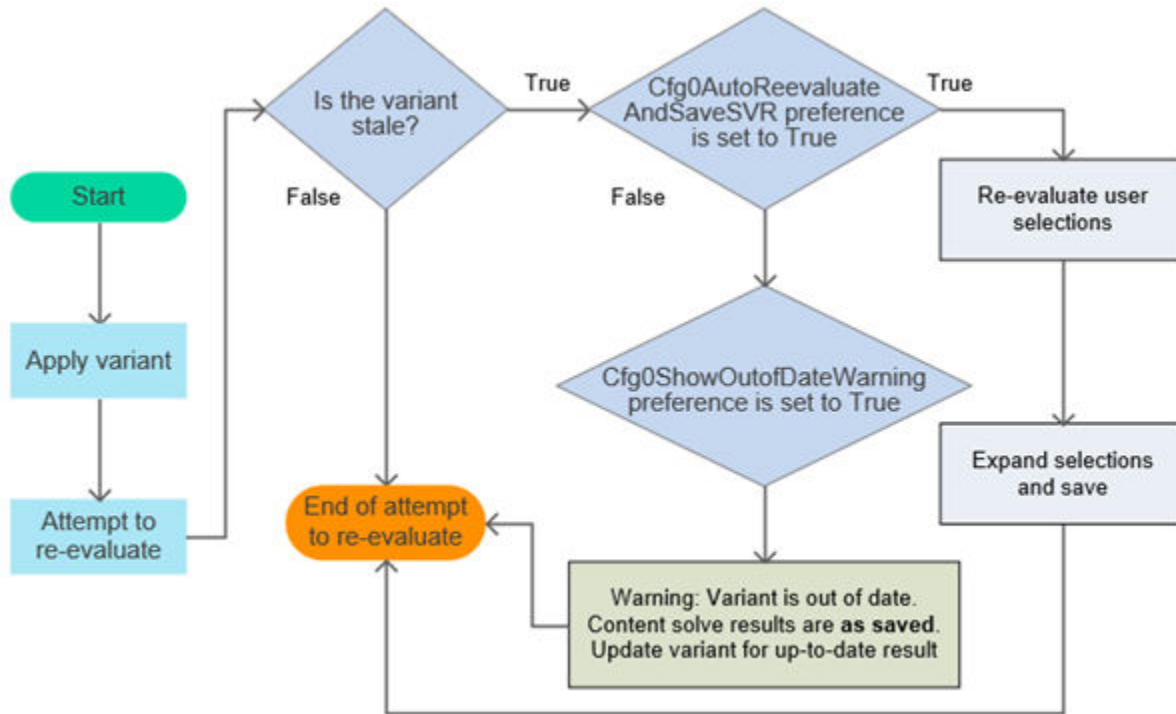
- Specify your search criteria and click **Search**.

You can use a wildcard search such as an asterisk on any of the search fields or on multiple search fields.

- To apply the SVR, select it and click **OK**.

Apply a valid and complete SVR for a faster BOM solve

You must create a valid and complete SVR to improve system performance while performing a BOM solve. You can do so by making the desired selections and by using the **Expand** command in the **Variant Configuration** view. Then, you can save it as an SVR.



The previously created SVRs become outdated if the configurator data such as family, features, and rules are modified or newly created. If a stale SVR is applied on a structure, then the system displays a warning saying that the applied SVR is stale and should be refreshed. To view this warning, you must set the **Cfg0ShowOutOfDateVariantWarning** user preference to **True**. By default, it is set to **False**.

Manual revalidation can be done by executing the **Expand** command on an SVR after opening it in the **Variant Configuration** view. If you want the system to revalidate stale SVRs, set the **Cfg0IsAutoReEvaluateAndSaveVariant** user preference to **True**. By default, it is set to **False**.

Author variant conditions in a multilevel structure

When you author variant conditions in a multilevel structure that has a configurator context associated at different levels, the variability displayed on the **Variant Expression Editor** view is that of the immediate parent. If the variability is not present at the immediate parent, the system continues to look till the top line to find the associated variability.

Let us assume that you open a multilevel structure that has configurator context associated at different levels. For example, the **LegacyCar** structure has the **Car** configurator context with features from both **Fuel** and **Engine** configurator contexts at the root level. Additionally, the **Fuel** and **Engine** configurator contexts are associated with **SubAsm1** and **SubAsm2**, respectively.

Note:

The root level configurator context must have all the variability available from the configuration context of its subassemblies.

In such a scenario, the **P11** and **P12** BOM lines for **SubAsm1** display only the **Fuel** configurator context features. Similarly, the **P21** and **P22** BOM lines display only the **Engine** configurator context features.

If you want to author variant conditions on **SubAsm1**, the features of the **Car** configurator context, that is, features from both **Fuel** and **Engine** configurator contexts are available.

Structure	Possible variant conditions	Configurator contexts at different levels
LegacyCar (root)		Car configurator context (Fuel , Engine)
SubAsm1		Fuel configurator context
	P11 Fuel only	
	P12 Fuel only	
SubAsm2		Engine configurator context
	P21 Engine only	
	P22 Engine only	
SubAsm3		
	P31 Fuel and Engine	

1. In Product Configurator, create the **Fuel_CC** configurator context with the group, family, and features as follows:



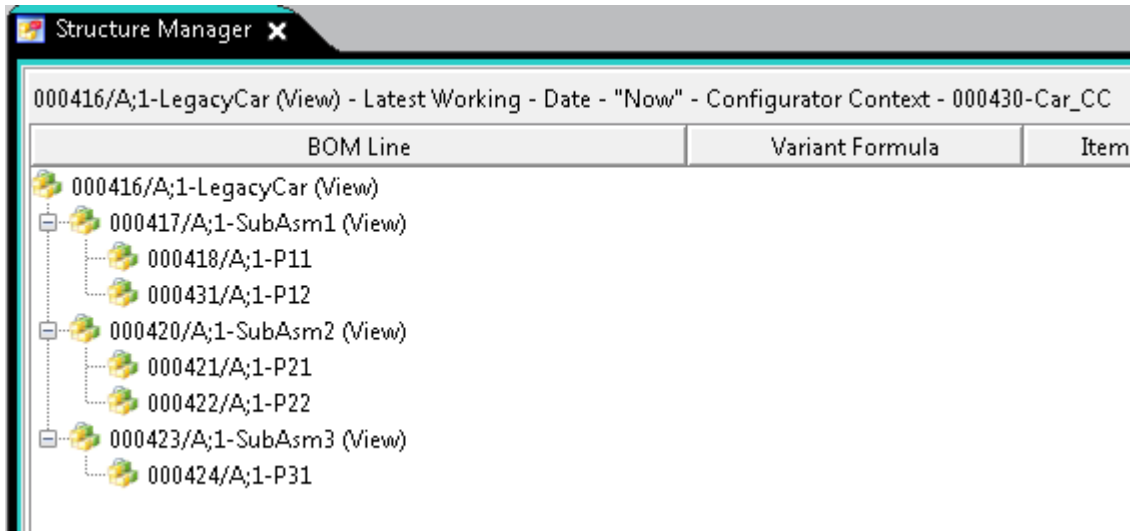
2. Create the **Engine_CC** configurator context with the group, family, and features as follows:

ID	Family Names...	Type	Description
000429-Engine_CC		Configurator Cont	
Engine_group		Family Group	
Legacy_engine_family	Teamcenter	Family	
1.2 litre		Feature	
1.4 litre		Feature	
1.6 litre		Feature	
Unassigned Families			

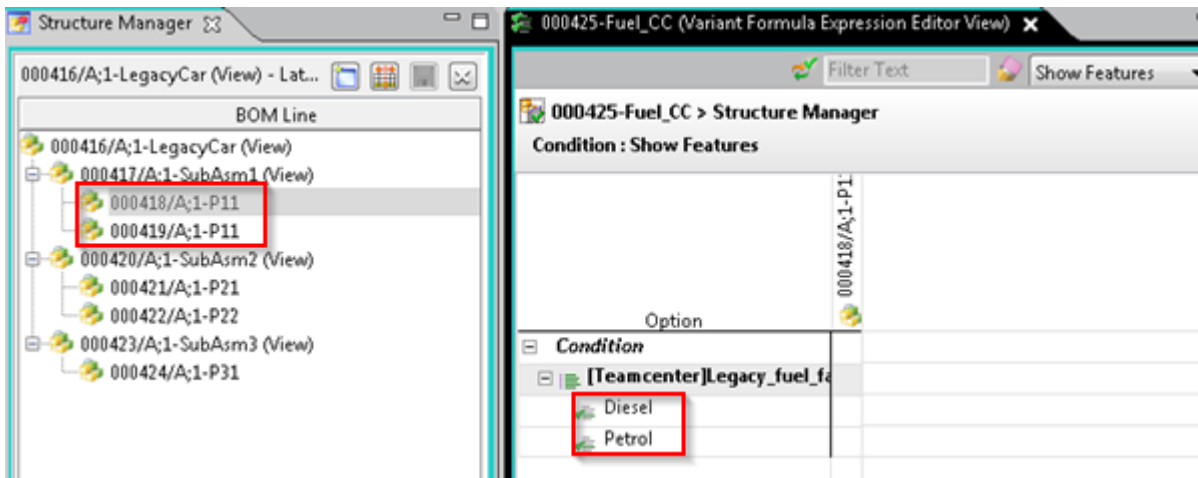
3. Create the **Car_CC** configurator context with the group, family, and features as follows:

ID	Family Names...	Type	Description	Feature...
000430-Car_CC		Configurator Cont		
Engine_group		Family Group		
Legacy_engine_family	Teamcenter	Family		String
1.2 litre		Feature		
1.4 litre		Feature		
1.6 litre		Feature		
Fuel_group		Family Group		
Legacy_fuel_family	Teamcenter	Family		String
Diesel		Feature		
Petrol		Feature		
Unassigned Families				

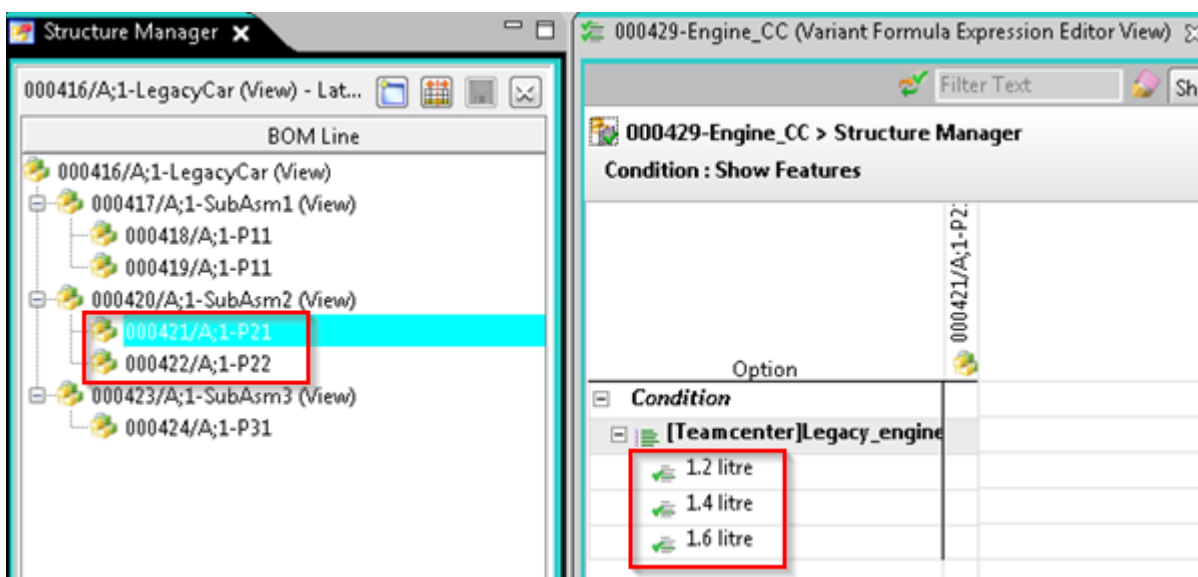
4. In Structure Manager, create the following structure.



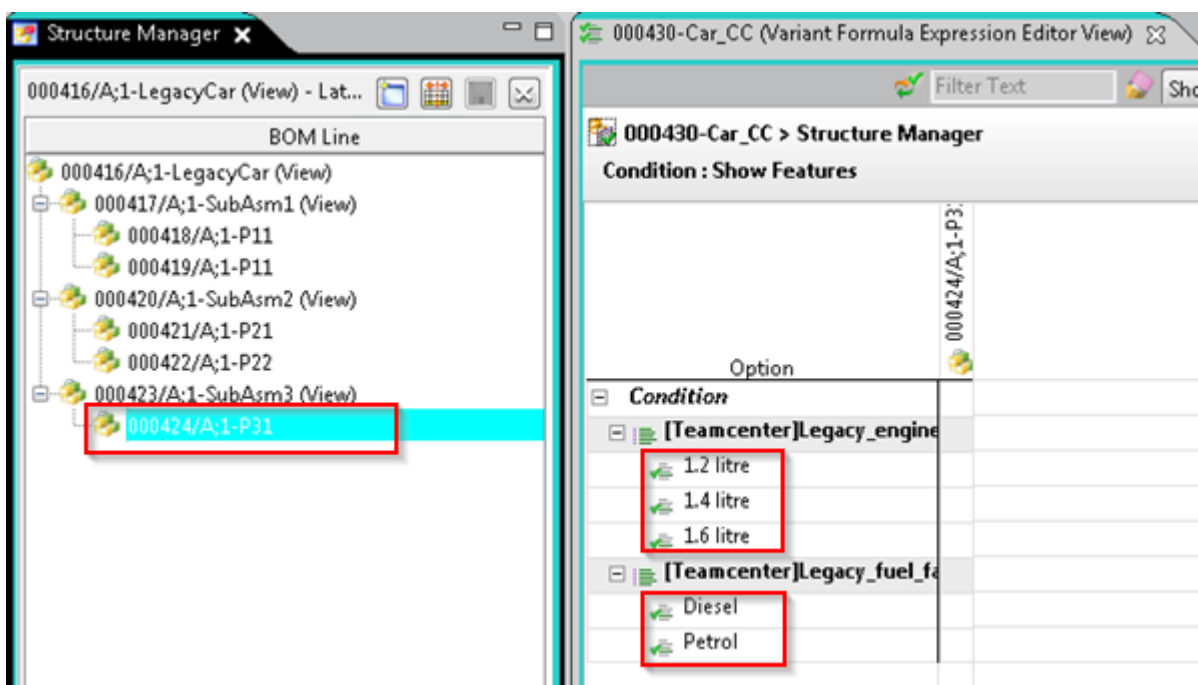
- Associate **Car_CC** to the root structure, **Fuel_CC** to **SubAsm1**, and **Engine_CC** to **SubAsm2**.
- Double-click the **Variant Formula** column for the **P11** and **P12** BOM lines. The **Variant Formula Expression Editor** view displays **Diesel** and **Petrol** features defined in the **Fuel_CC** configurator context.



- Double-click the **Variant Formula** column for **P21** and **P22** BOM lines. The **Variant Formula Expression Editor** view displays **1.2 litre**, **1.4 litre**, and **1.6 litre** features defined in the **Engine_CC** configurator context.



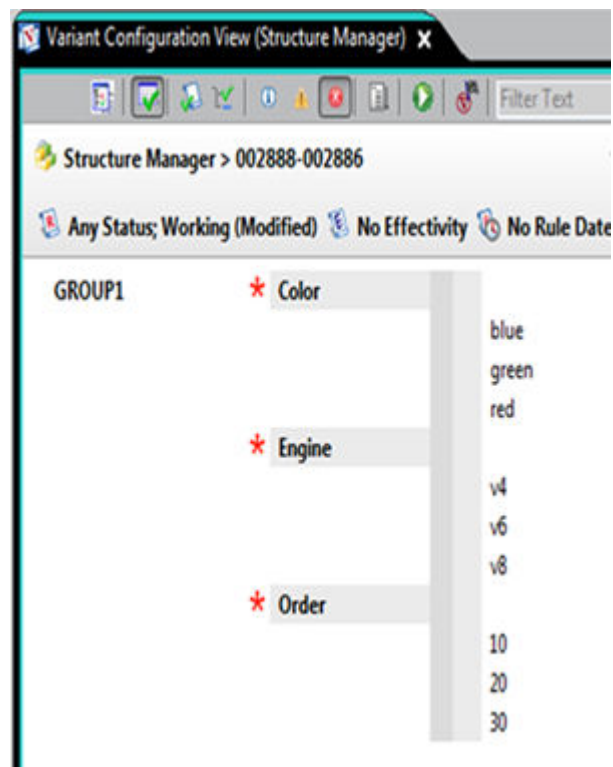
8. Double-click the **Variant Formula** column for the **P31** BOM line. The **Variant Formula Expression Editor** view displays **1.2 litre**, **1.4 litre**, and **1.6 litre** features defined in the **Engine_CC** configurator context and **Diesel** and **Petrol** features defined in the **Fuel_CC** configurator context.



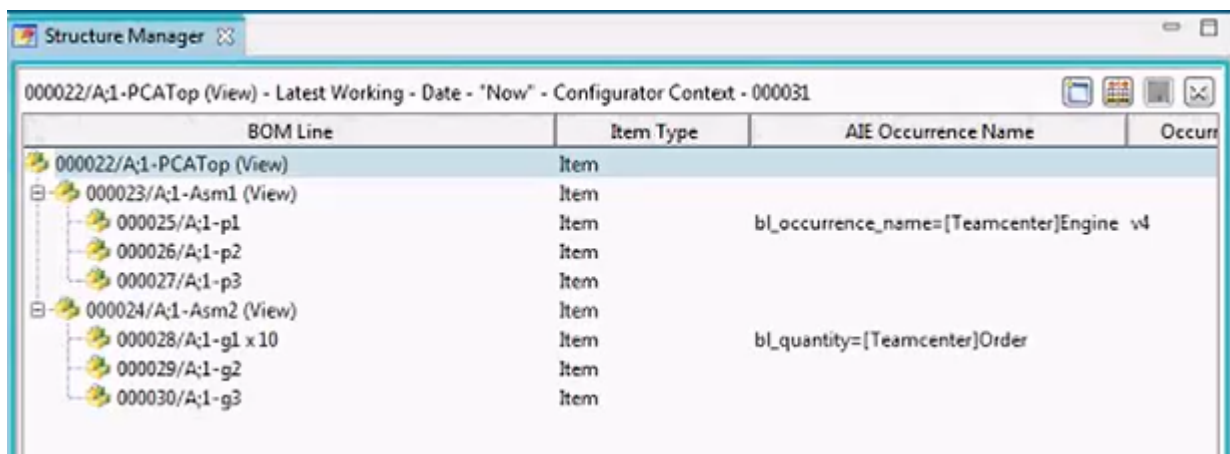
Set the configurator feature to BOM line properties and create a solution variant

You can set BOM line properties based on Product Configurator feature selections and persist those properties while creating a solution variant.

1. In Product Configurator, create the following configurator context.



2. In Structure Manager, create the following structure:



3. Associate the configurator context you created in step 1 to the structure you created in step 2.
4. Set the **PSEConfiguratorFeaturePropertyMapping** user level preference.

This preference indicates the BOM line property (for example, occurrence note) you want to persist while creating a solution variant.

Enable the BOM line property set under this preference. You may also want to enable the properties set using the configuration. For example, you can select **AIE Occurrence Name** for the mapping logic and set the occurrence name property based on this.

5. Right-click columns and enable the **AIE Occurrence Name**, **Occurrence Name**, and **Quantity** columns if they are not available in your view.
6. Create the mapping for the BOM line for which you want to set the properties:
 - a. Set the value for the BOM line property. BOM line properties have display names or system names, and the system names are in the format **bl_**xxx. You must use system names for the property. For example, if you choose the **AIE Occurrence Name** column to store the mapping and you want to set the value of the Engine family on the BOM line property, then the format of the mapping is: *bl_occurrence_name=[Teamcenter]Engine*.

