



TEAMCENTER

Multi-BOM Management

Teamcenter 2412

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1. What is Multi-BOM Management?

Multi-BOM Management enables you to link and assign content across representations for different lifecycle stages or uses for a product. This application is an alternative to Multi-Structure Manager for organizations that support most Multi-Structure Manager use cases, but require support for additional functionality. Examples of additional functionality that Multi-BOM Manager provides include:

- Full Bill of Materials (BOM) support for EBOM (Engineering BOM)-MBOM (Manufacturing BOM) and CAD BOM-part BOM alignment.
- Bill of equipment (plant) definition, editing and change reconciliation, and read-only access to process manufacturing information such as bill of process (BOP), plant BOP, and product BOP.
- The ability to manage variability in BOMs using Product Configurator, to define and run test scenarios for BOMs and plants, and apply manufacturing change notices (MCNs) to BOMs only.
- The capability to generate BOM and plant reports.

If you working with any of the following, use Manufacturing Process Planner instead:

- Process planning cases that include BOP authoring (assignment of parts from BOM to processes or operations, or assignment of a workarea from a plant to processes or operations).
- Work instructions authoring, line balancing, logistics planning, time management, 4D planning, or automotive body in white processes.

2. Multi-BOM Management workflows

Whatever your workflow, a wide variety of tools are available in Multi-BOM Management to suit your requirements.

Workflow	Available functionality
Manufacturing bill of materials (MBOM) aligned with engineering BOM (EBOM), or CAD BOM aligned with part BOM	You can: • Author MBOMs from EBOMs. • Author and manage part BOMs from CAD BOMs. • Run basic and advanced accountability checks, as well as alignment checks between EBOMs and MBOMs, to ensure that all lines in the EBOM are accounted for in the MBOM. Note: You can also run accountability checks on many types of structures.
Basic process planning	• Track and propagate changes such as revised parts and BOM line property changes. • Configure structures using Product Configurator variants such as option families, values, and rules. You can: • Create a new work area (plant) structure. • Manage incremental changes. • Assign objects from one structure context to another, for example, EBOM to MBOM.
Advanced process planning	You can: • Generate general BOM and bill of equipment (BOE) reports. • Perform advanced structure searches.

3. Multi-BOM Management general functionality

Multi-BOM Management fundamentals

How perspectives and views work

Working with manufacturing perspectives

Teamcenter presents manufacturing data in views, each of which provides its own specific way of managing or modifying data. The views provide an environment where, for example, you can construct processes and operations, relate additional relevant information, view different alternatives or studies, and collaborate with others who are working on the same information.

For common use cases, Teamcenter provides you with several collections of views, organized in collaboration contexts (CCs), that group the views that you need to perform common tasks. These CCs behave similarly to the Multi-BOM Management perspective.

For all Multi-BOM Management CCs, you can:

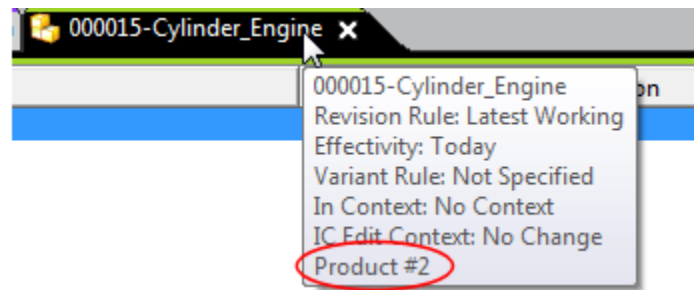
- Add these perspectives to the rich client navigation pane.
- View all loaded structures in the **Open Items** list and open structures from this list. If the structure is part of a collaboration context, the name of that collaboration context is shown in brackets behind the structure.
- Unload open structures by clicking the **Unload All** button in the **Open Items** list, or unload a single structure by right-clicking it and choosing **Unload**.

You can switch between perspectives using the  button. When you switch, the same structures are loaded in each perspective. You can see these structures in the **Collaboration Context Tree** view. Teamcenter displays the structures in the primary views of the perspective. If there is no suitable primary view in the perspective, the structure is listed in the **Open Items** list and the **Collaboration Context Tree** view from which you can activate it.

Secondary views are completely new between perspectives so the state of the secondary views are not the same when switching perspectives.

When you send an object from another application using the **Send To→Multi-BOM Management** shortcut menu command, Teamcenter opens the last Multi-BOM Management perspective that you used. If you have a perspective open in the current session and send a structure to Multi-BOM Management, the structure opens in the current Multi-BOM Management perspective.

Each primary view is assigned a number which represents the view regardless of the Multi-BOM Management perspective. Views with the same number are the same view.



In the figure, the view tooltip in every perspective in which item 000015 is open shows **Product #2**.

By default, you can open 10 views for each type of primary structure view. Your administrator can change this number in the **MEMaxOpenViewsSameType** preference. The view remains open as long as it is open in any of the Multi-BOM Management perspectives. As long as there is still one instance of the view open, when you activate that view, it opens in the same state (for example, expansion state). After the last instance is closed, activating the view opens the structure, but the expansion state is lost. However, the data is still loaded, so re-expanding is fast.

Your administrator can add new perspectives to Teamcenter.

Working with manufacturing views

Teamcenter presents manufacturing data in views, each view providing its own specific way of managing or modifying the data. There are *primary* views and *secondary* views. The most commonly used views in Teamcenter include engineering bills of materials (EBOMs), manufacturing BOMs (MBOMs), plant and product bills of process (product and plant BOPs), and graphic views.

Views provide an environment where you can author manufacturing processes based on additional information available in Teamcenter. You can construct processes and operations, relate additional relevant information, and collaborate with others who are working on the same information using studies and alternatives. There are primary views and secondary views.

- A primary view shows one configurable structure. That structure can contain a base view and several occurrence groups.
- A secondary view shows specific types of data related to the primary view with which it is associated. It can, depending on your needs, change its content if you select a new object in a primary view. Many of the secondary views are available only if you select an object in a primary view that contains valid input.

In addition to primary and secondary views, you can use the following:

- **Collaboration Context Tree** view to show all loaded objects.

- **Structure Search** view that allows you to search for any object regardless of view.
- **Graphics** view to display any visualization data associated with the structure. The **Graphics** view is closely associated with the primary view from which you open it.

You can open multiple views simultaneously. You can undock views and move them to a convenient position. You can open the same structure multiple times in different views. To assist you in keeping track of which views are associated, primary views and secondary views are color-coded. Primary and associated secondary views have the same framed color. In addition, Teamcenter frames the active view (the one in which you are currently working) in black.

Each view has a toolbar with buttons to execute the common tasks pertaining to that particular view. The view menu contains additional menu commands pertaining to that view. More complex tasks or tasks pertaining to several views simultaneously are found on the main application toolbar. The views have some features in common, such as the ability to change the displayed columns or filtering the results. You find these features in the view menu.

List of manufacturing views

Teamcenter presents manufacturing data in views, each view providing its own specific way of managing or modifying the data. The views provide an environment where you can author manufacturing processes based on information available in Teamcenter. You can construct processes and operations, relate additional relevant information, view alternatives and isolated studies, and collaborate with others who are working on the same information.

There are primary views and secondary views. A primary view shows one configurable structure. That structure can contain a base view and several occurrence groups. A secondary view shows specific data and, depending on your needs, can change its content if you select a new object in a primary view.

View Icon	Name	Description
	2D Viewer	You can have one or many two-dimensional snapshots associated with a line in your product structure. When you open a selected line in the 2D Viewer view, Teamcenter displays an attached image dataset. If there are multiple image datasets attached, you can select any preferred image.
	Accountability Check	Displays the results of an accountability check . This view lists the problem lines in the source and target and provides a list of conflict details. Lines that are colored in the source and target structures are also colored in the view. Fully matched lines are not listed.
	Advanced Accountability Check	Displays the results of an advanced accountability check . The Advanced Accountability Check view lets you compare and propagate multiple types of views/structures, run assessment comparisons to repair one structure from another, set reporting and equivalence options, and set partial match criteria for different types of structures. Many options are available, other than those the standard accountability check offers.

View Icon	Name	Description
	Design BOM	A CAD Bill of Materials (BOM), also called a design structure, is a type of primary structure view that displays parts from an original Computer-Aided Design (CAD) model or Electronic BOM (EBOM) and is often aligned to a part BOM .
	Collaboration Context Tree	Contains a list of all structures currently open in the application. You can use the Collaboration Context (CC) view to load and unload structures, as well as to save structures as new structure contexts. The Collaboration Context Tree does not respond to selection in other views.
	Engineering BOM (EBOM)	One of the most important primary structure views, the Engineering BOM (EBOM), sometimes also called a Computer Aided Design (CAD) BOM, is a breakdown of a three-dimensional product design consisting of part and assembly models. Because the order of parts and assemblies does not necessarily reflect the needs of manufacturing processes, the EBOM is used to generate a Manufacturing BOM (MBOM). You must continually compare and update the EBOM and MBOM, often using an advanced accountability check, to reflect engineering and manufacturing changes that occur during the manufacturing process.
	Graphics	Displays any 3D visualization data associated with the selected structure. The Graphics view is closely associated with the primary view from which you open it. If you close the associated primary view, Teamcenter closes the Graphics view as well.
	Incremental Change	Allows you to add, edit, or remove incremental changes from a selected line.
	IDC	Displays any Intermediate Data Captures (IDCs) associated with the selected structure. You can switch between captured states of an IDC by selecting from the Captured State list.
	Manufacturing BOM (MBOM)	One of the most important primary structure views, the Manufacturing BOM (MBOM) is a breakdown of a three-dimensional product design consisting of part and assembly models, usually derived from an Engineering BOM (EBOM) or design BOM, that reflects the needs of manufacturing processes. You must continually compare and update the EBOM and MBOM, often using an advanced accountability check, to reflect engineering and manufacturing changes that occur during the manufacturing process.
	Manufacturing Features	Shows all manufacturing features (welds, arc welds, and datums) under the current product scope in a table-like view. The view helps you manage scattered manufacturing features in a product structure in an easy and systematic way. Because the features displayed in the Manufacturing Features view are BOM lines, you can use the shortcut menu to perform many tasks.
	PERT	You can open this chart view for a process displayed in a structure view or for activities displayed in the Activities view. When opened

View Icon	Name	Description
		on a process, the Program Evaluation Review Technique (PERT) view shows the sequence of the first-level processes or operations that exist for the selected process. When opened on a top-level activity, the PERT chart displays the first-level activities. Each process or operation within the selected process is represented by a box in this view. Each box contains the name and ID of the process or operation. Use this view to arrange the boxes and create a sequential flow of processes, operations, or activities within the selected object.
	Plant	A type of primary structure view that displays the plant , work areas, work stations, lines, or any physical location where your manufacturing processes take place. This view is sometimes referred to as a work area view.
	Plant Bill of Process (BOP)	A type of primary structure view that displays resources necessary for a plant to assemble a product.
	Process Gantt	Displays processes and operations and the relations between them in a bar chart that illustrates the work breakdown structure of a project using a time line, from the start and finish times of the operations or processes and summary elements (operations or higher level processes). The also shows the dependency (sequence) of relationships between the elements.
	Product	Displays the product that you want to manufacture in a hierarchical tree structure.
	Product Bill of Process (BOP)	A type of primary structure view that displays processes and operations necessary to assemble a product. A product BOP is usually linked to a plant BOP.
	Product View Search	Helps you search for all product views associated with a particular part so that you can update them.
NA	Report	Supports the creation of reports for all three types of structures: products, processes (including their operations and activities), and plants. The generated report is presented through a browser window. You can create customized style sheets or use other formatting tools to customize both the data content and the report format.
	Structure	When you open the application, there are three empty structure views entitled Product , Process , and Plant . These views are placeholders for structures that you open. When you open a structure, it opens in the associated structure view and Teamcenter displays the information as a tree structure. You can open multiple structures at once, including multiple processes or plants. Each of these structures is displayed in a different view. You can configure these structures using revision rules, variant conditions, and effectivity dates.

View Icon	Name	Description
		- If you open a process, the structure view shows the process hierarchy in the sequence it uses for manufacturing the product. The process structure contains subprocesses and operations. You can view the workflow from one process to the next, as well as see parallel processes. You can also see alternate processes for creating the target product and allocate work area items, tooling, and workpieces to a specific process. - If you open a plant, the structure view displays your factory environment hierarchy as a tree structure. The root level identifies the high-level plant structure. Each layer beneath the root level breaks down the work areas within the plant until the lowest level in the structure represents individual work areas where specific operations are performed. Structure views are primary views for which you can open a variety of secondary views that provide detail information about the selected line. Although product, process, and plant are the most common types of structures that open in a primary view, there are additional types of structures that open in primary views, including an Intermediate Data Capture view, a Requirements view (when working in Systems Engineering), and a Standard Text view.
	Structure Search	Helps you perform a multitude of advanced searches on view structures using various properties of the structure's lines. The search is not limited to the loaded lines of the structure and can search an entire structure without you having to load it.
	Variants	Allows you to display and edit variant options, option defaults, and rule checks currently defined for the product selected in the structure pane.
	Viewer	Displays the content of a dataset that is attached to an item revision with a Rendering relationship, where possible. For example, if you select a text dataset, the viewer displays a text editor with the content of that text dataset. If you select a dataset containing a JT file, the viewer displays the JT.
	Workarea	A type of primary structure view used to display a plant, work area, work station, or any physical location where your manufacturing processes take place. This is sometimes referred to as the plant view.
	Work Instruction	If your administrator configured the publishing feature for manufacturing documentation, you may see the . The name of this view is configurable. Use it to create published pages containing manufacturing data. You can organize collections of publishing pages into portfolios, which you can view, publish to a Web server or PDF, or print in My Teamcenter.

Note:

The **PS_assume_legacy_transform_units** preference determines how Teamcenter interprets the units of measure for legacy transform data. Teamcenter and NX currently use meters for transform units of measure; legacy measurements were in inches or millimeters. This preference affects all data using legacy transforms that have no database-resident indication of the unit measurement stored with them. The default setting is **Unknown**. If the preference is left in the default setting, you may see discrepancies between the model and display units when you view collaboration context structures in Manufacturing Process Planner.

Behavior of selected objects in active views

If you select an object in the active view, the selections in the other views change as follows. This is known as *selection synchronization*.

- Primary views can change their inner selection (highlight) to suit the active selection. The following situations can cause them not to do so:
 - The selection does not correspond to any object in the view.
 - The corresponding object is not currently expanded, and the **MEEExpandToSelection** preference is set to false.
 - An expensive search is required to find the corresponding line. In this case, use one of the **Find** commands.
- Secondary views can change their inner selection (highlight) to suit the active section when that selection occurs in a primary view or in another secondary view that is associated to the same primary view. The following situations can cause them not to do so:
 - The selection does not correspond to any object in the view.
 - The **Disable response to selections** button  is turned on.

Controlling perspective behavior when opening structures in views

When working in a perspective, you can control when a perspective opens a new view for structures that are loaded. There are two ways of opening structures:

- Explicitly

You send a structure to Multi-BOM Management, load it from the **History** list, or use the **Open by Name** button to open a specific structure.

- Implicitly

You open a structure and all its associated structures are loaded as well. For example, when you open a collaboration context that contains multiple structures, all the individual structures are loaded into views. Alternatively, you open a product and its associated process or plant is loaded as well.

When you load structures explicitly, they are always opened into a view. If an empty view is available, the structure gets loaded into that view. If there is no empty view available, a new view is opened to house the structure.

When you load structures implicitly, you can control the loading of the associated structures. You can do either of the following:

- Open all related structures in their own views, first filling existing views and then opening new views for the remaining structures.
- Fill existing empty views with the appropriate structure. You must then open any remaining associated structures explicitly.

For example, you are working in the **Manufacturing - Process Sequencing** perspective and want to open a collaboration context that contains an EBOM, an MBOM, a process, and a plant structure. The **Manufacturing - Process Sequencing** perspective, by default, contains only a process view, the **Gantt** view, and the **PERT** view. Depending on which mode you choose for the perspective, one of the following happens when you send the collaboration context to Multi-BOM Management.

OpenExplicitOnly The process opens in the process view. If you want to see the EBOM, MBOM, or plant structure, you must open it explicitly (for example, by selecting them in the **Collaboration Context Tree** view and choosing **Activate**).

OpenAllStrategy The process opens in the empty process view; the EBOM, MBOM, and plant structures open in new views. These structures are opened implicitly.

You specify which mode Teamcenter uses to open structures using the **Window→Perspective Mode** command. When you choose a mode, it is applicable to that perspective. Other Multi-BOM Management perspectives can use a different mode. The default mode for each perspective is set using the **MEPerspectiveMode** preference. By default, the Multi-BOM Management default perspective opens all structures in views (**OpenAllStrategy** mode). Other Multi-BOM Management perspectives fill available views with structures but only explicitly opened views open in new views (**OpenExplicitOnly** mode).

Managing loaded objects with the Collaboration Context Tree view

The **Collaboration Context Tree** view displays all structures that are loaded in your session. You can use this view to load or unload structures or to make structures that have moved behind other structures in the structure view area visible. Additionally, you can use this view to create structure contexts from loaded structures, to create configuration contexts, and to save contexts into new or existing collaboration contexts.

The **Collaboration Context Tree** view is not a primary or secondary view. It is not associated with other views and does not respond to selection in other views. You can display this view by clicking the **Open CC Tree** button  in the toolbar.

You can drag a collaboration context from your **Home** folder into the **Collaboration Context Tree** view.

Open the Graphics view

The **Graphics** view is associated with the structure view from which you open it. You cannot change this association.

- In a structure view, click .

Teamcenter opens the **Graphics** view displaying the structure. The **Graphics** menu is displayed in the main menu bar if there is at least one **Graphics** view open.

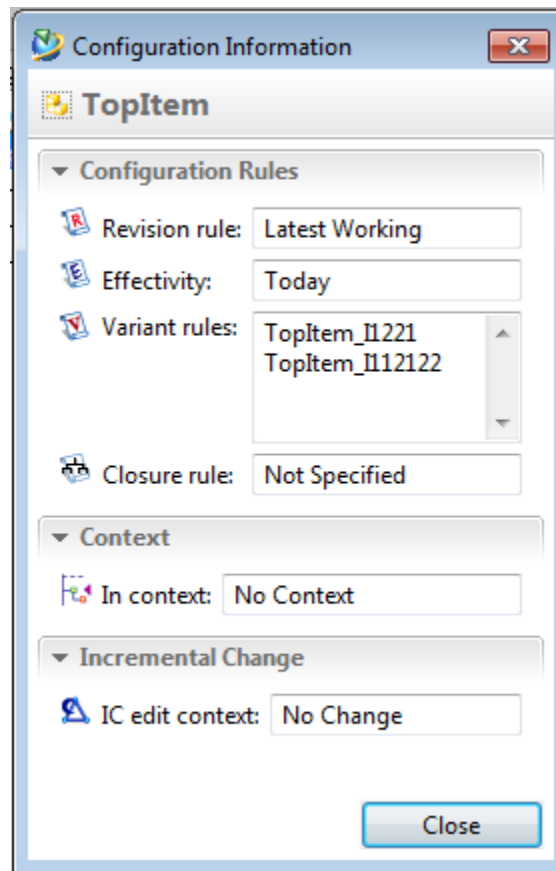
- When you close the primary view from which you opened the **Graphics** view, the **Graphics** view closes with it.
- If you unload data from the primary view, the **Graphics** view remains open, but empty.
- If you load a new structure into the primary view, the **Graphics** view is available, but the structure is only loaded when you select a structure to view.

Display configuration information for a primary view

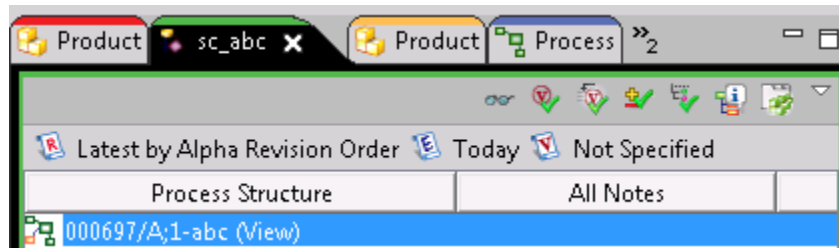
Do one of the following:

- Click  in a primary structure view to see configuration information about that structure.

The **Configuration Information** dialog box displays the following:



- The revision rule.
- The effectivity.
- The variant rule or rules currently in effect.
- Which structure is configuring the current structure.
- In-context information.
- Currently active incremental change.
- Ensure that the **MEShowConfigurationHeader** preference is set to **true**. This displays the current revision rule, effectivity, and variant rule at the top of the structure view. These entries are links that you can click to open the dialog boxes used to change the configuration.



Modify the column display

1. Select a line in the table in which you want to modify the columns to make the table the active one in the view.

This is important in views that contain multiple tables.

2. Click the **Menu** button ▼ and choose **Columns** from the view menu commands located in the top-right corner of the view.

Teamcenter displays the **Column Management** dialog box.

3. Select the desired columns from the **Available Properties** list and move them to the **Displayed Columns** list with the right arrow.
4. (Optional) Modify the order the columns appear in the selected view table using the up and down arrows.
5. Do one of the following:
 - Click **Apply** to save the current state.
 - Click **Save** and type a name for the column configuration. You can restore a saved column layout by choosing **Apply Column Configuration** from the view menu commands and selecting the saved configuration from the list.

Find in display

You can use advanced structure search functionality to find a line by property name in a view.

1. Click the **Menu** button ▼ and choose **Find in Display** from the view menu commands.

Teamcenter displays the **Find in Display** dialog box.

2. Click + to add a line to the table.
3. Double-click the **BOM Line** cell of the **Property Name** column and select the property name by which to search from the list.

4. Double-click the equal sign to change the operator.
5. Type a value corresponding to the property name, for example, **MEOP** if you select **Item Type** as the property name.
6. Click **Find**.

Teamcenter displays the number of matches in the bottom left of the dialog box.

7. Page through the matches using the right and left arrows, or display them all by clicking .

Teamcenter selects the matches in the view.

Sort data in view pane

1. Click the **Sort** button  at the top right of the view, or select **Sort** from the view menu commands.

Teamcenter displays the **Sort** dialog box.

2. Do one of the following:

- Sort by default order by selecting **Select default order**.
- Specify a different sort order.
 - a. Select **Select below criteria**.
 - b. In each of the three boxes, double-click in the box to select from a list of columns available in the view table.

You can modify the column display by inserting or removing columns from tables.

- c. Select whether to sort the column entries in ascending or descending order.
3. Click **OK**.

Teamcenter sorts the data in the selected table in the order specified.

Filter search results

Several **advanced structure search** features allow you to filter search results according to criteria that you specify.

- The **ALL** option displays properties for all the children of the object currently selected in the component view.

- You can use the **Filter Condition Editor** to create condition expressions for filtering the display.
- Expressions cannot be edited after they are listed in the **Auto Filter** dialog box, but they can be deleted.
- Teamcenter retains your filter condition expressions until you delete them.

To create conditions, click **Add a new search condition**  to display the **Filter Condition Editor**.

- To create an initial condition expression, select a property column value and a logical operator, and then enter an object value or select one from the list of objects displayed in the table, and then click **Add a new search condition** .

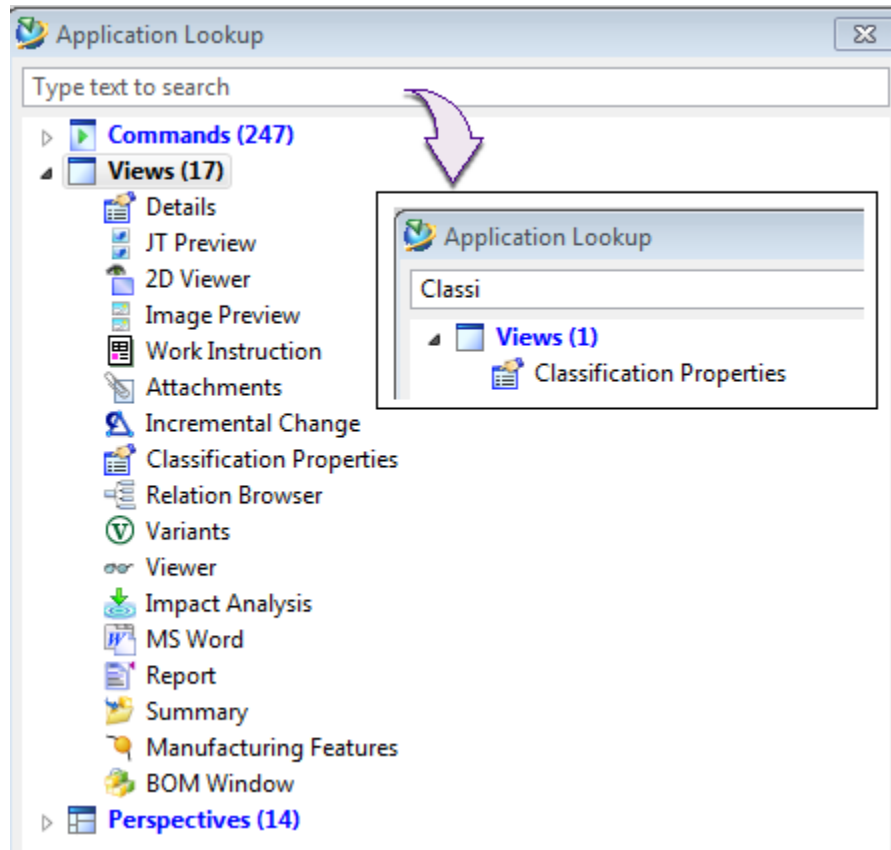
Note:

The == operator tests for an exact match. The = operator tests for a match but is not case sensitive.

- To expand the expression with additional conditions, use the **ADD** and **OR** operators.
- Click **Remove the selected condition(s)**  to delete the selected condition line.
- Click **Clean all the conditions**  to delete the entire expression.
- Click **...not meet the condition(s)**  to negate the selected condition.
- Click **OK** to add the condition expression to the **Auto Filter** dialog box.

Finding commands, views, and perspectives quickly

You can use the **Application Lookup** button to help you find user interface components quickly. As you type an entry in the box, Teamcenter searches for an entry that matches what you type.



The search finds the following:

- **Commands**

Only commands that appear in the main menu are listed. Commands that appear only in the shortcut menu, view menu, or view toolbar are not included. The command you select is applied to the object that was selected before you clicked **Quick Search**.

- **Views**

All the views that are displayed when you right-click the selected object and choose **Open With** are listed.

- **Perspectives**

Only Multi-BOM Management perspectives are listed. Other application perspectives are not available in this list.

Opening your Home folder and inbox

You can open your **Home** folder and **My Worklist** in Multi-BOM Management without opening My Teamcenter. This helps you quickly view your data structures or work with tasks assigned to you without

moving between perspectives. You can also drag objects directly from your **Home** folder into a structure view.

Do one of the following:

- Click **Home** in the navigation pane.
- Click  or  in the toolbar.

Saving changes

Teamcenter saves changes to the structure automatically. You do not need to save them manually.

Caution:

If the same structure is open in Structure Manager and Multi-BOM Management, one application can overwrite the changes made in the other application. To avoid this, close Multi-BOM Management before making changes in Structure Manager.

Displaying information

Load data to Multi-BOM Management

Do one of the following:

- Use the **Send to** menu command in any other application.
- Use the **Open By Name** buttons.
- Use the **MRU (Most Recently Used Structures)** button.
- Use the **Quick Search** feature.
- Use the **Open Items** list.

The **Open Items** section of the navigation pane lists all items that are currently open in the perspective.

- Use the **History** list.

The **History** list in the navigation pane displays links to objects that you opened. Links are displayed in reverse order; the last object you opened is the first displayed in the list.

- Use the **Favorites** feature.

- Drag a collaboration context from your **Home** folder to the **Collaboration Context Tree** view.

If you want the related product and plant to open when you load a process, set the **MSE_load_related_product_process_plant** preference to **true**. Also, to enable auto-loading of all the linked product structures and plant structures to a Bill of Process or Plant Bill of Process, the **MELoadAllLinkedStructures** preference should be set to **true**.

Tip:

Use the **Open Items** list in the navigation pane to activate a structure that is already loaded but not currently visible.

Open structure by name

You can search for and open a product, process or operation, work area, collaboration context or structure context by name or object ID.

1. In the toolbar, click **Open by Name** .
2. Click one of the following:

Button	To open a
	Generic BOP
	Product
	Process or operation
	Work area
	Collaboration context
	Structure context

If a structure is currently open in a structure view, it is listed in the **Association to** box.

3. To find structures associated with the listed structure, select the **Association to** option and skip to step 4, otherwise, do one of the following:
 - If there is no structure identified or if you want to search for structures associated with a different structure, select the new structure and click the **Set to selected** button .

You can use this option to search for structures that are not associated to loaded root structures.

- Select the **Attributes** option and type a structure name or ID.

Note:

You can type an asterisk (*) as a wildcard character if you do not know the entire name or ID.

4. Click **Search** or press the Enter key.

All structures that match your search criteria are listed in a table in the open structure dialog box.

5. Double-click a structure in the table. It is opened in a structure view.

Opening the most recently used object

You can click the **MRU** (most recently used) button  to open any of the last few 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 an item revision in the MRU list to open it.

Note:

If the business object display rule for the **Item** business object is hidden in the Business Modeler IDE, **Service Plan** does not show up in the most recently used (MRU) list.

Unload data

- Select the structure in the **Collaboration Context Tree** view and choose **Unload** from the shortcut menu or from the view menu.

This unloads the selected structure from the perspective.

- In the structure view, choose **Unload** from the view menu.

This unloads the selected structure from the perspective.

- In the **Collaboration Context Tree** view, choose **Unload All** from the view menu or **File → Unload All**.

This unloads all structures from the perspective.

- In the **Open Items** section of the navigation pane, right-click the structure you want to unload and choose **Unload**.

This unloads the selected structure from the perspective.

- In the **Open Items** section of the navigation pane, click **Unload All** to unload all the structures open in the perspective.

This unloads all structures from the perspective.

Note:

- When you close the primary view without unloading data, the structure is still open. You can activate it from the **Collaboration Context Tree** view.
- You can only unload a structure context object separately if you loaded it separately. You can unload only an entire collaboration context object—not parts of it.

Expand and collapse a structure

1. Select an object in the loaded structure.
2. Do one of the following:
 - Choose **View** → **Expand Options** → **Expand** to expand the structure to one level below the selected line.
 - Choose **View** → **Expand Options** → **Expand Below** to expand the entire structure below the selected line.

Teamcenter expands only to the level of consumed objects. If you want to expand further, your administrator must define an appropriate closure rule, and then you can expand based on the closure rule.

Note:

This can be time-consuming in very large structures.

- Choose **View** → **Expand Options** → **Expand Below...** and select a level to which you want to expand the structure.
- Choose **View** → **Expand Options** → **Expand to Type**.

Teamcenter displays the **Expand to Type** dialog box.

- a. In the **Type** list, select the type to which you want to expand the structure.

The types listed are dependent on the type of selected object and the **MEEExpandToBaseTypes** preference. The **MEEExpandToBaseTypes** preference is only applicable to selected processes.

Selected object type	Behavior
Process	The list contains subtypes of both Process and Operation .
Operation	The Expand to Type command is unavailable.
Plant	The list contains subtypes of Plant .
Product	The list contains subtypes of Product .

- b. Click **OK**.

Teamcenter expands the tree to the selected type.

- If the expand mechanism reaches the given type in a branch, it stops and moves to the siblings.
- If the expand mechanism does not find an object of the selected type in the tree, it does not expand the tree.
- If the expand mechanism does not find an object of the selected type in a branch, the branch remains collapsed.

3. (Optional) Collapse the structure by choosing one of the following:

- **View → Collapse Below** to collapse the entire structure.
- **View → Expand Options → Expand Below...** and selecting the **Collapse lower level** check box.

Tip:

Each of these commands are also available from the shortcut menu.

Hide subassemblies using end items

To improve Teamcenter performance and hide information that is not active in your process, you can make one or more assemblies in a product or plant structure into an end item. When you expand a structure containing an end item, Teamcenter does not expand beyond the end item. You can apply end items to an entire item, to all occurrences of the item in structures where it exists, or to the current occurrence only.

1. In a product or plant structure, select one or more product or plant lines and choose **Edit→End Item Assembly State**.

2. In the **End Item Assembly State** dialog box, to create the end item on the item itself as well as all structures that contain the selected item or items, select the **Item** check box.

When you select the **Item** check box, the **Occurrence** check box is also selected, and by default, the end item also applies **In all structures where this selected occurrence appears**.

3. To apply the end item:
 - To only the current selected occurrence so that it effects no other structures that contain it, select **For the current selection only**.
 - On only the selected item or items, clear the **Occurrence** check box.
4. Click **OK**.

The selected item appears as an end item  or overridden end item  in the structure.

Note:

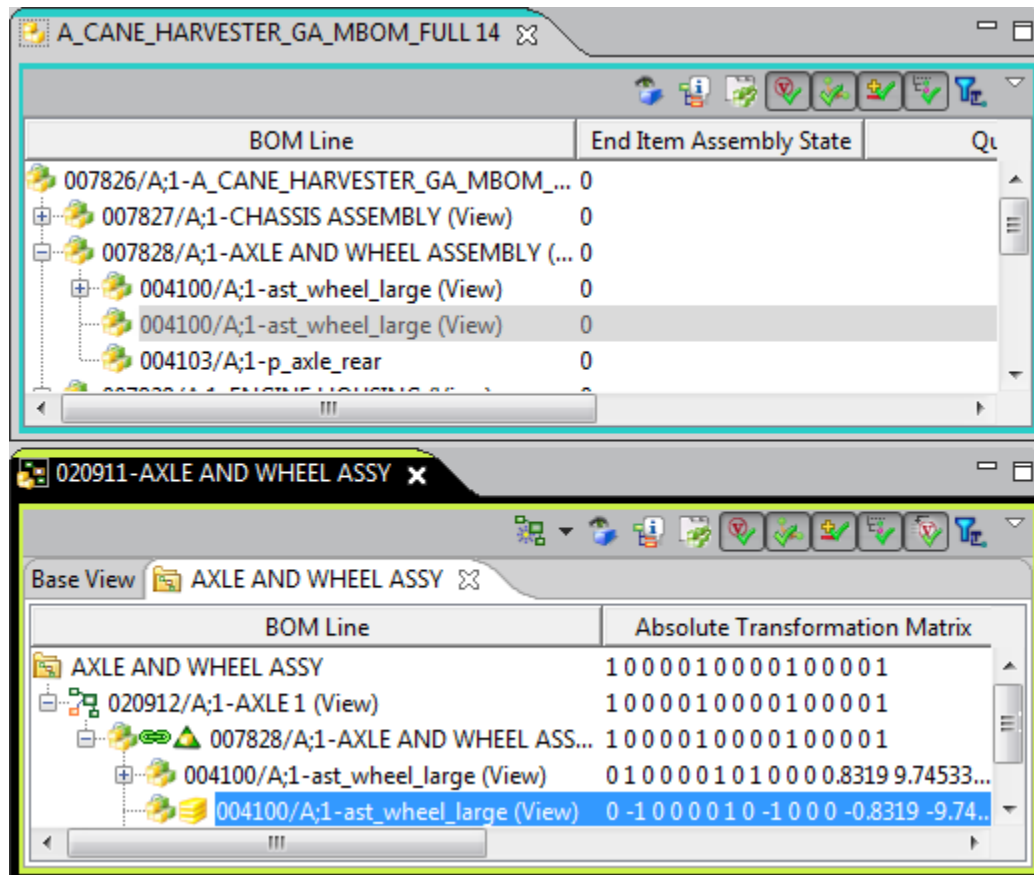
- To remove an end item assembly designation, repeat step 1, clear the check boxes in the **End Item Assembly State** dialog box, and click **OK**.
- You can temporarily allow expansion to display the lines below the end item assembly in Multi-BOM Management. This expansion is valid for the current session only. Expansion also occurs when you use **Find** commands.

Understanding end item assemblies

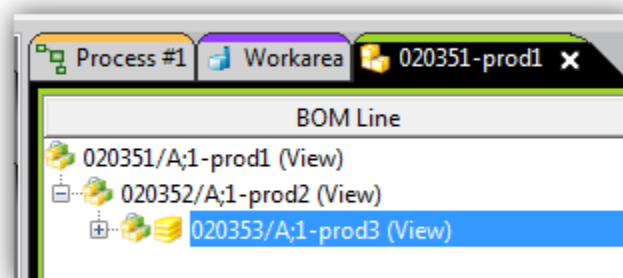
An end item is a final combination of consumed end products, component parts, and/or materials that are not currently of interest in a manufacturing process. You can specify an assembly in a product or plant structure as an end item assembly. When you expand a product structure, Teamcenter does not expand beyond the item designated as an end item assembly. Teamcenter does, however, store all visualization information necessary to view the assembly in both the embedded and stand-alone viewers.

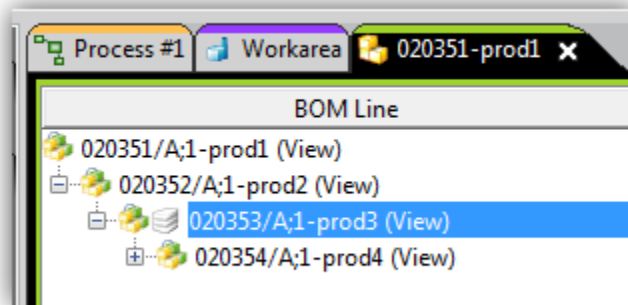
You can define an end item assembly on the item level or on the occurrence level. Once defined on the item level, every future occurrence is defined as an end item assembly on its occurrence as well. If you define it on the selected occurrence, and that occurrence exists in other places, it is technically the same occurrence and is defined as an end item assembly there as well. This is the same occurrence only if a parent node is shared between the structures. If the end item assembly itself is copied to another structure, this is a different occurrence.

You can also apply an end item to a specific line in a structure without affecting occurrences in other structures. The end item applies only to that occurrence and has no impact on the source structure or other occurrences.



You can temporarily allow expansion to display the lines below the end item assembly in Multi-BOM Management. This expansion is valid for the current window session only. Expansion also occurs if you use **Find** commands or when loading product views that contain references to lines below an end item assembly.





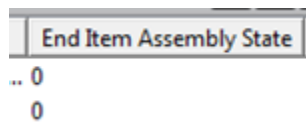
The end item assembly feature is enabled using the **EndItemState** preference.

Note:

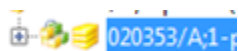
Your administrator must configure the export behavior for suppressed end item assemblies using closure rules.

Key points about viewing End Item Assemblies

- It is recommended that the **End Item Assembly State** column not be displayed. It is not an editable column and is not critical for determining if an item is an end item assembly.

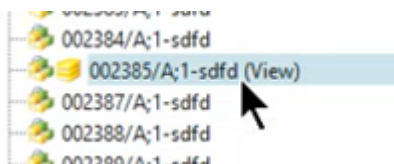


- To identify end items, it is best to refer to the icon that represents an end item.

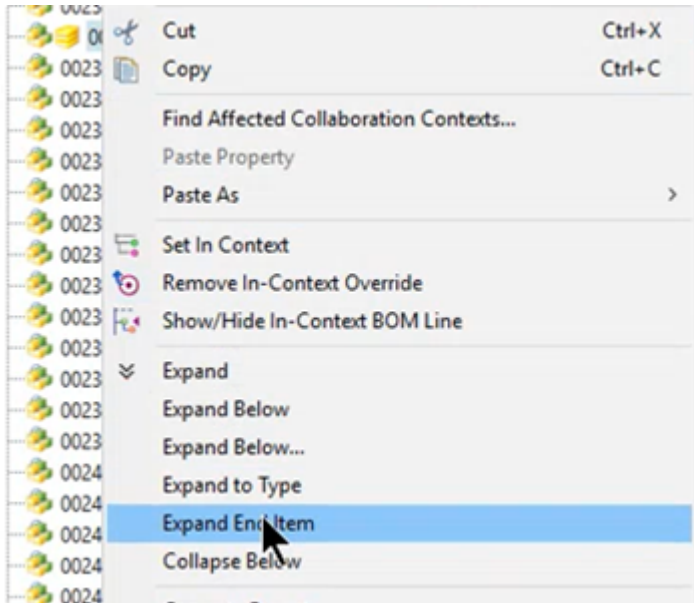


- To show an end item structure:

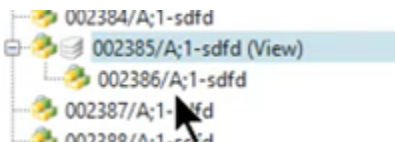
- Right-click the end item.



- Choose **Expand End Item**.



The end item structure is displayed, and the end item icon turns white.



- After expanding an end item, to hide it again, you must unload and then reload the structure.

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.

Lines filtered out by a closure rule are not exported.

If lines are hidden by a closure rule, you cannot find them from other views using the **Find** menu commands.

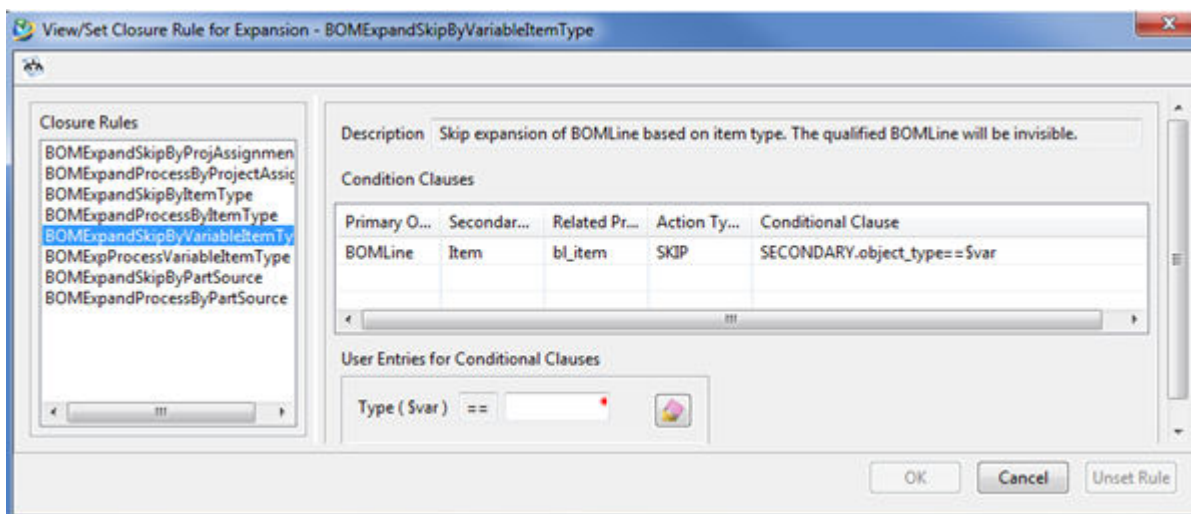
Note:

Expanding a structure based on a closure rule can affect the outcome of an accountability check. Because this type of expansion filters the displayed lines, it can interact with any inclusion rules you may set for the accountability check.

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 tooltip on the structure tab or in the configuration information when you click .

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.

Suppress and unsuppress occurrences

You can hide lines in a structure in the context of another line higher in the structure. This is useful if a structure contains content that is not pertinent to every user. For example, if you want to send a tool design package to a tool designer, not every operation that is contained in the package is relevant to the tool designer's work. You can hide the nonrelevant lines in a structure as follows:

1. Right-click the line in the structure that is the context of the suppression and choose **Set In Context**. For example, if you want to hide some lines in a tool design package, you select the root process.
2. Select the line you want to hide and choose **Edit→Suppress/Unsuppress Line**.

Teamcenter hides the line in the structure. If you export a structure with hidden lines, they are not included in the PLM XML of the structure and are not exported.

You can display lines that are suppressed as follows:

- In the structure view, click  or choose **Show Suppressed Occurrences** from the view menu.

Teamcenter displays the lines that are suppressed with a symbol  in front of them. You can display the **Suppressed** column to assist you in determining whether a line is suppressed.

BOM Line	Suppressed
 002039/A;1-Top Process (View)	False
 002040/A;1-mr3395 (View)	False
 002044/A;1-kioe994	False
  002045/A;1-lewq936	True
 002046/A;1-bcv3779	False
 002041/A;1-jl423 (View)	False
 002042/A;1-al1962 (View)	False
 002043/A;1-ee5223 (View)	False

You can unsuppress lines in a structure as follows:

1. Display all suppressed lines by clicking  or choosing **Show Suppressed Occurrences** from the view menu.
2. Select the suppressed lines that you want to show and choose **Edit→Suppress/Unsuppress Line**.

View only specific occurrence types

You can use the occurrence type filter to specify which occurrence types to display in the structure. The occurrence type filter is available on all loadable structures.

1. Select the desired structure root (product, process, or plant).
2. Choose **Select Occurrence Type Filters** from the view menu.
3. Choose the types of occurrences that you want to appear in the selected structure.
4. Click **OK**.

Only the occurrence types that you selected are shown in the structure.

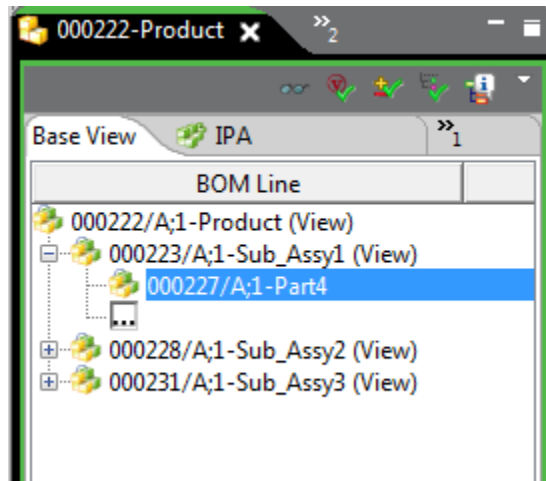
Note:

You can turn the filter on and off by choosing **Apply Occurrence Type Filter** from the view menu or clicking  in the view toolbar.

Expand partially loaded structures

When Teamcenter displays a BOM or manufacturing view containing the results of a search, the siblings of the node you searched for are hidden so the search results are displayed quickly. Each hidden node is represented by a ... symbol enclosed in a box. The ancestors of the found node are loaded and visible.

The following figure shows how a partly loaded structure displays in the BOM. In this example, three nodes are hidden and these nodes are siblings of the **000227/A;1-Part4** node found by the search.

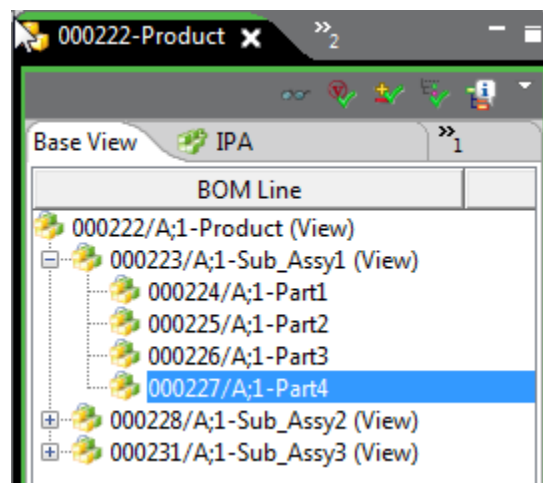


Partially loaded structure displayed as a result of a search

To expand this structure:

- Click

Teamcenter expands the structure showing the siblings of the search result.



Expanded structure

Refresh the display of attachments

Generally, when you modify a structure, it is automatically refreshed by Teamcenter. In some cases, however, the automatic refresh of new attachments is disabled, for example, when adding an attachment in another application such as My Teamcenter or NX. This is to ensure that performance

is not impaired. Because of this, a new release status does not appear automatically in the **Attachments** view. To refresh, you can:

- Select a different line in the structure then select the original one again.
- Use the **Refresh Current Structure** command.
- Set the **MEAttachmentPanelEnableRefreshChildren** preference to **True**. This causes Teamcenter to automatically refresh the attachments in the **Attachments** view.

Pasting into a pseudofolder does not refresh the **Attachments** view. After pasting the design object under the **Represented by** pseudofolder in the **Attachments** view, choose one of the following solutions to see the pasted object:

- Reload the part object again.
- Send the object from My Teamcenter to Multi-BOM Management.
- If the structure has more than one product, move the selection between the children.

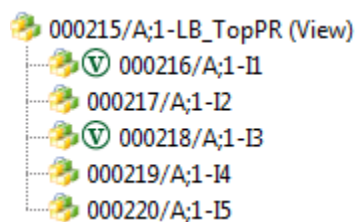
The **Attachments** view is refreshed and you can see the pasted design object.

Displaying and hiding structures using the Show Unconfigured buttons

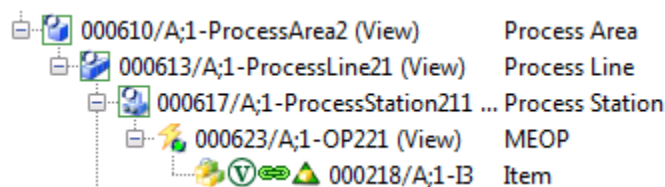
Teamcenter provides you with several buttons or menu commands that show or hide objects in a structure.

- **Show Suppressed Occurrences**
- **Show Unconfigured Variants**
- **Show Unconfigured By Occurrence Effectivity**
- **Show Unconfigured Changes**
- **Show Unconfigured Assigned Occurrences** (only applicable to a bill of process)
- **Apply Occurrence Type Filters**

If you have several structures open, the state of these buttons in the various structures affects what is visible in the structure. It can occur that you try to show unconfigured variants in a composition structure but are unsuccessful because they are not hidden in the parent structure. For example, you have the following product structure with Part2 configured out as a result of a variant rule, but with all variants exposed using the **Show Unconfigured Variants** button.



Additionally, you have a process structure that consumes Part2 from the product structure.



If, in the process structure, you turn off the **Show Unconfigured Assigned Occurrences**, you may expect the assigned part and the owning operation (depending on the settings of the **typeAndRuleForProcessConfiguration** preference) to be hidden in the process structure. If, however, in the product structure, the **Show Unconfigured Variants** button is turned on, you cannot hide the assigned occurrences in the plant BOP structure.

The following control only nodes in the process structure (processes and operations) and not assigned lines:

- **Show Suppressed Occurrences**
- **Show Unconfigured Variants**
- **Show Unconfigured By Occurrence Effectivity**
- **Show Unconfigured Changes**

The following control assignments being configured in and out:

- **Show Unconfigured Assigned Occurrences**
- **Apply Occurrence Type Filters**

Tip:

You can simultaneously show or hide all **Show unconfigured** options using the **Show Hide Unconfigured All**  list if your administrator sets the **MEShowHideUnconfiguredAll** preference to **All**.

Pack/Unpack a bill of materials

- Click one of the following two buttons on the toolbar to group or ungroup multiple, identical components in one level of the assembly to pack and unpack the BOM.
- Click  to pack.
- Click  to unpack.

Note:

When lines are packed, one of the packed lines is always designated the master packed line. If the **TCVIS_Selection_From_Viewer** preference is set to true, you can select packed objects in the viewer using the buttons available in the **3D Selection** toolbar. However, if you select the master packed line, all packed lines are selected. If you do not want this behavior, you must unpack the packed lines before selecting the individual objects in the viewer.

Manage checked-out objects

You manage checked out objects by doing one of the following:

- Check in the object by clicking **Check In**.
- Return the object to the database without saving any of the changes you made by clicking **Cancel Check Out**.
- Transfer the checkout ownership to another user by clicking **Transfer Check Out**.
- If you have only one object selected, view a listing of previous checkout activity by clicking **View Check Out History**.

Note:

You can configure the columns that appear in the **Checked Out Objects** dialog box and filter its content.

Understanding equivalence and in-context ID (IDIC)

Teamcenter has several features that depend on finding parts that are considered *equivalent*. This equivalency is often dependent on the in-context ID (IDIC), also known as the *absolute occurrence ID*. The in-context ID is a unique identifier, generally alphanumeric, that determines if two parts or processes are equivalent.

You can view the in-context ID by displaying the **ID in Context Top Level** column. It is usually automatically generated, and you should exercise caution in modifying its value.

The following features depend on the in-context ID:

- Reconciling and engineering bill of process (EBOM) with a manufacturing bill of process (MBOM)
- Finding products in processes that are not yet expanded
- Running an accountability check to verify line equivalence
- Assigning parts to a cloned process structure
- Comparing structures to intermediate data captures

An in-context ID is automatically generated in the following situations:

- When you assign a bill of materials (BOM) to a BOM
- When you assign a BOM to a BOP or enterprise BOP (EBOP) structure if the **MECopyIdInContextToAssignedLine** preference is set to true

An in-context ID is not generated when you assign from an EBOP structure to an EBOP structure.

Caution:

If a line has an in-context ID and you cut it and paste the same line back into the structure, Teamcenter creates a new occurrence without an in-context ID. Therefore, any of the above comparisons based on the in-context ID no longer work.

Searching for a component in other open structures

Setting up the search for components in other structures

You can select one or more objects in the following areas of the user interface and search for them in a different structure.

- Lines in a view
- Consumed parts in a process
- An object in the **Navigation** pane (**Favorites**, **History**, **Open Items**)
- Objects in the **Home** folder
- Objects in the **My Worklist** folder
- Items attached to a Teamcenter mail

- Lines in the **Summary** view
- Objects in the **Graphics** view

Whether you need to expand a target structure before choosing the **Find in All Visible Views** menu command depends on the settings of the following two preferences:

MECopyIdInContextToAssignedLine
MECopyIdInContextLowerLevels

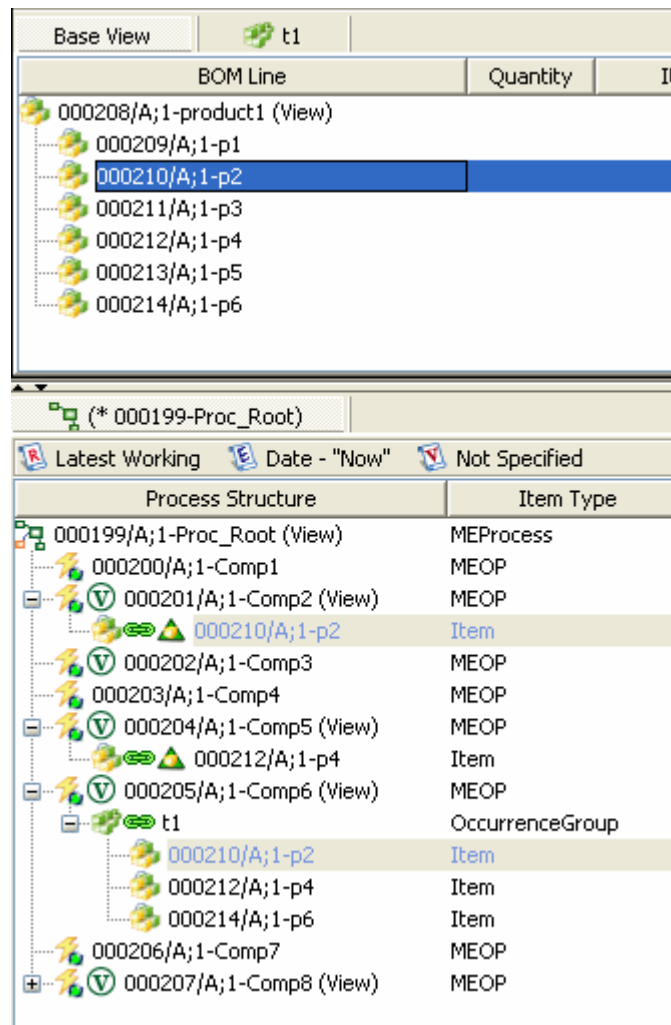
Note:

Whether you need to expand a structure before a found component can be highlighted within it depends on the value of the **MEEExpandToSelection** preference. If this preference is set to **false**, you must manually expand the target structure to highlight lines found within that structure.

Find components in open structures

1. Right-click one of the following:
 - Lines in a view
 - Consumed parts in a process
 - An object in the **Navigation** pane (**Favorites**, **History**, **Open Items**)
 - Objects in the **Home** folder
 - Objects in the **My Worklist** folder
 - Items attached to a Teamcenter mail
 - Lines in the **Summary** view
 - Objects in the **Graphics** view
2. Choose one of the following from the shortcut menu.
 - **Find** → **Find in all visible views** to find the line in all views that are open, not tabbed behind others, and not minimized.
 - **Find** and select the view in which you want to find the source line.
 - If the source structure is an occurrence group, choose **Find in Base View** to find the selected structure line in the base view associated with the occurrence group.

Teamcenter searches for the item in the alternate structure and, if successful, highlights it, as shown in the following figure.



Individual search result

Find in other enterprise BOP structures

The **Find** command functions on enterprise bill of process structures. You can select a line in a generic, product, or plant bill of process (BOP) and find all lines with the same origin in other enterprise BOP structures. You can use this menu command on processes and operations but not on consumed items.

If you use the **Disconnect** menu command to remove the origin link between structures, the **Find** command no longer finds the other structure.

- Select a line in a BOP structure and choose **Find**→**Find in All Visible Views** from the shortcut menu. Alternatively, you can choose **Find** and select a specific view from the list of open views (for example, **Find**→**Find in Selected View**).

Teamcenter highlights all lines sharing a common origin in the specified views.

Note:

- From a plant BOP, Teamcenter shows only matching objects from the product BOP and not the generic BOP.
- When searching from a generic BOP to a plant BOP, by default, Teamcenter searches by in-context ID (IDIC). If it does not locate the IDIC value it prompts you to search by item ID, which in some cases may not be helpful. To search by alternate values, you or your administrator can create a string preference named **METypesIgnoredForFindByItemId** and add values such as **MfgOBvrOperation** or **MfgOBvrProcess** to suppress the item id search prompt.

Comparing structures graphically

About comparing structures graphically

You can compare two structures (BOMs) and view the results to identify differences. The BOMs can contain different types of objects, such as mechanical parts, electrical parts, routes, and connections. You can use the graphical comparison capability with released BOMs or with structures that are configured by effectivity.

You can compare an assembly with an assembly, a part with a part, or two revisions of the same assembly. If you compare two revisions of an assembly, Teamcenter identifies the following supersedure information:

- Adds

These are objects that are in the target assembly but not in the source assembly. They have been added to the assembly.

- Cancels

These are objects that are in the source assembly but not in the target assembly. They have been removed from the assembly.

- Moves

These are objects that are in different positions in the source assembly and target assembly. Any object whose transform matrix differs between the source and target is identified as repositioned.

- Reshapes

These are objects that have alternate representations between the source assembly and target assembly. Any object identified with a **UG ALTREP** note type is identified as reshaped.

- Common

These are objects that are in both the source assembly and target assembly.

Compare two BOMs

1. Apply any revision rules or effectivity needed to configure the structures you want to compare.
2. Choose **Tools** → **Graphical BOM Compare**.

Teamcenter displays the **Graphical BOM Compare...** dialog box listing all loaded structures in both the **First Structure** and **Second Structure** boxes.

3. Select a first and second structure for compare from the lists and click **OK**.

Teamcenter analyzes the BOMs to identify any differences and displays the **Graphical BOM Compare** dialog box containing a visual indication of those differences.

Depending on the type of comparison, you can use the tools and controls in the window to change the view and examine differences more closely.

If you compare two versions of an assembly under change control (for example, a problem item and an affected item of an engineering change), Teamcenter displays a list of supersedures.

4. Click **Close** to close the window on completion.

Set color options

You can change the default colors in which differences and supersedures are displayed in the **Graphical BOM Compare** dialog box as follows:

1. Choose **Edit** → **Options**.

Teamcenter displays the **Options** dialog box.

2. Choose **Change Management** → **BOM Tracking** from the list of options.

Teamcenter shows the list of current colors assigned to the **Graphical BOM Compare** dialog box.

3. To change the color assigned to a difference type, double-click the current color assignment.

Teamcenter displays the palette of available colors. Click the required new color and click **OK** or **Apply** to change the color; alternatively, you can click **Cancel** to exit without changing the color.

Recovering a manufacturing session

If you are working 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 views and minimize loss of information.

If the server connection is lost, Teamcenter displays two dialog boxes:

- **Server Reassigned**

Informs you that the server connection was lost. Click **OK** to dismiss the dialog box.

- **BOM Session Recovery**

Informs you that a BOM recovery session has started. Click **OK** to dismiss the dialog box.

Additional error messages may appear, depending on the state of the recovered session.