Tip:

The format of the mapping is *bl_property_name=[Namespace]Feature*. If the mapping is not defined as per the format, the system does not set the property.

You can specify multiple occurrence notes or properties by specifying a semi colon (;) as a separator. Example:

bl_occurrence_name=[Teamcenter]Engine;bl_quantity=[Teamcenter]Order.

- b. Similarly, type *bl_quantity=[Teamcenter]Order* for BOM line **000028**.
7. Click **Set option values for selected module**  on the toolbar to open **Variant Configuration View**. Select **v6** engine and **30** order.
8. To apply the selected features to the structure, click **Applies the current configuration to the associated structure** .

The occurrence name and quantity columns have **v6** and **30** as values for the respective BOM lines on which you created the mapping.

9. After validating the configuration, create a solution variant. To do so, click **Solution Variant** .
10. Close all the structures, open the solution variant you created, and verify the occurrence name and quantity columns.

The occurrence name and quantity columns have **v6** and **30** as values for the respective BOM lines on which you created the mapping.

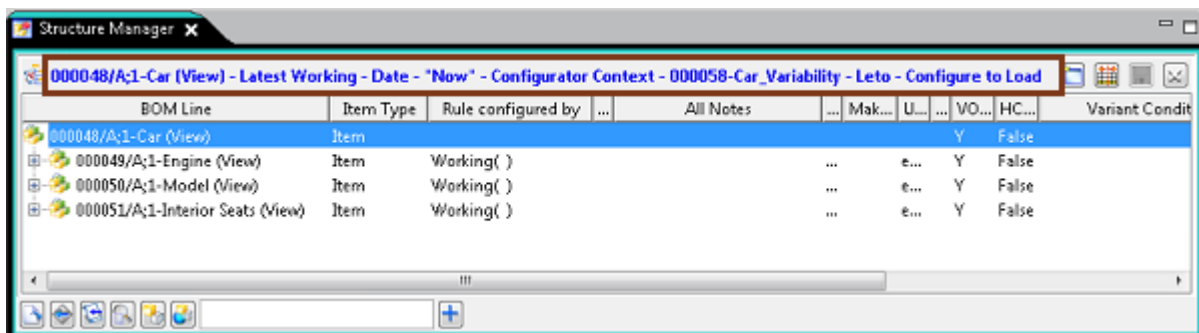
These values are not populated on generic variant assemblies.

Load a structure to display only configured variants

To quicken the loading of a structure, you can apply a filter so that only the configured variants are loaded. You can load the structure either by selecting an existing saved variant rule or by creating a custom configuration.

1. In Structure Manager, choose **View→Enable Variant Configure To Load**.
2. Send the structure to Structure Manager.
3. In the **Load Variant Rule** dialog box, perform either of the following steps:
 - Select the saved variant rule using which you want to configure the structure. Select the **Filter unconfigured BOM lines due to Variants** check box and click **OK**.
 - Click **Open Variant Configuration View** . In **Variant Configuration View**, create a custom configuration by selecting the required options.

When the structure is subsequently loaded, the BOM lines configured by the applied variant rules are only displayed. The title bar of the structure tree pane is highlighted in a different color (here, blue) to indicate that filtering is applied.



You cannot hide this selection when the structure is loaded. It persists each time the structure is loaded. To change it, you must follow the previous steps and clear the **Filter unconfigured BOM lines due to Variants** check box.

Once the variant rule is applied to a structure that is configured to load, you cannot reconfigure the structure with a different variant rule. To do this, open the structure in another view and apply a different variant rule in the new view.

Show or hide the unconfigured components in a structure

To display all components, configured and unconfigured, in a product structure, select the structure and choose **View→Show Unconfigured Variants**. The **VOC - Variant Occ. Config'd** column in the **Structure**

Manager view shows a **Y** if the component is configured. This column is blank if the component is not configured.

To hide all the unconfigured components in the structure, click **Show Unconfigured Variants** again.

Example: Apply constraints and allow validation rules to expand

The **Apply Constraints** selection in the **Variant Configuration** view allows users to select if all the constraints should be applied along with user selections while applying the configuration on content. If it is deselected, only user selections are considered while applying the configuration from **Variant Configuration** view on content.

The **Allow Validation Rules to Expand** selection in the **Variant Configuration** view allows users to select if validation rules should expand and perform selection during the expansion process. If only one selection is possible, these rules (exclusion rule and availability rule) can expand and perform selection. If deselected, expand does not make selections based on validation rules.

By default, Teamcenter displays the **Variant Configuration** view with **Apply Constraints** and **Allow Validation Rules to Expand** as selected. If users deselect any of the two buttons, closes the view, and relaunches the view, these buttons are reset to the default state.

1. A positively biased configurator context is created with the following data.

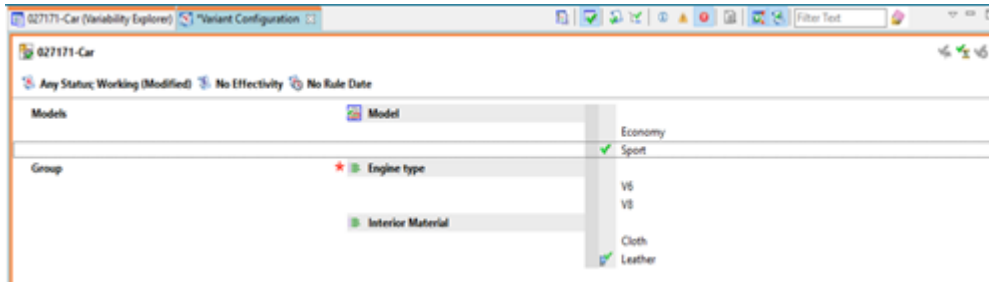
The screenshot shows the Teamcenter Variant Configuration view for a '201711-Car' model. The top pane displays the 'Configurator Context' with a tree view on the left and a table on the right. The bottom pane displays 'Configuration Rules' with a table of rules.

ID	Family Name...	Type	Description	Feature...	Unit of ...	Optional	Free Pa...	Multis...	Minimum ...	Maximum ...	Family Obj...	Effectivity	Sequen...
201711-Car		Configurator Context											
Model	201711	Model Family		String		False	False	False			Model	0	0
Economy		Product Model									Model	0	0
Sport		Product Model									Model	0	0
Group		Family Group										0	0
Engine type	Teamcenter	Family		String		False	False	False			Engine type	0	0
V8		Feature									Engine type	0	0
V6		Feature									Engine type	0	0
Interior Material	Teamcenter	Family		String		False	False	False			Interior Mater	0	0
Cloth		Feature									Interior Mater	0	0
Leather		Feature									Interior Mater	0	0
Unassigned Families												21478836	

ID	Type	Severity	Message	Select	Condition	Is Global	Effectivity
1208	Inclusion Rule	Error	Economy model includes V8	[Teamcenter]Engine type = V8	[201711]Model = Economy	False	
1209	Exclusion Rule	Error	Sport model excludes cloth type material	[Teamcenter]Interior Material = Cloth	[201711]Model = Sport	False	
		Error	Enter Message Here				

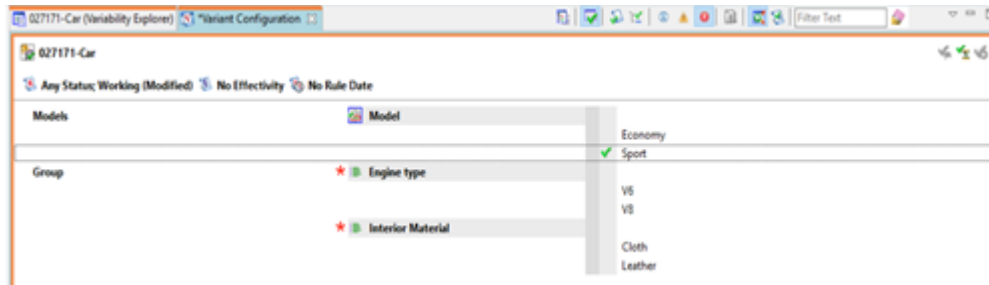
2. Open the **Variant Configuration** view and make selections as **Model=Sport** with the **Allow validation rules to expand** option as **selected**.
3. To perform the validate and expand action, click **Validate** and then click **Expand**.

The expansion action expands to system selection of **Interior Material=Leather** as **Cloth** is excluded due to the exclusion rule and only one possible selection is allowed other than what is available for the **Interior Material** family.



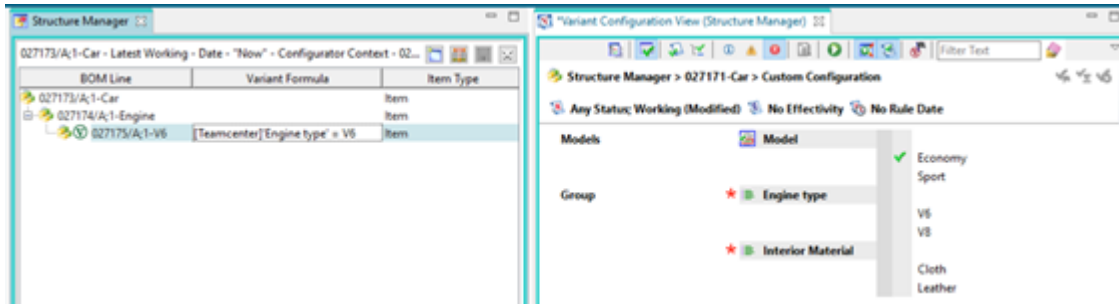
4. Open the **Variant Configuration** view and make selections as **Model=Sport** with the **Allow validation rules to expand** option as *deselected*.
5. To perform the validate and expand action, click **Validate** and then click **Expand**.

The expansion action does not expand to the system selection of **Interior Material=Leather**.



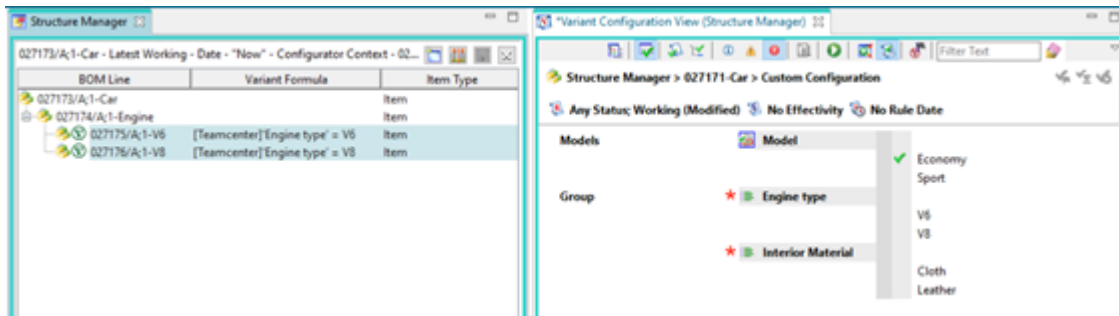
6. Create an assembly in Structure Manager, associate it with the configurator context, and author variant conditions for BOM lines.
7. Open the **Variant Configuration** view and make the selection as **Model=Economy** with the **Apply constraints** option as *selected*.

The **V6** BOM line is configured in. The **V8** BOM line is configured out as the constraints (include rule in this case) is considered while applying the configuration on the assembly.



- Open the **Variant Configuration** view and make the selection as **Model=Economy** with the **Apply constraints** option as *deselected*.

The **V6** and **V8** BOM lines are configured in. Here, the **V8** BOM line is configured in as only user selections are considered while applying the configuration, and constraints are ignored.



Configure with custom variant configuration (manual validation)

Manual configuration mode is primarily used to perform a study or an overlay analysis in the application that manages product content. Manual configuration is also used by configuration analysts to study the system response based on variety of selection paths. Using this mode, you can build and save valid configurations or study configurations.

If your system is configured with the global constant that points to **Name** as a primary business property, the **Variant Configuration** view displays **Name** instead of **ID** in the corresponding areas.

- Search for the structure in My Teamcenter, and click **Open**. Select it, right-click and select **Send To→Structure Manager**.
- To open the **Variant Configuration** view, click the **Set option values for selected module** icon on the main toolbar.
- Set a revision rule, effectivity, and rule date by clicking the corresponding hyperlink.

If an unconfigured feature exists in a configuration, such as after applying a saved variant rule, the system displays a question mark symbol next to the selected feature.

- Select manual validation mode by clicking **Guided configuration mode**  off. (The configuration mode always defaults to manual when you open a new session.)

By default, Teamcenter displays the **Variant Configuration** view in the **Overlay** configuration mode with all the available variant features including standalone features, feature packages, feature summaries, and summary models. You can select more than one feature from the single select family in the **Overlay** mode.

To switch to the **Order** configuration mode, click **Overlay Configuration Mode** . When you switch between the **Overlay** and **Order** modes, Teamcenter resets the system selections that were derived based on rules prior to switching the mode.

If you hover the cursor over the  button in the order mode, the tooltip displays **Order Configuration Mode**.

Your administrator can change the default configuration mode using the **Cfg0DefaultValidationMode** preference. By default, it is set to **Order** mode.

Observe that the header of the view displays the completeness check indicators. The icons appear active or inactive based on the results of the validation.

- Valid and complete product configuration .

Valid and complete means that the BOM is targeting a complete structure, that is, a 100% BOM. When a configuration is valid and complete, you could take this configuration input and perform a cost or a weight rollup, compute the center of gravity, or perform a digital analysis of that product.

On the contrary, if you do not see this completeness icon, you should not typically perform any of the above actions. It means that you have less content or more content.

When a configuration is valid and complete, it assigns a value to every family. This is irrespective of whether the family is mandatory or discretionary.

When you click **Validate** , the system only validates your input.

-  indicates that your input expands into a valid and complete configuration if you click **Expand**, such as it is a prediction of what would happen if you choose to expand your configuration.

When you click **Expand** , it means that the expanded configuration in the current configurator context is complete.

-  indicates that your input was valid and was successfully expanded into a valid and complete configuration. If the icon was not active prior to clicking **Expand** , the **Variant Configuration view** was changed during the **Expand** operation.
- Valid and incomplete product configuration .

When you click **Validate** , it means that the input criteria is valid during the validation.

When you click **Expand** , it means that the expanded expression is incomplete. For example, mandatory families may need to be selected to complete this configuration. You can also view a tooltip with a violation message with a list of incomplete families if you hover the cursor over the  result. The tooltip displays a list of incomplete mandatory families.

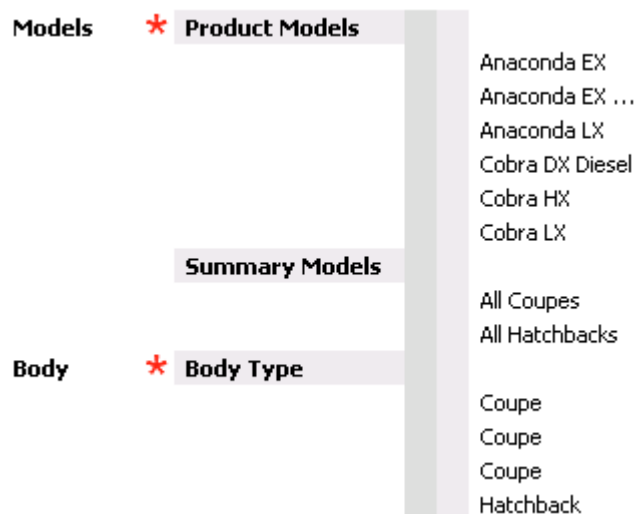
- Invalid product configuration .

It means that the input criteria is invalid based on the configurator rules set in the current configurator context.

Note:

Contact your system administrator if the system returns a validation failure without showing a list of information, warnings, or errors. It may be an access control issue.

A red asterisk  next to the family indicates that a variant feature selection is required. Once you make a selection that completes a required configuration, the red asterisk  disappears.



Warning:

Do not create configurator rules, variant conditions, or saved variant rules by combining a product model with a summary model or a product line.

- Click the cell to select the variant condition you want to use to define the configuration:
 - Click one time to display a green check mark  to include the variant condition when defining the configuration.
 - Click two times to display a red circle backslash  to exclude the variant condition when defining the configuration.

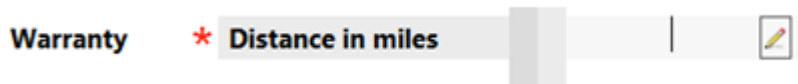
- Click three times to display a blank cell to indicate the variant condition is not used when defining the configuration.

If the cell is positively selected with a green check mark , it means **ANY**. If it is negatively selected with a red circle backslash , it means **NONE**.

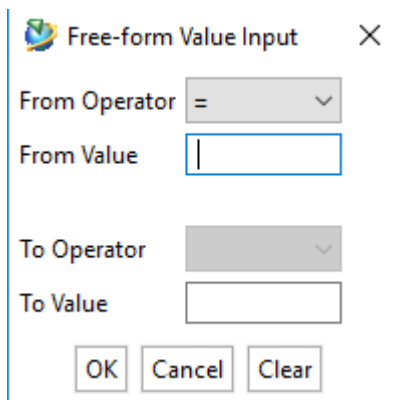
Multiple variant conditions are connected using a logical **AND** operation in the variant expression that defines the configuration.

- If you want to override the system-assigned default feature, click the system default feature once to deselect, and then click another feature from the same family.
- If the feature is a free-form text, perform the following steps:

- Click to the right of the cell under the corresponding feature to display the edit pencil  symbol.



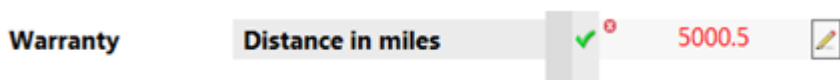
- Click  to type the values.
- In the **Free-form Value Input** dialog box, type the values to set the variant condition.



The image shows a dialog box titled 'Free-form Value Input'. It contains four input fields: 'From Operator' with a dropdown menu showing '=', 'From Value' with a text input field, 'To Operator' with a dropdown menu, and 'To Value' with a text input field. At the bottom are three buttons: 'OK', 'Cancel', and 'Clear'.

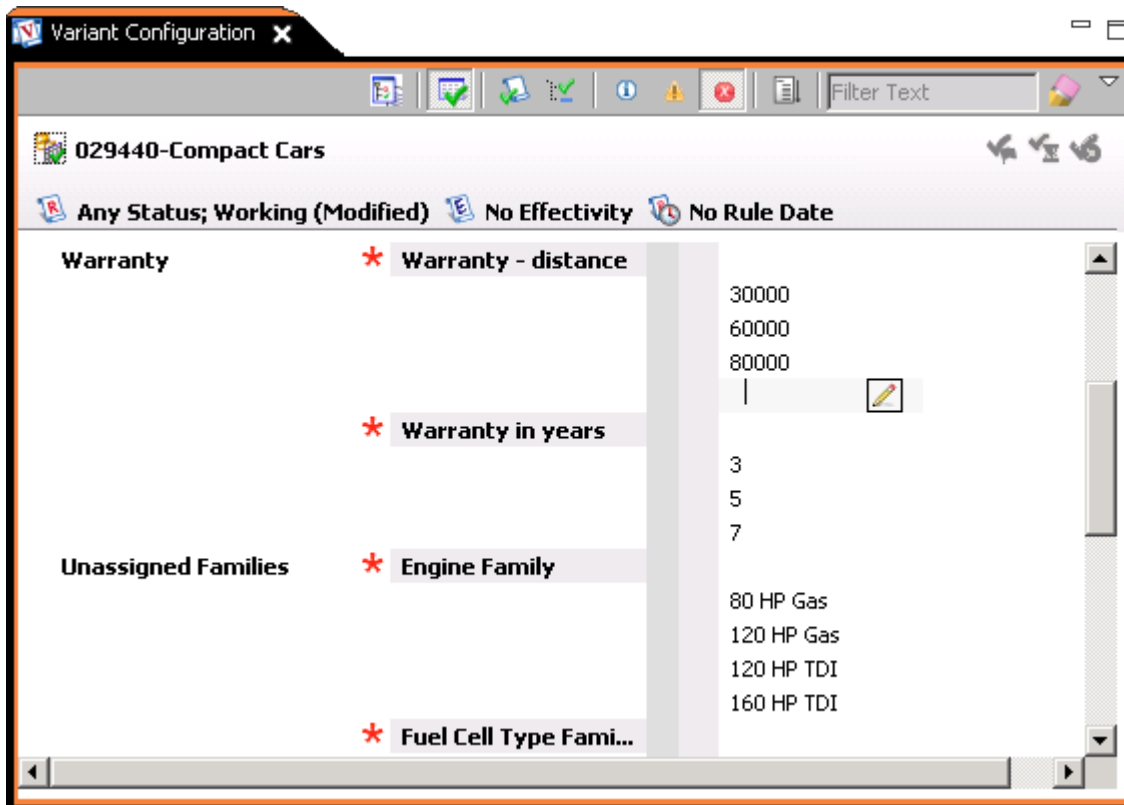
- Click **OK**.