The primary structure views are recovered and the secondary views have one of the following states:

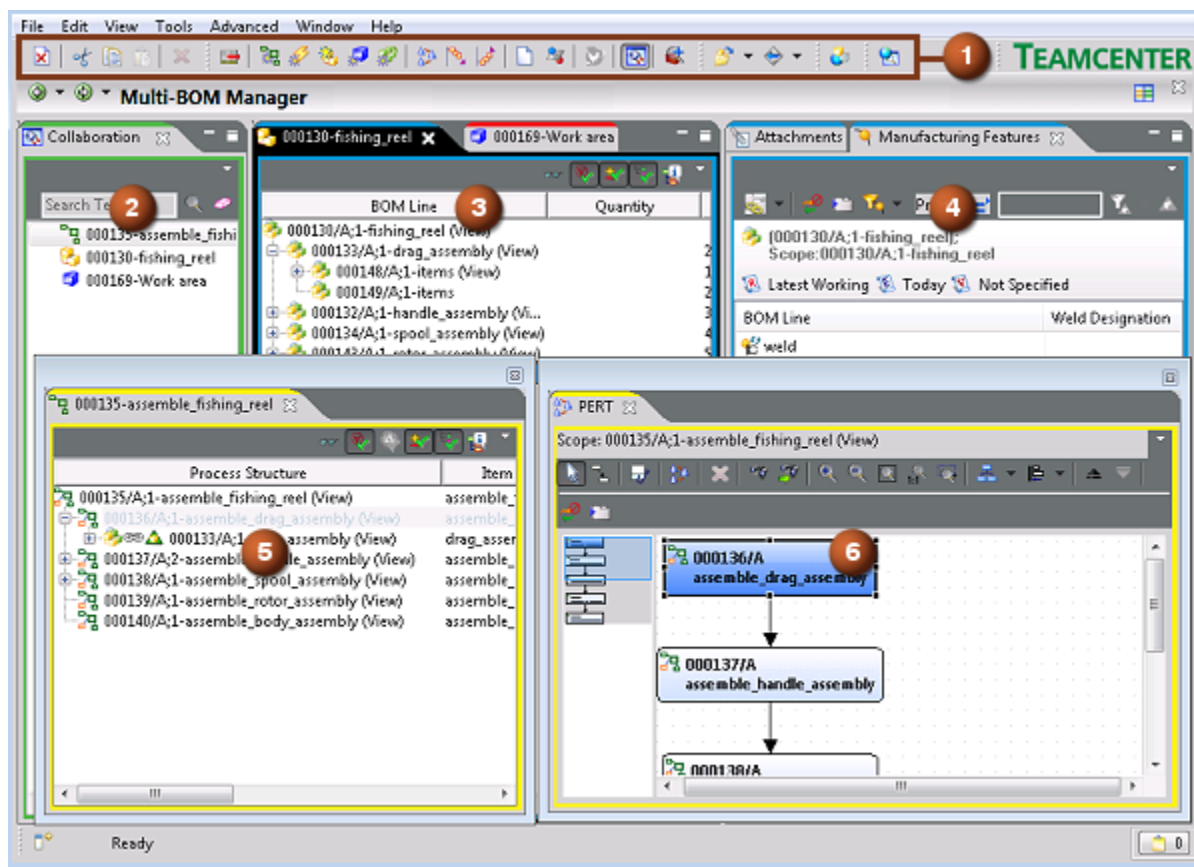
- Where possible, the view remains open.
- The view stays open, but its content is cleared.
- The view is closed.

The following limitations apply to BOM session recovery:

- BOM sessions are recovered only for the four-tier rich client.
- 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 modified the effectivity date on a revision rule but had not yet saved the change, the changes are not recovered.
- 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.
- The **Report** view is not recovered.
- The knowledge of which variant rule is in effect at the time of the crash is not recovered.

Multi-BOM Management interface overview



1	Toolbar	Provides a quick method for performing many of the most common tasks such as creating a structure, opening a structure by name, and adding resources.
2	Collaboration Context Tree view	Shows all open structures in the application.
3	Structure view	Shows each structure that is currently open in a separate view. A structure view contains, most commonly, a product, process, plant, or structure context. You can open multiple structures at once, including multiple products,

		processes or plants. A structure view is a primary view for which you can open multiple secondary views.
4	Manufacturing Features view	Shows all the features found under the currently selected scope. The Manufacturing Features view is an example of a secondary view opened for a primary product structure view. The blue border around the Manufacturing Features view and the product structure view shows that they are associated.
5	Detached structure view	Shows a process structure view that is detached from the Teamcenter window. You can detach and move any views to suit your needs.
5	Detached secondary view	Shows the PERT view that allows you to modify the flow of processes or activities in a graphical manner. You can detach secondary views and associate them with detached primary views. You can move the detached primary and secondary views anywhere in the display area, including to a second monitor.

Creating structures from templates

About cloning structures

When creating structures, it can be convenient to create a structure identical to another one. This may be because, over time, you may design standard products, processes, operations, and activities that act as templates that can be reused to manufacture typical products. Or, it may simply be the most convenient way to quickly generate another structure.

You can clone structures in one of two ways:

- Use the **Paste Duplicate** command to quickly clone a structure from another structure that is visible or easily available in the user interface.
- Use the **File→New→From Template** menu commands to create a structure that is based on another structure that is not currently open. You also use this method to clone structures when you want to select configuration options for the cloning process.

You can clone a product or plant structure. Your administrator specifies *cloning rules* that determine the actions taken when you clone a structure, as follows:

- **Clone**

The new structure includes a copy of the object that is referenced by the source structure.

- **Reference**

The new structure references the same object that is included in the source structure.

- **Ignore**

The new structure does not include or reference the object.

- **Map**

The system maps the template to a replacement structure. For example, this allows you to create a process structure from an existing process or from a process template. Optionally, this rule may be allowed by a second (default) action: **Reference** or **Ignore**.

You can use the cloning mechanism to create a new process structure that consumes the same parts as an existing structure. This action is based on in-context IDs.

Note:

Cloning is a core capability and is used in various functions, such as, create alternate, create from template, process synchronize, and isolated study. It is very recursive and database I/O intensive. To help reduce the number of database commits to the minimum needed, your Teamcenter administrator can create a preference named **ME_defer_save_in_clone** and set it to **true**.

IMPORTANT: The value of this preference should be made **true** only after running cloning usecases in a test environment. This is required as cloning may fail in specific data conditions when the preference is set to **true**.

Create a structure from a template

Note:

Ensure that the necessary **Product.Template**, **Process.Template**, and **Plant.Template** cloning preferences are defined. These preferences contain the rules that determine how the objects in the template are mapped to the objects in the new plant structure.

1. Select the line under which you want to add the cloned object.
2. Choose **File→New→From Template** and the type of structure that you want to create.
3. Click the **Choose Template** tab.
4. In the **Template ID** box, enter the ID of the structure that you want to use as a template and press Enter.

Alternatively, you can select the structure that you want to clone in the structure view and click .

You can also browse to the template you want to clone using Resource Manager, either by name or by searching for a template in the Classification Search Dialog if it is classified.

Teamcenter assigns a new ID in the **Process ID** box.

5. (Optional) Rename the new structure in the **Name** box.
6. Click the **Configuration** tab.
7. Select a revision rule from the **Revision Rule** list.
8. Select an effectivity by clicking **Set Date/Unit/End Item**.
9. Do one of the following:
 - Click **Process all variants** to traverse the structure considering all unconfigured variants.
 - Click **Process configured** to only process the configured structure. You must specify a variant rule when you choose this option. The structure is configured using the variant rule and unconfigured variants are not considered during cloning.
10. From the **Cloning Rule** list, select a rule.
11. If you are creating a process from a template,
 - Choose the product to which you want to map the consumed products by selecting it in the **Product Reference Structure** list.
 - Choose the work area to which you want to map the consumed work areas by selecting it in the **Plant Reference Structure** list.

This allows you to clone a process and map the consumed objects to different structures from the one chosen in the prototype.

12. (Optional) Select **Carry over future incremental changes**.

If you select this option, you must set the date in the cloning dialog. If you do not select this option, cloning copies the configured structure only.

13. (Optional) Select **Show as new root** to create the cloned structure as a top-level object.
14. Click **OK** or **Apply** to create the new structure from the template you choose.

At the end of any cloning operation, if new incremental changes are created as part of cloning process, Teamcenter displays a dialog box listing the new incremental changes.

Clone using Paste Duplicate

You can quickly clone structures using the **Paste Duplicate** command. This command clones selected structures as specified in preference-based cloning rules.

1. Select any structure line and click **Copy** .

The selected line can have children.

2. Right-click the parent line under which you want to place the cloned structured and choose **Paste Duplicate**.

Teamcenter pastes a clone of the copied structure line and all its children to the selected line. It creates a new occurrence of any consumed objects.

Apply revision rules to templates

1. On the **New Process from Template** or **New Operation from Template** dialog box, click the **Configuration** tab.
2. Click **Revision Rule** to select a revision rule for the template. The box lists all revision rules that are defined in the database.

-or-

Click **Cloning Rule** to select a cloning rule for the template. The box lists all cloning rules that are defined in the database.

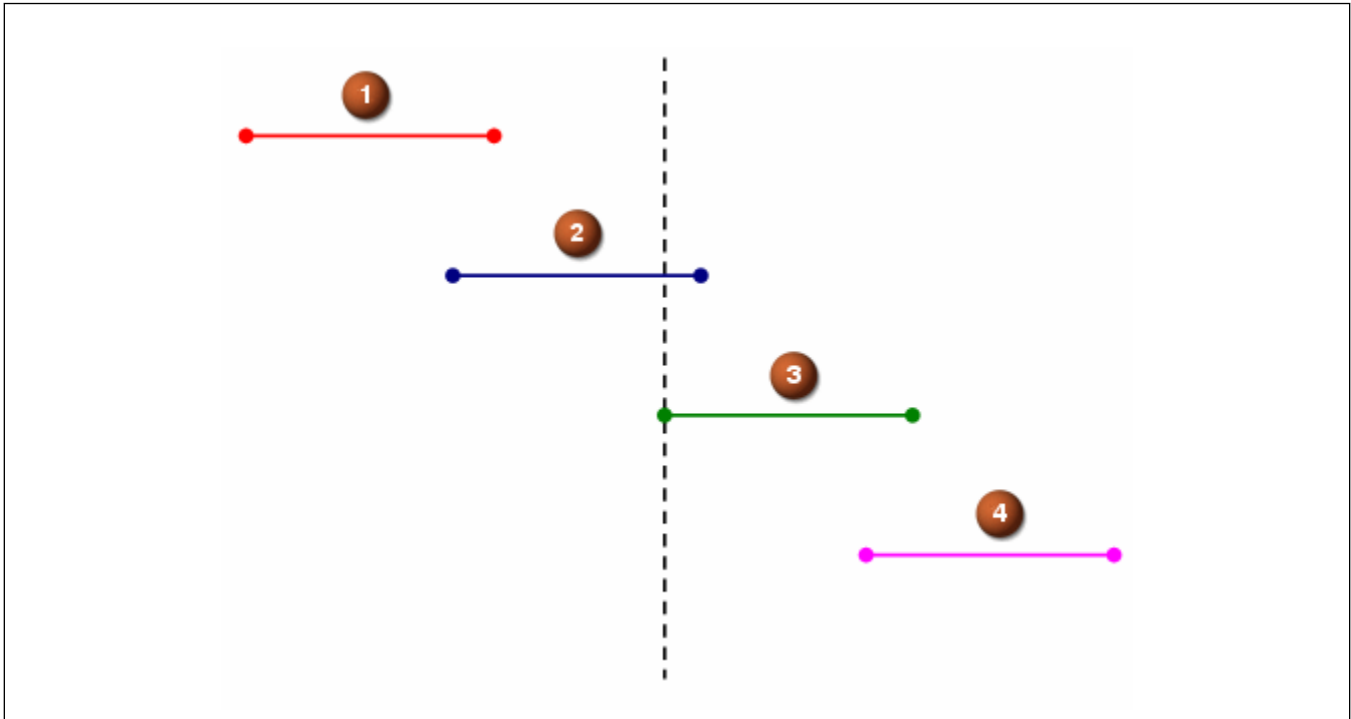
Carrying over future incremental change when cloning

When cloning, you have the option to carry over future effective incremental changes. If you are using date effectivity, *future* is anything falling after the date set in cloning dialog box. If you are using unit effectivity, future is anything after the unit number set in the cloning dialog box. Incremental changes that are currently effective are merged with the currently set incremental change. Those that are effective in the future are carried forward to the new cloned structure or re-created under new incremental change revisions. Any incremental changes whose effectivities are in the past are dropped from the cloned incremental change.

Note:

- Specify the release status type that is assigned to any newly created incremental change revisions during cloning in the **Clone_Pending_Release_Status** preference.
- Specify the release status type that should be considered as secure in the **Clone_Secured_Release_Status** preference.

In the following figure, the vertical line represents the point of cloning.



Cloning with incremental changes

1	IC1	Incremental change 1 whose effectivity lies in the past.
2	IC2	Incremental change 2 that is secure and configured.
3	IC3	Incremental change 3 is the current IC (set at the bottom of the pane) that is configured and pending. This is the target IC.
4	IC4	Incremental change 4 is pending and unconfigured.

After cloning, Teamcenter:

- Disregards IC1.
- Clones IC2 to a new IC5 and the change elements in IC2 (that is, **add** or **remove**) that are associated with the cloned object are cloned and added to IC5. IC5 then has a **pending** status.
- IC4 is left alone and the new change elements are added to it. This is not cloned because the status is pending and the **out** effectivity does not match the currently set IC revision (IC3).

Override copy action rules

To override the template copy action for any object found in a structure, add a template action occurrence note to the object in the cloned structure as follows:

1. From the **Edit** menu, choose **Notes**, or click the **Notes** button  on the toolbar.
2. In the **Create** list, choose **TEMPLATE ACTION**.
3. Enter **Ignore**, **Reference**, or **Clone** in the **Description** box.
4. Click **OK**.

For more information about adding, editing, and deleting occurrence note types, see *BMIDE for Data Model Design*.

Visualizing structures

Ways to visualize structures

You can visualize a structure in several ways.

- The **Graphics** view available in the manufacturing applications allows you to visualize the product, process, or plant structure. You open the **Graphics** view, sometimes referred to as the *embedded viewer*, by clicking  in the structure view toolbar.

When the **Graphics** view is open, many of the secondary views exhibit boxes in front of the nodes in the hierarchy structure that you can use to turn graphics display on and off.

- The rich client Lifecycle Viewer application provides you with nearly all of the visualization tools offered by the stand-alone viewer, many of which are not available in the embedded viewer within Teamcenter applications. You open the rich client Lifecycle Viewer application by clicking the **Lifecycle Viewer** application icon .
- Stand-alone Lifecycle Visualization provides you with all the functionality of a viewer view or the Lifecycle Viewer but with support for optional software modules such as Concept, Visualization Illustration, Quality Producer, and Variation Analysis. Stand-alone Lifecycle Visualization is integrated with Teamcenter, so you can send data from Teamcenter applications into the stand-alone viewer, perform analysis, and then save your work back to the database.

Display images in the Graphics view

If an image is associated with the object selected in a structure view, opening the associated **Graphics** view displays that image.

The following image types are available in this view:

- **DirectModel**

Imported **.jt** files or **.jt** files created by the translators. These datasets containing these files must be attached to the item or item revision with a **Rendering** relation.

- **DirectModelMarkup**

Captured image of a DirectModel dataset.

- **DrawingSheets** and **Markup**

Imported **.cgm** files.

- **Image**

Imported **.tif**, **.gif**, **.jpeg** and similar file types.

Note:

If the images that are attached to the BOM line are 2D snapshots, Teamcenter displays them in the **2D Viewer** view.

When you open an image in the **Graphics** view, the **Graphics** menu is displayed in the menu bar.

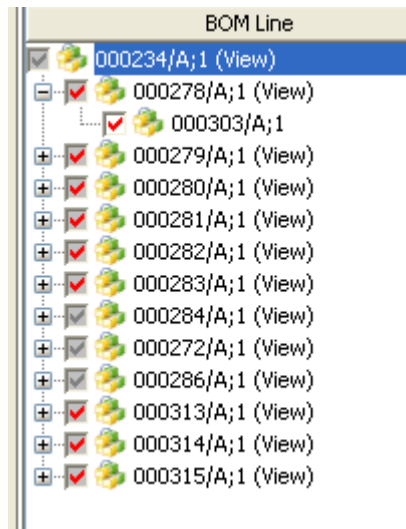
1. Right-click a line in the structure view and click  in the view toolbar.

Teamcenter opens the **Graphics** view associated with the structure view from which you open it.

Note:

Do not confuse this assembly viewer with the viewers that you can open using the **Open With** shortcut menu command. The assembly viewer has more features that you can use to view and manipulate 3D assemblies.

2. Select the check boxes next to the components in the tree that you want to display in the **Graphics** view. If you select the root item, the entire structure is displayed.



When you open the **Graphics** view, other views that display the hierarchy also display the check boxes that you can use to blank and display graphics. These check boxes are slightly different.

The following states exist for the check boxes.

Check box	State
	The part or assembly is fully loaded and visible.
	The assembly component is fully loaded but only partly visible. This can be because a part is turned off or because geometry does not exist for one or more parts.
	The assembly component is partially loaded and only partially visible.
	All available geometry is visible, but geometry does not exist for every part.
	The part or assembly is loaded but not visible.
	No geometry exists for the selected part, or if this is a parent structure, it is not fully loaded and not visible.

Tip:

If you want to display a single component in a large structure, additionally use the **Viewer** view that you open using the **Open With** shortcut menu command.

Toolbars available in the Graphics view

Use this toolbar	To
3D Alignment	Move individual parts or groups of parts and align them to other parts in the viewer.
3D Appearance	Work with advanced appearance attributes.
3D CAE Viewing	View Computer Aided Engineering (CAE) Finite Element Analysis (FEA) results.
3D Clearance	Check the clearance of parts in your model.
3D Comparison	Compare the geometry of two sets of parts.
3D Coordinate System	Create and manage coordinate systems. You can also align parts or your view to a coordinate system.
3D Display Modes	Control the display mode of geometry in the viewer. You can display geometry as shaded, tessellated lines, feature lines, or any combination of these. Tessellation or feature lines hidden by other geometry can be viewed as normal, semi-transparent, or invisible.
3D GDT Markup	Insert GD&T markups on your 3D models.
3D Markup	Add text or graphical elements on your 3D model in the viewer.
3D Measurement	Measure your 3D model.
3D Movie Capture	Capture the contents of the viewer as you move the camera around, show or hide parts, transform parts, play animation sequences, and play VFM motion files associated with your model.
3D Navigation	Manipulate the 3D view.
3D PMI	Display and control Product and Manufacturing Information (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**

Use this toolbar	To
	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 Part Manipulation	Manipulate parts by dragging.
3D Part Transformation	Translate, rotate, and scale parts in your model.
3D Section	Work with cross sections of your 3D model.
3D Selection	Pick part entities.
3D Standard Views	Examine your model from different views.
3D Thrustline Editor	Create and manipulate thrustlines.
3D Visibility	Hide obscuring parts and clip areas of your model.
Create Markup	Create product views, capture an image of the current geometry or show or hide the 3D PMI tree.
Print	Print an image or display a print preview.

Displaying images in views other than the Graphics view

When you open the **Graphics** view, other views that display the hierarchy also display the check boxes that you can use to blank and display graphics. These slightly different check boxes are displayed in the following views:

- **Gantt** view
- **Manufacturing Features** view
- **Structure Search Criteria** view (in the **Current Scopes** section)
- **Structure Search Results** view
- **Accountability Check** view
- **Assignments** view

▼ Search Result

BOM Line	Item
 000066/A;1-Body Sub:123-00	Item
 000201/A;1-item	Item
 000092/A;1-Case_SubAssy (v	Item
 000089/A;1-Head_SubAssy_C	Item
 000067/A;1-Head2 Sub;0,Pa	Item
 000069/A;1-Spark Plug	Item
 000098/A;1-CamShaft Sub:1	Item
 000070/A;1-Head Nut	Item
 000088/A;1-Valve Cover_cop	Item
 000087/A;1-Rocker Arm_cop	Item
 000084/A;1-Valve_Sub;0,Par	Item
 000068/A;1-Head_2	Item
 000086/A;1-Rocker Arm	Item
 000078/A;1-Valve Spring	Item
 000078/A;1-Valve Spring	Item
 000071/A;1-Rocker_Sub;0,P	Item
 000070/A;1-Head Nut	Item
 000079/A;1-Valve_Sub;0,Par	Item
 000095/A;1-Cylinder_2	Item
 000096/A;1-Cylinder_1	Item
 000097/A;1-cylinder bolt pat	Item
 000100/A;1-Crank_Assy (Vie	Item
 000108/A;1-Lifter	Item
 000110/A;1-crank_gear	Item
 000109/A;1-cam_gear	Item
 000108/A;1-Lifter	Item

The following states exist for the check boxes.

Check box	State
	The node is displayed in the Graphics view. If it is a leaf node (no children), it has geometric data. If it has children, all the children are currently visible.
	The node has children, and only some of them are currently displayed.
	The node is not displayed in the Graphics view for one of the following reasons: • The user has chosen to hide it. • There is no geometric data attached to it. • The geometric data of the node is not yet loaded, so it is uncertain whether the node has geometric data.
	The node is a leaf node and has no geometric data.

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**.

Displaying objects by type

Overview of displaying objects by type

You can display or blank objects in the **Graphics** view based on their type, occurrence type, or a combination of both. For example, you may want to blank all weld points or display only the parts consumed by a process. In addition, a visualization filter allows you to set the object and/or occurrence types you want to hide from the display on a more permanent basis.

The types of objects you can blank or display depend on the type of structure on which you are working. For a process structure, you can display or blank:

- Item types such as **Item**, **WeldPoint**, or **Workarea**. All item types that derive from **Item**, **Workarea**, and **PSConnection** (including **WeldPoint**) are supported.
- All available occurrence types such as **MEConsumed** or **ME Weld Point**.
- Any combination of these item and occurrence types.

For a product structure, you can display all types that derive from:

- **Item**
- **PSConnection**

For a plant structure, you can select all types that derive from the **Workarea** item type.

The object types to be blanked or displayed in the structure must exactly match the selected types. Selecting an item does not select every object derived from the **Item** type.

To reduce the size of this potentially long list of candidates, you can store the commonly used item list in the **MEBlankDisplayTypes** preference.

Display/blank objects by type

1. With a structure open in the **Graphics** view, do one of the following:
 - Choose **Graphics→Visibility→Display/Blank Selected by Type→Object/Occurrence Type**
 - Right-click in the viewer pane and choose **Display/Blank Selected by Type**.

- Right-click a subassembly in the structure tree and choose **Display/Blank Selected by Type**.
2. Choose the type of object or occurrence type that you want to blank or display.

The entries in this list are dictated by the value in the **MEBlankDisplayTypes** preference.

The object types that you select are displayed or blanked in the viewer.

Display/blank multiple object types

1. Choose **Graphics→Visibility→Display/Blank Selected by Type→Advanced**.
2. Select all the object types that you want to display. If you open the dialog box with a process displayed in the viewer, you can also select occurrence types.
3. (Optional) Select **Display only selected types** to blank all types other than those selected in the dialog box.
4. Click **OK**.

Set the visualization filter

Use the visualization filter to set the object and/or occurrence types you want to permanently hide from the display.

1. With a structure open in the **Graphics** view, choose **Graphics→Visibility→Define Visualization Filter**, or click the **Define Visualization Filter** button  in the toolbar.
2. Choose the object or occurrence types that you want to hide permanently from the display.
3. (Optional) Select **Apply visualization filter** to activate the filter as soon as you close the dialog box.
4. Click **OK**.
5. (Optional) If you did not activate the filter in step 3, activate it by choosing **Graphics→Visibility→Apply Visualization Filter** or clicking the **Apply Visualization Filter** button  in the toolbar.

Select objects by type

If you have a very complex assembly, it can be difficult to select only objects of interest to you. For example, you may want to select all weld points in an assembly or you may want to select only consumed parts.

You can specify that Teamcenter selects only objects of a certain type when you select an area or volume in the **Graphics** view.

Note:

The **Graphics** menu is available only if a **Graphics** view is open.

1. Set a selection filter as follows:
 - a. Choose **Graphics→Selection→Define Selection Filter**.
 - b. In the **Set Selection Filter Types** dialog box, select the item and occurrence types in the tree that you want to select in the **Graphics** view.
2. Select objects in the **Graphics** view. To do so, you must use one of the following methods available on the **3D Selection** toolbar in the **Graphics** view:
 - **Select Parts by Area** 
 - **Select Parts by Volume** 

Teamcenter selects only those objects that are of the type you specified in the selection filter.
3. (Optional) Turn the selection filter on and off by choosing **Graphics→Selection→Apply Selection Filter**.

Selecting packed objects for display

When lines are packed, one of the packed lines is always designated the master packed line. If the **TCVIS_Selection_From_Viewer** preference is set to true, you can select packed objects in the viewer using the buttons available in the **3D Selection** toolbar. However, if you select the master packed line, all packed lines are selected. If you do not want this behavior, you must unpack the packed lines before selecting the individual objects in the viewer.

Paste objects to a specific position

You can use the embedded viewer for rough layout planning to add resources into the graphics at a specific position. If you paste or drop resources into the tree, the resources are created at the 0,0,0 position, meaning that you must relocate the resources to the station where they are needed. To simplify this, you can add objects into the **Graphics** view at the right position using the **Paste Here** command.

Copy the objects that you want to paste to the clipboard and do one of the following:

- To add the objects under the top line of the structure, right-click the desired point in the viewer and choose **Paste Here**.
- To add the objects at a different location in the structure:

1. Right-click the desired parent object in the structure tree or in the viewer and choose **Set Active Parent**.

This menu command is available only when the **Graphics** view is open.

Teamcenter displays the active parent in the viewer in the color that you specify in the **MEActiveParentColorPref** preference.

2. Right-click the desired point in the viewer and choose **Paste Here**.
3. (Optional) Unset the active parent by right-clicking it and choosing **Set Active Parent** again.

Teamcenter places the objects at the specified location in the viewer, adds them under the active parent in the structure, and updates the transformation matrix to reflect the chosen location.

- The **Paste Here** command is available only for product and work area structures. It is not available for process structures.
- If you unload the structure view, the active parent selection is lost.

Temporarily reposition items

You can temporarily reposition items to visualize the result of a change.

- Choose **Graphics→Transformation→Temporary Transformation**.

The drawing displayed depends on the line in the BOM that is currently selected.

The **Temporary Transformation** dialog box provides the same options and commands as the Lifecycle Viewer **Part Transformation** dialog box.

Permanently reposition one or more items

Use this method to permanently reposition the BOM. The transformations are saved in the database.

Do one of the following:

- Save using the **Persist Transformation of Selected Objects** button by doing one of the following:
 - Reposition the part using Lifecycle Viewer repositioning capabilities and then click .
 - Select either the BOM line that you repositioned or the top line of the structure if you reposition several objects and click  in the **Graphics** view toolbar.

Teamcenter saves the temporary transformation in the structure.

- Save using the menu command.
 1. Select the appropriate line in the BOM.
 2. Choose **Graphics→Transformation→Persistent Transformation**.
 3. Use the **Persistent Transformation** dialog box controls to move and rotate the selected items.

The **Persistent Transformation** dialog box provides the same options and commands as the Lifecycle Viewer **Part Transformation** dialog box.

Note:

- The new position is saved in the database but it has no effect on positioning in the CAD part.
- Scale transformations are not saved.

Working with product views

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.
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,

Preference	Description
	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.

3. 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.

4. 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.
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.

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:

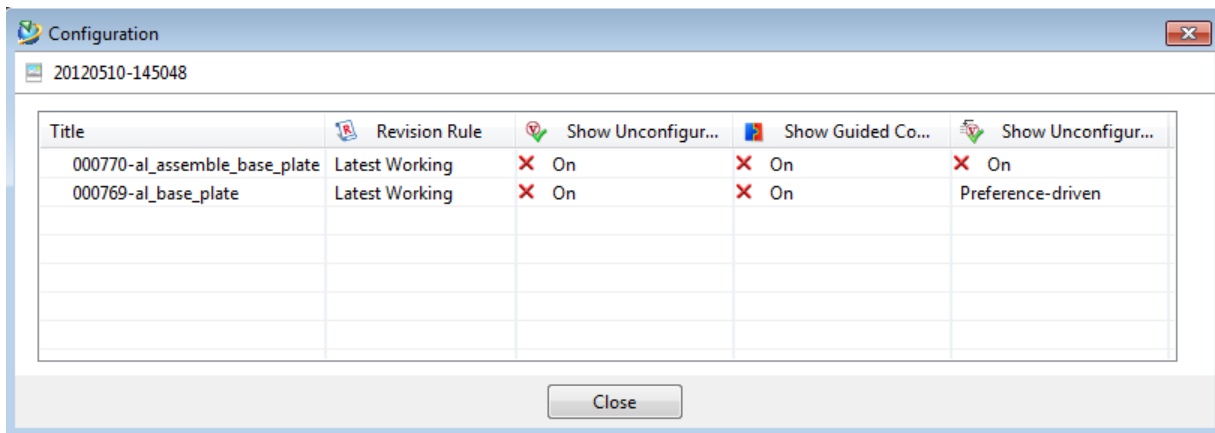
- **Show Unconfigured Variants**
- **Show Unconfigured By Occurrence Effectivity**
- **Show Unconfigured Changes**
- **Show Unconfigured Assigned Occurrences**
- **Show GCS Connection Points**
- **Apply Occurrence Type Filters**

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.

If you show the configuration for product views created on a composite structure (such as a process), the results are displayed in tabular form with each member structure occupying a line in the table. If any **Show Unconfigured ...** command was set to **Off** for all the assemblies contained in the structure, the corresponding column is not displayed. In the following figure, the **Show Unconfigured Changes** and **Show Unconfigured by Occurrence Effectivity** commands were turned off when the product view was created and those entries do not appear as columns.



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.
 2. 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.

3. 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.

4. 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.

5. 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:

1. Select one or more product view datasets in the **Attachments** tab.

2. Click the **Send to Lifecycle Visualization**  button.

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.

Finding product views

Searching for product views

After creating product views, there are many situations that may require finding all product views associated with a particular part so that you can update them. For example:

- A part in the original product structure may be replaced by another part. You must then update all product views containing the replaced part.
- A part's geometry or transformation data may change.
- A part may be removed from the product structure.
- A part may be moved from one operation to another or from one subassembly to another.

- You may want to re-create a product view based on an existing one.

Find product views

1. Open a product or process structure.
2. Select one or more products, processes, or operations from the structure as the scope of the search.
3. Choose **Tools→Find Product Views** or **Find Product Views** from the shortcut menu.

Teamcenter opens the **Product View Search** view that displays the scope that you selected and the search definitions.

4. (Optional) Change the scope at any time by selecting a new root and clicking .
5. Enter the search definitions by doing one of the following:
 - Navigate through the structure and select the required part for which you want to search and click . The view can remain open as you do this.

If you selected a process or operation as the search scope, you can select parts that are assigned to these structures from their product structures, or vice versa. For the search to work correctly in this case, your administrator must set the value of the **MECopyIdInContextToAssignedLine** preference to **True** before you assign parts from the product structure to the process structure.

- Click  and type the ID or name of the part for which you want to search.

Teamcenter adds the part to the **Parts** list, showing the item revision symbol for parts that you select from the bill of process and the item symbol for parts whose ID you enter by hand.

Caution:

When you search by ID, you search by item and not revision. Therefore, the search results will display all revisions associated with this item.

6. (Optional) Remove a part from the **Parts** list by selecting it and clicking **Delete**.
7. Click **Search**.

Teamcenter lists each search result in a separate line, displaying the process or operation to which it is attached as well as a thumbnail of the product view as you select the line. The **Parts found in selected Product View** list displays the searched parts found in the selected product view.

8. (Optional) Click **Back** to discard the search results and collapse the **Search Results** section. You can then modify the search criteria and rerun the search.

Update a product view

Caution:

The relevant product structures must always be loaded when working with product views. Not loading the product structures can lead to unexpected results.

Note:

This command will not work without a Teamcenter lifecycle visualization mockup license.

1. Open the **Graphics** view.
2. Find the product view you want to update.
3. In the **Search Results** section, select a product view.
4. Click the **Apply** button or choose **Apply** from the shortcut menu to load the product view that contains the new or changed part into the **Graphics** view.
5. Click the **Update** button or choose **Update** from the shortcut menu.

Teamcenter checks out the product view, updates it with the new or changed part, and highlights the row in the **Product View** list green to indicate that the selected product view is updated. If there is an error, Teamcenter highlights the row in red.

The highlighting is displayed for the current session only.

6. (Optional) Click **View Log** to see a log of the update activity. Teamcenter lists any errors encountered in this log.

Caution:

- Teamcenter cannot update product views that are checked out by another person or ones containing a release status.
- Legacy product views created with a version earlier than Teamcenter 8.1 must be updated manually.
- This mechanism does not find product views attached to parts newly added to the product structure. You must update these manually.

Update multiple product views

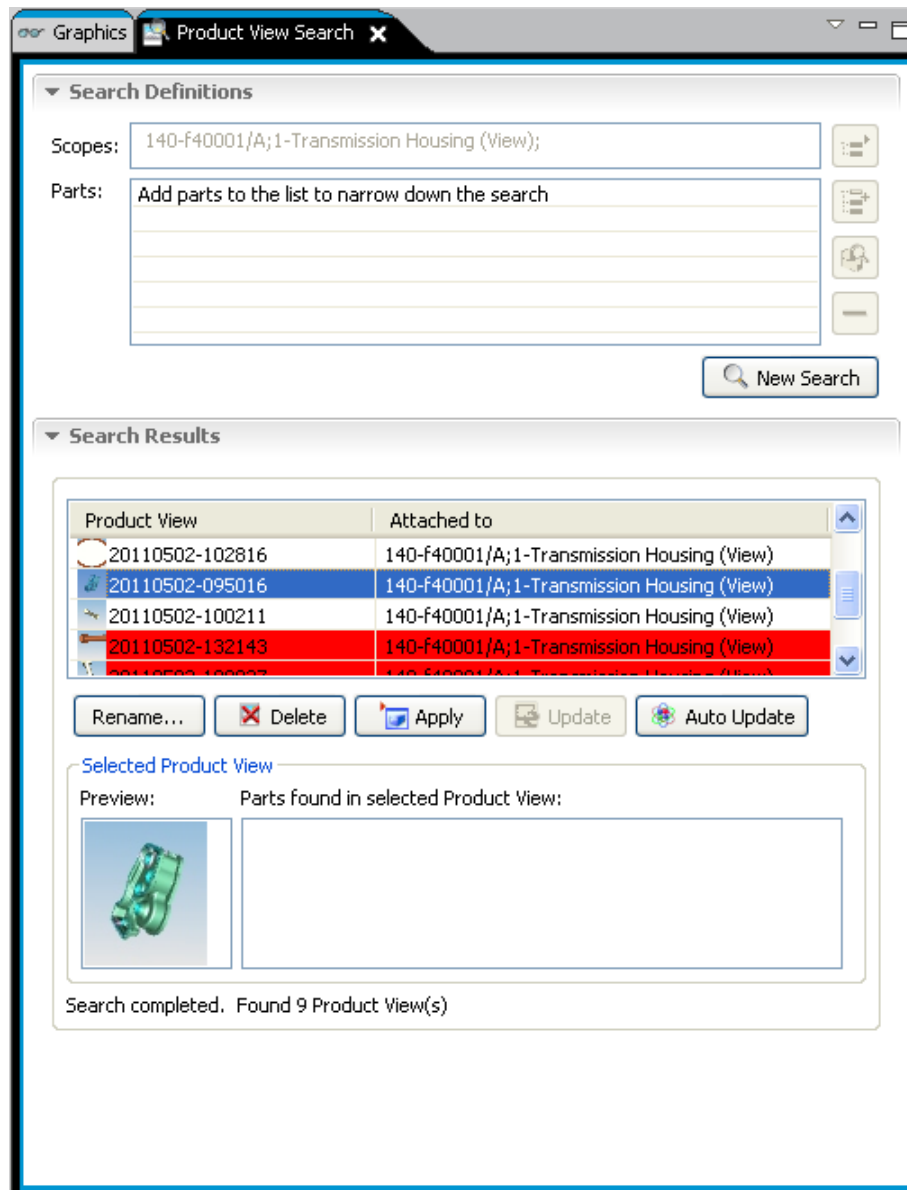
You can update all or some of the product views that you find in the product view search at one time.

Caution:

The relevant product structures must always be loaded when working with product views. Not loading the product structures can lead to unexpected results.

1. Perform a search to find product views.
2. Select multiple product views from the **Search Results** section of the **Product View Search** view.
3. Click **Auto Update**.

Teamcenter updates all the selected product views and highlights the row in the **Product View** list green to indicate that the selected product view is updated. If there is an error, Teamcenter highlights the row in red.



- (Optional) Click **View Log** to see a log of the update activity.

Teamcenter lists any errors encountered in this log.

Caution:

- Teamcenter cannot update product views that are checked out by another person or ones containing a release status.
- Legacy product views created with a version earlier than Teamcenter 8.1 must be updated manually.

- This mechanism does not find product views attached to parts newly added to the product structure. You must update these manually.

Remove a product view

1. Find the product view you want to update.
2. In the **Search Results** section, select a product view.
3. Click the **Delete** button or choose **Delete** from the shortcut menu.

Teamcenter deletes the product view from the database.

Note:

You must have delete permission on the product view to be able to delete it.

Re-create a product view based on an existing one

1. Find the product view you want to update.
2. In the **Search Results** section, select a product view.
3. Click the **Apply** button or choose **Apply** from the shortcut menu to load the product view that contains the new or changed part into the **Graphics** view.
4. Modify the product view as desired.
5. Select the operation or process to which you want to attach the new product view.
6. Open the **Product View Gallery** dialog box and create and save a new snapshot.

Rename a product view

1. Find the product view you want to update.
2. In the **Search Results** section, select a product view.
3. Click the **Rename** button or choose **Rename** from the shortcut menu to load the product view that contains the new or changed part into the **Graphics** view.
4. Type a new name in the box.
5. Click **OK**.

Show product view configuration

1. Find the product view for which you want to see the configuration.
2. In the **Search Results** section, select the product view.
3. Choose **Show Configuration** from the shortcut menu.

Teamcenter displays a dialog box containing the configuration of the structure for which the product view was created.

Working with 2D snapshots

Create or add a 2D snapshot

1. Right-click an item revision with one or more attached image datasets (for example, a PDF file) and choose **Open with→2D Viewer**.

The 2D viewer displays the first image dataset attached to the item revision.

2. If necessary, switch to the correct image dataset.
3. Navigate to the desired page if the base image contains multiple pages by selecting it from the **Page List** section of the navigation tree.
4. Zoom and pan to the region of interest.
5. Create necessary markups.
6. Click  to open the **Snapshot Gallery** dialog box.
7. Click **Add**  or right-click in the **Snapshot Gallery** dialog box and choose **Add**.
8. (Optional) If you have activated the **Attributes** dialog box, define attributes for the 2D snapshot.

Note:

Teamcenter opens the **Attributes** dialog box automatically each time you create a 2D snapshot when you choose **Options→Show Attributes Form on Add**.

Select an image dataset for viewing

If there are multiple image datasets attached to an item revision, you can select which one to use.

1. In the **2D Snapshots** toolbar, click .

Teamcenter displays the **Select Dataset** dialog box.

2. Select the desired image dataset from the list and click **OK**.

Open a 2D snapshot in the Lifecycle Viewer or a standalone application viewer

1. Click  to open the **Snapshot Gallery** dialog box.
2. Select a snapshot.
3. Do one of the following:
 - Select **Send to Lifecycle Viewer** in the context menu.
 - Select **Open in Lifecycle Visualization** in the context menu.
 - Click the **Start/Open in Lifecycle Visualization**  button in the toolbar.

Note:

This button is not available when incremental change is in effect.

Apply an existing 2D snapshot

1. With an item revision selected, click  in the **2D Snapshots** toolbar in the **2D Viewer** view.

Teamcenter opens the **Snapshot Gallery** dialog box.

2. Do one of the following:
 - Double-click a 2D snapshot in the list.
 - Select the desired snapshot and click **Apply**.

Teamcenter opens the snapshot in the **2D Viewer** view. In addition, any markups, zoom, pan, and rotation information active at the time the snapshot was created are also visible in the **2D Viewer** view.

Populate the snapshot gallery

1. With an item revision selected, click  in the **2D Snapshots** toolbar in the **2D Viewer** view.

Teamcenter opens the **Snapshot Gallery** dialog box.

2. From the shortcut menu, choose one of the following.

Choose	To
Show All	Load all 2D snapshots for the item revision of the selected BOM line into the Snapshot Gallery dialog box.
Search	Search all 2D snapshots for those containing specific attributes. The results of the search are added to the Snapshot Gallery dialog box.
Options→Show All on Open	Load all snapshots associated with the selected BOM line when the Snapshot Gallery is opened.

Search for a 2D snapshot

1. With an item revision selected, click  in the **2D Snapshots** toolbar in the **2D Viewer** view.

Teamcenter opens the **Snapshot Gallery** dialog box.

2. From the shortcut menu, choose **Search**.

Teamcenter displays the **Snapshot Search** dialog box.

3. In the form, type values to define attributes for the 2D snapshot.
4. Click **Search**.

Teamcenter displays the results of the search in the **Snapshot Gallery** dialog box.

Tip:

Display all snapshots associated with an item revision by choosing **Show All** from the shortcut menu.

Update an existing 2D snapshot

You can only update a 2D snapshot if you have checked out the selected snapshot. You can only check out a 2D snapshot if the selected snapshot was created from the currently open item revision. If you have a different item revision open, use the **Add** or **Replace** menu commands.

1. Search for the desired 2D snapshot from the current item revision.
2. Select the image by double-clicking or clicking **Apply**.
3. Choose **Check-In/Out→Check-Out** from the shortcut menu.

4. Make any necessary changes to the view such as changing the zoom, panning into a different area of the drawing, and adding or changing markups.
5. In the **Snapshot Gallery** dialog box, click **Update**.

Teamcenter updates the 2D snapshot with the changes that you made in the viewer.

6. Check in the 2D snapshot by choosing **Check-In/Out→Check-In**.

Tip:

Any changes you make in the 2D snapshot are not saved to the database until you check in the snapshot. If you make a mistake with the markup, choose **Check-In/Out→Cancel Check-Out** to revert the snapshot to its original state.

Replace a 2D snapshot

When you are working with multiple item revisions and the selected 2D snapshot is based on an item revision older than the one you currently have open, you can replace the selected 2D snapshot with a new one, and the old 2D snapshot remains associated with the old item revision.

1. With the snapshot that you want to replace open in the 2D viewer, and a newer item revision than the one associated with the selected snapshot open, right-click the snapshot in the **Snapshot Gallery** dialog box and choose **Replace**.

Teamcenter associates the newly created snapshot with the currently open item revision, leaving the original snapshot associated with the original item revision.

2. (Optional) Define attributes for the 2D snapshot.

Note:

Teamcenter opens the **Attributes** dialog box automatically each time you create a 2D snapshot when you choose **Options→Show Attributes Form on Add**.

Rename a 2D snapshot

1. Select a 2D snapshot in the **Snapshot Gallery**.
2. Choose **Check-In/Out→Check-Out** from the shortcut menu.
3. Choose **Rename** from the shortcut menu.

Teamcenter opens the **Rename Snapshot** dialog box.

4. Type the new name of the snapshot and click **OK**.

5. Check the snapshot back in by choosing **Check-In/Out→Check-In** from the shortcut menu.

Delete a 2D snapshot

1. Search for the 2D snapshot that you want to delete.
2. Select the snapshot and choose **Delete** from the shortcut menu or click .

Teamcenter deletes the selected 2D snapshot.

Note:

Teamcenter can only delete 2D snapshots that are not referenced by an existing document.

Compare a 2D snapshot to the current image

You can visually compare the current image with a 2D snapshot that was captured from a previous revision of the base image dataset.

1. Open a newer item revision that contains a reference to the 2D snapshot that you want to compare.
2. Select a 2D snapshot created from a previous revision in the **2D Snapshot Gallery**.
3. Right-click the selected snapshot and choose **Compare**.
4. Click the **Compare Layers** button.

Teamcenter displays the **Compare Layer List** dialog box.

5. Click **OK**

Teamcenter opens the current image dataset to the same view that was used to capture the 2D snapshot in the previous revision and applies the same markup. You can then visually compare any differences in the two image datasets.

6. Right-click the selected snapshot and choose **End Compare**.

Check out/check in a 2D snapshot

1. Search for the 2D snapshot that you want to check out.
2. Right-click the desired snapshot and choose **Check-In/Out→Check-Out**.

Teamcenter displays the **CheckOut** dialog box.

3. Click **Yes** to check out the snapshot.

Teamcenter automatically checks out the current version of the snapshot from the database to prevent you from unintentionally overwriting another user's changes.

Tip:

Note that the checked-out 2D snapshot now has a green or red (if it is currently selected) border in the **Snapshot Gallery** dialog box and its name is displayed in an italic font.

Define attributes for a 2D snapshot

You can define attributes that Teamcenter uses to search the 2D snapshots in the **Attributes** dialog box.

The checkin and checkout for the snapshot attributes are independent from the checkin and checkout for the snapshot itself. You do not need to check out the snapshot to edit its attributes. Even if you have the snapshot checked out, you still need to check out the attributes form to edit it.

1. In the **2D Snapshot Gallery** dialog box, right-click the desired snapshot and select **Snapshot Attributes**.
2. In the **Attributes** dialog box, click **Check-Out and Edit**.
3. In the **CheckOut** dialog box, click **Yes**.
4. Enter values into the boxes. By default, revision ID and page number of the base image are already provided. Your administrator can configure which attributes are available by creating a custom form and setting the **VisSnapshot2DFormName** Business Modeler IDE constant.
5. Click **Save**.

Teamcenter saves these attributes with the 2D snapshot.

6. Click **Check-In** to check in the changes or **Cancel Check Out** to discard the changes.
7. (Optional) To have Teamcenter display the **Attributes** dialog box each time you create a 2D snapshot, choose **Options→Show Attributes Form on Add**.

Create custom forms for 2D snapshots

If you want to use custom 2D snapshot forms, your administrator must do the following:

1. Create a new business object with **Vis_Snapshot_2D_Form** as the parent.
2. Define the **VisSnapshot2DFormName** business object constant.

- Set this constant to the name of the extended form.

Note:

When adding the new custom form, you must not modify the form storage class name that is automatically set (*name_of_custom_formStorage*).

Create a 2D geometry asset

If you want to embed a 2D snapshot in a work instruction, you must create a 2D geometry asset for the snapshot. You can create work instructions using Teamcenter Publish.

- Right-click a 2D snapshot in the **Snapshot Gallery** dialog box.
- Choose **Options→Capture 2D Geometry Asset**.
- (Optional) Modify the graphic quality of the 2D geometry asset by choosing **Options→Modify 2D Geometry Asset Settings** and adjusting the slider to the desired quality.
- Create the 2D snapshot.

Teamcenter creates the 2D geometry asset while creating the snapshot.

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.

Working with markups

Adding and deleting markups

When an image is loaded in the viewer, you can add markup layers to the image. You can mark up JT files that are attached to **DirectModel** datasets or schematic geometries. You can also view images in JPEG or BMP formats that are attached to a schematic geometry. To view and mark up schematics, your administrator must set the **TC_Schematic_BOMView_Types** preference to **on**.

Markups are text or graphical elements that you draw in the viewer with your model or schematic. 3D markups display on 3D layers.

Markups may include lines, rectangles, polygons, ellipses, inset images, and text.

Anchored text markups can include part information and metadata attributes.

To create or modify markups, display the relevant toolbar by right-clicking the Lifecycle Visualization base toolbar and choose the appropriate command from the shortcut menu.

Note:

If you are working with schematics, only a limited set of functions are available. The following options do not apply to schematics: edit color/translucency, insert, view control, export 3D, reposition, rotate, PMI, clearance, cross-section, navigation, and visibility.

Working with 3D and schematic markups

Create a 3D markup dataset

You need to create a **DirectModel3DMarkup** dataset to store 3D markups of structures or assemblies.

Note:

You **MUST HAVE** at least the Teamcenter lifecycle visualization standard configuration installed to work with 3D markups.

1. Load the structure or assembly (**DirectModel** dataset) in the viewer.

Teamcenter displays the model and the Lifecycle Visualization toolbar.

2. Click the **Create Markup**  button.

Teamcenter displays the **Create Markup3D Dataset** dialog box.

3. In the dialog box, type a name for the dataset in the **Dataset Name** box.
4. (Optional) Type a description of the dataset.
5. Click **OK**.

Teamcenter creates the **DirectModel3DMarkup** dataset and attaches it to the **DirectModel** dataset.

You can create multiple **DirectModel3DMarkup** datasets under a single structure or assembly. Each **DirectModel3DMarkup** dataset can contain multiple markup layers.

Note:

Markup layers are stored as VPL files.

Draw 3D markups

Perform the following steps to draw markups on structures, assemblies, or schematics:

1. On the **3D Markup** toolbar, click **Enable Markup** .
2. (Optional) To change colors, fill styles, line and edge styles and sizes, and font styles and sizes, click **Preferences** .
3. (Optional) To draw a filled ellipse, polygon, rectangle, or text markup, click **Fill** .
4. (Optional) To attach the markup to a point on the model or schematic click **Anchor** .

Anchored markups display, hide, and move with their attached parts. Anchored text markups are attached to parts with leader lines.

5. (Optional) Create or select a layer for the markup. If you do not have a markup layer, one is created when you add the first markup.
6. Specify the markup type by clicking the corresponding button on the **3D Markup** toolbar.

Teamcenter changes the cursor to indicate the type of markup.

7. Place the markup in one of these ways:

To place this markup	Perform these actions
Line	a. (For an anchored markup) Select a point on the model or schematic. b. In the viewer, drag the mouse pointer to draw a line. c. (Optional) To draw a horizontal or vertical line, press and hold the shift key as you drag.
Polyline	a. (For an anchored markup) Select a point on the model or schematic. b. In the viewer, click to place one endpoint. c. (Optional) To draw horizontal or vertical polyline segments, press and hold the shift key. d. Click to place each vertex. e. Double-click to place the last vertex.
Freehand line	a. (For an anchored markup) Select a point on the model or schematic. b. In the viewer, drag the mouse pointer to draw.
Rectangle	a. (For an anchored markup) Select a point on the model or schematic. b. In the viewer, click to place one corner. c. Drag the mouse pointer, and then release to place the opposite corner.

To place this markup	Perform these actions
Polygon	d. (Optional) To draw a square, press and hold the shift key as you drag. a. (For an anchored markup) Select a point on the model or schematic. b. In the viewer, click to place each vertex. c. (Optional) To draw horizontal or vertical segments, press and hold the shift key as click. d. Double-click to place the last vertex.
Ellipse	a. (For an anchored markup) Select a point on the model or schematic. b. In the viewer, drag the mouse pointer to draw. c. (Optional) To draw a circle, press and hold the shift key as you drag the mouse pointer.
Inset image	a. In the Open dialog box, select the image dataset and click Open. b. (For an anchored markup) Select a point on the model or schematic. c. In the viewer, drag the mouse pointer to place and size the image.
Text	a. (For an anchored text markup) Select a point on the model or schematic. Teamcenter displays the Markup Text dialog box. b. (Optional for an anchored text markup) In the Markup Text dialog box, click Advanced to add part information or metadata attributes. c. (For a floating text markup) Click a point in the viewer to place the text markup. Teamcenter displays the Markup Text dialog box. d. (Optional) Change the font, size, and style of the text.

To place this markup	Perform these actions
URL	e. (Optional) To change the shape in which the text appears, from the Bounding shape list, choose the None, Rectangle, or Circle. f. Type the text of the markup in the Text box. g. Click OK. a. Place a text or inset image markup. b. Right-click the markup, and choose Properties. c. In the Properties dialog box, click the Hyperlink tab. d. In the Link Specification box, type the URL, or click Browse and browse to the appropriate file path. You can link to any type of file. The application that is associated with the file type opens and displays the file. e. Click OK. f. To navigate to the URL or launch the referenced file, double-click the link. Note: When you open a URL for an animation (VAN) file, the animation plays automatically. To create a URL markup that opens the default E-mail program and addresses a message, type mailto: in the Address box. When you double-click the link, the E-mail program is launched and a message is addressed to the specified address.

The markup appears in the viewer, with a list of markups under the selected markup layer. If Teamcenter displays an asterisk (*) before the markup layer name, changes were made to the markup layer since it was last saved.

Note:

If you open a 3D model that includes an anchored text markup that is anchored to an item that has been removed from the current 3D model or moved to a different structure in the same 3D model,

when the 3D model file opens, the leader line does not appear and the text of the 3D markup appears in red.

Create a 3D markup layer

Create a 3D markup layer using one of the following methods:

Initial markup layer

1. Ensure a 3D markup is visible.
2. Click the **Save Layers**  button on the Lifecycle Visualization base toolbar.

The system displays the **Save Layer** dialog box.

3. Type a name for the new layer in the **Name** box and click **OK**.

Teamcenter displays the new layer in the **Markup Layers** list.

Note:

The **Markup Layers** list does not display until you create a 3D layer.

Additional markup layers

1. Right-click in the **Markup Layers** list and choose **New Layer** from the shortcut menu.

Teamcenter displays the **Save Layer** dialog box.

2. Type a name for the new layer in the **Name** box and click **OK**.

Teamcenter displays the new layer in the **Markup Layers** list.

Note:

The **Markup Layers** list does not appear until you create a 3D layer.

Open 3D markup layers

- Select a 3D Markup dataset.

Teamcenter opens the **Markup Layers** list containing the saved layers for the dataset.

Save 3D markup layers

When you create or edit a 3D layer, an asterisk (*) appears before the name of the layer in the **Markup Layers** list until you save the layer. When you save the layer, the asterisk disappears until the layer is edited again.

Save 3D layers together or separately. Perform the following steps to save layers:

- 1. From the **Markup Layers** list, select the layer that you want to save.
- 2. Right-click and choose **Save Layer** from the shortcut menu.

Teamcenter removes the asterisk next to the layer name in the list.

Delete 3D markup layers

- 1. Right-click the **DirectModel3DMarkup** dataset in the tree.

Teamcenter displays the **Dataset Object** menu.

- 2. Choose **Named References**.

Teamcenter displays the **Named References** dialog box.

- 3. In the named reference table, select the markup layer that you want to delete.
- 4. Click the **Cut**  button.

Teamcenter removes the layer from the named reference list.

- 5. Click the **Close** button.

Teamcenter closes the **Named References** dialog box.

Control the display of 3D markup layers

To	Perform these actions
Display or hide 3D layers	Select or clear the state indicator to the left of the layer name in the Markup Layers list.
Save all layers	Save all the 3D layers, separately, with their current file names.
Save layer	Save the selected 3D layer.

To	Perform these actions
Save layer as	Save the selected 3D layer with a new file name.
Capture view	Capture the orientation of the model and markup as seen in the viewer for the selected layer.
Apply view	Restore the captured view for the layer selected.
Hide view	Hide the captured view for the layer selected.

Working with 2D markups

View 2D images

1. Select the **DirectModel** dataset in the navigation tree or **Properties** table and click the **Viewer** tab.

Note:

To view a named reference of the **DirectModel** dataset, right-click the dataset in the tree, choose **Visualize Named Reference** from the **Dataset Object** menu, and choose the named reference file that you want to view.

Teamcenter displays a message indicating that you are about to view a JT assembly and verifying that you want to download all the components of the assembly.

2. Click **OK** to download the components.
3. Click the **Image Capture**  button in the viewer pane. The **Create Markup Layer** dialog box appears, allowing you to create a **DirectModelMarkup** dataset and attach it to the original **DirectModel** dataset as a markup relationship. The **Viewer** pane now contains a **Markup Layers** tree to the left of the graphical display.

Compare 2D image layers

You can compare image layers when you want to:

- Display common areas and differences.
- Display the common areas of both layers, one of the comparison layers, or all of the comparison layers.
- Change the colors of one or both image layers in your comparison.

- 1. Choose two 2D image datasets in the navigation tree.
- 2. Choose **Compare 2D Images** from the **View** menu.

Teamcenter displays the images in the **Viewer** tab and displays the 2D Compare toolbar.

- 3. Perform one of the following tasks:

To	Perform these actions
Display only the compare layer (common areas of both layers)	Click the Display Compare Layer button  on the 2D Compare toolbar. Only the compare layer is displayed in the Viewer tab. The information that is common to both layers is drawn in black.
Display one layer and not the other	Click the Display 1st Layer button  or the Display 2nd Layer button  .
Display all comparison layers	Click the Display All Layers button  . All the comparison layers are displayed. Unless you have changed the color preferences, the first layer is green; the second layer is red; the comparison layer is black.

Create 2D markups

- 1. Select the 3D format (**DirectModel**) of the object that you want to revise.
- 2. Click the **2D Markup** button  in the viewer pane.

Teamcenter displays the **Create Markup Layer** dialog box.

- 3. Type the name of the markup layer that you are creating in the **Name** box.
- 4. Select the type of file from the **File Type** list.
- 5. Type a brief explanation of the markup layer's purpose and content in the **Description** box and click **OK**.

The new markup layer can be found in the **Properties** table, or by expanding the **DirectModel** object in the tree.

Create 2D markup layers

You can use **DirectModelMarkup** and **Markup** datasets to create a new markup layer for a 2D format image, as follows:

- 1.
2. Mark up the 2D image using the markup toolbar.
3. Save the markup layer in the new dataset component.
4. Click the **Save 2D Markup** button .

Teamcenter displays the **Save Layer** dialog box.

5. Type the name of the layer that you are creating in the **Name** box and click **OK**.

Teamcenter generates a 2D file, stores it in the current dataset and displays it in the **Markup Layers** tree. If multiple markup layers are created in the same session, they can all be saved simultaneously. Teamcenter displays a separate **Save Layer** dialog box for each saved layer.

Manipulating subcomponents

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.

Managing product and manufacturing information (PMI)

Using PMI objects for inspection planning

Creating and maintaining inspection documentation can be a tedious and manual task. Product and manufacturing information (PMI) is usually authored in a CAD system and saved with the part. Using the **PMI Manager** view, you can:

- Import product and manufacturing information (PMI) data into Teamcenter and use it to directly generate inspection points. PMI created in NX part (PRT) files can be imported from:
 - An XML file exported from **BCT Inspector**.
 - A Teamcenter lifecycle visualization JT file exported from NX 7.5 or later using JT Open Toolkit V7.1.5.0 or later. You can import all data from the JT file or select the data you want to import from the list or visual area of the **Graphics** view. PMI that can be imported from JT includes GD&T modifiers and feature control frames (both single and composite), upper and lower surface finish roughness values and related ISO details, linear, angular, and radial dimensions, upper and lower specification limits, nominal values, and dimensional text notes. Set the **Mci0ExtractPMISurfaceProperties** preference to **true** to retrieve surface properties that can be displayed as columns in bill of materials (BOM) or bill of process (BOP) views.

Surface location X	Surface axis K	Primary datum reference
Surface location Y	Surface radius	Secondary datum reference
Surface location Z	Surface entity	Tertiary datum reference
Surface axis I	Surface type	Characteristics type
Surface axis J	Surface name	Tolerance description

Note:

You can also import PMI created in Catia and converted to JT using NX, the official PLM translator for Catia, which provides a unique accountability ID for each PMI object. If you use other CAD translators, the accountability ID of each PMI object must be larger than 0 and unique under the part to import correctly.

Except in the **Graphics** view, GD&T is reported using readable text. No special symbols are provided.

You can also:

- Assign PMI objects to operations so that they become inspection points.
- Create new inspection points, known as Data Collection Definitions (DCDs), on parts in a BOM and copy and paste them to processes and operations so that they are consumed in a BOP. You can also directly create DCDs on processes and operations in a BOP.
- Edit and add manufacturing parameters to PMI objects and DCDs to better support your process.
- View the acquired PMI objects per .prt (stage) file from NX.
- Indicate on some PMI objects that they are not to be inspected.
- Delete PMI objects.

Caution:

The following limitations exist:

- Assembly PMI objects are only connected to the assembly (.jt) and not to stage (.prt) parts.
- When importing PMI from a JT using JT Open Toolkit, the API must be installed externally from Teamcenter.
- Weld objects on JT are not supported.

After assigning PMI objects to operations, you can export the inspection parameters with PLM XML information in a work package to a manufacturing execution system (MES), where data can be used to assure inspection results meet PMI parameters during inspection operations.