If the entered value contains any validation or formatting issues, the free-form feature is displayed in red in the feature text field and flagged with an error message.



8. Use the above procedure to specify values for free-form non-string, numerical, or date type families.

Click below the last cell with enumerated values to display a new line and the edit pencil  symbol.



You can use operators only for the enumerated values for numeric families.

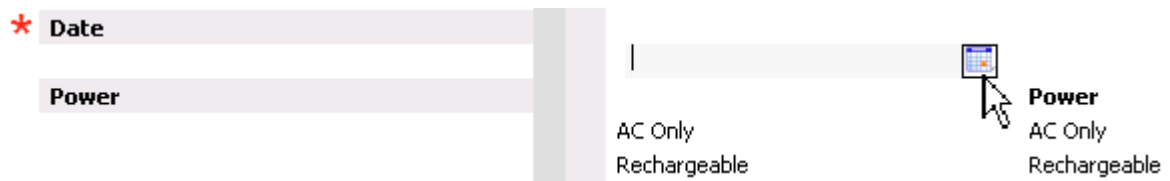
9. If a family is defined as free-form string, perform the following steps:
 - a. Click to the right of the corresponding cell under the free-form string family.
 - b. Enter values directly in the cell.

Other

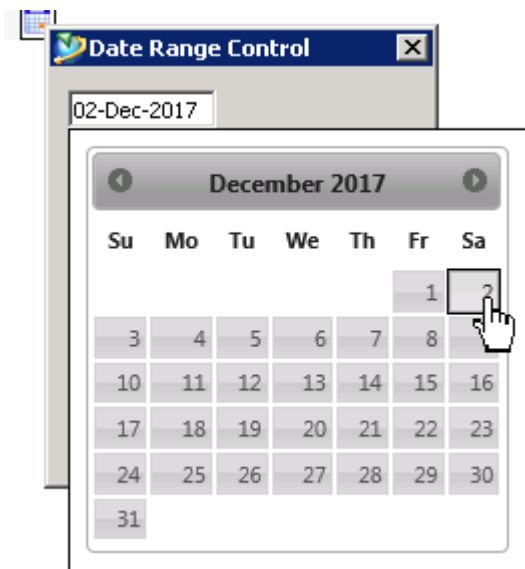


10. If a family is defined as date, perform the following steps:

- a. Click to the right of the cell to display the date  symbol.



- b. Click  to define dates.
- c. In the **Date Range Control** dialog box, click today's date to open the calendar to set the required date or type the values and ranges.



The calendar initially displays the current day, month, and year.

For a non-free-form data type, predefined features are not listed in the drop-down list when choosing a range.

For example, if an integer family **Horse Power** has features of **200**, **400**, and **500**, then the dialog box displays **200**, **400**, and **500** in the drop-down list. If a family **Release** has features of **01-01-2018** and **01-01-2019**, then the dialog box does not display a drop-down list with these features. If you want to use a range by using these features, select the precise date using date control in the **Date Range Control** dialog box.

- d. Click **OK** to set the date.
11. If a family is defined as a dynamic family, when you select a standalone feature in the manual mode, it is valid across all the selections in the dynamic families where this feature resides.

Your administrator can enable the creation of dynamic families and standalone features using the **Cfg0EnableDynamicFamilySupport** preference.

Note:

The standalone features and the dynamic family concept are in an incubation phase. They should only be used with the approval from Siemens product management. They require authoring in Active Workspace and consumption of configurator data.

12. If you do not want to apply constraints, deselect **Apply constraints**. By default, this option is selected.
 - If selected, constraints are applied while applying the variant rule expression on the content.
 - If deselected, only user selections are applied.
13. If you do not want validation rules to participate during criteria expansion, deselect **Allow validation rules to expand**. By default, this option is selected.
 - If selected, allows validation rules to participate during criteria expansion.
 - If deselected, only violations, if present, are reported. The system selections based on validation rules does not occur in the expanded criteria.

For more information, see [Example: Apply constraints and allow validation rules to expand](#).

14. To remove all variant expressions, click **View menu**  and choose **Clear Expression**.

The system re-evaluates the configuration and displays features that were hidden based on the previous selections.

15. To load an existing configuration for viewing or editing, perform the following steps:
 - a. Click **Load Variant Rule(s)** .

Teamcenter displays the **Load Variant Rule(s)** dialog box. You can search and filter variant rules or variant criteria using your defined criteria in this dialog box.

- b. Type a name or description as your search criteria to find variant rules or variant criteria.
- For variant criteria only, you can also search using the revision ID or ID. Additionally, you can specify the revision rule and the rule date in the **Load Variant Rule(s)** dialog box to locate the required revision of your variant criteria.

Press Enter or click **Search**.

Your administrator controls which queries and search criteria display in the **Load Variant Rule(s)** dialog box using the **PCA_VariantRuleSearch_SavedQueries** preference. This preference sets the default value as **Variant Rules** which is a generic saved query used to perform a search for variant rules. You can define your own saved query for variant rules and add its name to the **PCA_VariantRuleSearch_SavedQueries** preference.

If your administrator adds configurator context to the search criteria, the system locates only variant rules that are shared with the current and active configurator context in the **Variant Rule(s)** view.

Your administrator controls if you create variant rules or variant criteria using the **Cfg0CreateVariantRuleType** preference. The preference can be set to either **VariantRule** or **Cfg0VariantCriteria** which allows you to create either variant rules or variant criteria, respectively. By default, it is set to **Cfg0VariantCriteria**. If the value is not set, you see an error message notifying you that no valid variant rule is found in the system.

All variant rules that match your search criteria are listed in a table at the bottom of the dialog box. Additionally, it displays the number of variant rules found in your search.

- c. If needed, you can filter the results by typing your criteria in the filter box.

Variant Rules

Enter text to filter list of variant rules

- d. Check one or more boxes to select product configurations you want to load and click **OK** to replace the existing selections. By default, **Load expanded expression only and skip revision, effectivity and violation level information** is selected.

Note:

The default state of the check box is controlled by the **Cfg0LoadExpressionInfoForVR** user preference. By default, it is set to **false** and the variant rule is loaded without session information.

The system loads expressions of the selected variant rules or variant criteria in the **Variant Configuration** view.

If not selected, the configuration session information with expressions is loaded for the selected variant rule. A variant rule session information consists of severity, validation mode, revision rule, effectivity, and a rule date saved along with an expression.

When you load the rule without the session information, the system displays it as **Custom configuration**. If you modify and save it, the system saves it as a new rule.

If you load the entire rule including all of the expressions and the session information, the system displays the name of the variant rule or the ID, revision, and the name of the variant criteria. If you make any changes to that rule, the system overrides the information and saves the changes in the same rule. Validation information is not saved along with the rule. It is recommended to validate the rule after you reload it.

When you make changes to variant rules or variant criteria, such as make a new selection, change a revision rule or effectivity, the system resets the validation flags.

Alternatively, you can select **Append only expressions to the existing configuration in the view** and Teamcenter loads each in a separate column, preserving the existing selections. Teamcenter loads only saved expressions. The system applies the configuration to the current content and logically overlays multiple columns, resulting in a 120% BOM configuration or an imprecise configuration.

When using the **Load Variant Rule(s)** dialog box to append new saved variant rules to your configuration using **Append only expressions to the existing configuration in the view**, you can only view the already loaded SVRs but you cannot deselect them. You can choose to load other available saved variant rules.

When you overlay configurations, the system displays each configuration in a separate column during authoring and validation. Configurations are also expanded column by column. Number of columns in the input and output configurations are maintained by the system.

If you select variant rules to load with **Append only expressions to the existing configuration in the view** not selected, then the system does not append the columns for the selected rules. If you search and load variant rules or variant criteria multiple times, then the system constructs results only for the newly selected objects and does not include the already loaded ones.

Note:

If you make imprecise selections, you cannot switch to the guided (active) mode. The system generates an error message stating that the active validation mode only supports the precise configuration.

16. (Optional) Click **View menu**  and choose **Clear Variant Rule** to unload the variant rule or variant criteria from the view and reset the session information, including severity, validation mode, revision rule, effectivity, and the rule date, to the default state.
17. (Optional) Click **View menu**  and choose **Clear Un-configured Feature** to remove unconfigured features.

The expression on the unconfigured feature in the view is removed. Also, the row holding the unconfigured feature is removed.

18. Click **Validate** . The system validates your input and considers all system rules to validate and report the verdict. It does not change the input expression. It does not consider rules below the selected severity level, such as default rules.

You can specify operators for numerical or date family when validating your configuration.

Teamcenter provides feedback after performing a set of functions as follows:

- a. Validates the selected criteria against the system rules with the severity equal or greater than the input severity.
- b. Applies all configurator rules.
- c. Reports violations based your selections.

If prior to validation, all families have precise selections, the system displays the **Valid and complete product configuration**  status. Otherwise, the system displays the **Valid and incomplete product configuration**  status and provides additional information indicating the reason for the invalid status.

- d. Reports violation on the free from families where value specified is outside their minimum or maximum range.

If you hover over the violation, the tooltip displays object details that caused this violation, such as specific features or configurator rules. If needed, you can select and copy the violation message.

If your configuration contains an inconsistent or conflicting rule set, then the violation occurs irrespective of any selection in the **Variant Configuration** view or for any other validation. In such cases, the violation may not be displayed on your selection. For example, if no features from mandatory families are available, then during the validation, the violation occurs. The violation is displayed on features of mandatory families even if they are not a part of the input configuration to validate.

Configurator constraint rules, such as inclusion or exclusion rules, specify a severity level. When you are validating your configuration, the system reports the constraint rule violations with the specified severity level.

19. You can perform the following actions to modify the interaction for validations during the manual configuration:
 - a. Click **Set Info level violations to be fetched while applying validations** ⓘ to switch between displaying and enforcing or hiding and dropping of all informational messages.
 - b. Click the **Set Warning level violations to be fetched while applying validations** ⚠ to switch between displaying and enforcing or hiding and dropping of all warning messages.

Error level violations 🚫 are always displayed.

During the validation process, if you have multiple rules with conflicting severity levels, the systems validates and enforces the rules based on the following severity ranking:

- a. Error (highest severity)
 - b. Warning
 - c. Information
 - d. Package Default
 - e. Default
 - f. System Enforced Defaults (lowest severity)
20. Click **Expand** 📦. The system considers all system rules to validate your input and assigns features or precise values to the feature families using system knowledge.

If **Allow Validation Rules to Expand** button is deselected during expansion, only violations are reported, if present. The system selection based on validation rules does not occur in the expanded criteria. By default, Teamcenter displays the **Variant Configuration** view with this button as selected.

- In the **Overlay** mode, the system assigns values based on the valid input criteria.
- The system appends your input in the **Variant Configuration** view with the values that the system identified as the only possible solution in the selected families. The system considers all configurator rules with the severity equal or greater than the input severity.

Note:

The families with multiple possible solutions are left unassigned.

- The system informs you if the expanded criteria is complete or incomplete.
- In the **Order** mode, the system assigns values based on the valid input criteria, similar to the **Overlay** mode. Moreover, it provides additional values to help you create 100% configuration or order configuration. These additional values are provided for all families.

The system suggests the empty value  as the default if there are multiple solutions or for an optional family. This means the resulting configuration is not choosing any values for the optional family.

All of the nonconflicting low severity rules, including default rules, are considered.

21. Click  to save the custom rule.

If you started from a blank view, Teamcenter displays the **Save Product Configuration** dialog box; otherwise it saves the changes to the existing product configuration.

If you exit the **Variant Configuration** view without saving, you are prompted to save the changes.

22. To save a new configuration, in the **Save Product Configuration** dialog box, type a name and description, and click **OK**.

Teamcenter creates a custom configuration with the specified name and variant configuration. The system adds the name of the saved variant rule to the title bar.

23. To clear a previously loaded custom configuration, click **View menu**  and choose **Clear Variant Rule**.

The system removes the name of the saved configuration from the title bar and then resets user and system selections to the initial state.

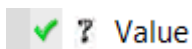
Configure with guided variant configuration (active validation)

Guided configuration mode is primarily used to simulate the configuration behavior for customer interactions. The users of this configuration want to be sure that there is a valid configuration path for every planned product variant. Similar to manual configuration mode, validated configurations can be saved and used to track primary configurations.

If your system is configured with the global constant that points to **Name** as a primary business property, the **Variant Configuration** view displays **Name** instead of **ID** in the corresponding areas.

1. Search for the structure in My Teamcenter, and click **Open**. Select it, right-click and select **Send To→Structure Manager**.
2. To open the **Variant Configuration** view, click the **Set option values for selected module** icon on the main toolbar.
3. Set a revision rule, effectivity, and rule date by clicking the corresponding hyperlink.

If an unconfigured feature exists in a configuration, such as after applying a saved variant rule, the system displays a question mark symbol in front of the selected feature.



4. Click to use guided validation by clicking **Guided configuration mode**  on. (The validation mode always defaults to manual when you open a new session.)

By default, Teamcenter displays the **Variant Configuration** view in the **Overlay** configuration mode.

To switch to the **Order** configuration mode, click **Overlay Configuration Mode** . When you switch between the **Overlay** and **Order** modes, Teamcenter resets the system selections that were derived based on rules prior to switching the mode.

If you hover the cursor over the  button in the order mode, the tooltip displays **Order Configuration Mode**.

Your administrator can change the default configuration mode using the **Cfg0DefaultValidationMode** preference. By default, it is set to **Order** mode.

Observe that the header of the view displays the completeness check indicators. The icons appear active or inactive based on the results of the validation.

- Valid and complete product configuration 

Valid and complete means that the BOM is targeting a complete structure, that is, a 100% BOM. When a configuration is valid and complete, you could take this configuration input and perform a cost or a weight rollup, compute the center of gravity, or perform a digital analysis of that product.

On the contrary, if you do not see this completeness icon, you should not typically do any of the above actions. It means that you have less content or more content.

When a configuration is valid and complete, it assigns a value to every family. This is irrespective of whether the family is mandatory or discretionary.

- Valid and incomplete product configuration 

In the guided mode, Teamcenter does not provide a list of incomplete mandatory families.

Tip:

To locate a list of missing required families, switch to the manual mode. For the valid and incomplete product configuration  in the manual mode, Teamcenter generates a tooltip with a list of incomplete mandatory families.

- Invalid product configuration 

Teamcenter shows a list of groups with the first in bold and arrows above and below the list. Any features that violate constraints are indicated. The families and features of the group are displayed in the right pane.

A red asterisk  next to the family indicates that a variant feature is required. Once you make a selection,  next to the family disappears.

- A  symbol is displayed next to the system-assigned available features.

It indicates that the displayed features are enforced in the current configuration. Typically, features configured due to include, exclude, and availability rules are shown as system-assigned.

A system selection is only shown for families with exactly one solution.

- A  symbol indicates that the presence of the selected feature is denied by the system due to configurator constraints, such as inclusion, exclusion, or availability rules.
- A  symbol is displayed next to the default features when the selection is enforced by:
 - A default rule.

The applicability of the default rule is satisfied either directly by a user-defined criteria or by a system selection enforced by include, exclude, and availability rules.

- An include rule.

The applicability of the include rule is satisfied through a default rule.

- A  symbol indicates that a selected feature is denied by the system due to the default rule.

If you have an imprecise configuration displayed using manual validation, you cannot switch to the guided (active) mode. The system generates an error message stating that the active validation mode only supports the precise configuration.

Guided configuration displays variant data within one group at a time. These are user-created groups. Every configurator context contains a default **Unassigned Families** group. As this group is system-generated and not manually created by a user, it is *not* displayed in a guided configuration mode. Thus, the variant data within the **Unassigned Families** group is also *not* displayed in a guided mode. However, in a manual mode, both the **Unassigned Families** group and its variant data are displayed. Families and features become visible in a guided configuration mode, once you create a new parent group or move the unassigned families with the corresponding features to an existing group.

Standalone features and dynamic families with standalone features are also displayed, if available.

The system displays all of the available Boolean features and features from the multi-select families, only if they are made explicitly available.

Note:

Product lines, summaries, summary models, and families that reside in the **Unassigned Families** group are not displayed during the guided validation.

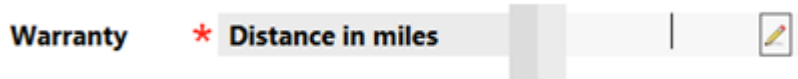
5. Click the cell to select the variant condition you want to use to define the configuration.
 - Click one time to display a green check mark  to include the variant condition when defining the configuration.
 - Click two times to display a blank cell to indicate the variant condition is not used when defining the configuration.
 - Click the , , or  system-assigned features once to change them to the user-assigned selections.

If the cell is positively selected with a green check mark , it means **ANY**. If it is negatively selected with a red circle backslash , it means **NONE**.

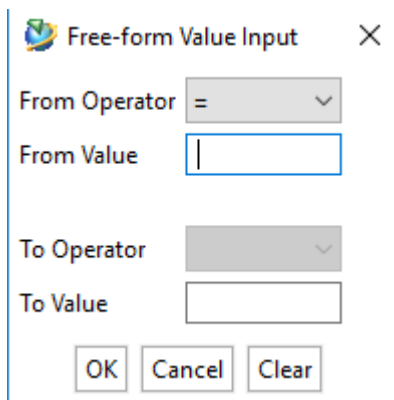
Multiple variant conditions are connected using a logical **AND** operation in the variant expression that defines the configuration.

If you select features that define a model, validation automatically selects a model. When you select a product model or a feature package, then the system adds the corresponding product model or feature package members, respectively, to the configuration.

6. If the feature is a free-form text, perform the following steps to set the feature:
 - a. Click to the right of the cell under the corresponding feature to display the edit pencil  symbol.



- b. Click  to type the values.
 - c. In the **Free-form Value Input** dialog box, type the values to set the variant condition.



The 'Free-form Value Input' dialog box is shown. It has a title bar with a close button (X). Inside, there are four fields: 'From Operator' with a dropdown menu showing '=', 'From Value' with a text input field, 'To Operator' with a dropdown menu, and 'To Value' with a text input field. At the bottom, there are three buttons: 'OK', 'Cancel', and 'Clear'.

- d. Click **OK**.

If the entered value contains any validation or formatting issues, the free-form feature is displayed in red in the feature text field and flagged with an error message.



7. If a family is defined as a free-form string, perform the following steps:
 - a. Click to the right of the corresponding cell under the free-form string family.
 - b. Enter values directly in the cell.