Working with product and manufacturing information (PMI)

If you use product and manufacturing information and want to ensure that effectivity works correctly, you must set the following preferences:

- **MESStockAbleBomLinePropertyName**
- **MEValidStockAbleValues**
- **MEPostAssignIDICMaker**

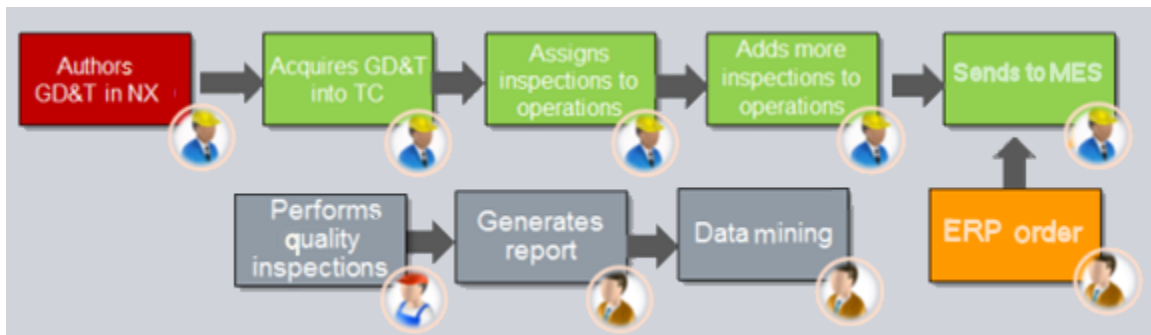
To ensure that effectivity functions properly in your environment when using PMI, you can create a pre/post extension on the **BOM__line_assign_child_line** operation and implement your own business logic. This operation is used to form connections between two objects, for example, to connect (assign) a part to a process or the engineering bill of materials (EBOM) to the manufacturing bill of materials

(MBOM). Additionally, this operation copies some attributes from source object to target. Your custom extension computes the effectivity of the source occurrence in the EBOM and sets it as the effectivity of the target occurrence under the PMI context.

Note:

You should not set an in-context ID manually if you are working with PMI and effectivity.

Inspection planning workflow

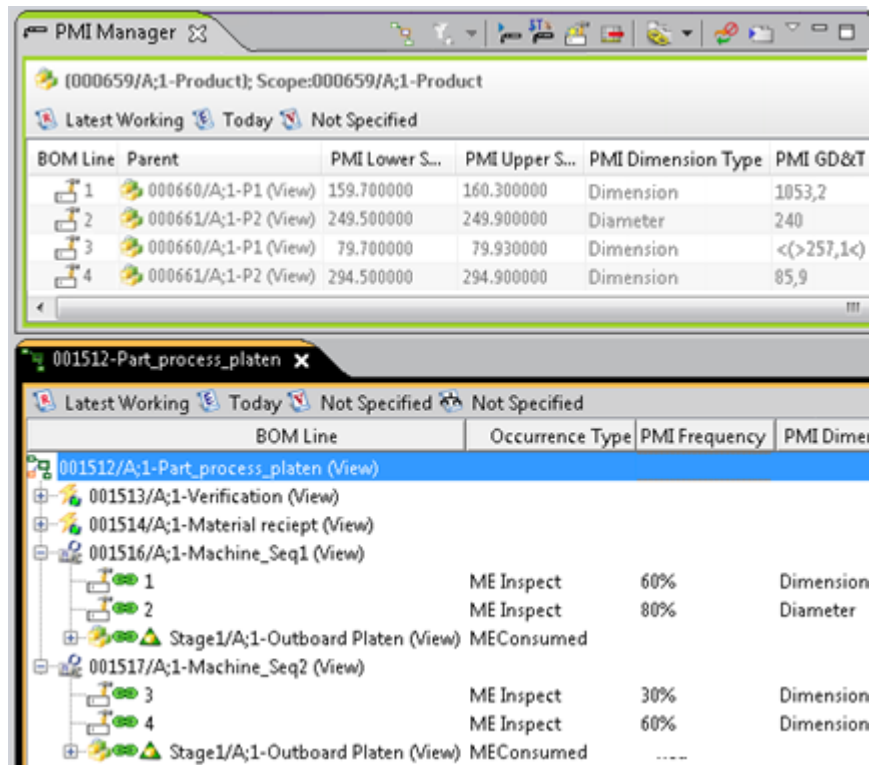


1. PMI annotations are authored in NX.
2. PMI objects are either:
 - Captured and ballooned using BCT Inspector Suite software, then exported from BCT Inspector Suite in XML format for use in Teamcenter.
 - Or exported from NX in JT format using JT Open Toolkit.
3. PMI objects are imported into Teamcenter.

Objects appear as lines when you open them in the **PMI Manager** view.

PMI Manager			
{000659/A;1-Product}; Scope:000659/A;1-Product			
Latest Working Today Not Specified			
BOM Line	Parent	PMI Lower S...	PMI Upper S...
1	000660/A;1-P1 (View)	159.700000	160.300000
2	000661/A;1-P2 (View)	249.500000	249.900000
3	000660/A;1-P1 (View)	79.700000	79.930000
4	000661/A;1-P2 (View)	294.500000	294.900000

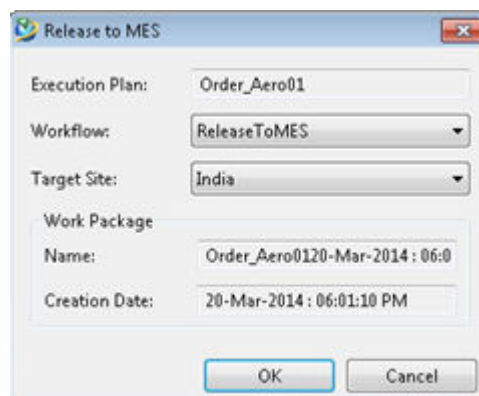
- You assign PMI objects to operations by copying from the **PMI Manager** view and pasting to a process view so that they become inspection points.



Tip:

You can add additional inspection points in Teamcenter by creating Data Collection Definitions (DCDs). You can also edit process-specific attributes for PMI objects or DCDs, and remove any unwanted PMI objects or DCDs.

- Finally, you release the structures to your MES system.

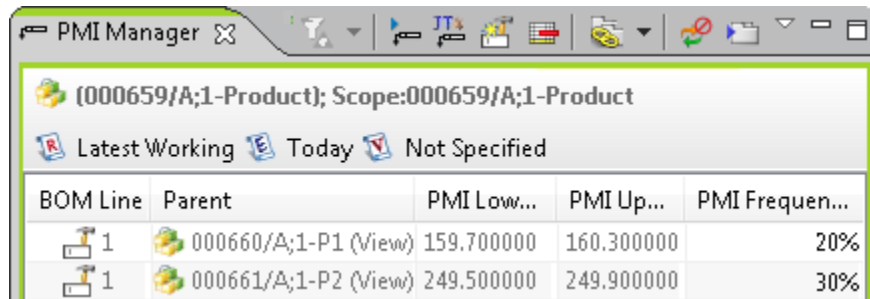


- The operator can now execute work instructions and retrieve the required data collection values.

Using the PMI Manager

Customize the **PMI Manager** view to display a wide variety of PMI attributes as columns, many of which are editable and let you add process information not included in the PMI that derives from NX source data. Many PMI columns are also available from bill of material (BOM) and bill of process (BOP) views.

PMI data flows differently when you set the view scope by selecting a part in the product or process structure and choosing **Open with → PMI Manager**.



The screenshot shows the PMI Manager window with a toolbar and a table of PMI data. The window title is 'PMI Manager'. The toolbar includes icons for 'Latest Working', 'Today', and 'Not Specified'. The table has the following columns: BOM Line, Parent, PMI Low..., PMI Up..., and PMI Frequen... (Frequency). The table contains two rows of data.

BOM Line	Parent	PMI Low...	PMI Up...	PMI Frequen...
1	000660/A;1-P1 (View)	159.700000	160.300000	20%
1	000661/A;1-P2 (View)	249.500000	249.900000	30%

From **PMI Manager** views launched from the product structure, you can:

- Import new PMI or update PMI objects in Teamcenter from NX models using the third-party BCT Inspector Suite plug-in or exported in JT format from NX or other translators, provided unique accountability IDs exist for each PMI object .
- Remove PMI objects and Data Collection Definitions (DCDs) from the product structure.
- Filter PMI objects and DCDs that are assigned or not assigned to the process structure.

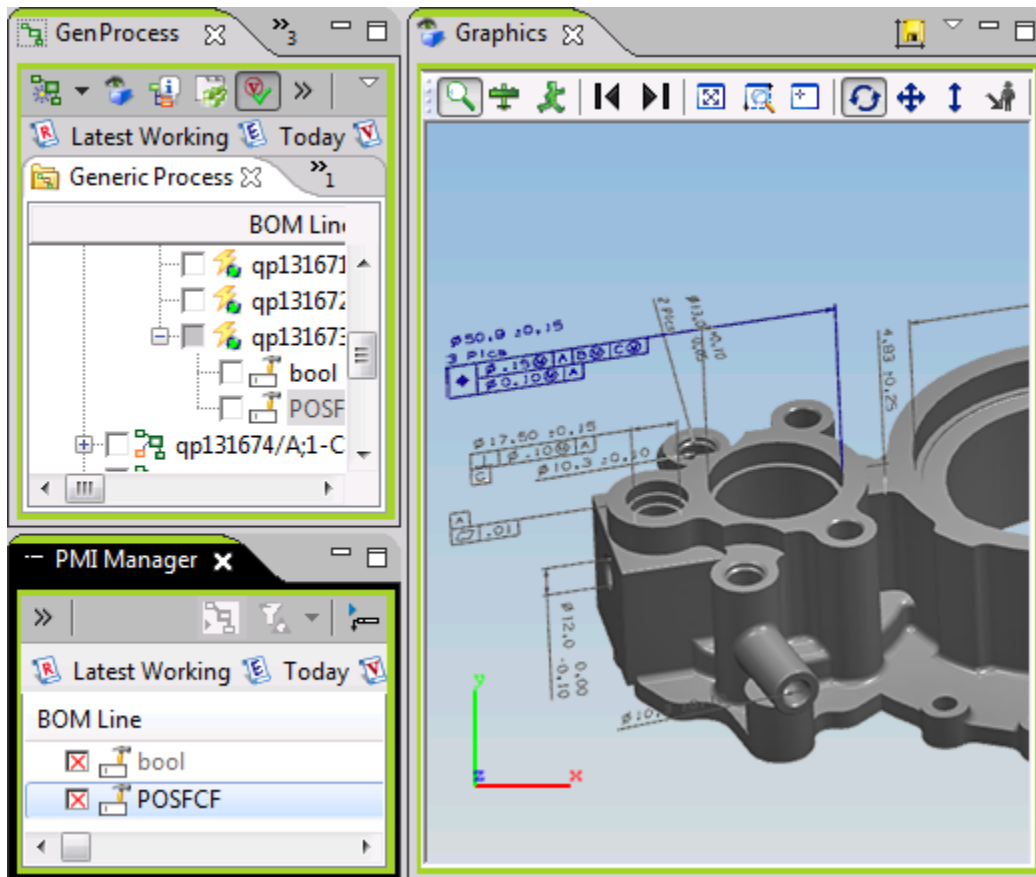
From **PMI Manager** views launched from the process structure, you can:

- Create additional DCDs not included in the NX data.
- Edit PMI attributes not defined in the NX source.

Note:

To assign PMI, you may still copy and paste structures containing DCDs from the **PMI Manager** view to the process view.

If part JT information that contains the PMI information is imported from NX to Teamcenter using the BCT Inspector Suite, a link between the BOM line PMI entities and JT PMI tags is created to synchronize the **PMI Manager** and **Graphics** views. Selecting a PMI object in the **PMI Manager** view highlights it in the **Graphics** view, and vice versa.



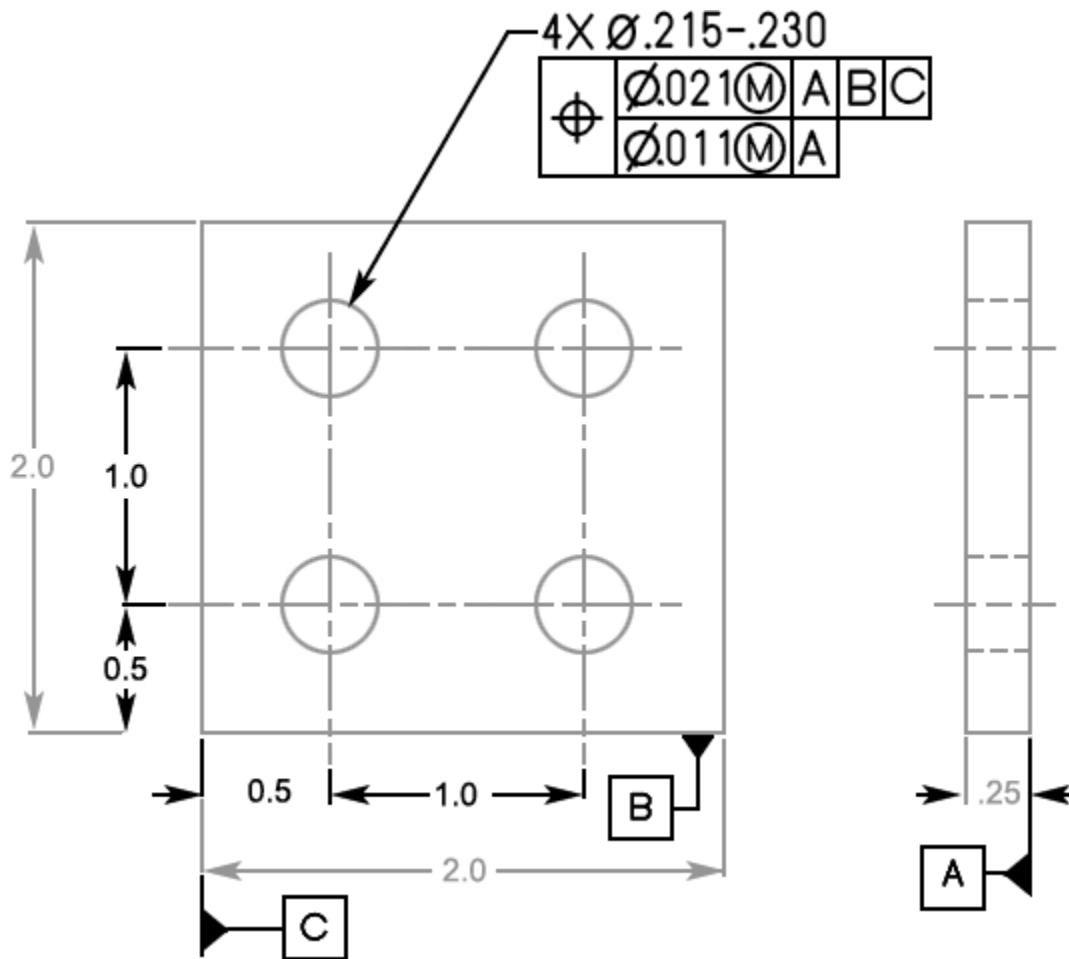
Support for GD&T composite FCFs and modifiers

Composite feature control frames (FCFs)

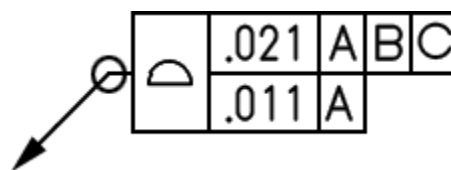
Composite FCFs consist of two or more feature control frames tied to a single feature, or to a pattern of multiple features of the same type. The example below applies a diameter tolerance to the positions of four holes (4X), relative to datums A, B, and C.

Note:

You or your administrator must set the value of the preference **Mci0ExtractPatternPMI** to **true** to extract a GD&T callout for multiple features associated to the same callout, as defined by a pattern (for example, 4X below). If the preference is set to the default value of **false**, only a single callout is extracted. This preference also applies to composite linear dimensions.



Below is an example of a composite surface profile tolerance. Many web sites contain more detailed information on GD&T and composite FCFs.



Note:

Composite FCF refinements, such as a third FCF that defines parallelism or perpendicularity tolerances for a pattern of holes, are not supported.

Like NX, Teamcenter uses a simple numbering sequence for each composite FCF. NX uses, for example, 11 and 11_1 to indicate FCFs that make up a composite FCF top to bottom, while Teamcenter uses 11 and 11.1 in the **PMI ID** column to show that these two FCFs are related to the same feature. The **PMI Is Composite FCF** column also displays a 1 to indicate that an FCF is part of a composite.

BOM Line /	PMI ID	PMI Is Composite FCF	Tolerance...	PMI Pri...	PMI Sec...
002210/A;1-Top_Product (View)					
002239/A;1-Base_Plate (View)					
Datum Feature Symbol A (8)	8	0			
Datum Feature Symbol B (9)	9	0			
Datum Feature Symbol C (10)	10	0			
Feature Control Frame (11)	11	1	PER 0.7	B	
Feature Control Frame (11)	11.1	1	PER 0.3	C	
Feature Control Frame (12)	12	0	PAR 0.9	C	
Feature Control Frame (4)	4	1	TPS 0.8	A	B
Feature Control Frame (4)	4.1	1	TPS 0.5	C	
Linear Dimension (1)	1	0			
Linear Dimension (2)	2	0			
Linear Dimension (3)	3	0			
Radial Dimension (5)	5	0			
002250/A;1-Pin (View)					
002258/A;1-Locking_Nut					

Note:

- When consuming composite FCFs in an operation—for example from a **Product** view to a **Process** view—you must press Ctrl and select all composite FCFs in the **Product** view before you copy and paste them to the **Process** view.
- To remove a composite FCF from an operation, you must also select both parts.
- You cannot assign one part of a composite FCF to one operation and the other to a different operation.

Modifiers

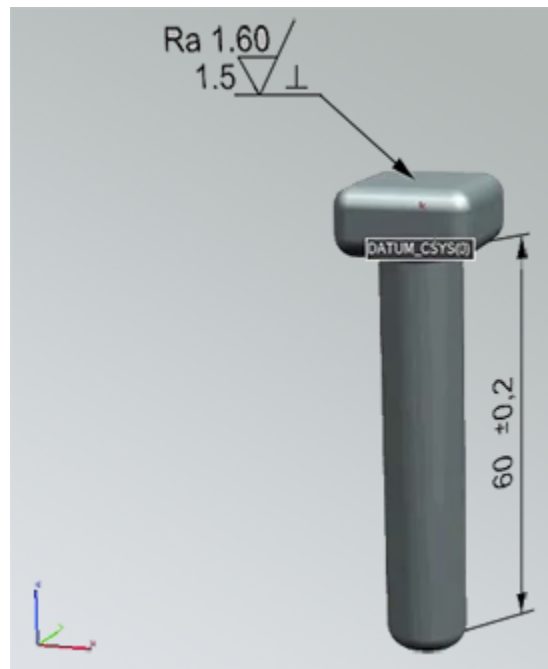
Modifiers added to tolerances and datums are extracted from JT files in relation to their tolerance and/or datum. The most common modifiers are **(M)** for maximum material condition (MMC) and **(L)** for least material condition (LMC). Supported modifiers are defined below.

Modifier symbol	Description
(M)	Maximum material condition
(L)	Least material condition
(F)	Free state

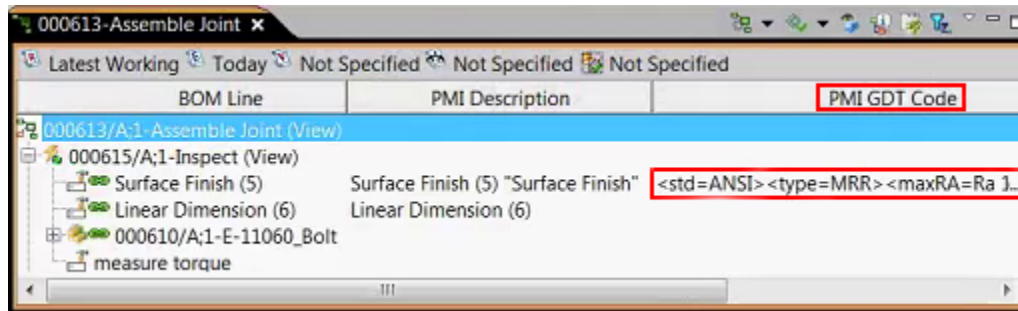
Modifier symbol	Description
Ⓣ	Tangent plane
Ⓟ	Projected
Ⓤ	Unilateral
Ⓢ	Regardless of feature size (RFS, discontinued after Y14.5, 1994)

Support for surface finish roughness

You can import upper and lower surface finish roughness values when importing PMI objects. This capability supports direct mapping of these values, as well as GD&T code properties, to system integration testing (SIT) data collection interfaces.



Once you create data collection definitions (DCDs) and assign them to operations in **PMI Manager**, you can view surface roughness values in your Manufacturing bill of materials (MBOM) and your bill of process (BOP) by enabling both the **PMI Upper Specification Limit** and the **PMI Lower Specification Limit** columns. You can view PMI GD&T code by enabling the column **PMI GDT Code**.



Note:

If the roughness is a simple Ra value (the value of all absolute distances of the roughness profile from the center line within the measured length), that value is applied to the **PMI Upper Specification Limit** property.

Import PMI objects from a BCT Inspector file

BCT Inspector exports PMI objects from NX in an XML format that you can subsequently import into Teamcenter.

Note:

You must use the following configuration settings:

- In the NX session, in the .ipxml file from BCT Inspector, set the PMI XML relation as a relation type to enable PMI import.
- A PMI dataset of the type **ipxml** should be attached with a PMI XML relation.
- In the BCT configuration file *bct_inspector_cfg.xml*, use the following settings:

```
(<ExportProject Enable="1" DatasetType="Mci0PMIXml"
DatasetNamedRev="Mci0ipxml" FileExtension="ipxml" batchProcessing="0"
IgnoreBalloons="0" />)
```
- In Teamcenter, set the value of the preference **INSPECTOR_DATASET_RELATION_TYPE** to **Mci0PMIXmlRel**.

1. From a product structure, right-click the part to which you want to import PMI information and choose **Open with→PMI Manager**.
2. In the **PMI Manager** view, click **Import PMIs**.

Teamcenter imports the PMI objects, places them on the appropriate parts, and extracts PMI information into the PMI property cells. You can now assign the PMI objects to operations.

Import PMI from a JT file

You can import PMI from a Teamcenter lifecycle visualization JT file. PMI can include linear, angular, and radial dimensions, upper and lower specification limits, nominal values, dimensional text notes, upper and lower surface finish roughness values and ISO details, and both regular and composite GD&T feature control frames (FCFs) derived from JT. Set the **Mci0ExtractPMISurfaceProperties** preference to **true** to retrieve surface properties such as position X, Y, and Z, and direction I, J, and K.

You can import all data from a product structure or specific data from the part table or 3D window of the **Graphics** view.

1. If you have not already done so:
 - a. Install JT Open Toolkit *that is supplied with Teamcenter* externally from Teamcenter.

Note:

The JT Open Toolkit supplied with Teamcenter is stamped with a Manufacturing license, and any other toolkit package will fail to work.

- b. In NX 7.5 or greater, define the PMI information—for example, features, datums, tolerances, and FCFs—to be imported.

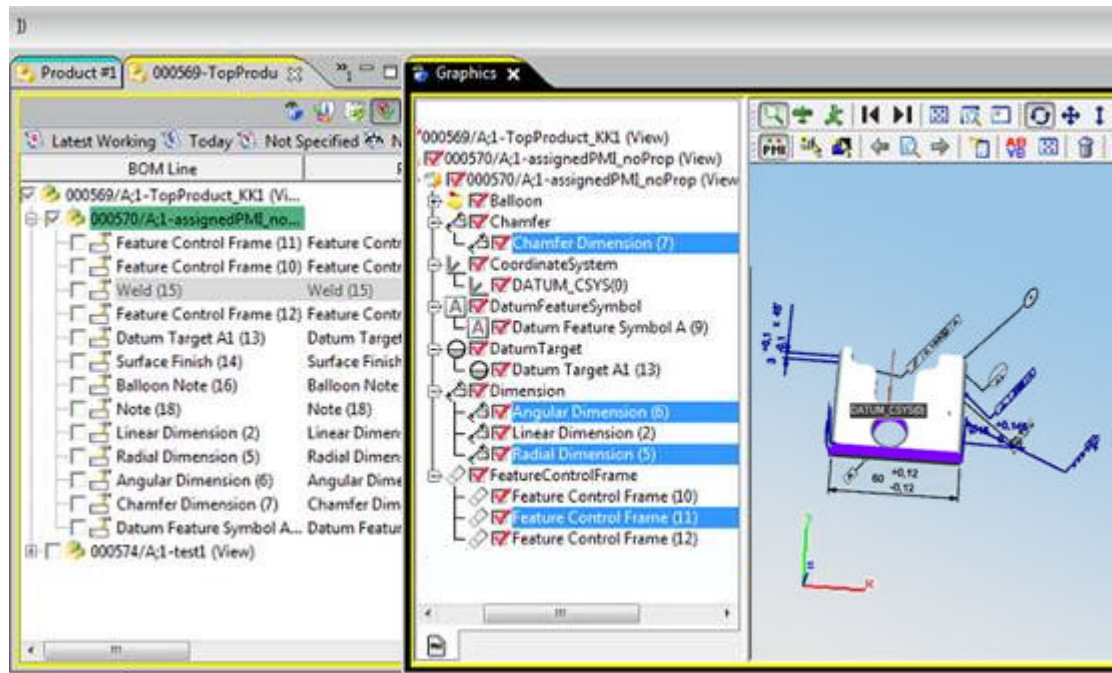
Use the JTTK Inspector to verify which properties can be extracted.

- c. In NX, use JT Open Toolkit to export the JT file as documented in the NX help.
 - d. In Teamcenter, create a product structure and apply the JT file to a Direct Model dataset.
2. In Multi-BOM ManagementPart Planner, from the product structure, select a BOM line containing child lines as well as the directModel dataset.
3. From the product structure, right-click a BOM line containing child lines as well as the directModel dataset to which you want to import PMI information and choose **Open with→PMI Manager**.
4. Click  to open the **Graphics** view.
5. From the product structure, show the JT image, right-click the image, and in the **Graphics** view, choose **Show PMI**.
6. Do one of the following.
 - To import all PMI data, in the **Graphics** view, right-click the part and choose **PMIs→Import PMI from JT**.

Tip:

You can also import PMI from the **PMI Manager** toolbar.

- a. To import specific PMI data, in the list or 3D viewer of the **Graphics** view, press Ctrl and select each PMI element you want to import.



- b. In the product structure, right-click the part and choose **PMIs**→**Import selected PMI from JT**.

Because the JT toolkit provides different ways to store information on JT files (assembly, part, monolithic), PMI objects are imported under the part the JT was created with, without any validation that those objects are attached to the part in the **Graphics** view. You can move, update, and delete PMI objects as necessary after import. The information is read from the JT and no changes are applied to the JT file. You can now assign the PMI objects to operations.

Note:

If the JT is updated and you reimport PMI, new PMI objects are added, existing PMI objects are updated, and missing PMI objects are deleted.

Assign a PMI object to an operation

1. In the **PMI Manager** view, assign PMI objects to operations by doing one of the following.
 - Use the **Copy** and **Paste** commands.

- a. Right-click a PMI object and choose **Copy**.

Note:

To assign composite feature control frames (FCFs) to an operation, press Ctrl and click all FCFs that make up that composite.

- b. In the process pane, select the appropriate operation and choose **Paste**.
- Drag the part to the appropriate operation.

Assigning the PMI to an operation shares the values of specified properties with the operation. Any changes in these values in the structure automatically changes the values in the process.

2. Edit PMI object information.

Create data collection definitions (DCDs)

In addition to assigning PMI objects imported from CAD to operations, you can add your own DCDs to items such as parts, or to a process or operation, to better define the inspection plan. These DCDs share the same behavior as those that were generated from the PMI objects.

1. From a part or process structure, right-click a part, process, or operation and choose **Open with→PMI Manager**.

Note:

You can also create a DCD from a part in a bill of materials (BOM) structure, or a process or operation in a bill of process (BOP) structure, by right-clicking the element and choosing **PMIs→Create DCD**.

2. In the **PMI Manager** view, click **Create DCD** .
3. Select the type of data collection definition (DCD) you want to create.

You can choose from:

- **Boolean**
- **Buyoff**
- **Duration**
- **Image**
- **Integer**

- Procedure Completion
- Real Number
- String Data
- Time Stamp
- List of Values

4. Click **Next**.
5. Add the properties required by the DCD type you are creating and click **Finish**.
6. If necessary, **assign** the DCD to an operation.

Edit PMI object information

You can add additional information to a PMI object to define attributes that pertain specifically to your process. This information, which does not exist in the CAD model, is saved only in the context of your process.

1. In the **PMI Manager** view, select **View Menu**→**Columns**.
2. In the **Available Columns** box, type **PMI**, and then add the columns for which you want to add information.
3. Click **Apply**, and then click **Close**.
4. Review or add PMI information.

Note:

You can edit the following columns.

Property	Description
Key Characteristic	Supports aerospace and defense enterprises that must adhere to the SAE AS9103 standard . You can identify features that must be controlled during production and that when changed, require a first article inspection. You can select the values DKC (Design Key Characteristic) or PKC (Process Key Characteristic).

Property	Description
Occurrence Effectivity	Lets you hide or show assembly parts and PMI objects associated with those parts based upon occurrence effectivity settings.
PMI Criticality	Allows you to select values such as Critical , Major , Minor , or Documentation Only to indicate each PMI object's degree of importance when you are defining inspection operations.
PMI Description	Specifies a description that can be presented in the work instructions.
PMI Dimension Type	Specifies the type of the dimension, such as radius or diameter.
PMI Frequency	Specifies information for the MES system representing the frequency of the inspection, for example, whether it applies to every instance, once in a lot, first and last, and so on. The precise semantics of this property are project-specific.
PMI GD&T Code	Specifies XML code representing geometric dimension and tolerancing information.
PMI Marked As Deleted	Indicates whether the PMI object is deleted in NX.
PMI Not For Inspection	Prevents the PMI object from being included in the accountability check and also from being exported to MES.

Filter assigned and unassigned PMI objects

If you have a large number of PMI objects in the product view and want to verify which are or are not assigned in the process view, you can filter them in the **PMI Manager** view.

1. Open the **PMI Manager** view from the product structure by right-clicking the line that includes the PMI objects shared with the process structure and choosing **Open with → PMI Manager**.

Tip:

If you already have a different **PMI Manager** view open, you can change to the product view by clicking  in the **PMI Manager** view.

2. In the process structure, select the structure that includes the same PMI objects.
3. In the **PMI Manager** view, click **Set selected process/operation as target process** .

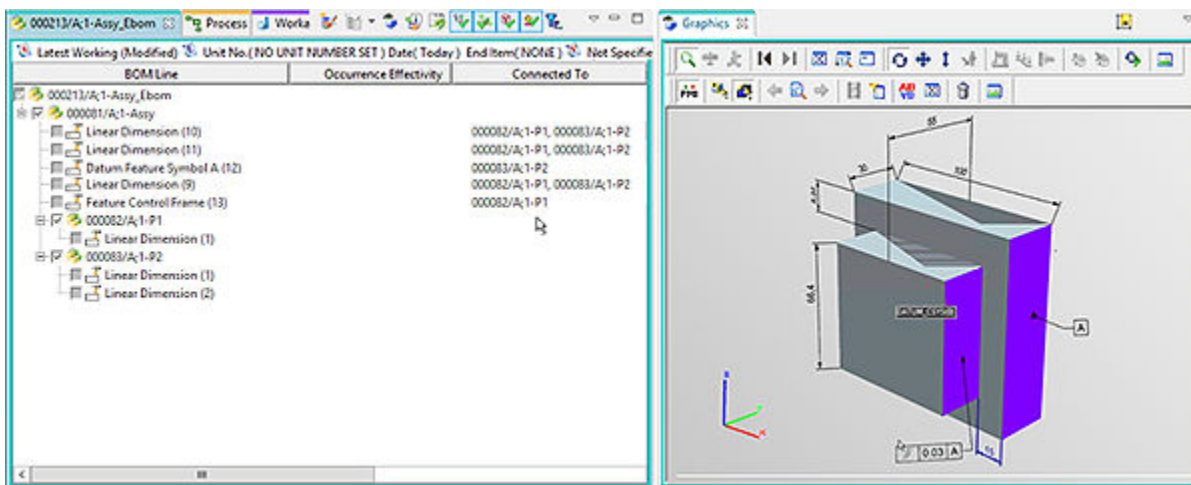
The process structure sets the scope of the command.

4. Select **Filter data based on assignment indication** and choose **Assigned** or **Unassigned**.

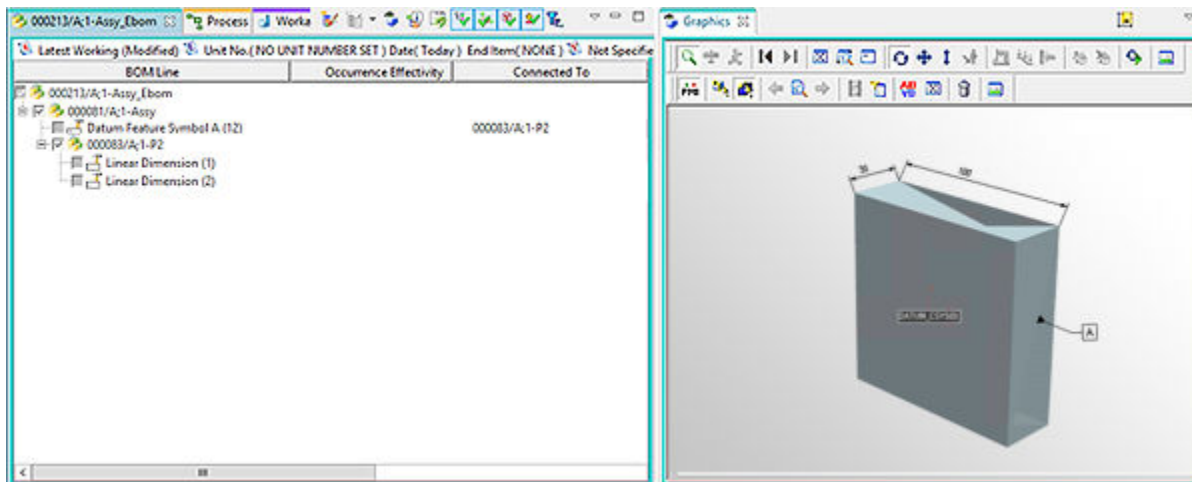
Hide or show PMI assembly parts and objects using occurrence effectivity

In Teamcenter Visualization, you can use **All Associated Parts are Configured** date-based or unit-based effectivity settings to hide or show assembly parts and PMI data. When you define this global setting in Teamcenter and apply occurrence effectivity, parts can be configured out and all assembly-level PMI associated to those parts are no longer displayed in the **Graphics** view. Additionally, if the assembly PMI is consumed in an operation, it is configured out as well.

In this example, some PMI objects are associated with multiple parts in an assembly, some are associated with a single part, and some are associated with no parts. Associations are reflected in the **Connected To** column in the assembly EBOM.



When you define occurrence effectivity settings for the part or parts you want to hide or show, those parts are hidden as well as any PMI specific only to those parts. In this example, part 000082/A-P1 is configured to be excluded from viewing on the current date. The PMI objects specific to this part are also excluded. Any PMI objects not connected to a specific part remain displayed. If a dimension is also connected to another part, it remains in the **Graphics** view.



Remove PMI objects

To avoid data loss during synchronization, PMI objects that are removed in NX are not deleted in Teamcenter. They are marked for deletion in the **PMI Marked As Deleted** property, and you can then remove them manually.

1. In the **PMI Manager** view, select the PMI object or DCD to be removed and click **Remove** .
2. Remove the PMI line from the manufacturing BOM.

When you run an accountability check, you can include the **PMI Marked As Deleted** property in the partial match criteria. Teamcenter then displays the removed PMI objects as a partial match, and you can delete them manually.

Run an accountability check on PMI objects

You can run an accountability check to validate completeness (whether all PMI objects are part of an inspection plan) and to discern changes to them.

- If a part is revised and corresponding PMI objects change, the accountability check highlights all changes (additions, modifications, deletion) by comparing two revisions of the part (MBOM-MBOM compare). The MBOM must be configured differently for the two revisions (for example, **working** and **released**).
- If a part is modified without revising it, the accountability check detects all modifications for the PMI objects that are assigned to operations in the plan (using MBOM-BOP compare).

Note:

Changes done in operation-level properties are not reported by the accountability check.

1. **Run an advanced accountability check.**

2. Select the **AccountabilitySkipPMINotforInsp** as the source filtering rule.
3. When you reach the step where you are choosing comparison properties in the **Partial Match** tab, add the desired properties.

Note:

If you want to prevent a PMI object from being included in the accountability check and also from being exported to MES, use the **Not For Inspection** property to exclude it from consideration.

Working with drafting symbols and GD&T symbols

Your administrator may permit the use of drafting symbols and geometric dimensioning and tolerance (GD&T) symbols in any of the fields of a form.

To add or edit symbols in a form, display the form in the **Viewer** view and click the **Edit** button. Teamcenter displays the **Change GD&T Symbols** dialog box.

To add or edit drafting symbols, click the **Drafting Symbols** tab and click one or more of the predefined symbol buttons. To add or edit GD&T symbols, click the **GDT Symbols** tab and click one or more of the predefined symbol buttons.

To format rich text, use the following buttons that are available in the **Drafting Symbols** tab and the **GDT Symbols** tab:



Manually refresh the editing box.



Add a frame around the selected characters.



Bold the selected text.



Italicize the selected text.



Underline the selected text.



Set the color of the selected text.



Decrease the size of the selected text.



Increase the size of the selected text.



Subscript the selected text.



Superscript the selected text.



Align the selected text.



Center align the selected text.



Right align the selected text.



Insert the text you typed in the two boxes to the left of this button.



Insert a control frame around the selected characters.

Additions and changes are reflected in the editing box of **Change GD&T Symbols** dialog box. To save changes and exit, click the **Edit** button again.

Performing 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

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	IC
ASSY_2345-04-69/B-VOLVO AS...	B						Y
04_MAZ(A)	A 10		Released		Released 1-UP (ASSY_2345-0...	Y	Y
TYPE-FM_NORMAL_W6D-2...	A 20		Released		Released 1-UP (ASSY_2345-0...	Y	Y
ENG-VE12_UTURBOC(A)	A 30		Released		Released 1-UP (ASSY_2345-0...	Y	Y
04_MR(A)	A 40		Released		Released 1-UP (ASSY_2345-0...	Y	Y
PAP3140(A)	A 50		Released		Released 1-UP (ASSY_2345-0...	Y	Y
RAP_6640(A)	A 60		Released		Released 1-UP (ASSY_2345-0...	Y	Y
ASSY_2345-04-69_1(A)	A 70		Released		Released 1-UP (ASSY_2345-0...	Y	Y
ASSY_2345-04-69_2(A)	A 80		Released		Released 1-UP (ASSY_2345-0...	Y	Y
20409535(A) (view)	A 90		Released		Released 1-UP (ASSY_2345-0...	Y	Y
20392008(A)	A 10		Released		Released 1-UP (ASSY_2345-0...	Y	Y
20567341(A) (view)	A 100		Released		Released 1-UP (ASSY_2345-0...	Y	Y
20453035(A)	A 10		Released		Released 1-UP (ASSY_2345-0...	Y	Y
20453035(A)	A 20		Released		Released 1-UP (ASSY_2345-0...	Y	Y
20487187/C (view)	C 100		Released		Released 1-UP (ASSY_2345-0...	Y	Y
20367635_101/B (view)	B 10	AAA			Released 1-UP (ASSY_2345-0...	Y	Y
20367635_201(A)	A 10	CCC			Released 1-UP (ASSY_2345-0...	Y	Y
20367635_3(A)	A 10	XXX	Released		Released 1-UP (ASSY_2345-0...	Y	Y
3988731(A)	A 20		Released		Released 1-UP (ASSY_2345-0...	Y	Y
3988731(A)	A 30		Released		Released 1-UP (ASSY_2345-0...	Y	Y
20429251(A)	A 40		Released		Released 1-UP (ASSY_2345-0...	Y	Y
20429252(A)	A 50		Released		Released 1-UP (ASSY_2345-0...	Y	Y
1076334(A)	A 60		Released		Released 1-UP (ASSY_2345-0...	Y	Y
1076334(A)	A 70		Released		Released 1-UP (ASSY_2345-0...	Y	Y
1075726(A) (view)	A 80		Released		Released 1-UP (ASSY_2345-0...	Y	Y
1075726(A) (view)	A 90		Released		Released 1-UP (ASSY_2345-0...	Y	Y
3171036(A)	A 100		Released		Released 1-UP (ASSY_2345-0...	Y	Y
3171036(A)	A 110		Released		Released 1-UP (ASSY_2345-0...	Y	Y
3171036(A)	A 120		Released		Released 1-UP (ASSY_2345-0...	Y	Y
3171036(A)	A 130		Released		Released 1-UP (ASSY_2345-0...	Y	Y
1075723(A)	A 140		Released		Released 1-UP (ASSY_2345-0...	Y	Y
1075723(A)	A 150		Released		Released 1-UP (ASSY_2345-0...	Y	Y
1075723(A)	A 160		Released		Released 1-UP (ASSY_2345-0...	Y	Y
1075723(A)	A 170		Released		Released 1-UP (ASSY_2345-0...	Y	Y
20374919(A)	A 180		Released		Released 1-UP (ASSY_2345-0...	Y	Y
20374919(A)	A 190		Released		Released 1-UP (ASSY_2345-0...	Y	Y
1628449(A)	A 200		Released		Released 1-UP (ASSY_2345-0...	Y	Y
1628449(A)	A 210		Released		Released 1-UP (ASSY_2345-0...	Y	Y
914170(A)	A 220		Released		Released 1-UP (ASSY_2345-0...	Y	Y
914170(A)	A 230		Released		Released 1-UP (ASSY_2345-0...	Y	Y
914170(A)	A 240		Released		Released 1-UP (ASSY_2345-0...	Y	Y
914170(A)	A 250		Released		Released 1-UP (ASSY_2345-0...	Y	Y
914170(A)	A 260		Released		Released 1-UP (ASSY_2345-0...	Y	Y
914170(A)	A 270		Released		Released 1-UP (ASSY_2345-0...	Y	Y
966360(A)	A 280		Released		Released 1-UP (ASSY_2345-0...	Y	Y
966360(A)	A 290		Released		Released 1-UP (ASSY_2345-0...	Y	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

Line	Purpose
	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 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.

Icon	Indicates
	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.
	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

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 Options→Expand Below** or choosing **Expand Below** from the shortcut menu.
2. Right-click the top line that is the context of this edit and choose **Set In-Context** from the shortcut menu.

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.

- Right-click the green context line and choose **Set in Context**.

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 right-clicking the structure line and choosing **Set In Context**.
2. Select the line containing the absolute occurrence with which you want to associate a new instance-specific dataset or form and open it in the **Attachments** view.
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** view. You can then search for and insert a replacement dataset or form.

Associate a transformation with an absolute occurrence

Note:

You cannot associate a transformation (positioning information) with an absolute occurrence in Teamcenter manufacturing process management; you can only make the initial association in Structure Manager.

1. Ensure you have selected in-context editing mode by right-clicking the structure line and choosing **Set In Context**.
2. Select the line containing the absolute occurrence for which you want to change the transformation.
3. Select the **Graphics** view 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 right-clicking the structure line and choosing **Set In Context**.

2. Select the line containing the absolute occurrence with which you want to associate an occurrence note.
3. Choose **Edit→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 right-clicking the structure line and choosing **Set In Context**.
2. Select the line containing the absolute occurrence with which you want to associate a variant condition.
3. Choose **Edit→Variant Condition**.

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 open the **Attachments** view. 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 **Show Unconfigured Changes** from the view menu or click  in the view toolbar.

Understanding how data precedence works with absolute occurrences

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

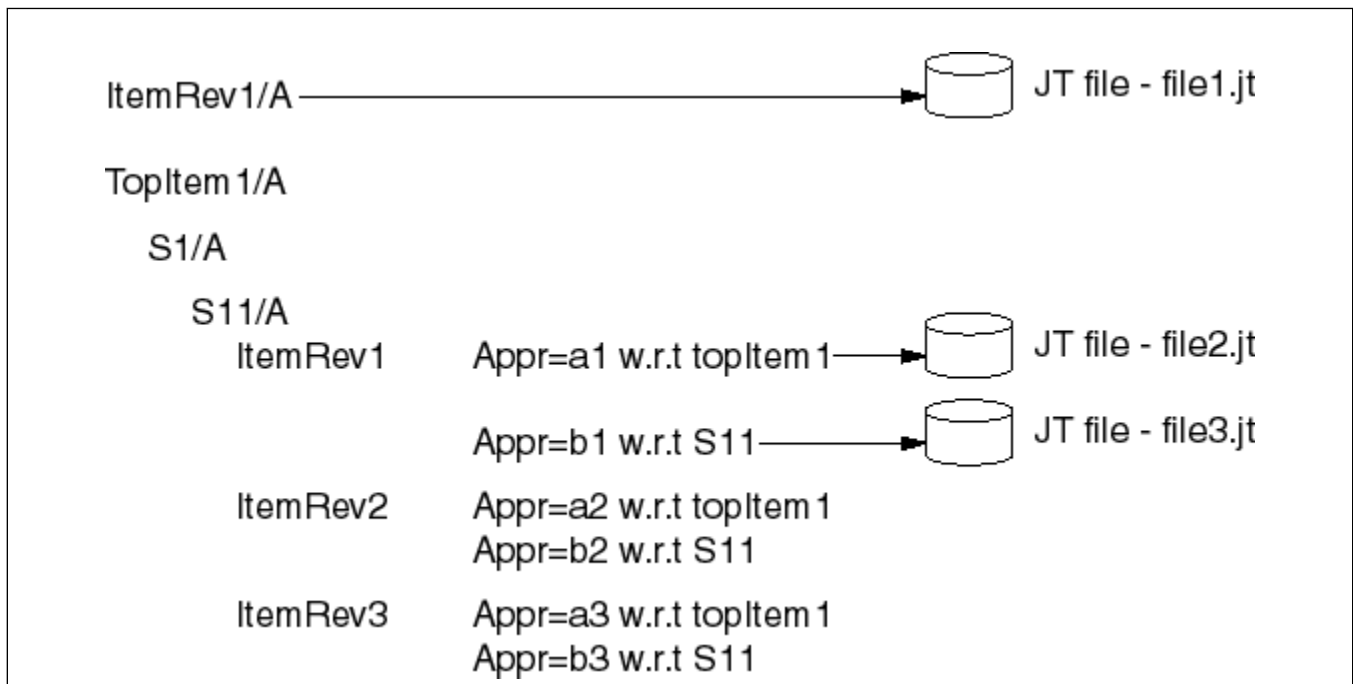
In this example, you can see **file1.jt** in the viewer in My Teamcenter without any context. However, when you view the same item revision (**ItemRev1**) in the context of **TopItem1**, you see the JT file (**file2.jt**) that is associated with the corresponding absolute occurrence (**appr1**) in the 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 **TopItem 1/A**, while the **file3.jt** file is added in the context of **S11/A**. Consequently, if you view **ItemRev1** in the context of **TopItem 1/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.

Understanding ID in context and assigned products

When assigning a product to a process or copying processes or operations from one process structure to another, Teamcenter can assign the same ID in context (IDIC) to the structure lines in the source and target structure. Doing so provides a method for Teamcenter to find the assigned objects in the other structure, for instance, when using the **Find in All Visible Views** menu command or running an accountability check.

This mechanism is controlled by two preferences:

- **MECopyIdInContextToAssignedLine**

If set to **True**, Teamcenter copies any existing in-context IDs to the target structure when assigning a product to a process or copying a process or operation from one structure to another. If an in-context ID does not exist, Teamcenter creates one on the source and copies it to the target object. Any generated IDs are unique within the source and target structures.

If set to **False**, no in-context ID is copied.

- **MECopyIdInContextLowerLevels**

If set to **True**, Teamcenter copies any existing in-context IDs of consumed items under subprocesses and suboperations to the target structure when copying a process or operation from one structure to another. If an in-context ID does not exist, Teamcenter does *not* create one.

If set to **False**, no in-context ID gets copied for the consumed items under subprocesses and suboperations, even if one is present.

Note:

The **MECopyIdInContextLowerLevels** preference is considered only if **MECopyIdInContextToAssignedLine** is set to **True**.

In the following example, if you copy process **P1.1** from **Proc1** in the upper pane to **Proc4** in the lower pane:

- Teamcenter only generates an in-context ID for the process that is being copied. It never generates an in-context ID for subprocesses, suboperations, or their consumed items, regardless of the settings for these preferences.
- If **MECopyIdInContextToAssignedLine** = **false** and **MECopyIdInContextLowerLevels** = **false**, Teamcenter does not copy any in-context ID.

Note:

For **P1.1**, the ID is not generated at the source if it is not present (in the following example, it is already generated).

BOM Line	ID In Context (Top Level)
000528/A;1-Proc1 (View)	
000529/A;1-P1.1 (View)	kJBtMh0hAABaaA
000532/A;1-P1.1.1 (View)	
000533/A;1-P1.1.2 (View)	
000536/A;1-I1.2	kdGtMh0hAABaaA
000535/A;1-I1.1	USktMh0hAABaaA
000530/A;1-P1.2 (View)	

BOM Line	ID In Context (Top Level)
000540/A;1-Proc4 (View)	
000529/A;1-P1.1 (View)	kJBtMh0hAABaaA
000532/A;1-P1.1.1 (View)	
000533/A;1-P1.1.2 (View)	
000536/A;1-I1.2	
000535/A;1-I1.1	USktMh0hAABaaA

After copying, under the **Proc4** process, note that there are no in-context IDs in the **ID In Context (Top Level)** column.

- If **MECopyIdInContextToAssignedLine = true** and **MECopyIdInContextLowerLevels = false**, the in-context ID for **P1.1** and **I1.1** only are copied. The existing in-context ID for **I1.2** is not copied because **I1.2** is the consumed item of a lower level.

Note:

For **P1.1**, the in-context ID is generated at the source if it is not present and then copied. For **I1.1**, the ID is not generated if it is not present.

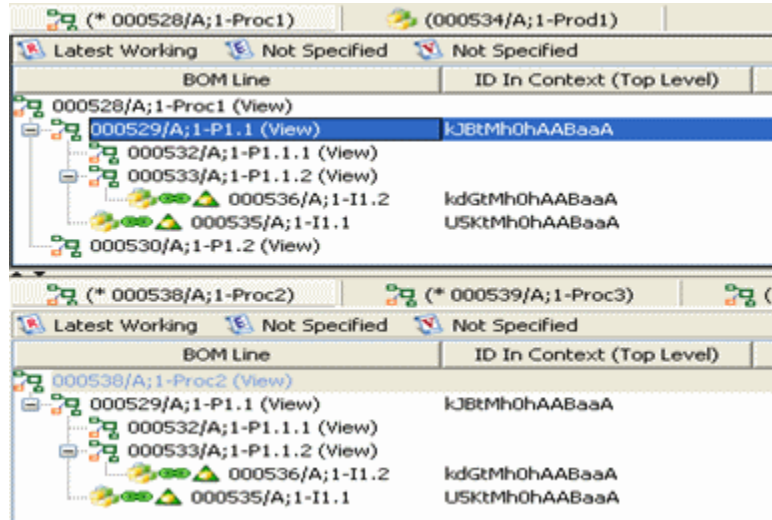
BOM Line	ID In Context (Top Level)
000528/A;1-Proc1 (View)	
000529/A;1-P1.1 (View)	kJBtMh0hAABaaA
000532/A;1-P1.1.1 (View)	
000533/A;1-P1.1.2 (View)	
000536/A;1-I1.2	kdGtMh0hAABaaA
000535/A;1-I1.1	USktMh0hAABaaA
000530/A;1-P1.2 (View)	

BOM Line	ID In Context (Top Level)
000540/A;1-Proc4 (View)	
000529/A;1-P1.1 (View)	kJBtMh0hAABaaA
000532/A;1-P1.1.1 (View)	
000533/A;1-P1.1.2 (View)	
000536/A;1-I1.2	
000535/A;1-I1.1	USktMh0hAABaaA

- If **MECopyIdInContextToAssignedLine = true** and **MECopyIdInContextLowerLevels = true**, the IDs for **P1.1**, **I1.1**, and **I1.2** are all copied.

Note:

For **P1.1** the ID is generated at the source if it is not present and then copied. For **I1.1** and **I1.2**, if the ID is not present, it is not generated, but if it is present, it is copied.



Performing advanced structure searches

About advanced structure searches

The **Structure Search** view helps you perform a multitude of searches. The search mechanism searches a structure using various properties of the structure's lines. The search is not limited to the loaded lines of the structure and can search an entire structure without loading it. It then reports the results in the **Structure Search Results** view and partially expands the structure to the found lines.

Note:

A partial expand occurs only if the **Expand to Selection** option in the **Manufacturing** section of the **Options** dialog box (**Edit→Options**) is selected.

You can:

- Search large process, product, plant, or occurrence group structures with spatial criteria, or with a combination of spatial and attribute criteria. Spatial searches are particularly useful for end items that represent large processes containing a large number of lines, allowing you to focus quickly on the manufacturing needs of a particular area or part of the product.

Note:

The search does not return matches found in occurrence groups that are assigned to an occurrence group.

- Search for features in a structure based on different search criteria such as searching for weld points assigned to specific processes or arc welds connected to specific parts.
- Perform a search for objects found in a specific classification class or containing a specific classification attribute value.
- Store the search criteria and search results in the **Structure Search** view. These can then be reloaded or shared by different users.

Making attribute searches

You can search structures for all objects that contain the following:

- 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.

- 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, in-context form, or their subclasses.

Making feature searches

When you manage features in the body in white environment, you frequently deal with large amounts of features within a product structure. The **Structure Search** view helps you to find the features you seek, and narrow down the list of matches to a manageable number of search results. You can search for the following features:

- Weld points
- Arc welds
- Datums

The starting point for a feature query is an item in a product structure. Using the feature search you can:

- Find all features in the search scope that are assigned or not assigned to specified operations.
- Find all features in the search scope that are connected to specified parts.
- Find all features in the search scope that are connected to parts assigned to specified operations.
- Find all features in the search scope that are connected to parts in the incoming IPA of specified processes.
- Find all datums that were assigned to previous stations.

You can combine a feature search with other search criteria.

- Use the spatial search to find all features in the search scope of a specific type by bounding box or in the proximity of a given part.
- Use the attribute search to find all features in the search scope of a specific type that contain a specified attribute value. These attributes can be defined on:
 - The feature occurrence (occurrence notes).
 - The feature attribute form on the **PSOccurrence** or the item revision.
 - Any other form on the **PSOccurrence** or the item revision.
 - The feature item or item revision.

Making spatial searches

A spatial search, also referred to as a *cacheless* search, allows you to enter search criteria as numerical values or by dragging a search box in the viewer to find those objects that are within these spatial boundaries. Teamcenter displays the results of the search as a list of matching occurrences (structure lines). Selecting an entry in the list highlights the occurrence in the structure tree pane and in the embedded viewer.

You can refine spatial searches with other attribute searches.

You must complete certain installation and configuration steps before you can run spatial searches.

Making classification searches

You can extend your search to include 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.

Perform a structure search

1. Open the structure and select the top line against which you want to search.

You can select a process, operation, product, plant or occurrence group. You can also select multiple top lines in the same structure or substructure.

Note:

To perform a feature search, you must select one line in a product structure.

2. Do one of the following:
 - Choose **Tools** → **Structure Search**.
 - Choose **Structure Search** from the shortcut menu.

Teamcenter displays the **Structure Search** view.

The structure line you select represents the scope of the search and is listed in the **Scopes** box.

3. (Optional) Click **...** to add more lines to the search scope or clear the scope.
 - Select a line in the structure and click **+** in the **Scopes** dialog box to add a scope.
 - Select a line in the **Scopes** dialog box and click **—** to remove the line from the scope.
 - Click **Clear**  in the **Scopes** dialog box to clear all scopes.

The columns names and widths that are initially displayed in the scope list are configured by the **MEAdvancedSearchResultsViewColumnsShownPref** and **MEAdvancedSearchResultsViewColumnsShownWidthPref** preferences.

4. (Optional) Load an existing search by clicking **Open Search**  to load a saved search.
5. Define a query.

You can choose from the following search types, depending on which type of structure you selected:

- **General**
- **Weld Points**
- **Arc Welds**

- **Datum Points**
- **Enterprise BOP**

6. Use the criteria sections to specify the search criteria pertaining to the type of search you selected. For example, use the **Weld Points Criteria** section to specify the criteria for a weld point search.

Click the ... button to the right of each individual search criteria box and enter search criteria 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.

7. Select **Show results in a new tab** if you want to display each set of results in its own tab in the **Structure Search Results** view. If this check box is not selected, Teamcenter overwrites the results of the last search in the same pane.

Note:

The **Show results in a new tab** check box is not visible on the **Structure Search** view until after the first structure search is performed.

8. Click **Search**  to begin the search.

Teamcenter starts the search and loads the lines into the **Structure Search Results** view.

You can manage the search results in the **Structure Search Results** view.

9. (Optional) Select a line in the **Structure Search Results** view to highlight the corresponding item or item revision in the structure tree and the embedded viewer.

Tip:

The **Display** and **Blank** commands in the shortcut menu control the visibility of the search results in the embedded viewer.

10. (Optional) Click **Clear**  to clear individual search criteria from the search, or click **Clear All** to clear all criteria from the **Structure Search** view.
11. (Optional) Save the structure search.

Save a structure search

You can store a search and, optionally, its results for future reuse. You can also allow other users access to this search.

Teamcenter saves the search in a **SearchStructureContext** object that includes a saved configuration. If you reload a saved search, the configuration in effect at the time of storage is also loaded.

Teamcenter saves the following configuration information at the time of storage:

- Current revision rule (with the effective date, end item, or unit number)
 - Variant rule
 - Effectivity group objects
 - Closure rule
 - State of the **Show Unconfigured** buttons
 - If the search is performed on a process structure and any part of the search contains lines from a composition structure, the configuration of those related composition structures
1. After entering search criteria and running a search, do one of the following:
 - Click  on the toolbar of the **Structure Search** view, or choose **Save** from the **View Menu** to save a new search, or update a loaded search with new criteria and results.
 - Choose **Save As** from the **View Menu** to save the search under another name. This may be necessary if, for example, you do not have write access to the original saved search but still want to modify it.
 2. Enter a name and, optionally, a description for the search.
 3. Select one of the following.

Option	Action
Search definitions	Saves the entries in the Structure Search view.
Search definitions and consistent results	Saves the entries in the Structure Search view and additionally, all results that are compatible with the current scope of the search.

4. To grant read-only access to other users for this search, select the **Is shared?** check box.

This allows other users to select and run this saved search when they load saved searches. Other users cannot modify this search. They must use the **Save As** command to save any modifications.
5. Specify the location in the database to store the search by clicking **Create in** and selecting a folder.

By default, Teamcenter stores the search in the **My Saved Searches** folder in My Teamcenter. You can create other folders to organize your searches by clicking **New Folder**.

6. Click **OK**.

Rename an existing search

1. With a search open in the **Structure Search** view, choose **Save As** from the **View Menu**.
2. Click **Create in** to expand the **Save Search** dialog box.
3. Select the search that you want to rename from the **Existing Saved Searches** list and click **Rename**.
4. Type a new name for the search and click **OK**.

Assign access rights to a saved search

1. With a search open in the **Structure Search** view, choose **Save As** from the **View Menu**.
2. Click **Create in** to expand the **Save Search** dialog box.
3. Select the search for which you want to modify access rights from the **Existing Saved Searches** list and click **Access**.
4. Click the **Get access control list.** button  in the lower-right corner of the **Access** dialog box.

The system displays the **ACL Control List** dialog box.

5. In the **ACL Control List** dialog box, choose the entry that you want to modify.

Note:

You can only change entries you have created or entries you have been given permission to change by the Teamcenter administrator.

6. Grant or deny privileges for the type of accessor by double-clicking in the column corresponding to the privilege you want to modify.
 - Select the check mark  to grant a privilege.
 - Select  to deny the privilege.

Note:

To clear a privilege box, double-click in the box and choose the blank entry from the list.