Other

Cord Length

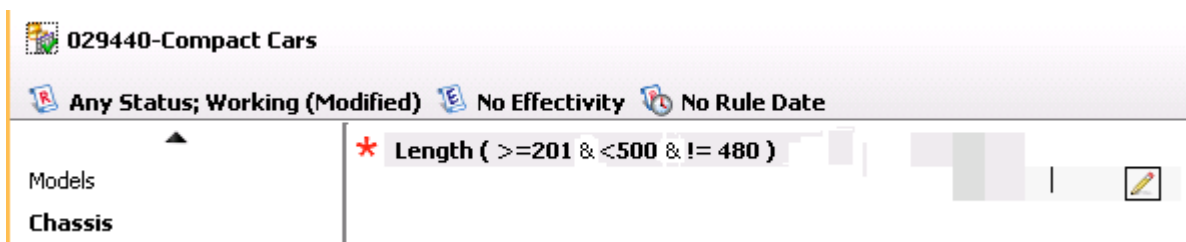
Cord size

Power

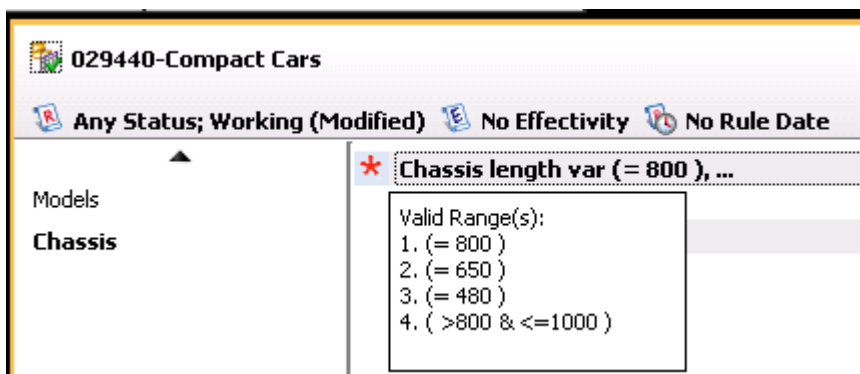


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8. During guided validation mode, for enumerated and free-form non-string families, the system displays allowable ranges by considering all of the configurator rules.



The system displays the updated range and considers all possible subranges. The tooltip displays the disjointed ranges, if present.



9. To remove all variant expressions, click **View menu**  and choose **Clear Expression**.

The system re-evaluates the configuration and displays features that were hidden based on the previous selections.

10. Set the type of violation messages to be displayed by the system as follows:
- Click **Set Info level violations to be fetched while applying validations** ⓘ to switch between displaying and enforcing or hiding and dropping of all informational messages.
 - Click the **Set Warning level violations to be fetched while applying validations** ⚠ to switch between displaying and enforcing or hiding and dropping of all warning messages.

Error level violations  are always displayed.

The severity of the rule is honored when the system displays the available features in active mode. For example, if you set a minimum error severity of *warning* , then the features that violate the *information*  severity rules are also available for selection in active mode along with the features that do not violate any other rules.

11. Select families, one group at a time, making modifications and resolving violations.

Click  or  to switch groups to select families, one group at a time.

If you deselect the **Allow Validation Rules to Expand** button, system selections based on validation rules does not occur after selection in the guided mode.

Teamcenter applies constraints to each group according to your previous selections. Each time you select a different group, it:

- Displays only valid available features. Features that are not available are hidden.
- If no model is selected, the system shows all features that are available to any model in the configurator context.
- Once a model is selected, the system only shows the features that are available to the selected model.
- Similarly, if you select a feature prior to selecting any models, then the system only shows the models where that feature is available.

Note:

Because configuration validation is automatically done whenever you navigate to a different group, you can make modifications to resolve the violations.

- Validates the current selections and identifies the validation result with appropriate symbols.
- Determines valid selections in the next group and applies constraints.

If there are no valid selections for a family in the next group, that family is not included. If the family is required, it displays an error message.

The system preselects features based on defined configurator rules. It also hides the features that are excluded as a result of constraints. If multiple features apply, the system does not suggest a selection. In this case, you can create a default configurator rule to define a preferred selection.

Selection of features through inclusion rules during configuration rules out other features. Whereas selection of features from default rules does not rule out other features. You can only select features that are available and selectable, if no other rules create any conflicts.

- Applies system-assigned features and defaults to the families in the next group.

You can change the selection from a system-assigned to a user-assigned feature. For example, if a **Music Player** feature is set to a system-assigned **DVD** feature, you can choose an **MP3** feature instead, as an upgrade.

The system allows you to validate configurations by specifying operators only for free-form families. You can only use = and != operators for text and free-form string features.

Note:

While computing a valid and complete configuration in the guided mode, the system selection of features within families in a group is only honored for that group. Switching to a new group makes the system selection ineffective for the previously selected groups. After switching groups during the guided mode, you can switch to the manual mode to view the system-selected features that impact the completeness of your configuration.

12. If you do not want to apply constraints, deselect **Apply constraints**. By default, this option is selected.
 - If selected, constraints are applied while applying the variant rule expression on the content.
 - If deselected, only user selections are applied.
13. If you do not want validation rules to participate during criteria expansion, deselect **Allow validation rules to expand**. By default, this option is selected.
 - If selected, allows validation rules to participate during criteria expansion.
 - If deselected, only violations, if present, are reported. The system selections based on validation rules does not occur in the expanded criteria.

For more information, see [Example: Apply constraints and allow validation rules to expand](#).

14. Click  to save the custom rule.

If you started from a blank view, Teamcenter displays the **Save Product Configuration** dialog box; otherwise it saves the changes to the existing configuration.

If you exit the **Variant Configuration** view without saving, you are prompted to save the changes.

15. To save a new configuration, in the **Save Product Configuration** dialog box, type a name and description, and click **OK**.

Teamcenter creates a custom product configuration with the specified name and variant configuration. The system adds the name of the saved variant rule to the title bar.

16. To clear previously loaded custom configuration, click **View menu**  and choose **Clear Variant Rule**.

The system removes the name of the saved configuration from the title bar and then resets user and system selections to the initial state.

17. (Optional) Click **View menu**  and choose **Clear Un-configured Feature** to remove unconfigured features.

The expression on the unconfigured feature in the view is removed. Also, the row holding the unconfigured feature is removed.

About solution variants

Why create solution variants?

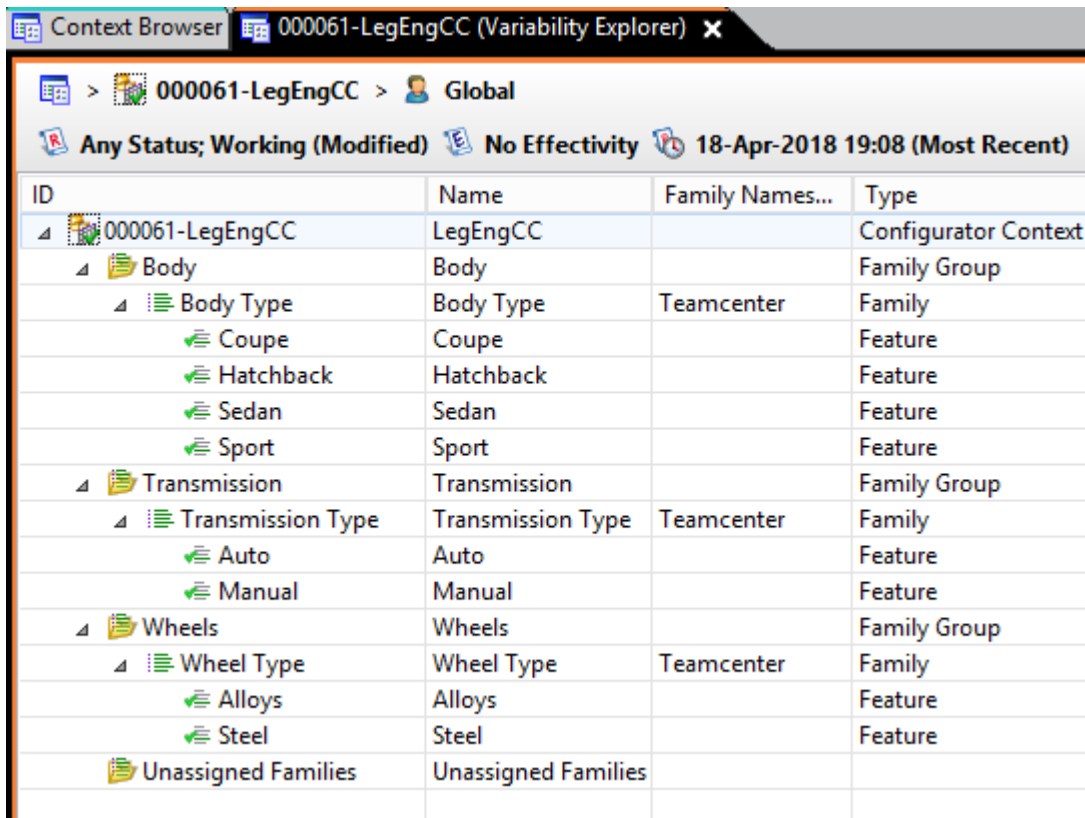
It is much more efficient to manage a range of product variants as a single variable structure instead of separate product variants. However, when you configure the variable structure to a 100% BOM, there is no static structure to represent a physical part, order, assembly, or to send to manufacturing.

You can create *solution variants* to capture and identify these product variants without the variability. As the product structure evolves, you can manage its variability. In addition, you can maintain the structure as a separate entity, but retain the links to the content from which it was derived.

- When the solution variant is opened in Structure Manager, the revision rule and the variant rule of the solution variant is applied on the Structure Manager view.
- The **Variant Configuration** view shows the variant rule of the solution variant. You cannot modify this variant rule.
- After a solution variant is created, the source structure and the solution variant both can evolve over the time. You can update the content changes from the source structure to the solution variant, but not the other way around.
- You can create solution variants for a single level structure or a multiple level structure. However, you can update the solution variant with only the first level content changes from the source structure currently.
- You cannot create a solution variant from another solution variant.

Create a solution variant

1. In Product Configurator, create a configurator context with groups, families, and features as follows.



ID	Name	Family Names...	Type
000061-LegEngCC	LegEngCC		Configurator Context
Body	Body		Family Group
Body Type	Body Type	Teamcenter	Family
Coupe	Coupe		Feature
Hatchback	Hatchback		Feature
Sedan	Sedan		Feature
Sport	Sport		Feature
Transmission	Transmission		Family Group
Transmission Type	Transmission Type	Teamcenter	Family
Auto	Auto		Feature
Manual	Manual		Feature
Wheels	Wheels		Family Group
Wheel Type	Wheel Type	Teamcenter	Family
Alloys	Alloys		Feature
Steel	Steel		Feature
Unassigned Families	Unassigned Families		

2. In Structure Manager, open the structure for which you want to create a solution variant, and apply the configurator context you created.
3. Enable the **Solution Variant Category** column. This column is not available by default.
 - To insert this column, right-click on a column, select **Insert columns**, choose **Solution Variant Category**, click **Add**, and then click **Apply**.
4. In the **Solution Variant Category** column, select one of the following categories for the solution variant you want to create.
 - **Reuse:** You can create only one solution variant for an SVR from the same source structure. If you try to create a solution variant for the same SVR from the same source structure, the system reuses the existing solution variant.

If the source structure changes, you can update the solution variant structure. Regardless of this, the system automatically applies the changes from the source structure to the solution variant structure.

You cannot make structural changes such as adding, removing, or revising BOM lines in the solution variant structure.

- **Managed:** You can create multiple solution variants for the same SVR from the same source structure.

If the source structure changes, you can compare the changes with the solution variant structure and merge the changes manually.

You can make structural changes such as adding, removing, or revising BOM lines in the solution variant structure.

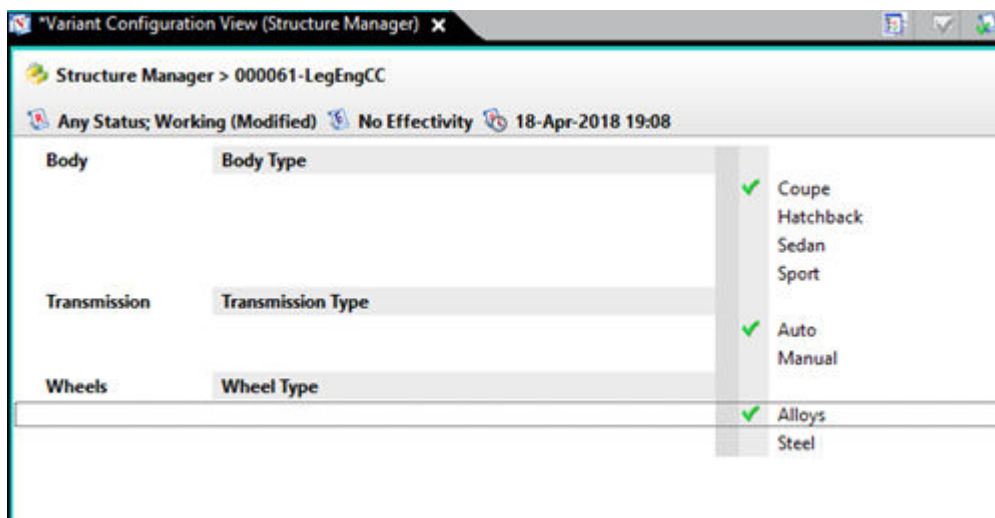
- **Unmanaged:** You can create multiple solution variants for the same SVR from the same source structure.

If the source structure changes, you cannot update the solution variant structure, that is, there is no sync mechanism.

You can make structural changes such as adding, removing, or revising BOM lines in the solution variant structure.

5. Apply the features you created in the configurator context to the respective BOM lines in the structure.
 - a. To open the **Variant Configuration** view, click **Set option values for selected module**  on the main toolbar.
 - b. Select the required features.

Selections are indicated by a check mark  or a circle backslash icon  in a cell. The check mark  indicates that the option is included in the product configuration. The circle backslash icon  indicates that the option is excluded from the configuration.



Alternatively, click **Load Variant Rules** and select an SVR.

Note:

The solution variant is always created based on the applied SVR on the assembly or the structure.

- c. To validate if the selected features are applicable to the structure, click **Validate** .
- d. To apply the selected features to the structure, click **Applies the current configuration to the associated structure** .

6. Create a solution variant for a single level.

Use this option to create a solution variant for the root line of the structure.

- a. Select **Tools→Solution Variant** and clear the **Enable Multi-Level Creation** option. By default, the system creates solution variants for multiple levels.
- b. To create the solution variant, click **Solution Variant** .

Tip:

You can set the **PSESolutionVariantAutoCreate** site preference to **false** to create a solution variant by specifying a name. Alternatively, set it to **true** to create a solution variant with a system generated name.

7. Create solution variants for multiple levels.

Use this option to create a solution variant for the complete structure.

- a. Select **Tools→Solution Variant** and select the **Enable Multi-Level Creation** option. By default, the system creates solution variants for multiple levels.
- b. To create the solution variant, click **Solution Variant** .
- c. (Optional) Select **Dry Run** and click **Start**.

Alternatively, click **Start** to create a solution variant without performing a dry run.

The solution variant is created with the name and ID format that your administrator sets.

Search for a solution variant

Search for a solution variant without using configurator criteria

1. In Structure Manager, open a structure.
2. Click **Search Solution Variant**  in the main toolbar.
3. (Optional) Clear the **Unmanaged**, **Managed**, or **Reuse** check box as appropriate. By default, all the options are selected.
4. (Optional) Select the appropriate revision of the BOM line you have selected in the source structure.
5. Click **Search**  in the **Search Solution Variants** view toolbar.
6. From the search results, double-click a solution variant to open it.

Search for a solution variant by using configurator criteria

You can search for a solution variant, using the configurator criteria by keeping the **Variant Configuration** view open while performing the search.

1. In Structure Manager, open a structure.
2. Click **Set option values for selected module**  on the main toolbar to open the **Variant Configuration** view and select some option values.
3. Click **Search Solution Variant**  on the main toolbar.
4. (Optional) Clear the **Unmanaged**, **Managed**, or **Reuse** check box as appropriate. By default, all the options are selected.
5. (Optional) Select the appropriate revision of the BOM line you have selected in the source structure.
6. Click **Search**  on the **Search Solution Variants** view toolbar.

You can use the **Overlay** or the **Order** configuration mode to search for solution variants. The difference between these modes is that the defaults are considered only for the **Order** mode. For example, if you search for solution variants that are configured using a 12V battery in the **Overlay** mode, the search considers only the 12V selection.

Variant Configuration View (Structure Manager)

Structure Manager > 030989-Handdrill MkIII

Any Status; Working (Modified) No Effectivity 26-Feb-2020 12:21

Overlay Configuration Mode

Power s...	Battery Voltage		Option to control the battery voltage
	25V		25 Volt Battery
	✓ 12V		12 Volt battery
	18V		18 Volt battery
* Type of Battery	NiMh		Option to control type of battery
	NiCd		Nickel-MetalHydride battery
	None		Nickel-Cadmium battery
Power c... * Motor type			No battery (OEM version or for spare par
	Brushless DC motor		Option to select the motor type
	DC motor		Brushless DC motor with encoder
* Spindle rotation			Standard DC motor with brushes
	Right only		Option to select the possible spindle ro
	Left and Right		Spindle right wise turning only
* Speed control			Selection of turning the spindle left or rig
			Option to select the type of (spindle) s

Search Solution Variants

Context Item: 3-001-000261/A;1-Handdrill MkIII (variability) ☒ Unmanaged ☒ Managed ☒ Reuse Item Revision A

Showing results for: 3-001-000261/A;1-Handdrill MkIII (variability)

Solution Variant Item Revision	Category	Source Item Revision	Update Required
012915/A;1	Reuse	3-001-000261/A;1-Handdrill ...	Yes
013021/A;1	Managed	3-001-000261/A;1-Handdrill ...	Yes

However, in the **Order** mode, the search results for solution variants configured using a 12V battery are different.

Variant Configuration View (Structure Manager)

Structure Manager > 030989-Handdrill MkIII

Any Status; Working (Modified) No Effectivity 26-Feb-2020 12:21

Order Configuration Mode

Configuration Option	Selected Value	Description
Power s... Battery Voltage	12V	Option to control the battery voltage
Type of Battery	NiMh	Option to control type of battery
Motor type	Brushless DC motor	Option to select the motor type
Spindle rotation	Right only	Option to select the possible spindle rotations
Speed control	Left and Right	Option to select the type of (spindle) speed co

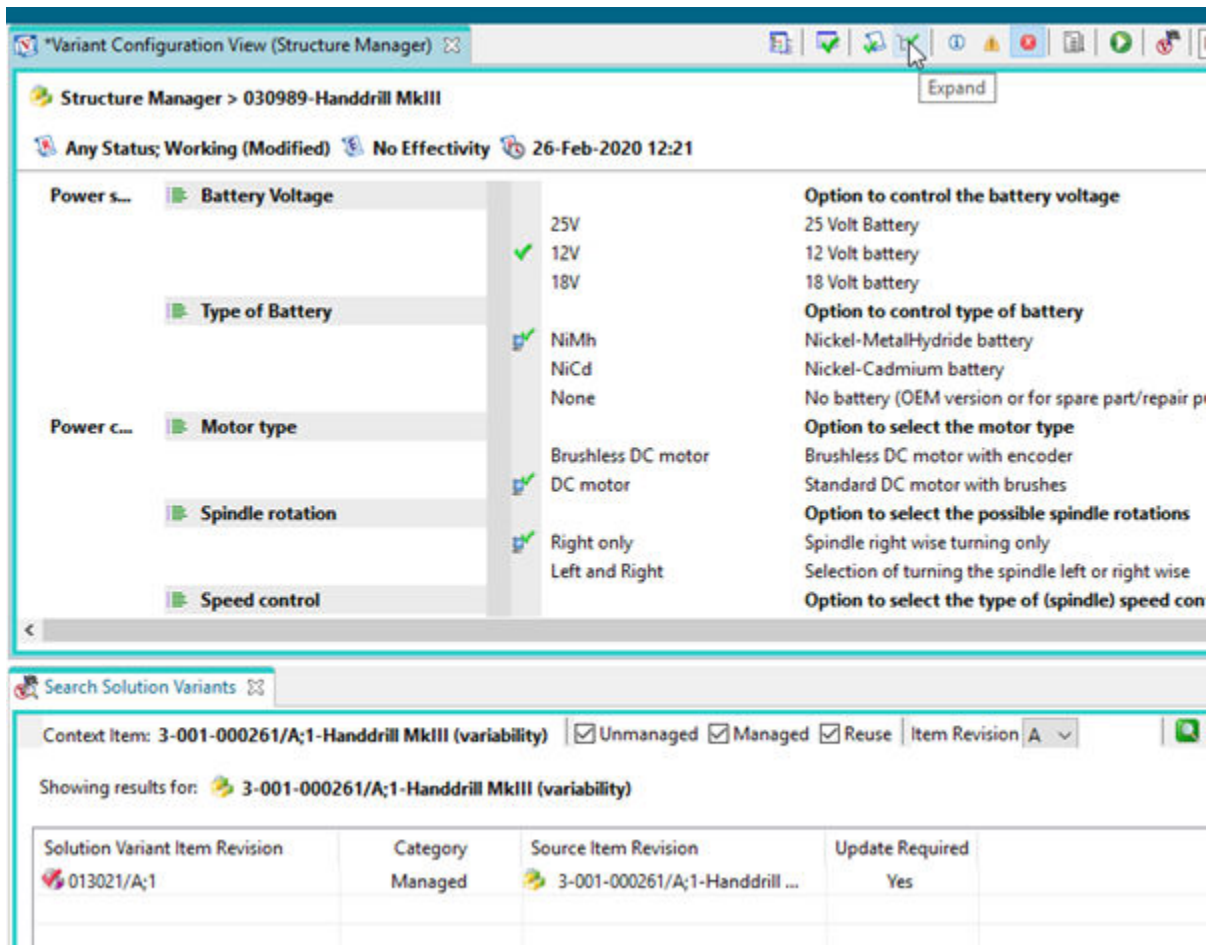
Search Solution Variants

Context Item: 3-001-000261/A;1-Handdrill MkIII (variability) ☒ Unmanaged ☒ Managed ☒ Reuse Item Revision A

Showing results for: 3-001-000261/A;1-Handdrill MkIII (variability)

Solution Variant Item Revision	Category	Source Item Revision	Update Required
013021/A;1	Managed	3-001-000261/A;1-Handdrill ...	Yes

The search results are different because the 12V battery and the defaults such as *NiMh*, *DC motor*, and *Right only* are also considered in the **Order** mode.



Update a solution variant for changes to structures

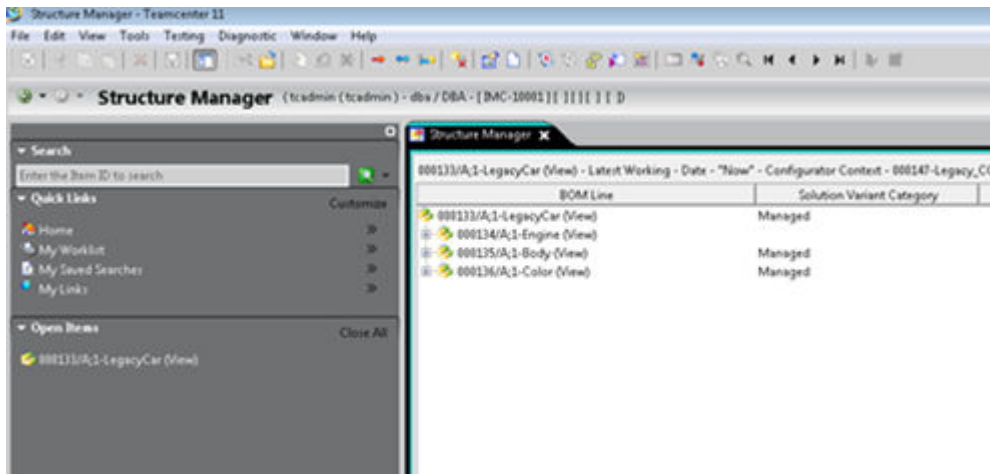
If the source structure or the solution variant structure has changed, when you search for the solution variant, the system displays that an update is required.

If an update is required for a **Managed** category solution variant structure, the system displays the **Update Solution Variant from Source Assembly** dialog box. You can make selections and manually merge or automatically merge the changes.

If an update is required for a **Reuse** category solution variant structure, in the **Search Solution Variants** pane, you must click **Update** for the changes to take effect.

To update a solution variant:

1. In Structure Manager, create a source structure as follows.



2. Enable the **Solution Variant Category** column. This column is not available by default.

To insert this column, right-click on a column, select **Insert columns**, choose **Solution Variant Category**, click **Add**, and click **Apply**.

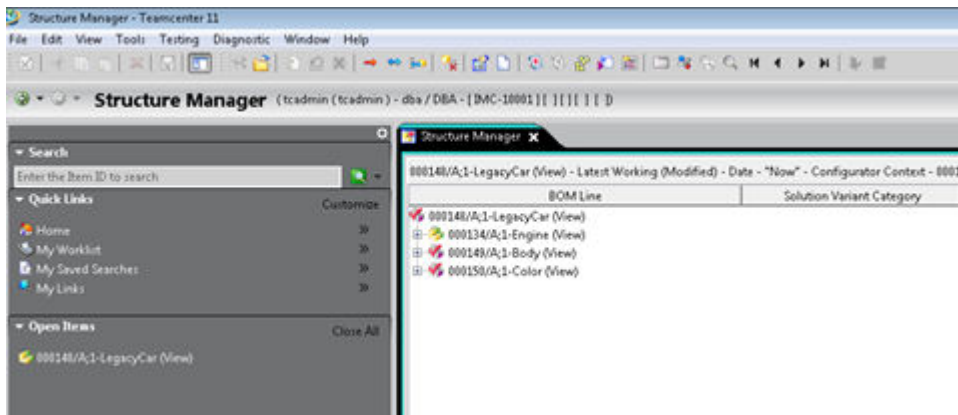
3. Select **Managed** from the **Solution Variant Category** column for the root structure, and **Body**, and **Color** as subassemblies.
4. To open the **Variant Configuration** view, click **Set option values for selected module**  on the main toolbar.
5. Select the required features.

Selections are indicated by a check mark  or a circle backslash icon  in a cell. The check mark  indicates that the option is included in the product configuration. The circle backslash icon  indicates that the option is excluded from the configuration.

Alternatively, click **Load Variant Rules** and select a saved variant rule.

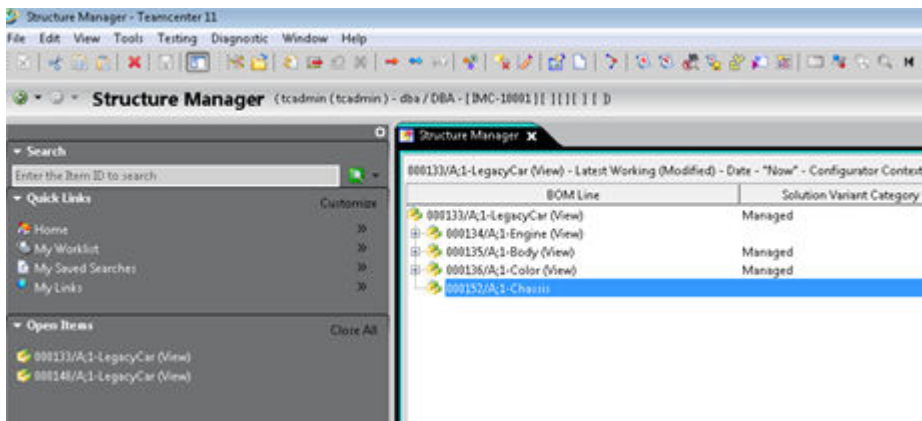
6. To validate if the selected features are applicable to the structure, click **Validate** .
7. To apply the selected features to the structure, click **Applies the current configuration to the associated structure** .
8. To create the solution variant, click **Solution Variant** .

The system creates solution variants as follows.



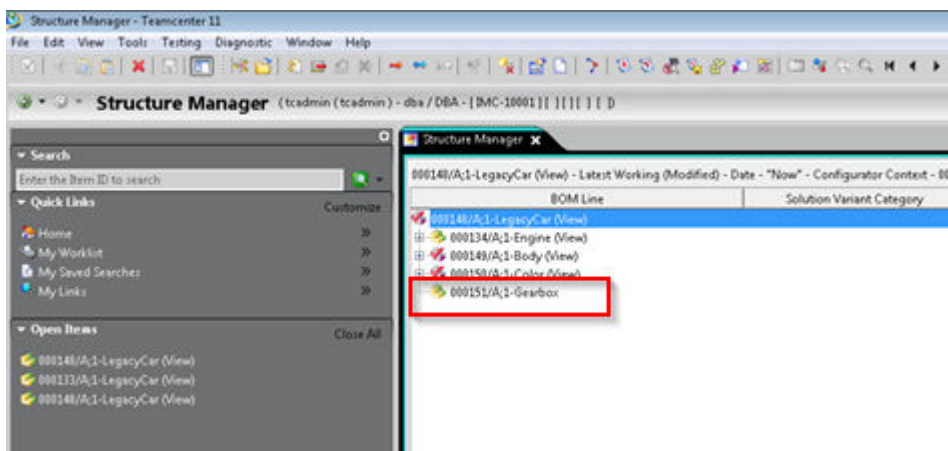
- Modify the source structure by adding an item.

In this example, **Chassis** is added.

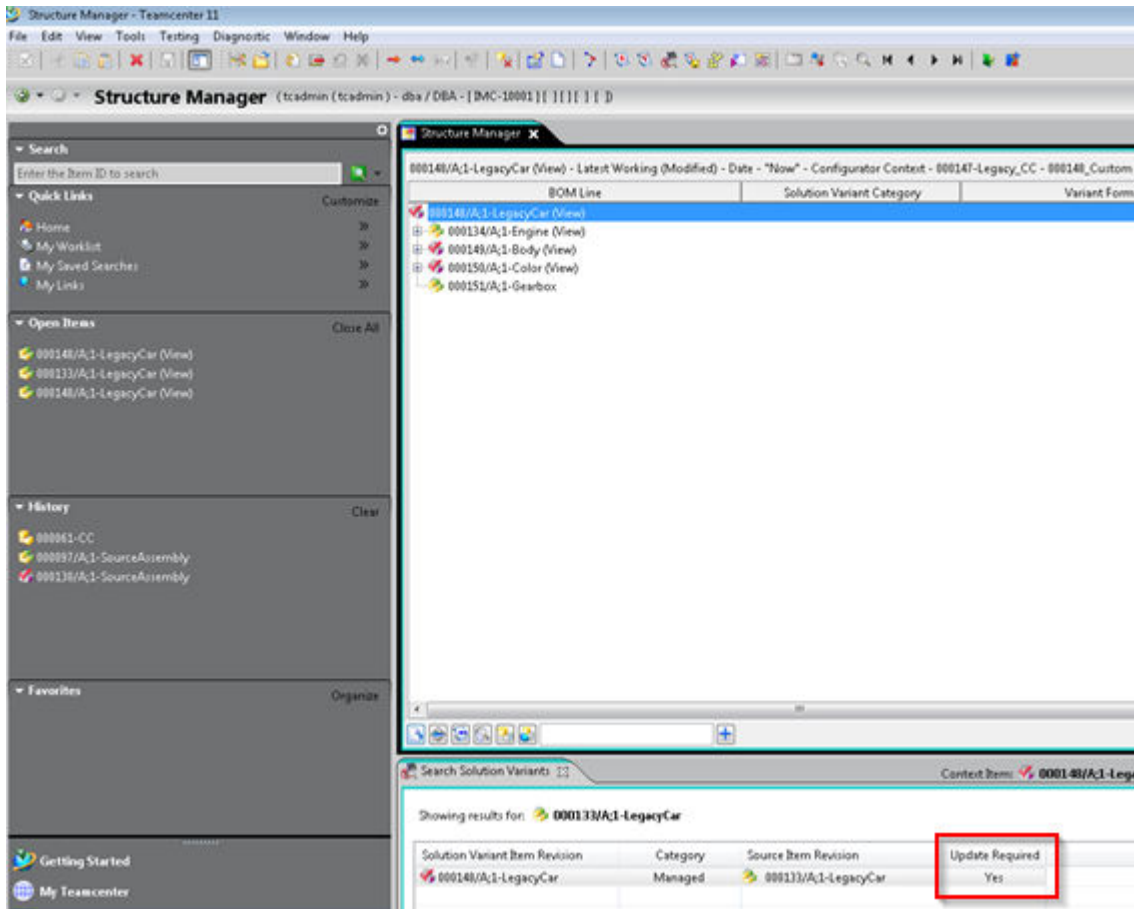


- Modify the solution variant structure by adding an item.

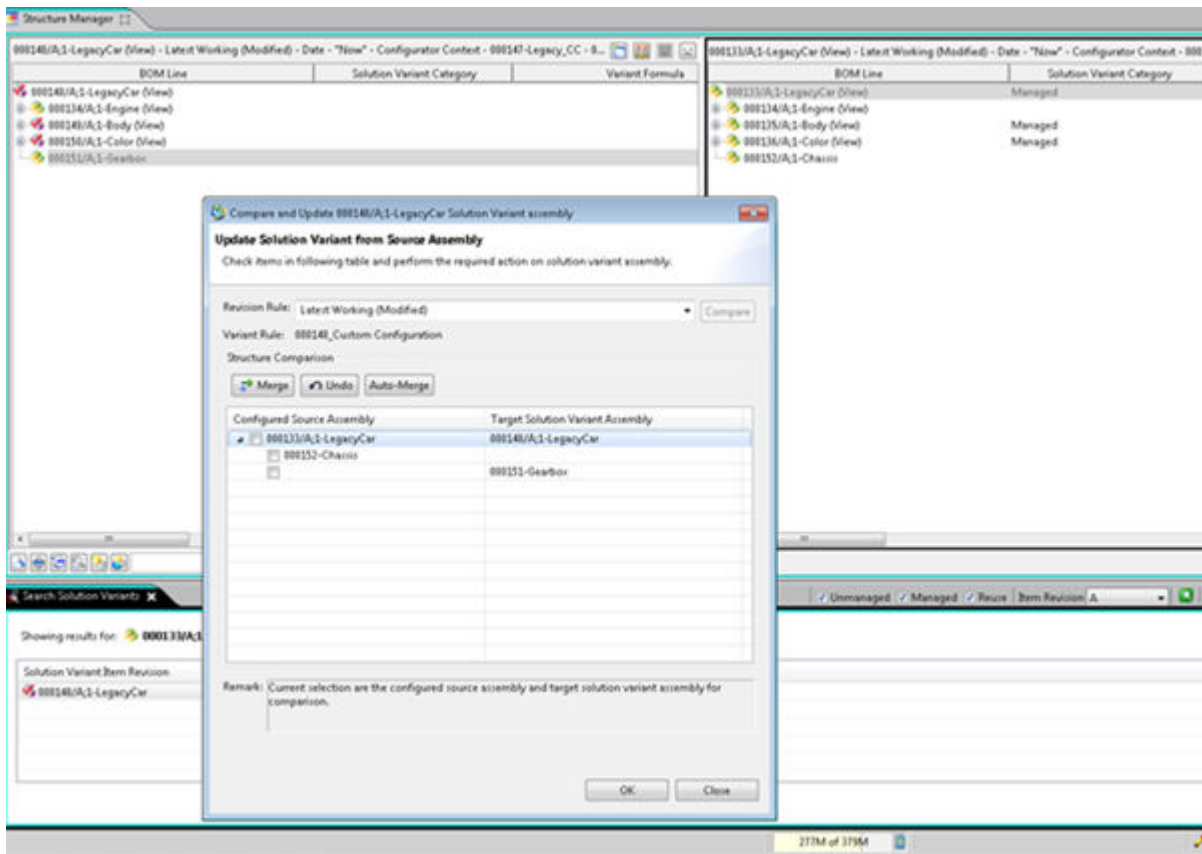
In this example, **Gearbox** is added.



11. Open both the source structure and the solution variant structure in two views side-by-side.
12. Click **Search Solution Variant**  in the main toolbar. The system displays **Update Required** as **Yes**. Click **Yes**.

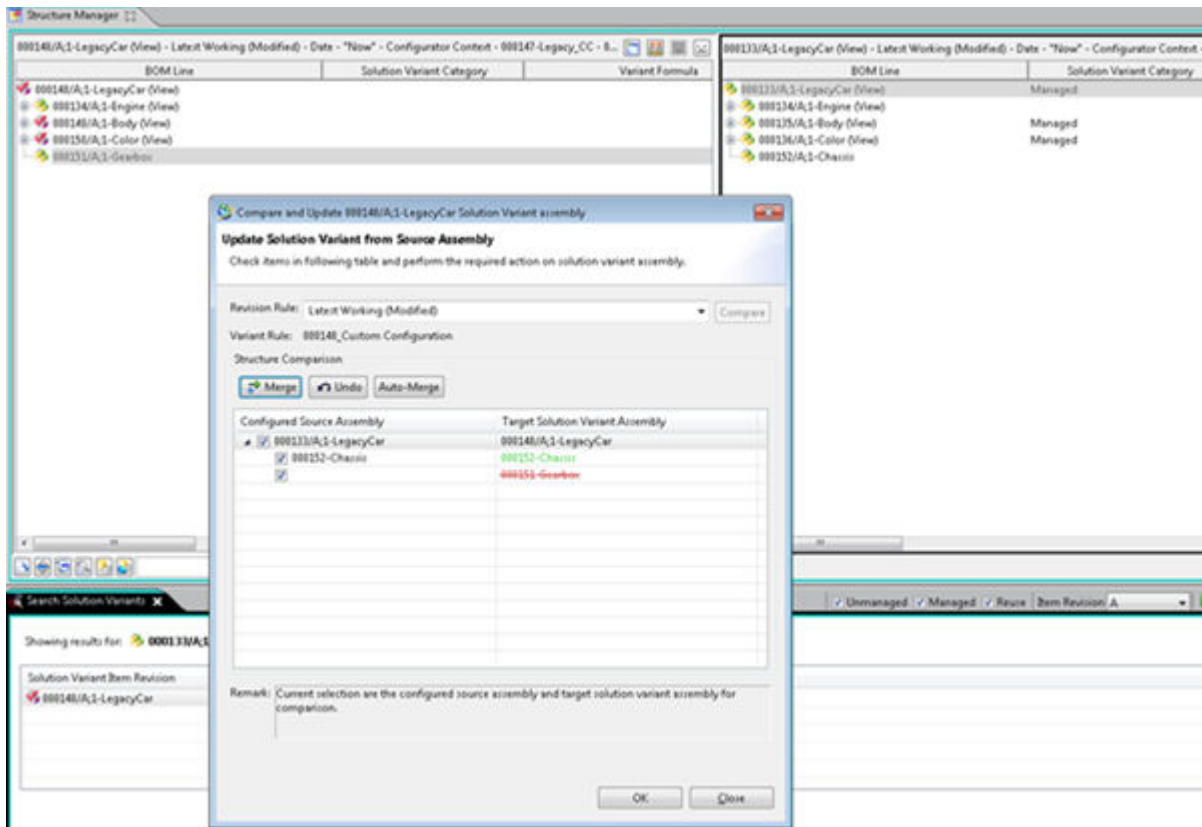


In the **Update Solution Variant from Source Assembly** dialog box, you can merge the changes manually or automatically.