7. Click **OK** to save the list.

Load a saved search

Teamcenter saves the search in a **SearchStructureContext** object that includes a saved configuration. If you load a saved search, the configuration in effect at the time of storage is also loaded.

1. Do one of the following:

- a. Load a recently used search.

- In the **Structure Search** view, click the down arrow beside the **Open Search** .

Teamcenter displays the most recently used searches.

- Select one of the searches listed.

Teamcenter displays the **Open Saved Search** dialog box where you can specify load options.

- b. Load a search not recently used.

- A. In the **Structure Search** view, click **Open Search** .

Teamcenter opens the **Open Saved Search** dialog box listing all the saved search objects belonging to you. The **Revision Rule**, **Variant Rule** and **Effectivity Group** columns show the information of the primary structure (for example, in the case of a process structure where configurations of composition structures are also stored).

If you want to see the saved searches belonging to other users, select **Show searches shared by other users**.

- B. (Optional) View the detailed configuration of a search object by right-clicking it in the list of searches and choosing **Show Configuration**.

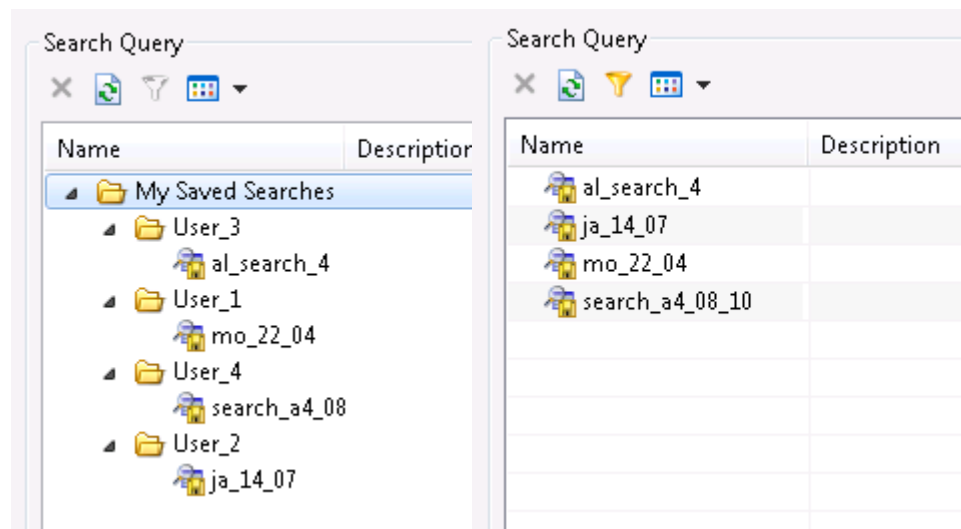
The resulting **Configuration** dialog box shows the configuration of all composition structures associated with the primary structure.

- C. (Optional) Filter the list of searches by clicking .

- D. (Optional) Click the arrow beside the **Change your view** button  and select the format in which you want to display the saved searches. The tree view allows you to display the folders that you create in the **Save Search** dialog box, and the table view displays all the searches in list form.

Tree view

Table view



2. Select a load option.

- **Load search criteria only**

Loads only search definitions so you can reuse a complex definition on a different structure or scope. If the criteria includes the proximity search (and, therefore, a proximity part, which is structure dependent), you must have the same structure open to load the proximity part; otherwise, Teamcenter ignores the proximity criteria.

- **Load search criteria and scope**

Loads the search definitions and the original search scope so you can re-execute the search and to display refreshed results.

- **Load search criteria, scope and results**

Loads everything that is available in the saved search (scopes, definitions, and results). This option is selected by default. If the object selected in the table does not have results stored, Teamcenter loads only the search criteria and scope by default.

3. Click **OK**.

Teamcenter loads the object including those parameters that you specified. The loaded structure lines represent the current state of the structure. These may differ from the lines that were saved with the object. Consider these situations:

- If structure line properties or occurrence notes were changed after saving, the new values of the properties or occurrence notes are displayed in the loaded results. You do not receive any indication about changed values or inconsistent results.

- If the item revision was changed after saving the results and the **Latest Working** revision rule is set, the new revision is displayed. You do not receive any indication about changed item revision or inconsistent results.
- If the structure line was deleted or moved to other place after saving, the saved BOM line is loaded in the results. Teamcenter displays information about inconsistent results in a tooltip on the result tab. You must then update the saved search.
- If changes include a later revision of the top-line item, Teamcenter considers the structure to be the same structure and tries to find all the search result lines in the structure.

Change the structure of the saved searches tree

1. Right-click the folder or the search that you want to move and choose **Cut**.
2. Right-click the parent folder and choose **Paste** to place the folder or search object inside the parent folder.

Open a copied search

When you save a search, by default, Teamcenter stores it in the **My Saved Searches** folder in My Teamcenter. You can copy this search and open it in Manufacturing Process Planner, Multi-Structure Manager, or Multi-BOM Management. You can also add the saved search to the **Favorites** list and copy it from there.

1. Find the desired search in My Teamcenter and copy it.
2. In the **Structure Search** view, click **Open the copied search object** .

Teamcenter displays the **Load Search** dialog box asking if you want to apply the saved configuration to the search.

3. Choose **Yes** to run the copied search or **No** to select a new search.

Change the properties of a saved search

1. In the saved search table, right-click a search and choose **Edit Properties**.
2. In the **Check-Out** dialog box, click **Yes** to check out the properties form.

Teamcenter displays the **Edit Properties** dialog box where you can edit a variety of properties. The properties most pertinent to the saved search are:

- **Name**
- **Description**

- **Is Shared?**

3. Edit the desired property and click **Save and Check-In**.

Filter data in the Auto Filter dialog box

The **Auto Filter** dialog box narrows down the search results according to conditions that you create in the **Filter Condition Editor**.

- The **ALL** option displays properties for all the children of the object currently selected in the component view.
- You can use the **Filter Condition Editor** to create condition expressions for filtering the display.
- Expressions cannot be edited after they are listed in the **Auto Filter** dialog box, but they can be deleted.
- Teamcenter retains your filter condition expressions until you delete them.

To create conditions, click **Add a new search condition**  to display the **Filter Condition Editor**.

- To create an initial condition expression, select a property column value and a logical operator, and then enter an object value or select one from the list of objects displayed in the table, and then click **Add a new search condition** .

Note:

The **= =** operator tests for an exact match. The **=** operator tests for a match but is not case sensitive.

- To expand the expression with additional conditions, use the **ADD** and **OR** operators.
- Click **Remove the selected condition(s)**  to delete the selected condition line.
- Click **Clean all the conditions**  to delete the entire expression.
- Click **...not meet the condition(s)**  to negate the selected condition.
- Click **OK** to add the condition expression to the **Auto Filter** dialog box.

Update a saved search

After loading a search, do one of the following:

- Rerun the search to get the latest results.

- Modify the search definitions and click  to update the same saved object with new data. If you loaded a shared search belonging to another user, you must have write access to update the search.
- If you load both search definitions and results and modify the search definition, rerun the search to update the saved search object.
- Save the modified search as a new object by using the **Save As** menu command.
- Change whether the search is shared.
 1. In My Teamcenter, find the search in the **My Saved Searches** folder.
 2. Edit the **Is Shared?** search object property.

Delete a saved search

Do one of the following:

- In My Teamcenter:
 1. Expand the **My Saved Searches** folder.
 2. Select the search object you want to delete.
 3. Click  in the toolbar.
- In the **Structure Search** view:
 1. Open the **Save Search** dialog box.
 2. Click **Create In**.
 3. Select the search object you want to delete.
 4. Click **Delete** on the right.
- In the **Structure Search** view:
 1. Open the **Load Search** dialog box.
 2. Select the search object you want to delete.
 3. Click  in the **Load Search** dialog box.

If you delete the search object currently loaded in the **Structure Search** view, the search context is cleared from the view.

Entering search criteria

About search criteria

Each type of query that you select has its own criteria that you can use to define a search. You can always refine your search by combining it with one or more of the criteria in the general criteria section.

Alternatively, you can load a saved search which populates the search criteria from the data stored in the search.

Enter item ID or item attributes search criteria

To search for items whose identifiers, names, attributes, or types match a specific pattern:

1. Type an item ID or item name directly into the boxes. For example, you can type **57h*** into the **Item ID** box to find all items whose ID starts with **57h**.

When you click outside the box, Teamcenter enters the search criteria into the **Item attributes** box.

2. Click ... beside the **Item attributes** box to specify additional attributes to be taken into consideration for the search. The search result must fulfill all specified search criteria.

You can also immediately open the **Item Attributes** dialog box without previously specifying an item ID or name.

3. (Optional) Filter the search with saved search criteria by clicking **Change**.

Teamcenter displays the **Change Search** dialog box. You can choose any of your saved searches or system-defined searches to filter the basic search results.

Note:

The **Search** and the **Clear All** buttons are available only after entering criteria in the **Item attributes** box. You cannot perform a search or save one until this box is populated.

Enter Enterprise BOP search criteria

If you work with enterprise bill of process structures, you can you can search by a logical designator.

1. In the **Query Type** box, select **Logical Designator**.
2. In the **Result Type** box, select the type of result for which you want to search. You can search for a process or an operation.

3. In the **Logical designator** box, do one of the following:

- Type a logical designator. You must follow the convention of serializing the logical designator.
- You must specify the searched values of the fields in the order they appear in the logical designator form.
- You must separate the searched values by the logical designator delimiter, defined by the **MELogicalDesignatorDelimiter** preference (; by default). Do not use leading or trailing blanks. For example, if the logical designator consists of four fields, and the search should find logical designators whose first field (a string) equals **SubsystemX** and whose third field (a number) equals five, the serialized filter is **SubsystemX;;5;**.

When you type the filter value, Teamcenter does not check for validity (for example, compatibility with the types of the fields or conformance with LOVs).

- Click

Teamcenter displays the **Logical Designator** dialog box. This dialog box includes all the fields that comprise the logical designator class that is related to the object type you chose in the scopes section.

- Enter search criteria in the available boxes.

Boxes that are defined as mandatory in the logical designator form are marked with an asterisk but they are not mandatory in this dialog box.

- Click **OK**.

4. Click **Search**.

Enter occurrence note search criteria

- Click the ... button to the right of the **Occurrence Notes** box to 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 the work instruction manual that describes how to assemble the part. You can search for all parts illustrated in the appropriate section of the manual.

Enter spatial filter 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 **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. 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

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**

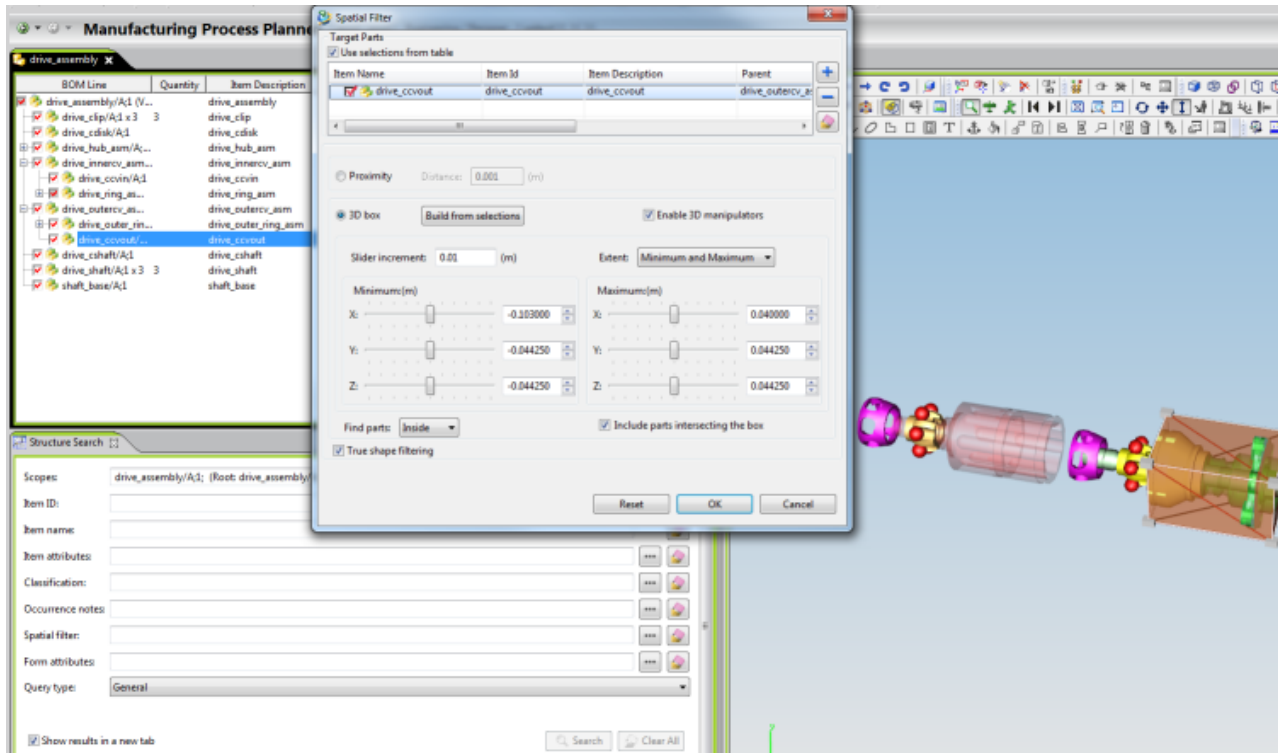
If checked, the search returns parts that intersect the bounding box, as well as parts that are fully inside or outside it. This option is enabled only if you select the **True Shape filtering** option.

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.

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. 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.

2. To remove a target part, select it in the table and click the – button.

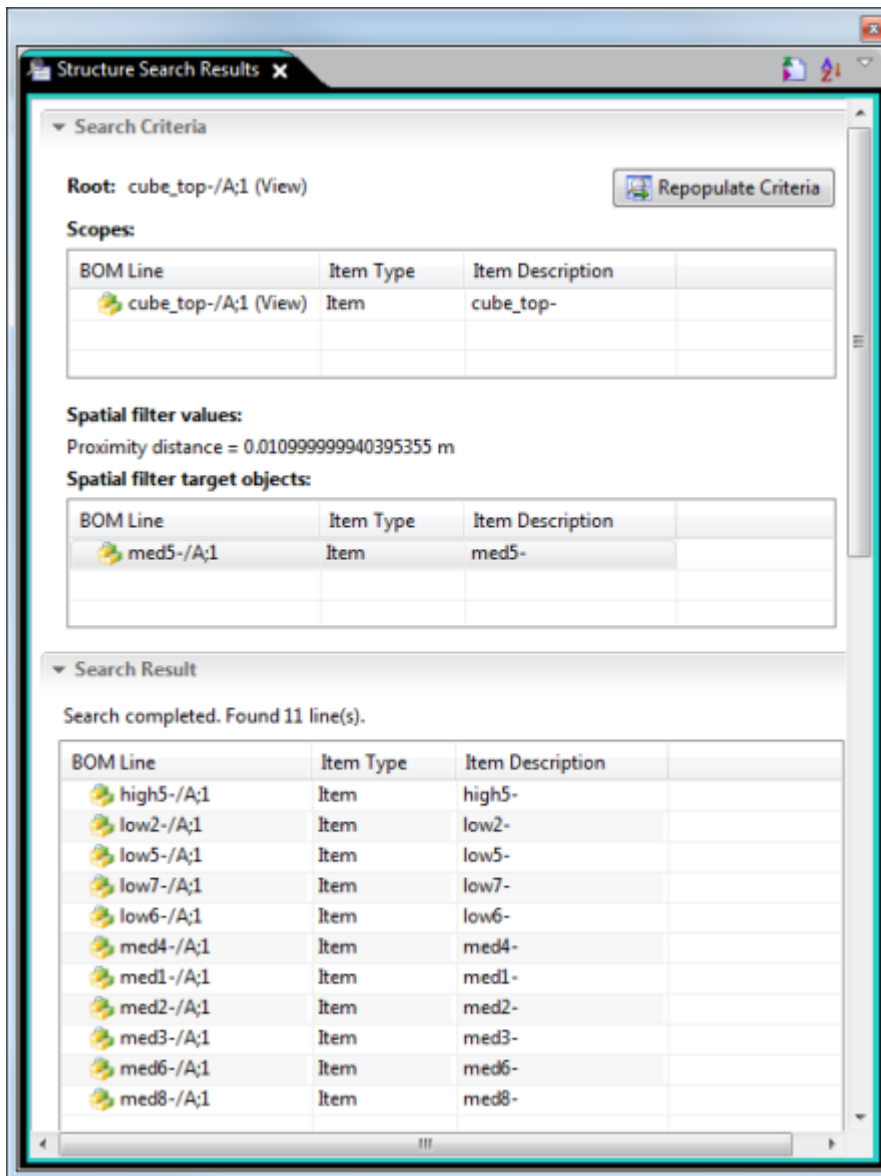
To clear the table of all entries, click .

3. 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.

4. **Perform a spatial search.**

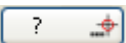
Teamcenter displays the **Search Results** pane containing the results of the spatial search.



Enter classification 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 here (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 main section of the **Search** view.

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.

- a. Select the relation, parent, and form type for which you want to search.
- b. Click **+** to add a line.
- c. Enter or modify the property name, operator, or searching value by clicking in those cells in the table.

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"

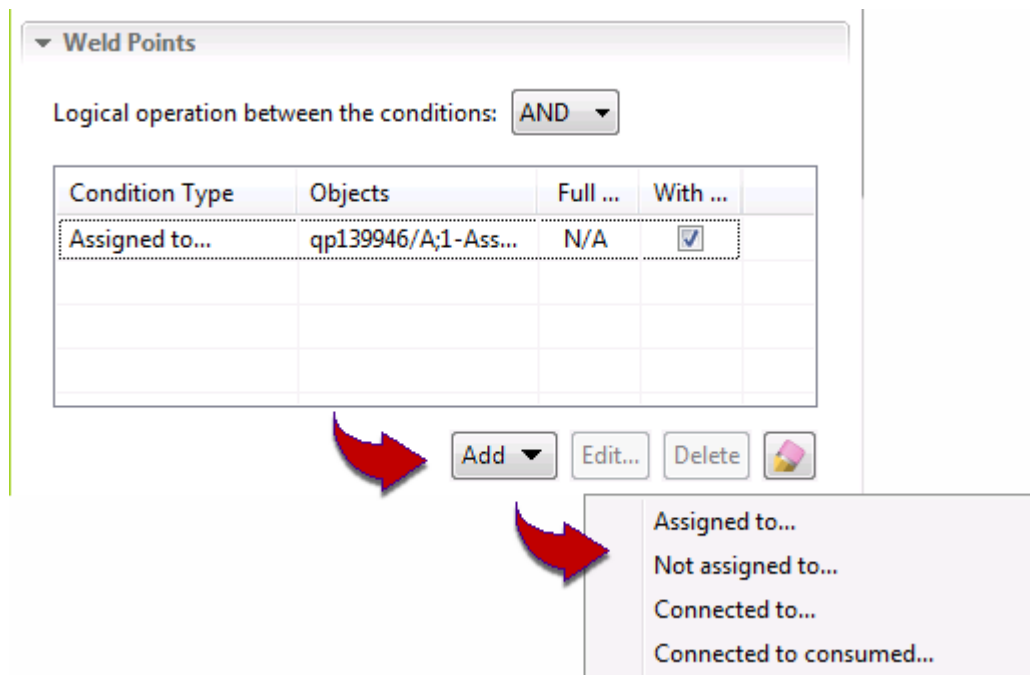
Enter feature criteria

Feature criteria comprise a selection of conditions that you create, and then join by **AND** or **OR** logical operators to form a search query. You can refine this search by combining it with criteria from the **General** search. These are combined using an **AND** operator.

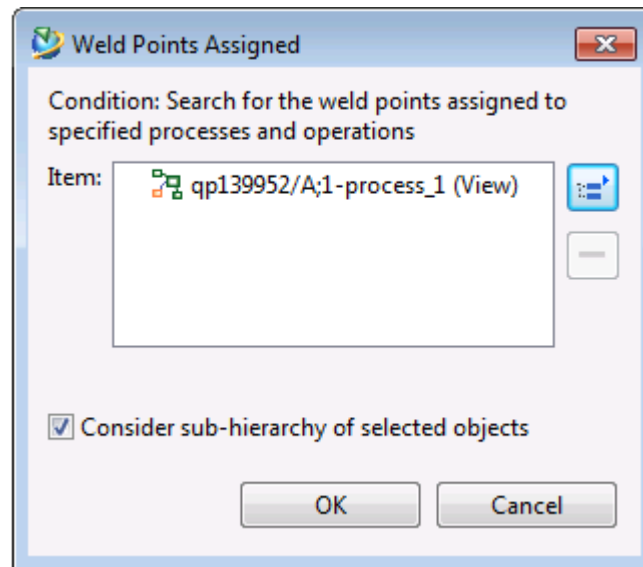
1. Open the appropriate search criteria section of the **Structure Search** view. For example, open the **Weld Points Criteria** section to perform a weld point search, or the **Arc Weld Criteria** section to perform an arc weld search.
2. Click the **Add** button.
3. Select one of the conditions and click **Add**.

Teamcenter opens a dialog box where you can specify the processes, operations or parts on which to perform the search. This dialog box is modeless so that you can select the appropriate object for the search. The add button on the dialog box is enabled only when you select the appropriate object for the condition. Also, at the time of adding the condition, if Teamcenter already has valid objects selected, those get added to the list automatically.

4. Enter the condition data for each of the conditions by clicking **Add**.



In each of these condition dialog boxes, you specify the scope by selecting an appropriate structure line and clicking the **Add** button .



You can remove the line, if necessary, by clicking **Remove** —. Select the **Consider sub hierarchy of selected objects** option to expand the search to include all children of the specified process or operation.

- **Assigned to**

Teamcenter searches for all the features assigned to specific processes and operations. The scope for this condition is a process or operation.

- **Not assigned to**

Teamcenter searches for all features *not* assigned to the specified processes or operations.

- **Connected to**

Teamcenter searches for all features connected to specified parts. The scope for this condition is an item in a product structure. You can only select parts from the same product structure from which the search is initiated. Select **Full Match** to return features that are connected only to the specified parts (or to several of the specified parts, if multiple parts are listed).

- **Connected to consumed**

Teamcenter searches for features connected to parts that are consumed by the specified processes and operations. The scope for this condition is a process or operation.

- Select **Consider In Process Assembly in addition to consumed parts** to find all features in the search scope that are connected to parts in the incoming in-process assembly of a given process.

- Select **Consider Dynamic In Process Assembly** to find all features in the search scope that are connected to parts in the incoming dynamic in-process assembly of a given process.
- Select **Full Match** to return features that are connected only to the consumed parts.
- **Assigned to Previous Station** (available only for datum points).

Teamcenter searches for all datums assigned to the previous stations of the given process or operation, as defined by the process flow in the **PERT** view. It also searches for datum points assigned to the root process or operation directly.

5. Select a logical operator.

- **AND**

Each condition (row) in the condition table must be fulfilled by the search result.

- **OR**

One or more of the conditions (rows) in the condition table must be fulfilled by the search result.

You can only specify one logical operator for the entire condition table.

6. Click **OK**.

Teamcenter adds the condition type to the condition table and completes the column entries.

7. (Optional) Perform one of these actions:

- Edit columns that are applicable to the chosen condition in the table cell.
- Edit a row in the table by selecting it and clicking **Edit**.

Teamcenter opens the condition dialog box.

- Delete a row in the table by selecting it and clicking **Delete**.

8. Click **Search**.

Teamcenter runs the search and displays the results in the **Structure Search Results** view. If you selected **Show results in a new tab**, Teamcenter creates a new **Result** tab for each time you run the search.

Manage the search results

About search results

Search results are displayed in the **Structure Search Results** view. This view has two sections:

- **Search Criteria** section

This section displays the scope and the search criteria that you specified in the **Structure Search** view. The contents of this section vary depending on which type of search you ran and which criteria you entered.

- **Search Result** section

This section contains a table of individual lines representing the search results. Teamcenter displays the search results as individual lines without indication of any structure.

Each time you run a new search in the **Structure Search** view, you can specify whether you want the search results to open in a new tab in the **Structure Search Results** view or replace the contents of the current tab. If you move from result to result (tab to tab), you can update the search criteria displayed in the **Structure Search** view using the **Repopulate Criteria** button.

When Teamcenter displays the result of a search, the selection in the search results table is synchronized with the selection in the structure view. When you select an object in the **Structure Search Results** view:

- If the object is expanded in the structure that is being searched, Teamcenter automatically selects and shows the object in the originating structure.
- If the object is not expanded, the synchronization depends on the **MEEExpandToSelection** preference. If the value is **true**, the application partially expands the object and shows it in the originating tree. Otherwise, the selection is not synchronized in the originating structure.

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.

Lines in the search results table are actual BOM lines, and you can use the same shortcut menu commands for these objects as you do for any structure line in the structure pane.

The **Structure Search** view is dependent on the configuration changes applied to the originating tree structure, such as showing configured or unconfigured, revision rules, or configuration by occurrence group. Changing the configuration of the structure pane causes the **Structure Search Results** view to clear all relevant tabs.

Removing a line from the originating structure removes only this line from the results list. Unloading the originating tree structure from the application causes the **Structure Search** view to clear all relevant tabs.

If you unload the originating tree structure from the application, causes the **Structure Search** view to close all associated tabs. The same thing happens if you change the configuration of the originating structure.

View and manage the search results

In the **Structure Search Results** view, do one of the following:

- View search result lines in original structure.

In the context menu, use the **Find** menu commands to find the search result line in the structures loaded in the structure view.

- Copy or drag lines from the search results table.

You can copy and paste lines from the search results table to structures in the structure view. In addition, you can drag lines from the search results table to structures in the structure view. When doing this, the behavior is the same as if you drag the line from the searched structure itself. If you drag the search result line to a structure other than the searched structure, it is as though you copied the line in the searched structure and pasted it into a new structure.

- In the **Search Criteria** section, click **Repopulate Criteria**. This is useful if you navigate between several search result tabs. As only one **Structure Search** view is available, you can use the **Repopulate Criteria** button to update the **Structure Search** view with the search criteria active for the current **Structure Search Results** tab.
- Customize the column display.
 1. Click the **View Menu** button ▼ and choose **Columns** from the view menu commands located in the top-right corner of the **Structure Search Results** view.

Teamcenter displays the **Column Management** dialog box.
 2. Select the desired columns from the **Available Properties** list and move them to the **Displayed Columns** with the right arrow.
 3. (Optional) Modify the order the columns appear in the search results table using the up and down arrows.
 4. Click **Save**.

The columns names and widths that are initially displayed in the search results list are configured by the **MEAdvancedSearchResultsViewColumnsShownPref** and **MEAdvancedSearchResultsViewColumnsShownWidthPref** preferences.

5. (Optional) Save the column layout by choosing **Save Column Configuration** in the view menu commands. You can restore a saved column layout by choosing **Apply Column Configuration** and selecting the saved configuration from the list.

- Find individual search results.

Choose the **Find in Display** command from the view menu commands to define criteria and apply them to the results list. Objects fulfilling those criteria are selected in the results list.

- Copy selected table data to the operating system clipboard. You can then paste this into any document, for example a Word or Excel document.
- Export to Word and Excel.

Choose the **Objects to Word** or **Objects to Excel View Menu** commands to export search results to Microsoft Word or Excel.

- Sort the search results.

You can sort the search results by clicking on the column header or by clicking the **Sort** button  to open the **Sort** dialog box to define a more advanced sort. You can specify a primary, secondary, and tertiary sort order for the columns.

- Hide the display of an object in the viewer.

You can hide or display a search result line in the assembly viewer. Select an object from the results list, and choose **Display** option from the shortcut menu. If the assembly viewer is open, the user sees the selected object in the graphical viewer beside the originating tree.

Managing intermediate data captures

About intermediate data captures

An intermediate data capture (IDC) is a PLM XML file that contains an exported structure with the configuration in effect at the time the IDC is created. An IDC may contain any configured structure including a collaboration context, structure context, or group of BOM lines. 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, running accountability checks, and controlling access privileges with Access Manager.

After you create an IDC, it appears as a separate structure view and an entry for it appears in the **Collaboration Context Tree** view.

After creation, you can compare an IDC to existing structures. For example, if you create an IDC from a product structure, and then make modifications in that product structure, you can run an accountability check that compares the IDC to the modified structure to see the modifications.

To compare IDCs with each other or another structure, each line being compared must contain an in-context ID. Your administrator can run the **bom_expand** utility to ensure that each relevant line in the structure is stamped with an in-context ID.

When you create an IDC, Teamcenter uses transfer modes to export the structure and alias files to determine what to include in the IDC viewer. If you want to export custom objects or properties to the IDC, you must ensure that a transfer mode exists that contains clauses that includes these objects. You must also ensure that the alias files are modified to include the desired objects. If you want to see these objects or properties in the IDC viewer in the rich client, you must modify the alias files so that the viewer can extract them from the request object's XML. The location of the various alias files is found in the following preferences:

- **Structure_Alias_File**
- **Attachment_Alias_File**
- **Dataset_Alias_File**

For more information about using transfer modes, see *Tc XML and PLM XML Configuration for Data Import and Export*.

An intermediate data capture structure is view-only. You cannot make changes to this structure.

There are various views available when working with an IDC, such as the **Attachments** view and the **Graphics** view.

Capture structures in an IDC

1. Select the root object in the structure and choose **Tools→Intermediate Data Capture**. You can capture BOM lines, an occurrence group, a structure context with multiple roots, or a collaboration context containing multiple structures.

Teamcenter displays the **New Intermediate Data Capture** dialog box.

2. Select the type of IDC you want to create in the list on the left.
3. Type the name and optional description of the intermediate data capture, and select the appropriate transfer mode name from the list.
4. To open the IDC in Part Planner, select **Open on Create**. If you do not select this option, you can find the IDC in the **Newstuff** folder in My Teamcenter.

5. Click **OK** or **Apply**.

Teamcenter validates the objects you selected. If any of the objects cannot be captured, Teamcenter displays an error message, otherwise it creates the PLM XML file containing the IDC and displays it in a structure view.

6. (Optional) Open the IDC in the **Viewer** view in My Teamcenter or in the **Object View** tab in Multi-Structure Manager to see a list of the captured states, including their descriptions and creation dates.
7. (Optional) If you make changes to the originally captured structure, create a new captured state in My Teamcenter or Multi-Structure Manager by clicking **Add State**.