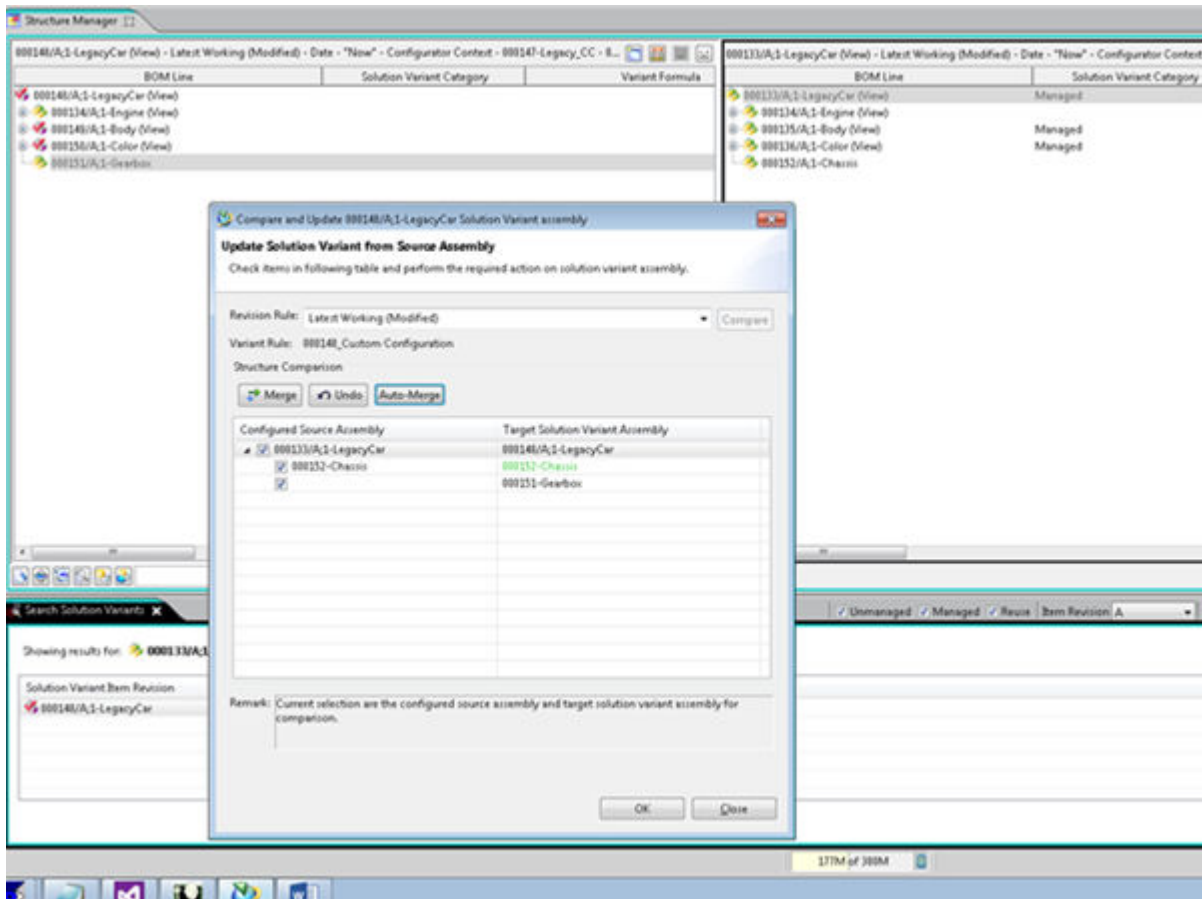
13. (Optional) Select **Merge**.

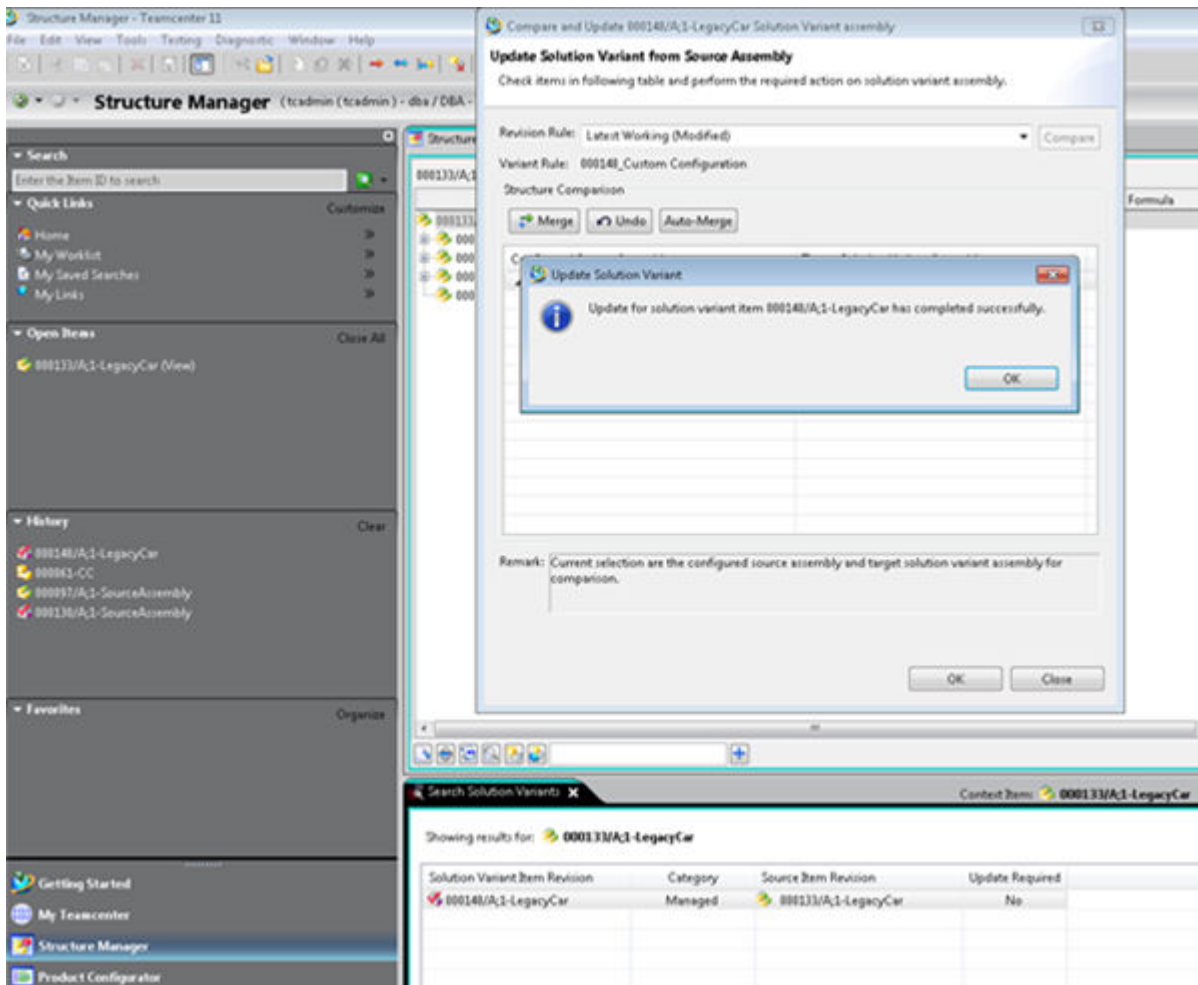
When you do a merge, the system adds **Chassis** to the target solution variant assembly and removes **Gearbox** from the target assembly.



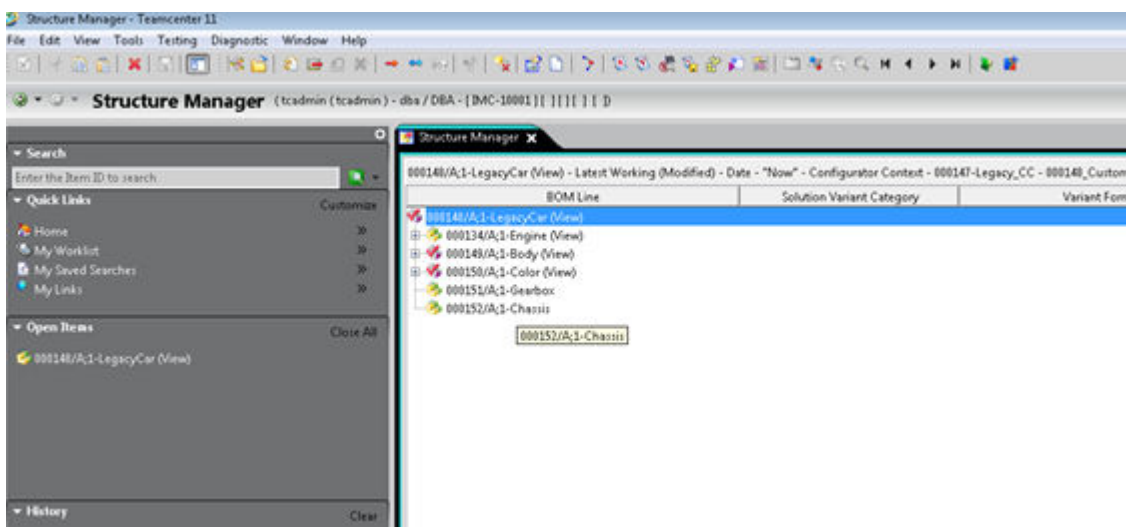
14. (Optional) Select **Auto-Merge**.

The system adds both **Chassis** and **Gearbox** to the target assembly.





The final source structure is as follows when you merge the changes automatically:



Create solution variants for subset SVR

If the configurator context is different is subassemblies, the system limits the creation of the solution variant to the subassembly that contains the SVR. In such cases, only the features that apply to the configurator context associated to that subassembly are used in the solution variant.

Note:

You must allocate all the features from the configurator context of subassemblies to the configurator context of the root structure.

The following is an example of how to create solution variants with subset criteria.

1. For the root assembly, the configurator context with groups, families, and features is as follows.

ID	Family Names	Type	Description	Feature	Unit of	Optional	Free-to	Multi-s	Minimum	Maximum	Sequen	Family Obj
			Configurator Cont Configuration								214748364	
	Unassigned Families										2	
	Spindle	Family Group									3	
	Torque control	Family	Option to cont String			False	False	False			0	Torque contro
	Yes	Feature	No Torque cor								0	Torque contro
	No	Feature									0	
	Power supply	Family Group									0	
	Battery	Family	Option to cont String			False	False	False			0	Battery
	NiCd 18V	Feature	Nickel Cadmis								0	Battery
	NiCd 12V	Feature	Nickel Cadmis								0	Battery
	Power control	Family Group									1	
	Spindle rotation	Family	Option to sele-String			False	False	False			0	Spindle rotatio
	Right only	Feature	Spindle right w								0	Spindle rotatio
	Left and Right	Feature	Selection of fu								1	Spindle rotatio
	Speed control	Family	Option to sele-String			False	False	False			1	Speed control
	On/Off	Feature	Basic speed re								0	Speed control
	Electronic	Feature	Professional sq								1	Speed control

2. For the subassembly, the configurator context with groups, families, and features is as follows.

ID	Family Names	Type	Description	Feature	Unit of	Optional	Free-to	Multi-s	Minimum	Maximum	Sequen	Family Obj
			Configurator Cont								0	
	Power supply	Family Group									0	
	Battery	Family	Option to cont String			False	False	False			0	Battery
	NiCd 12V	Feature	Nickel Cadmis								0	Battery
	NiCd 18V	Feature	Nickel Cadmis								0	Battery
	Spindle	Family Group									2	
	Torque control	Family	Option to cont String			False	False	False			3	Torque contro
	No	Feature	No Torque cor								0	Torque contro
	Yes	Feature									0	Torque contro
	Unassigned Families										214748364	

3. In Structure Manager, open the following structure.

BOM Line	Solution Variant Category	Variant Formula
3-001-000078/A;1-Handdrill Mkl (Product Configurator)	Managed	
3-001-000009/A;1-Battery pack 18V	Managed	
3-001-000062/B;1-Battery pack 12V	Managed	
3-001-000065/A;1-Drill machine housing		
3-001-000068/B;1-Drill machine housing (no direction slid...		
3-001-000021/A;1-Drill chuck (open/close with tool)		
3-001-000105/A;1-Motor with gearbox (Variability)	Reuse	
3-001-000022/A;1-DC motor 18V		[TCNS-HDRL]Battery = 'NiCd 18V'
3-001-000079/A;1-DC 12V motor		[TCNS-HDRL]Battery = 'NiCd 12V'
3-001-000023/A;1-Adapter ring		
3-001-000024/A;1-Gearbox housing		
3-001-000025/A;1-Main shaft		
3-001-000026/A;1-Motor sun gear (9T)		
3-001-000027/A;1-Second sun gear		
3-001-000028/B;1-Planet gear x 6		
3-001-000029/A;1-Annular gear (fixed)		[TCNS-HDRL]'Torque control' = No
3-001-000086/A;1-Annular gear		[TCNS-HDRL]'Torque control' = Yes
3-001-000088/A;1-Annular gear fixtures		[TCNS-HDRL]'Torque control' = No
3-001-000030/A;1-Inner retaining ring		
3-001-000090/A;1-Torque adjustment ring		[TCNS-HDRL]'Torque control' = Yes
3-001-000091/B;1-Dummy torque ring		[TCNS-HDRL]'Torque control' = No
3-001-000031/A;1-Ring3		
3-001-000093/A;1-Ball x 16		[TCNS-HDRL]'Torque control' = Yes
3-001-000094/A;1-Ring1		[TCNS-HDRL]'Torque control' = Yes
3-001-000095/A;1-clutch spring holder		[TCNS-HDRL]'Torque control' = Yes
3-001-000096/A;1-Clutch tension ring		[TCNS-HDRL]'Torque control' = Yes
3-001-000032/A;1-Ring5		
3-001-000033/A;1-Ring2		
3-001-000100/A;1-Clutch balls		
3-001-000101/A;1-Clutch ring		[TCNS-HDRL]'Torque control' = Yes
3-001-000043/A;1-Chuck front plate		
3-001-000103/A;1-Spring x 8		[TCNS-HDRL]'Torque control' = Yes
3-001-000034/A;1-Screw dia 3 x 12 x 5		
3-001-000116/A;1-Electrical wiring (Variability)		

4. Enable the **Solution Variant Category** column. This column is not available by default.

To insert this column, right-click on a column, select **Insert columns**, choose **Solution Variant Category**, click **Add**, and then click **Apply**.

5. In the **Solution Variant Category** column, select:

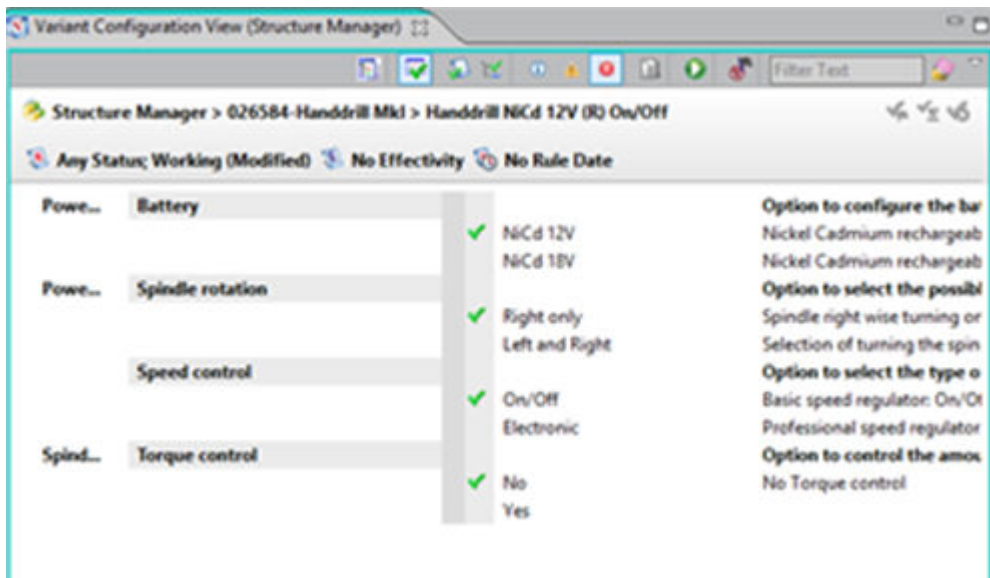
- **Managed** for the root structure (**Handdrill**), and **Battery Pack 18 V** and **Battery Pack 12 V** subassemblies.
- **Reuse** for the **Motor with gearbox** subassembly.

6. To open the **Variant Configuration** view, click **Set option values for selected module**  on the main toolbar.

7. Select the required features.

Selections are indicated by a check mark ✓ or a circle backslash icon ⚡ in a cell. The check mark ✓ indicates that the option is included in the product configuration. The circle backslash icon ⚡ indicates that the option is excluded from the configuration.

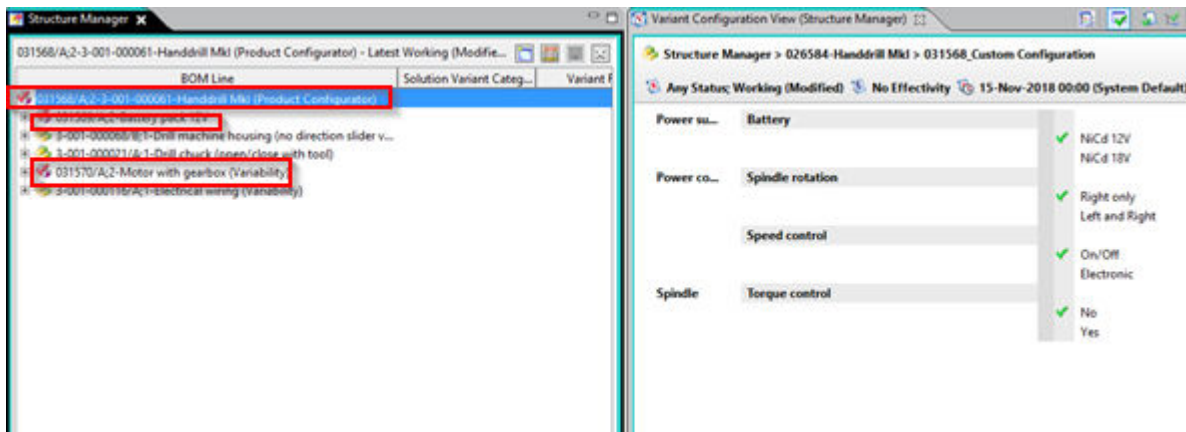
Alternatively, click **Load Variant Rules** and select a saved variant rule.



8. To validate if the selected features are applicable to the structure, click **Validate** ✓.
9. To apply the selected features to the structure, click **Applies the current configuration to the associated structure** ▶.
10. To create the solution variant, click **Solution Variant** ⚡.
11. (Optional) Select **Dry Run** and click **Start**.

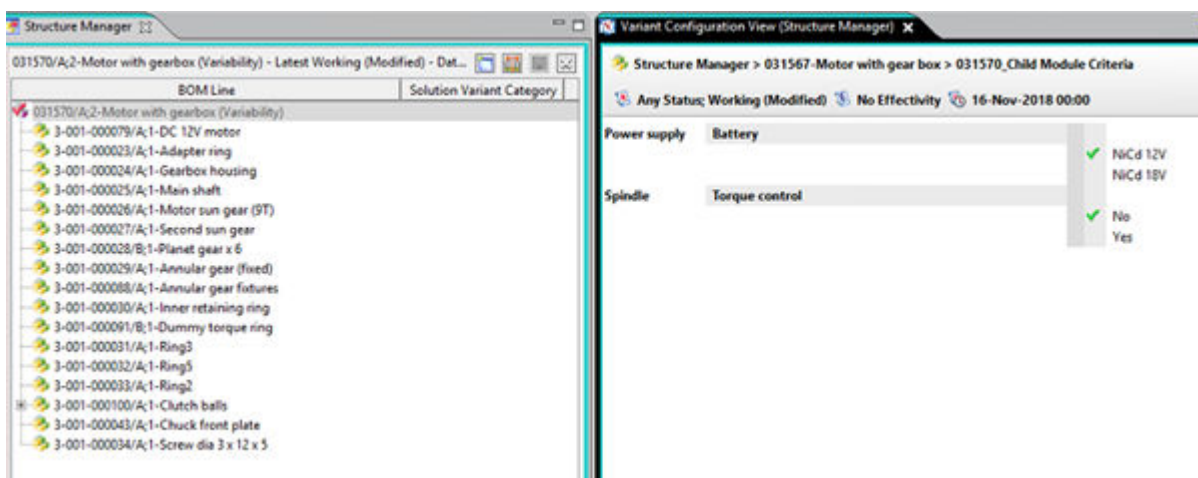
Alternatively, click **Start** to create a solution variant without performing a dry run.

The system creates three solution variants for the complete root structure and creates the **Motor with gearbox** and **Battery Pack 12 V** subassemblies.



The root structure contains all the criteria from the top configurator context and the **Motor with gearbox** subassembly contains only the subset criteria from the subset configurator context.

- Open the **Motor with gearbox** solution variant and view its SVR. It shows the subset SVR as follows:

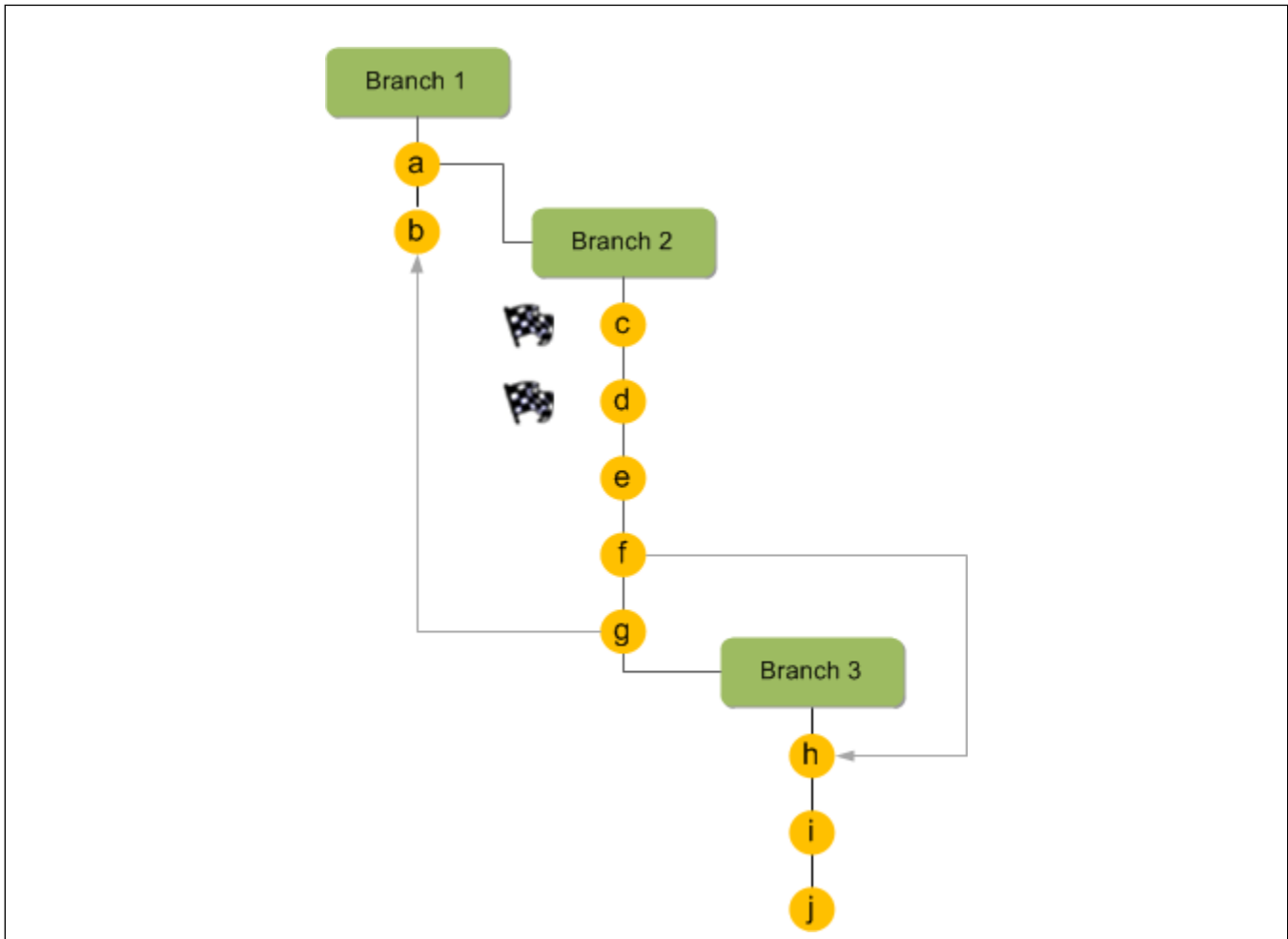


18. Configuring structure with branch definitions

Using branch definitions to configure product structures

Branches provide a mechanism of grouping multiple working item revisions with certain intent. Branch definition is a paradigm similar to that employed by software configuration management systems to define node or release content. A branch definition identifies the contents of a structure in the context of its business purpose.

One use case for creating branches is to track virtual prototypes in a preproduction environment. A virtual prototype represents a specific configuration of a product platform. The variants chosen represent the product intent of the platform and therefore are a repeatable configuration. As the product definition matures, the virtual prototype is used to track the maturity of the product definition, perform analyses, compare data, and construct reports. In practice, a development program can be defined as a progression of virtual prototypes where each iteration can be constructed from only the changes to the previous virtual prototype. Different virtual prototypes may be used for the same platform. They may be used to collaborate towards key milestones or prototype build events.

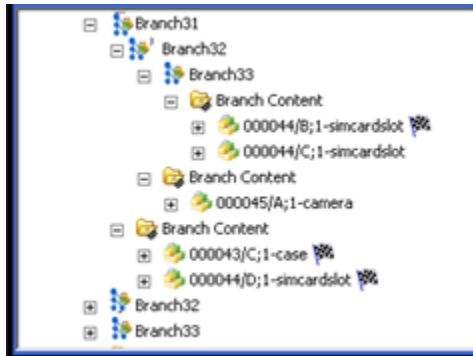


Typical branch configuration

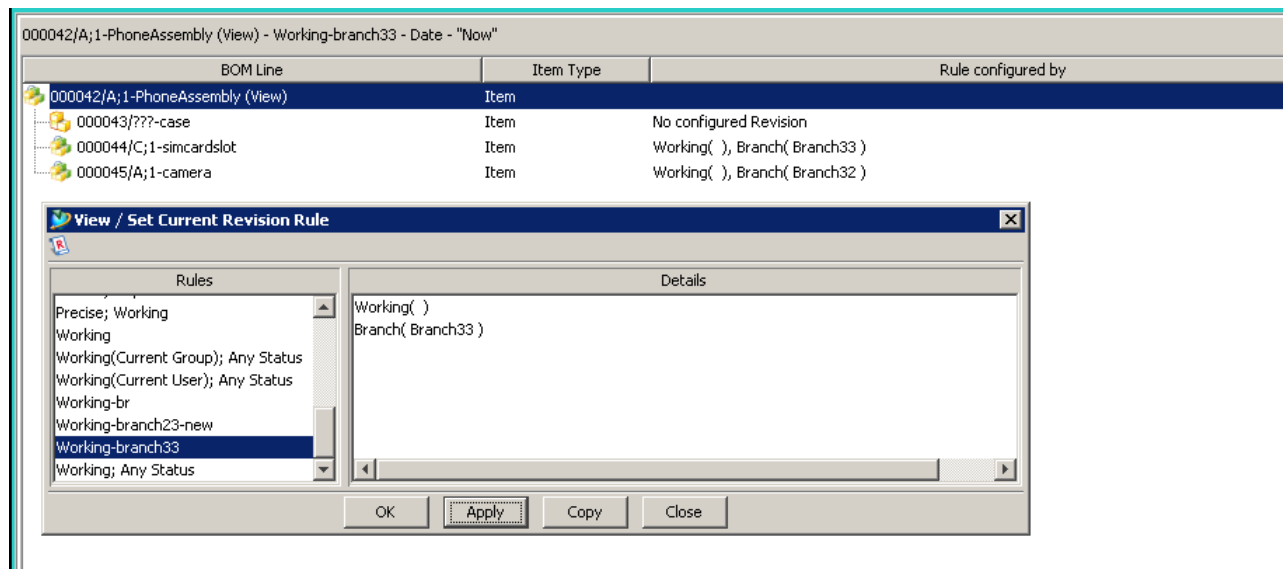
This diagram shows how you can use branches to configure a specific revision with intent-based parameters. The item revisions a through j are split into different branches or intent sets. For each intent set (that is, revisions associated with a certain intent), Teamcenter configures revision candidates by revision rule parameters such as release status, effective date, and unit number. There may not be a valid candidate for any of the relevant intent sets. If there is a valid candidate, Teamcenter considers it, but the precedence and relevance of intents in the intent configuration specification principally determine which revision is configured.

You can specify a branch definition in a revision rule, and Teamcenter configures the structure to the branch definition as well as any effective predecessors. It fetches all effective branches in the hierarchy up to the root. It then considers effective item revisions in each branch for revision configuration. Revisions in the specified rule branch are considered first, and then revisions in any predecessor branches. If none of the revisions of the item participate in the branch hierarchy, it is marked as an unconfigured revision. If revisions of the item participated in the branch hierarchy, but none of the revisions are configured with other revision rule entries, it is marked as an unconfigured revision. Contents of all immediate parents at the same level are considered for evaluation.

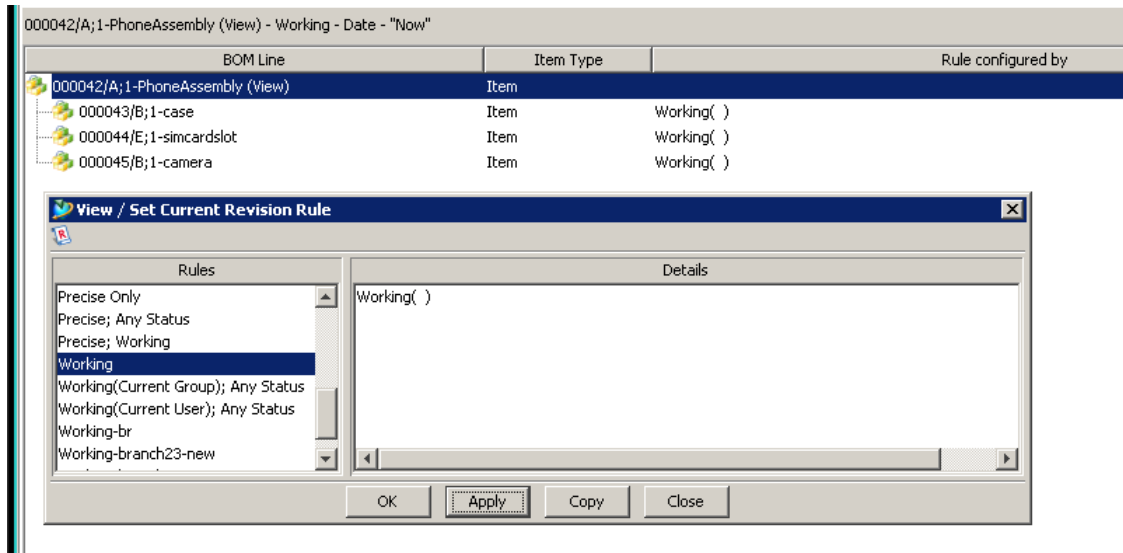
In the following example, a branch chain is created with three branches. Content is pasted into branches 31, 32 and 33.



If you then configure the assembly in Structure Manager with a revision rule that includes a branch definition, the branch content is considered. The following example contains a structure that is configured with a **Working()**, **Branch 33** revision rule. The **simcardslot** item revision is configured with branch 33 content, the camera is configured with branch 32 content, but the case is not configured because the working revision is not available in any of the branches in the branch chain.



In contrast, if you configure the structure with a **Working()** revision rule and do not take into account the branches, the configured structure is as follows.



By default, branch entries are not available for creating revision rules, and this capability must be enabled by setting the **PSEEnableBranchConfiguration** site preference.

You create a branch and then paste in the content of the branch in My Teamcenter. That is, you paste in the item revisions that you want to be configured by this branch. Once created, branches may be added to revision rules that are applied in Structure Manager.

Managing single branches

When managing single branches, you can do the following:

- Control access to branch definitions.

You can restricting the ability to create, modify, or delete branch definitions to identified users with access rules and Command Suppression. Access restrictions on branch definitions are honored during revision configuration, for example, unreadable content in branch definitions is not considered for revision configuration.

- Identify content for branch definitions.

Identify item revisions for branch definitions. Available item revisions are listed in a pseudo folder under the branch definition. Duplicate item revisions in the same branch definition are not permitted.

- Mark branch definitions as active or inactive.

By default, branch definitions are active at the time of creation. You can change the state of a branch definition to inactive at any time. If a branch is in an inactive state, no item revisions can be added to or obsoleted from it. Item revisions in a branch definition are considered during revision configuration, regardless of its state; the state of the branch does not affect any action on any of its item revisions.

- Add an item revision to a branch.

You add an item revision to a branch definition by copying it, and then pasting it with a **Branch Content** relation. After the successful addition of the item revision to the branch, the start date on the **Branch Content** relation is set to the creation date of the relation. The item revision is effective in the branch definition from this start date onwards or until the end date if one is specified.

- Obsolete item revisions from a branch definition.

To obsolete item revision from a branch definition, set an end date on the **Branch Content** relation. The item revision is effective in the branch definition from the start date to the specified end date.

- Delete branch definitions.

You can only delete a branch definition if it is not referenced by a revision rule or by another branch definition.

Managing branch chains

You can organize branches in a hierarchical way. A branch definition may itself configure 100% content of the structure, or work together with related branch definitions in the chain to configure the full content. A branch definition chain is an ordered set of branch definitions that may configure the structure, with the contents of the later branch definitions having precedence over earlier branch definitions.

For example, a pen assembly has four components and participates in a branch chain, where branch 1 is used by branch 2 and branch 2 is used by branch 3. The results is as follows.

Pen assembly item	Pen assembly item revision	Branch 1	Branch 2	Branch 3
Body	Body;A	x		
	Body;B		x	
	Body;C		x	
Cartridge	Cartridge;A	x		
	Cartridge;B			x
Point	Point;A	x		
	Point;B		x	
	Point;C			
Label	Label;A			x

(x indicates the revision is part of the branch definition.)

When managing branch chains, you can:

- Create or add to a branch chain.

You can link branch definitions to form a hierarchical chain. Any number of branch definitions can be chained in a hierarchical (tree) structure. You can insert a branch definition at any place in a chain. A branch definition is added or inserted into another branch definition by copying it and then pasting it with a **Branch Relation** relation. After successful addition of a branch definition, the start date on the **BranchRelation** relation is set to the creation date of relation. The branch definition is effective in the target branch definition from the start date onward or until the end date if one is specified.

By default, a secondary branch cannot have more than one primary branch, but you can manually override this behavior to allow the multiple parents for a branch. Multiple parents must be siblings in a hierarchy.

- Obsolete a branch definition from a branch chain.

To obsolete a branch definition from a branch chain, set an end date on the **BranchRelation** relation. The branch definition is then effective in from the start date to end date. Item revisions under an obsolete branch definition are not considered during structure configuration evaluation whether the canceled branch is implicitly or explicitly specified in the revision rule.

- Browse branch chains.

You can browse the branch definitions used by a specified branch definition. Such branch definitions are listed in a pseudofolder under the branch definition.

- Break an existing branch chain

You can break a branch chain, for example, to reorganize it by adding or removing branches using cut and paste commands.

The effective branch that configured in an item revision is identified in the **How Configured BOM** line property.

Create a branch

1. From the navigation pane, click **My Teamcenter**.
2. Select a folder and then choose **File→New→Other**.

My Teamcenter displays the **New Business Object** dialog box.

3. Select **Branch** and click **Next**.

My Teamcenter displays the **Object Create Information-Branch** dialog box.

4. Enter a name and (optionally) a description for the new branch. You should also choose whether to make the branch active once it is created. By default, the contents of the baseline are associated with it using the **Contents** relation, but you can change this if other relations are listed.

Note:

When a branch is inactive, no content can be associated with it. That is, you cannot paste an item revision or another branch on an inactive branch. However, an inactive branch is still available for structure configuration. You can activate or deactivate a branch at any time by left-clicking it, choosing **Edit Properties**, and then changing the state.

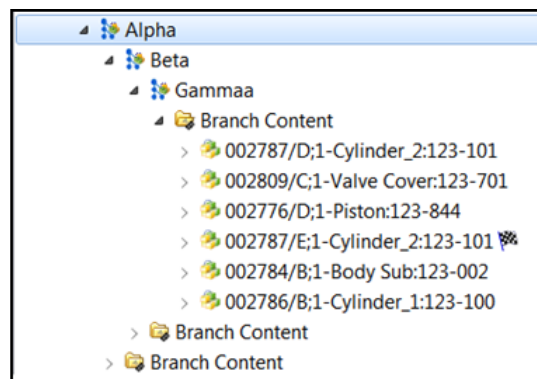
When the properties are shown correctly, click **Finish** and Teamcenter creates the branch in the selected folder.

5. (Optional) Set an effective period for the branch by right-clicking it, choosing **Properties on Relation**, and then setting a start date and an end date. By default:
 - The start date is the date you pasted the branch under its predecessor.
 - The end date is empty, that is, the effectivity of the branch is open ended.

Likewise, you can specify effective periods for any of the item revisions in the branch.

You can perform revision configuration of structures in Structure Manager based on the defined branches. New branch entries are added to the revision rule entry list, allowing you to specify the branch in a revision rule. You can specify only one branch definition in a revision rule.

You can add contents to a branch in My Teamcenter by copying the relevant item revisions and pasting them on the branch, as shown in the following example.



Teamcenter configures each of the item revisions that you paste on the branch when you apply a revision rule in Structure Manager that includes the branch.

You can also create *branch chains* by pasting a branch under another branch. In the following branch chain, branches 03 and 04 are pasted under branch 02 and inherits all the branch content (item revisions) of branch 03 and branch 04. You can still paste unique item revisions under branches 03 and 04 if required.



19. Aligning structure

Alignment methods

Depending on your product structures, you may want to align related items or item revisions to ensure dependencies are captured and are visible if changes are made. There are two general categories of alignment that you should consider:

- Internal alignment

An element in the product structure affects or is equivalent to other elements in the same structure.

- External alignment

An element in the product structure is equivalent to an object in an external system, such as a BOM or ERP system.

Aligning the structure internally

Aligning structure items internally

Teamcenter supports several methods of internal alignment; you may apply one or more of them, depending on your product data.

- Part and design alignment

You can align any types of items that are appropriate for your business practices, for example, parts with CAD designs, or parts with documents. You can globally associate a part and a design, in which case all revisions of the part and design are automatically associated. The publish link between the items is revision independent. Alternatively, you can choose to evaluate the alignment each time the part or design is revised. This configuration ensures the design can always be correctly visualized wherever it occurs in the structure.

- Allocations

Allocations provide a similar ability to publish a link between two items to the part and design alignment feature. They provide more traceability but do not support the copying of transforms and shapes. Allocations can be configured and managed, for example, by applying effectivity under an incremental change.

- Assign in Multi-Structure Manager

Use assignments to create a composition that represents a layout for design in context work across several structures or products.

- Assign in Manufacturing Process Planner

Use assignments in a process to consume parts in operations. Each time you make an assignment in Manufacturing Process Planner, Teamcenter creates a new occurrence in the operation that corresponds to the selected BOM line. The part and the operation share an absolute occurrence. You can perform an accountability check on the structure to verify that all parts are consumed by an operation, based on the shared absolute occurrence IDs.

- Platform Designer

You can use part and design alignment to complement Platform Designer, if you work with layouts (that is, an ad hoc collection of installation assemblies), rather than installation assemblies themselves. The context for publishing links must be an installation assembly, rather than a layout.

- BOM alignment

You can align BOMs of different types by indicating that occurrences in each BOM are functionally equivalent. For example, a manufacturing engineer may link a configured EBOM root with a configured MBOM root. When these structures are linked, all further assignments to the MBOM from the EBOM create logically equivalent MBOM occurrences. Teamcenter allows you validate these occurrence links with an alignment check and keeps the data of aligned occurrences synchronized.

Aligning parts and designs

Aligning parts and designs

A business part typically has a design solution developed for it. The business part and the design solution may have different lifecycles. A part may have several design representations, for example, in the case of flexible parts. Conversely, a design model may apply to multiple parts, for example, colored parts.

Also, users may create independent part and design structures, then organize and manage them separately. When the design structure and the part structure are independent these different views of the same product must be reconciled. The action of aligning or reconciling the structures in this way is referred to as *publishing* occurrence data. For example, some part occurrences may use positioned designs and you need to align each such part occurrence with a design occurrence that is positioned in the context of the product. Alignment allows you to visualize the positioned design from the part structure itself.

You can optionally automate the alignment so that when the user creates a design, Teamcenter automatically creates the corresponding part. To do this, you define the source, target, and relationship of the automated creation process in the Business Modeler IDE, for example, **Part**, **Design** and **TC_Is_Represented_by**. You can also use custom source and target types. Alternatively, you can configure the creation of a design to initiate a workflow that notifies a part engineer to manually create the corresponding part.

Note:

Automation fails if you do not specify an object naming rule for the target attribute. For example, Teamcenter cannot automatically create a text dataset if you do not specify the name it should give the new dataset. In this situation, consider using property mapping, that is, the text dataset may inherit the object name of the source design object if you configure the **Fnd0InheritFrom** business object constant accordingly.

When you create a business object (for example, an item), there may be certain attributes that cannot be null. If these attributes are not specified, object creation fails. If you are creating a business object manually, the **Finish** button is not enabled if you do not enter all the required values. However, if you are automatically creating the target object, the user is not required to enter target object values; for example, the designer may not be aware of part attributes because the design creation dialog box does not show part attributes. To address this issue, you can do one of the following:

- Provide default values for required and mandatory attributes.
- Write custom code through a post action on the **finalizeCreateInput** operation of the target object. For instance, if you are automating part creation, write a post action on the **finalizeCreateInput** operation of the part.

You publish occurrence data between source and destination occurrences of two representations. Teamcenter takes a snapshot of the source occurrence data and creates a *publish link* to the destination occurrence. For example, you can publish an absolute transform from a source design occurrence to a destination part occurrence, ensuring the shape is correctly positioned in the product. If the source occurrence data was already published, Teamcenter updates the snapshot with the new information.

Depending on your business practices, you can align a design occurrence to more than one part occurrence. Teamcenter may automatically mark one of the part occurrences as the *primary*, based on an assessment of the maturity of the design occurrence and its latest revision. The maturity of the design revision is set with the **Mature Statuses** global constant in the Business Modeler IDE. Users may also manually set a design occurrence as the primary.

Part and design occurrences must be reconciled when the same context is set in both structures. For example, in the design structure, the designer positions a wheel in the **WheelAssembly** assembly; that is, the left front wheel is positioned in the context of **WheelAssembly**. Also, the **WheelAssembly** assembly is itself positioned in the context of the **Car** product; that is, the left front wheel is positioned in the context of **Car**. If you require the positioned design of the part occurrence denoting the left front wheel of the car, you must reconcile the design occurrence of the left front wheel in the **Car** context. Before publishing the occurrence data, you therefore set the context of both structures to **Car**.

When you revise a part, the associated designs are propagated to the new revision.

Note:

If you are automating the creation of a design when a part is created, be aware that the part object has a **Design Required** Boolean attribute. If this is set to **false**, the design may not be aligned to a part. Consequently, you should not use this default attribute on the master form to trigger a condition.

Note:

If you visualize a JT file attached to the part structure, Teamcenter first looks for the JT file associated to the part occurrence. However, it does not traverse from the part occurrence to the design occurrence. Consequently, if no JT file exists for the part occurrence, it then looks at the associated primary design revision for a JT file.

Typical structure alignment process

The following example shows a typical process for aligning a product structure comprising parts and designs. It would not apply if you work with items, rather than separate parts and designs.

1. The BOM engineer creates a part.
2. The CAD engineer creates a design for the part, independently of the part.
3. The BOM engineer associates the CAD design as a solution for the part.
4. The BOM engineer adds the part to the part structure. This action creates an occurrence of the *part*.
5. The CAD engineer creates a layout and positions the CAD design. This action creates an occurrence of the *design*.
6. The CAD engineer aligns the design occurrence with the part occurrence by publishing a link between the two occurrences.
7. The BOM engineer validates the part-CAD occurrence alignment occurrence with the part occurrence.
8. The user views the positioned CAD design from the part structure.

Associating a design revision to a part revision globally

You fulfill a business part's need for a design solution by associating a part revision to a design revision in My Teamcenter. This association is *precise*—it is between a revision of a part and a revision of a design. You can associate a part revision with multiple design revisions, in the case of flexible parts such as hoses or pipes. Similarly, a design revision may be valid for several part revisions, for example,

for colored parts. The part revision is associated with the design revisions by the **Represented By** relationship.

When you revise a part, you decide whether to carry forward existing associations with design revisions. By default, all associations with **Represented By** relationships are carried forward. Conversely, when you create a new revision of a design, the existing associations with parts are *not* carried forward by default. This allows the designer to determine manually when to make the new revision visible to the BOM engineer.

To allow automatic propagation of a new design revision to the associated part revision, add a **TC_Is_Represented_By,Part Revision,LookLeft** string to the **AutoCopyRel** business object constant on the design revision object with the Business Modeler IDE. However, propagating the design revision to the part revision does not automatically make it the *primary* revision, that is, the revision displayed in the viewer. The primary revision is controlled by the maturity level, as described later.

Note:

Automatic propagation assumes an association between a single design and a single part. If a design revision is associated with several revisions of the same part, the latest mature revision is carried forward. If a design revision is associated with revisions of different parts, nothing is propagated.

Defining the primary design representation

If you associate a part revision with more than one design revision, you must choose a default or primary design representation. This sets a **TC_Primary_Design_Representation** relation on the part revision. It is indicated in the user interface by a check mark against the part revision.

You can customize the action of making a design revision the primary representation, so that Teamcenter checks if the design revision qualifies to be the primary representation. Do this by adding the necessary checks to the **USER_make_design_rev_primary_precond** user exit.

If the primary design representation of a part revision is a piece part, Teamcenter uses the JT file attached to the design revision for visualization in the embedded viewer. If the primary design representation is an assembly, visualization data is captured in a PLM XML file that is attached to the design revision as an assembly dataset by a **Tc_Rendering** relationship. The design revision assembly must be configured using the default revision rule in Structure Manager before capturing the PLM XML data. Any changes to the assembly design revision are only reflected in the PLM XML file if it is set as the primary design representation.

Note:

You can set the **PSM_enable_PLMXML_Assembly** preference to control PLM XML generation. By default, this preference is set to **true**, which generates a PLM XML assembly file and attaches it to the part revision with a rendering relation. If you set the preference to **false**, the PLM XML assembly file is not generated.

When you visualize a part revision, the necessary shape data is derived from the primary design representation that is identified by a **depends on** or **refers to** relationship. Be aware of these relationships if you export the part or design data using Multi-Site Collaboration or PLM XML.

You can use the **PSM_Skip_Unload_PublishedPartAssembly_OnViewer** preference to control the unloading of published part assemblies. After loading a published part structure into the **Graphic** viewer, the following occurs if you clear the selection of the line that represents a published part.

- If this preference is set to **True**, the part structure becomes invisible in the **Graphic** viewer, but the associated JT data is not unloaded.
- If this preference is set to **False**, the part structure becomes invisible in the **Graphic** viewer and the associated JT data is also unloaded.

Checking design maturity level

As a design changes over time, more than one revision of the design may be associated with a part. One of these revisions must always be the primary, that is, the source of visualization data in the part structure. The primary revision cannot be configured but is determined by a maturity level, for example, if a release status is attached and (if so) its type.

Note:

The name of the release status used in the workflow should already be defined in the Business Modeler IDE. Use the real name of the release status in the workflow, not the display name.

The decision on whether a design revision is considered mature depends on your business processes. You can define the appropriate maturity level by setting the **AutoRevise** constant or **ReviseAndRelateToLatest** action on deep copy rules in the Business Modeler IDE. Alternatively, you can customize the **USER_is_item_rev_mature** user exit.

Teamcenter can automatically change the primary design representation as the design evolves, so that the new design revisions are associated with a part revision. When you associate a design revision to a part revision, Teamcenter compares it with the existing primary design representation by maturity level and latest revision. If one of the design revisions is mature, it is made the primary representation, otherwise the latest is used. For example, **Part1/A** is represented by mature **Design1/A** and you then associate a new working revision **Design1/B** with **Part1/A**. Teamcenter compares the maturity levels of **Design1/A** and **Design1/B**. As **Design1/A** is mature, it remains the primary representation and **Design1/B** is associated with **Part1/A**. If **Design1/B** is subsequently released, it becomes mature and is eligible to become the primary representation. The user can then manually make **Design1/B** the primary representation.

Alternatively, you can use Workflow to initiate the setting of the primary design representation. If the approval of a design revision makes it mature, use the approval status to initiate the **PS-make-mature-design-primary** Workflow handler. This action automatically makes the design revision the primary representation of the part revision that was approved.

Aligning part and design structures

To allow accurate visualization of a part occurrence, Teamcenter must know its positioned design. To achieve this, data is copied from the source occurrence to the target occurrence by a **Publish** action that creates a publish link relationship between the occurrences.

A publish link may associate one source occurrence with several target occurrences. If you are associating parts and designs, the design structure is the source structure and the part structure is the target structure.

You can align any items types that you use in structures. You can align other item types in structures, if appropriate. To configure the source and target types of such alignments, set the following preferences:

- **PUBLISH_AlignableSourceTypes**

Specifies the item types that are valid as the source of a publish link. The default values are **Design** and **Item**.

- **PUBLISH_AlignableTargetTypes**

Specifies the item types that are valid as the target of a publish link. The default values are **Part** and **Item**.

Teamcenter creates the publish link between absolute occurrences of the relevant structure lines. Data published on the target occurrence is stored as an absolute occurrence override. When you publish data, you require write access to the BOM view revision (BVR) of the displayed top-level context item. Ensure the contexts in which you align the occurrences are equivalent. For example, in the case of a car, the position of a wheel in the context of a wheel assembly differs from its value in the context of the entire car.

It may not be practical to load the top-level item of very large structures. If you utilize installation assemblies in your design structure, it is sufficient to load the relevant installation assembly as the top-level assembly for alignment purposes. (Installation assemblies are assemblies above which no transforms are created.) You may have designs aligned from different installation assemblies. In the case of a large part structure, consider breaking it down such that it is not a completely flat structure. The high-level part structure need not mirror the design structure exactly. The context level at which you perform alignment may have designs aligned from different installation assemblies.

The publish link is independent of revisions and persists if the structures are revised, unless one of the associated structure lines is removed. It is preserved if the structure line is substituted or replaced.

For detailed information about aligning structures, see the *Multi-Structure Management*.

Validating alignment

Teamcenter provides two tools to help assess alignment status:

- Accountability check

Allows you to verify that all publish links have valid sources and targets. Incomplete links are reported as having missing sources or targets, indicating incomplete alignment work. Any occurrences of parts that do not require a design are reported as having a missing source. You can use the **Requires Positioned Design** property in one of the structure editor applications to identify such occurrences.

- Completeness check

Allows you to identify part occurrences that do not yet have aligned design occurrences. The design occurrences must have a published transform and the part occurrence must have an associated primary design. In the case of flexible parts, a shape must be published. Unlike the accountability check, the completeness check excludes parts that do not require a design, for example, adhesives, lubricants, and consumables. You can only perform a completeness check on structures containing items of the **Part** type.

For detailed information about validating alignments, see *Multi-Structure Management*.

Deciding order when visualizing a part structure

Teamcenter first looks for the in-context data, such as a PLM XML / JT file, directly associated with the part occurrence. If no in-context data is found, it then looks at the associated primary design revision for the PLM XML / JT file.

The following is the deciding order when visualizing a part structure. Any first match will be returned.

1. PLM XML assembly file attached directly to the part revision with absolute occurrence relation (in-context data).
2. JT file attached to the part revision with absolute occurrence relation (in-context data).
3. PLM XML assembly file from its primary design representation.
4. JT file from its primary design representation.

Aligning with allocations

You can use allocations to capture, locate, and manage dependencies between different *representations* of the product. They provide traceability of dependencies, unlike some other alignment methods such as part-CAD alignment. During the development process, a product may evolve through various representations. For example, during system analysis and engineering, you express the representation of the product in terms of a set of requirements the product must satisfy and a set of functions it is expected to perform.

As the product design matures, you may identify other representations, including the logical structure, the assembly structure and the manufacturing structure. All these representations are related and a change to one representation may necessitate changes to other representations. If you align these

representations with allocation maps, the dependencies between elements are identified and the impact of any changes are more obvious.

Create and maintain allocations with Multi-Structure Manager.

Making alignments in Multi-Structure Manager

When you collect related data into a collaboration context (for example, compositions of structures), you implicitly aligning the data elements. Typically, you align only part of the product structure or elements of more than one structure in a collaboration context; you omit components that are not of immediate interest.

Aligning the structure externally

Teamcenter structure data can be aligned with data in external business and bill of materials (BOM) releasing systems.

A CAD designer is responsible for creating and maintaining the CAD view of the product data, while the release engineer uses the BOM to identify the actual parts required to manufacture the physical product. The BOM system is often the backbone of the company, as it drives manufacturing, purchasing, costing, logistic, and other related functions. BOM systems normally contain usage information, while the CAD and PLM systems contain part and design data.

The CAD system includes data about detailed part geometry and configured part positions. It allows users to view 3D models in a structure, determine how parts fit or do not fit with parts around them, and identify a part location in a given assembly by coordinates. It does not allow users to make global where-used searches or identify the parts that fit together in a particular assembly.

The BOM system allows users to identify if a part is used on a given product, to determine which parts can be used together, to view every application of a part globally, and to view change history. It does not include information about parts in the context of surrounding parts or location coordinates. In a typical company, business (BOM) data and engineering (CAD) data overlap but are not well aligned. Users of one system must obtain the data they need from the other system. Business users can then quickly visualize and correlate business status and engineering status of development programs. They can then determine completeness of these programs; that is, if you have designed all the parts necessary for all the combinations to build. They can also validate the design against order processing and confirm that all the parts fit for a specific product configuration. Change and release management processes can be connected to the visual representation, making virtual builds easier to maintain.

20. Working with projects

About projects

Projects represent and control access to a particular piece of work that may be accessible to multiple organizations, such as project teams, development teams, suppliers, and customers.

Objects, such as items, item revisions, datasets, and forms can be assigned to projects. Additionally, folders, or folders and their contents can be assigned to projects. Items, item revisions, and engineering change objects can be assigned to projects during the creation process. All other workspace objects can only be assigned to projects after the object has been created. Objects can be selected from search results and assigned to a project or projects.

When an object is assigned to a project, attachment objects, as defined by the propagation rules, are also assigned to the project. Propagation rules are determined by include and exclude relations lists. By default, the include relation list contains the following relation types:

- **Specification**
- **Manifestation**
- **AltRep**
- **EC_affected_item_rel**
- **EC_solution_item_rel**

You can only assign objects to projects if you are a privileged project team member.

If you are a Teamcenter administrator or a project administrator, you can assign multiple objects in a structure to a project by running the **update_project_bom** utility. You can also use this utility to remove multiple objects from a structure.

Assigning objects to projects

Objects can be assigned to projects either during the creation process or after they are created. Items, item revisions, and engineering change objects can be assigned to a project during the creation process, all other objects must be assigned after they are created.

Objects can be assigned to projects by making selections from the tree or **Properties** table or by selecting from the search results display.

Note:

You can select from different lists of values (LOVs) for a property, depending on which project the object is assigned to.

Assign objects to projects from the tree or Properties table

1. Select one or more objects in the tree display or **Properties** table.
2. Right-click and choose **Project→Assign**, or choose **Tools→Project→Assign** from the main menu.

If multiple objects were selected in step 1, the system displays the **Assign Objects to Projects** dialog box. If a single object was selected, the system displays the **Assign an Object to Projects** dialog box. The projects of which you are a privileged member are displayed in the **Projects for Selection** list.

Caution:

The objects you selected in step 1 may already be assigned to one or more projects. However, this is not reflected in the selection list.

3. Select the project or projects to which the objects will be assigned and move them to the **Selected Projects** list using the right-arrow button. To select all projects in the list, click the double-arrow button.
4. Click **Apply** to assign the objects to the projects and retain the dialog box. Click **OK** to assign the projects and dismiss the dialog box.

Note:

You can also assign a selected object to a project by dragging it onto the project icon.

Assign objects to projects by search results page

1. Right-click a search results tab.

Teamcenter displays the Explorer shortcut menu.

2. Choose **Project→Assign**.

Teamcenter displays the **Assign Object to Projects** dialog box.

3. Select the project or projects to which the objects will be assigned and move them to the **Selected Projects** list using the right-arrow button. To select all projects in the list, click the double-arrow button.

4. Select the objects to be assigned by selecting either the **Current Page** or **All Found Objects** button.
5. Click **Apply** to assign the objects to the projects and retain the dialog box. Click **OK** to assign the projects and dismiss the dialog box.

To selectively assign objects displayed in the search results tab, select the search results tab and perform the steps described in *Assign objects to projects from the tree or Properties table*.

Remove objects from projects

1. Select one or more objects in the tree display or **Properties** table. You can also select the objects from the results of a search.

Note:

Two standard search forms, the **Projects Search** form and **Objects in Projects** form can be used to locate objects for removal from a project.

2. Right-click and choose **Project→Remove**, or choose **Tools→Project→Remove** from the main menu.

If multiple objects were selected in step 1, the system displays the **Remove Objects From Projects** dialog box. If a single object was selected, the system displays the **Remove an Object from Projects** dialog box. The projects of which you are a privileged member are displayed in the **Projects for Selection** list.

3. Select the project or projects from which the objects will be removed and move them to the **Selected Projects** list using the right-arrow button. To select all projects in the list, click the double-arrow button.
4. Click **Apply** to remove the objects from the projects and retain the dialog box. Click **OK** to remove the projects and dismiss the dialog box.

21. Attaching licenses to structures

Attach licenses to items and item revisions in a structure

You can attach ADA licenses that are not locked and not expired to items and item revisions in a structure. Attaching an ADA license allows the users and groups to get access based on the rules configured in Access Manager.

As you attach an ITAR license, you can cite the applicable authorizing paragraphs. The audit log records an entry for every license attached.

Attach licenses to items and item revisions in a structure

1. Search for a structure and open it in Structure Manager.
2. Right-click the assemblies, sub-assemblies, or occurrences as appropriate and choose **License→Attach**.

 **Attach Objects to Licenses** ✕

 **BRAKE & SUSP CK/A;1 ...**

Attached Licenses for this Object

No licenses currently attached to this Object ^
v

License Type: ALL v

Licenses for Selection

- Exclude_21
- Exclude_22
- Exclude_23
- Exclude_24
- IPLic01
- IP 11

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Selected Licenses

- EXCLUDE_License_01
- EXCLUDE_License_02

Authorizing Paragraph

License Name	Authorizing Paragraph

< >

Parent to Assign Item Revision v

Children Levels Entire BOM v

OK
Apply
Cancel

3. In the **Attach an Object to Licenses** dialog box, set **License Type** to the type of license to be attached.

Note:

Only unlocked licenses and licenses that have not reached their expiration date are listed.

4. In the **Licenses for Selection** list, select the license to be attached and click the (**>**) button.

The selected licenses appear in the **Selected Licenses** list.

- To move all licenses to the **Selected Licenses** list, click the (**>>**) button.
 - To remove licenses from the **Selected Licenses** list, click the (**<<**) or (**<**) button.
5. (Optional for ITAR licenses only) Type a statement in **Authorizing Paragraph** to explain the authorization.
 6. To apply access to items and item revisions, from the **Parent to Assign** menu, select **Item** or **Item Revision**.
 7. To apply access to the entire BOM or specific levels in a structure, from the **Children Levels** menu, type the number of levels or select **Entire BOM**.
 8. Click **OK** or **Apply**.

Detach licenses from items and item revisions in a structure

1. Search for a structure and open it in Structure Manager.
2. To detach licenses, right-click the assemblies, sub-assemblies, or occurrences as appropriate and choose **License→Detach**.
3. To remove licenses from the **Selected Licenses** list, click the (**<<**) or (**<**) button.
4. Click **OK** or **Apply**.