Running accountability checks

Visually compare EBOM to MBOM or BOM to BOP part assignments

You can use a quick 3D visual confirmation of which parts are and are not assigned from a source to a target structure rather than compare structure names and IDs. When aligning EBOM to MBOM or BOM to BOP, you can visually identify which parts are unassigned in the source graphic view, and which are already assigned in the target graphic view. You can also review the target and source assignments from the **Advanced Accountability Check** dialog box or more quickly from the **Multi-BOM Management** toolbar.

Note:

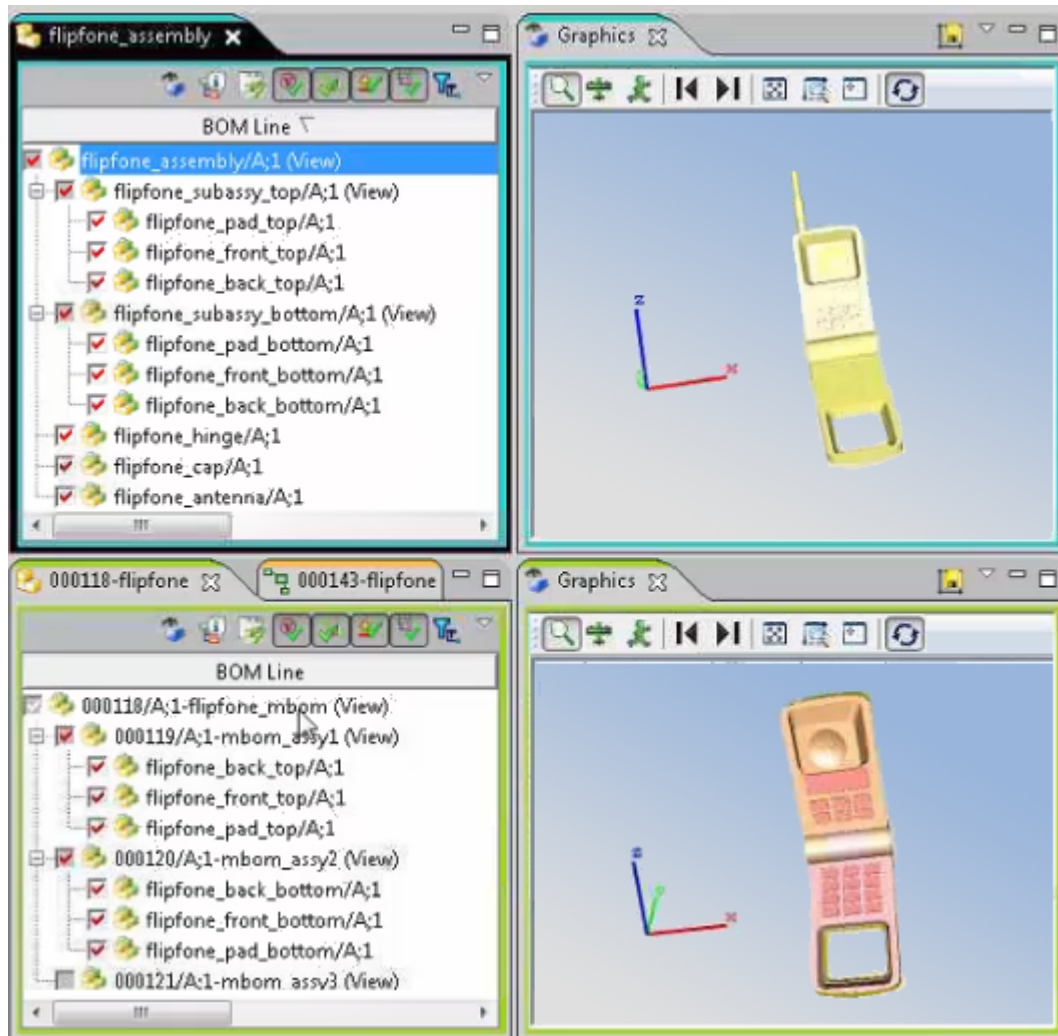
Your administrator can also hide those parts assigned to the target in the source graphics view, and hide unassigned parts in the target graphics view, using the **MEDisplayOnAssign** preference.

1. Load EBOM and MBOM and link both the structures. To link an MBOM to an EBOM, right-click on the MBOM top node and choose **Link/Associate** → **Link structures**.
2. If you want to compare part assignments using an advanced accountability check, create an advanced accountability check favorite for BOM-BOM compare and apply that favorite name as the value of the **MEAssignmentIndicationDefault** preference.

Tip:

While running an advanced accountability check, you can save it as a favorite by clicking  on the **Scope** tab of the **Advanced Accountability Check** dialog box.

3. If you have not already done so, assign EBOM parts to the MBOM.
4. In both structure views, load graphics views by clicking .

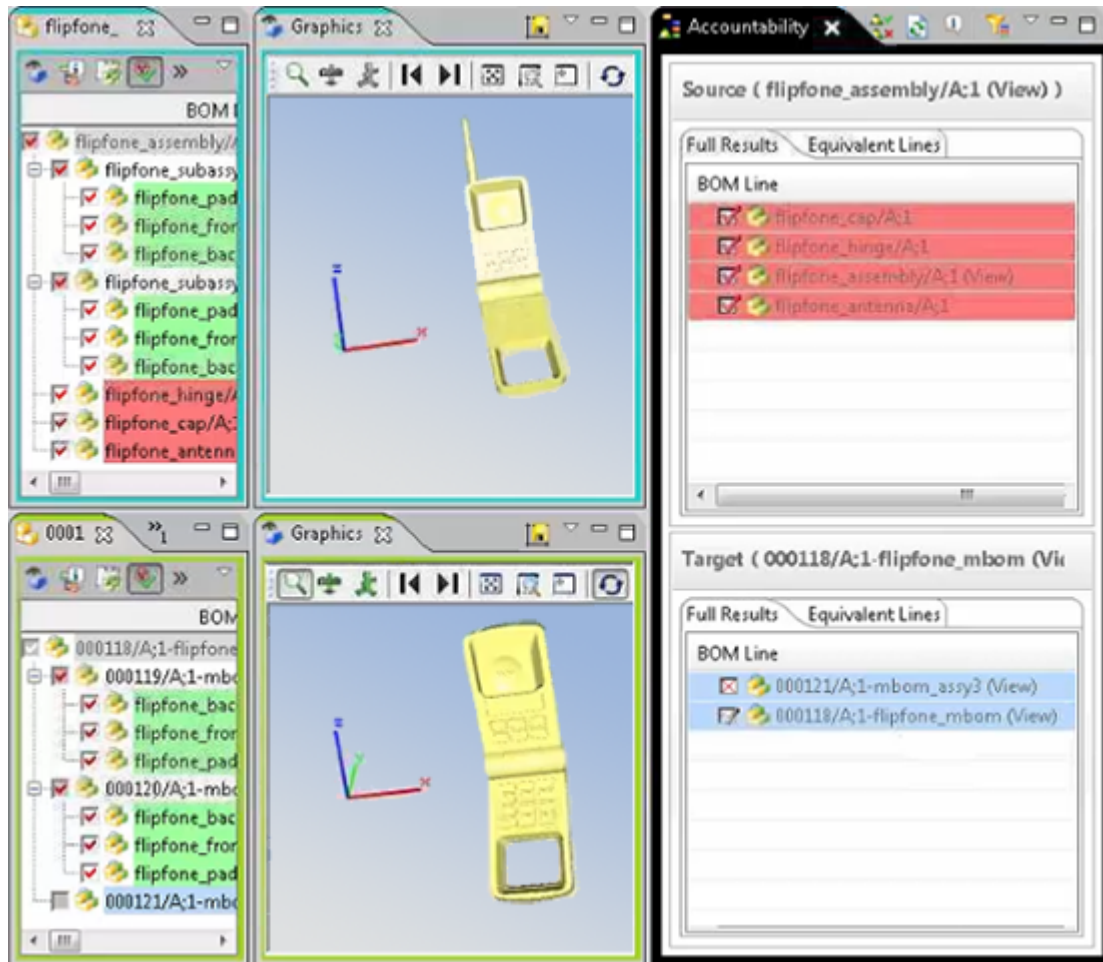


5. Select the top BOM lines in the source and target views.
6. If you want to compare assignments:
 - Using an advanced accountability check:
 - a. Choose **Tools** → **Advanced Accountability Check**.
 - b. In the **Advanced Accountability Check** dialog box, click **OK**.

In the structure views, parts that are:

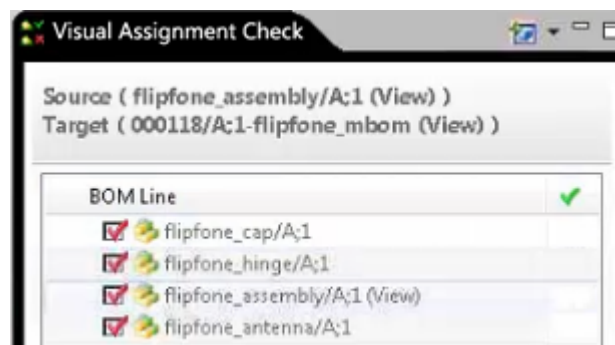
- Shared by both structures are highlighted in green in the structure views.
- Only in the source structure view are highlighted in red in the source structure and source accountability check views.

- Only in the target structure view are highlighted in cyan in the target accountability check view.



- c. In the **Advanced Accountability Check** toolbar, click **Visual Assignment Check** .

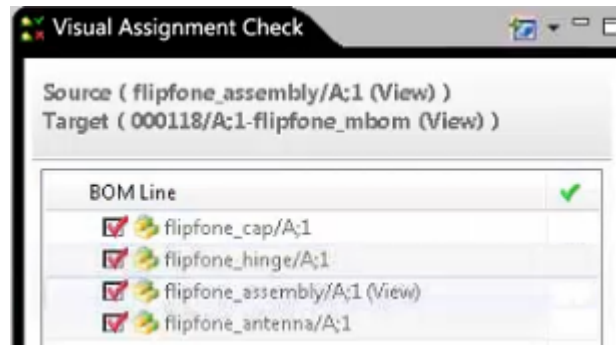
The **Visual Assignment Check** view is displayed, showing all items not assigned to the target.



- Without running an advanced accountability check:

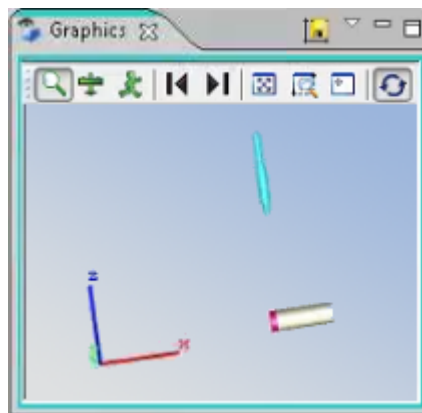
- a. In the **Manufacturing Process Planner** toolbar, click **Visual Assignment Check** .
- b. In the **Check Alignment Completion** dialog box, click **OK**.

In the structure views, parts do not display highlighted colors as they do after running an advanced accountability check. However, the **Visual Assignment Check** view identifies all items not assigned to the target.



- c. **Note:**
If there is an accountability check results view already open, it will get cleared while running **Visual Assignment Check** without accountability check.

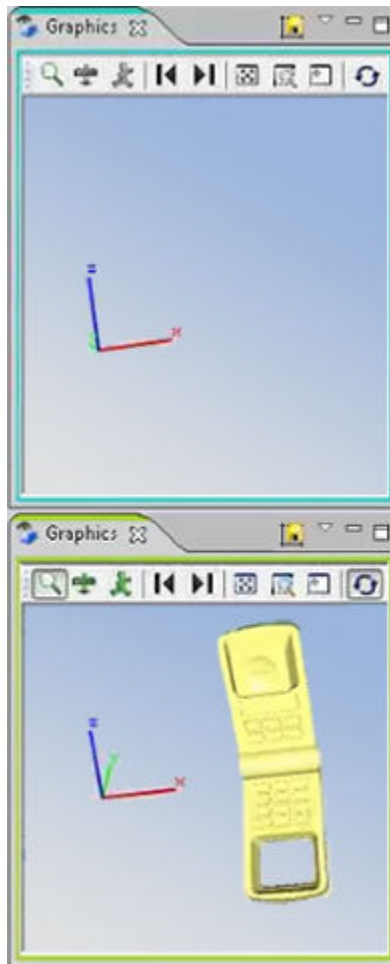
7. To see only those graphics assigned to the target in the source's **Graphics** view, in the **Visual Assignment Check** toolbar, click , and then select **Blank**.



- Note:**
You can also select **Transparent**. The **MEAssignmentIndicationTransparencyValue** preference determines how transparent the unassigned parts are in the source.

8. Assign parts from the source to the graphic window.

Once all parts are assigned to the target, no parts are visible in the source graphics view and all parts are visible in the target graphics view.



Running an accountability check

Running accountability checks

You can compare two structures to ensure all lines in the source structure are accounted for in the target structure. For example, you can compare the EBOM structure to the MBOM structure to ensure all parts and assemblies are assigned or compare the product structure and the process structure to ensure that all occurrences of product components and features are used in the process structure as consumed items. You can compare the entire assembly or only a subassembly to the process structure. These types of comparison are performed using an *accountability check*.

Any differences found during the comparison are reported, as they may indicate problems in manufacturing the product to its specification. However, an imbalance between the structures may not necessarily indicate a problem with the structure itself.

An accountability check or comparison:

1. Traverses the source structure.
2. For each line in the source, finds one or more matching lines in the target structure, according to defined equivalence criteria.
3. For each pair of equivalent lines, identifies if there is a full match or a partial match. A partial match exists if one or more aspects of the structures that you compare are not equal.
4. Colors each line in the structures and, if you have the correct license, opens the **Accountability Check Result** view displaying the full matches, partial matches, and unmatched lines.

The following differences are reported:

- Lines in the source structure that do not have counterparts in the target
- Lines in the source that have more than one counterpart in the target
- Lines in the target that do not have counterparts in the source
- Lines in the source whose counterparts in the target have some significant difference, for example, a different quantity

The analysis is done on the structures as they are configured in the rich client. You can run the analysis with any combination of configuration options on both structures.

If you compare enterprise bill of process structures, you can propagate differences found from a generic BOP to a product BOP, or from a product BOP to a plant BOP.

When setting up the accountability check feature, a power user generally creates favorites—a collection of typical options and settings for different situations. An administrator can publish these favorites for different groups or roles so that regular users can then select one of them to quickly run the comparison.

Run an accountability check with saved settings

1. With the two structures that you want to compare open in structure views, select the appropriate levels and choose **Tools→Accountability Check→Accountability Check**.
2. Verify that the correct structures are listed in the **Source objects** and **Target objects** boxes. If necessary, add structures by selecting them and clicking .
3. In the **Available Settings** box, select the entry that includes the appropriate settings for the accountability check.

Only the settings applicable to the types of structures that you selected as source and target are displayed in the **Available Settings** list.

4. Click **OK**.

Teamcenter runs the accountability check and lists the results in the **Accountability Check** view.

5. Examine the results and make the necessary modifications to the structures.
6. Rerun the check using the same settings by clicking  in the **Accountability Check** view.

Note:

- How far you need to expand the structure depends on the settings in place when the saved setting was created. Ask your administrator for information about how far to expand the selected structures.
- When running an accountability check based on saved settings or rerunning an accountability check, you cannot report the results in occurrence groups or create a printable report. Consider **running an asynchronous accountability check**.

About the Accountability Check view

When you run the accountability check, Teamcenter displays the results in the **Accountability Check** view. This view lists the problematic lines in the source and target and provides a list of conflict details. Lines that are colored in the source and target structures are also colored in the view. Fully matched lines are not listed by default.

Note:

Displaying fully matched lines in large structures can clutter the view

Lines in the **Accountability Check** view behave in the same fashion as lines in the source and target structures. If you remove a line in the view, Teamcenter removes the line from the source or target. You can copy lines from the view into the clipboard, drag them to another structure, or send them to another application.

When you select a source or target line that is marked as having net effectivity or being a partial match, Teamcenter displays the conflicts in a third pane at the bottom of the view. The tabs shown in the **Partial Match** section of the view are dependent on which partial match criteria you selected in the **Partial Match** pane during the check. The table can display information about:

- Properties
- Predecessors (enterprise BOP structures only)
- Assignments (enterprise BOP structures only)
- Hierarchy (enterprise BOP structures only)

When you select a line in the source section of the **Accountability Check** view, you can click the **Equivalent Lines** tab in the target section of the view to find the lines in the target structure that match the selected source line, and vice versa. These lines are then selected in the visible structure views.

When you work through the accountability check results, resolving conflicts, the accountability check results are not updated—the lines remain highlighted in the original check colors. To update the lines, you must rerun the accountability check. You can do this using the same settings by clicking  in the **Accountability Check** view.

Note:

The **Accountability Check** view is not displayed when one or both of the structures being compared is an intermediate data capture.

Display the partial compare results

After running an accountability check, you can view the partial compare results. Do one of the following:

- Select a partial match line in either the **Source** or **Target** section of the **Accountability Check** view.

Teamcenter displays the partial compare results in the **Partial Match** section at the bottom of the view.

- Right-click a partial match line in the structure pane and choose **Partial Compare Results**, or choose **Tools→Accountability Check→Partial Compare Results**.

Teamcenter displays the **Partial Compare Results** dialog box.

View settings used to run the accountability check

You can display a read-only listing of the settings in force when you ran the accountability check report.

- Click  .

Teamcenter opens the **Accountability Check Settings** dialog box displaying the scope and configuration in effect at the time the check was made. This is not necessarily the same as the currently active configuration.

Filter accountability check results

When you run the accountability check, you can select check criteria in the **Accountability Check** dialog box. After running the report, you may find that the **Accountability Check** view shows too many results and the display is cluttered. You can filter out some of the check criteria in the view to make it more readable without having to rerun the accountability check.

1. Click **Filter**.

2. Clear the categories that you want to hide in the view and click **OK**.

Teamcenter displays only those categories that are selected in the **Filter** dialog box. The filter button is turned on when you remove the check mark from any categories to indicate that filtering is applied.

Using the Accountability Check view options

The **Accountability Check** view provides a multitude of options that are common to many views.

Do any of the following:

- Find individual objects in the view.
- Customize the column display.

Mark broken links

The accountability check can help you find all the lines with broken links below a selected process.

1. Make sure the associated product structure is loaded.
2. Select one or multiple processes or operations and choose **Accountability Check→Mark Broken Links**.

Teamcenter finds all broken link lines below the selected process or processes, partially expands the structure to display them, and colors the background red. Each time you run the **Mark Broken Links** command, the marking of broken link lines is additive. The display is not cleared before the command is run.

You can modify the color of the marking in the **MEAccountabilityMarkBrokenLinksColor** preference.

3. (Optional) Reconcile the broken links.
4. (Optional) Clear the background colors by choosing **Accountability Check→Clear Accountability Check Display**.

Tip:

If you use this feature often, you can add the **Mark in Broken Links** button  to the menu bar.

Mark lines in the base view

If you run an accountability check and report the results in occurrence groups, you can mark a selected line in the occurrence group in the base view.

1. Select a child line that is directly under an occurrence group and choose **Accountability Check→Mark in Base View**.

Teamcenter selects the base view tab, partially expands the structure to the marked lines, and colors the background light green. Each time you run the **Mark in Base View** command, the marking of lines is additive. The display is not cleared before the command is run.

You can modify the color of the marking in the **MEAccountabilityMarkInBaseViewColor** preference.

2. (Optional) Clear the background colors by choosing **Accountability Check→Clear Accountability Check Display**.

Tip:

If you use this feature often, you can add the **Mark in Base View** button  to the menu bar.

Clear display

You can reset all background colors on objects in the active window and their corresponding objects in the process window to the default colors.

- Choose **Tools→Accountability Check→Clear Accountability Check Display**.

Note:

The command works only if either the source view or the target view is the active window.

Running an advanced accountability check

Understanding line equivalence

When comparing product and process, the standard accountability check comparison is based on the assignments between the structures. When comparing two process structures, Teamcenter additionally uses the in-context ID and any common assignments to the same product to determine equivalence. Because the accountability check is based on the assign action, it does not compare by item ID and does not recognize if a line is copied from another structure or from the **Newstuff** folder.

Types of structures you can compare and propagate

Using an accountability check, you can compare the following pairs of source and target structures:

- EBOM and MBOM to see which of the EBOM parts are aligned to the MBOM
- Product and product

After comparison, you can propagate changes between the compared structures.

Note:

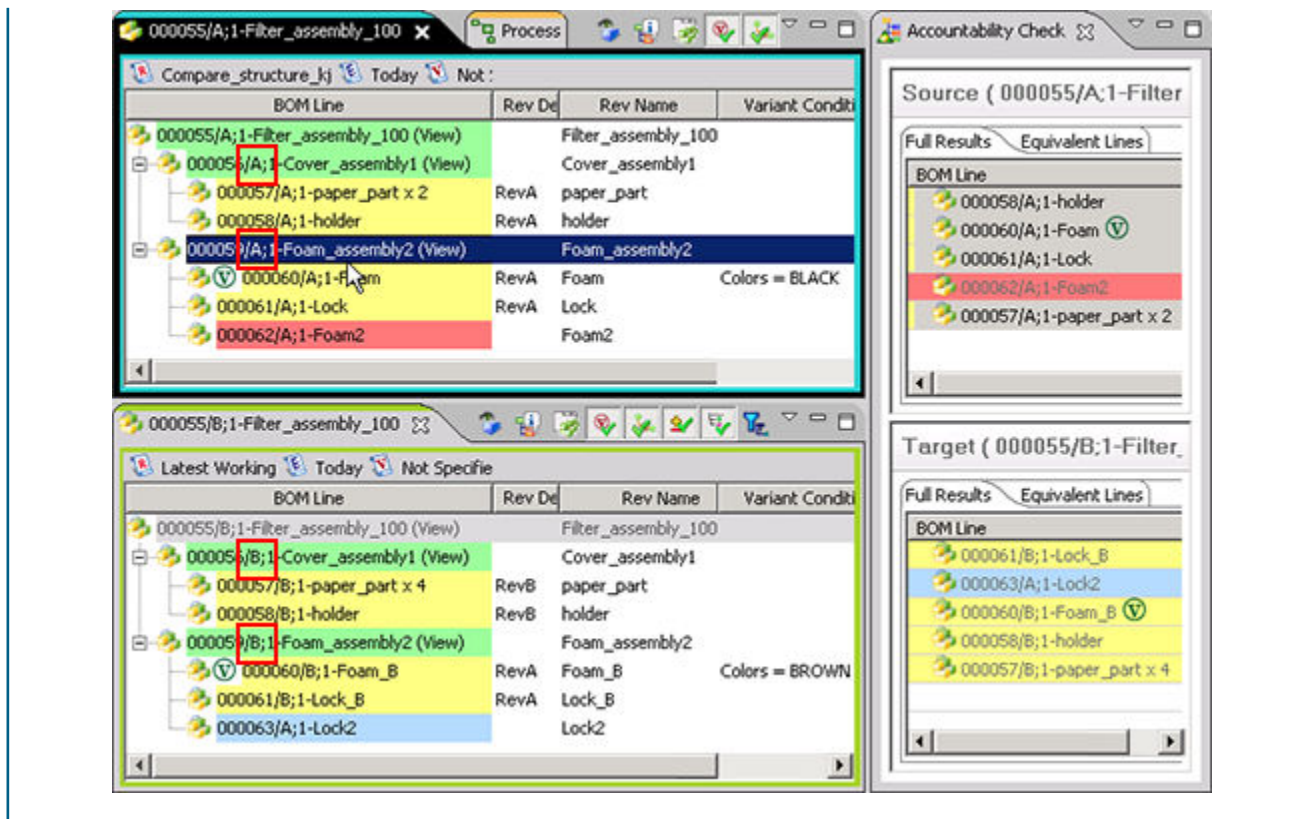
BOM-BOP propagation depends on the properties mentioned in the **MEAssignProperties** preference.

The following is an overview of the types of structures you can compare.

	Target			
	BOM	Part BOM	IDC	4GD
BOM	X		X	
Design BOM		X		
IDC			X	
4GD	X			

Note:

You can compare two revisions of the same BOM, BOP, or plant BOP structure. You can compare item IDs, item revisions, item revision and BOM line attributes and properties, and quantity for pack/unpack lines. This provides a better understanding of what has changed from one structure event to another, including which objects were added or changed, which were updated, and which remain the same. To compare two revisions of the same structure, open each in its own structure and run an advanced accountability check using the top lines as source and target.



Run an advanced accountability check

As an advanced user, you can set a variety of options before you run an advanced accountability check. If you save these options as favorites, you can repeat the advanced accountability check using the same options.

Note:

To run an advanced accountability check, you must have two linked source and target structures to compare. These are typically a source engineering bill of materials (EBOM) generated from a design BOM that is exported from a CAD application such as NX or CATIA, and a target manufacturing BOM (MBOM) created for specific manufacturing needs from the EBOM. When the EBOM is updated, the MBOM must be compared and updated as well. This is the purpose of an advanced accountability check: the two structures must be examined to ensure that they share equivalent BOM lines.

1. Select the source objects in the source pane.
2. Select the target objects in the target pane.
3. Select source and target objects in structure views and open the **Advanced Accountability Check** dialog box by choosing **Tools→Accountability Check→Advanced Accountability Check**. Use one of the following methods:

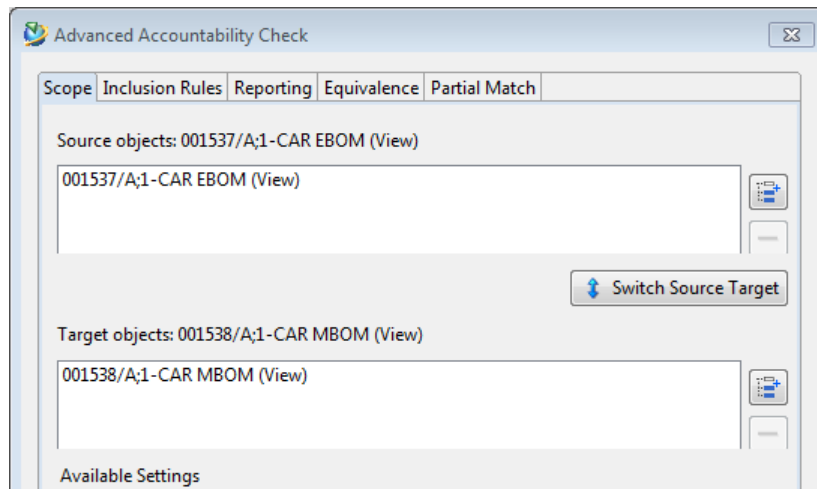
- Select a source line, open the dialog box, and then select a target line and click **Set/add current selection**  beside the **Selected target objects** box.
- Select the source and target lines in the structure views, and then open the **Advanced Accountability Check** dialog box.

Tip:

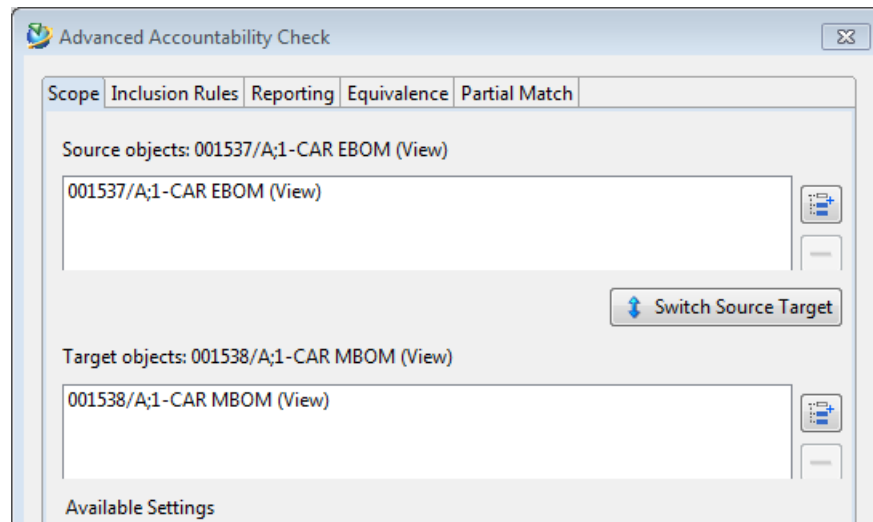
As long as only the source and target views are open, Multi-BOM Management autodetects and adds the correct source and target lines to the **Source objects** and **Target objects** boxes.

Note:

You must select at least one line before you can open the **Advanced Accountability Check** dialog box.



4. (Optional) Change the source or target object at any time by selecting the desired line in the structure and clicking the respective **Set/add current selection** . You can add multiple scope lines from the same structure or remove a scope line by selecting it and clicking .



5. Ensure that you correctly selected the source and target objects. If not, switch the source and target by clicking the **Switch Source Target** button.
6. Click the **Inclusion Rules** tab, and do one of the following:
 - Select **Search currently expanded source lines** to run the accountability check on the selected lines and all visible lines below the selected lines. Additionally, you can choose to run the accountability check on all the lowest visible (expanded) lines under the selected scope line by selecting **Compare lowest visible level of source**.
 - a. Select **Search lines per filtering rule** to expand the source and target structures and only consider a subset of the lines during the accountability check.
 - b. Select the **Source filtering rule**. For a description of the filtering rules, move your mouse over the list. The rules along with their short descriptions are displayed.

You can specify to which level in a structure you want the check to consider by selecting **Limit search in source/target to first x levels** and typing a value for x.

Note:

For information about filtering rules, see Managing filter rules in the Tc XML and PLM XML Configuration for Data Import and Export.

Note:

When you set these options, the values take effect in all applications that support accountability checks.

7. (Optional) If you know the source and target scope lines to be different because these lines are source and target specific, select the **Do not compare selected lines** check box ☒.

In the advanced accountability check results, the selected scope lines do not appear as missing in target and missing in source.

8. Click the **Reporting** tab and set the result reporting options.
9. Click the **Equivalence** tab and set the equivalence options.
10. Click the **Partial Match** tab and specify the partial match criteria.
11. Click **OK** to run the accountability check.

Teamcenter displays the **Accountability Check** view.

Note:

The number of lines returned in the accountability check is limited by the value of the **MEAccountabilityCheckAllowableReturnedLines** preference. If the number of lines to return exceeds the preference value, a message will be displayed notifying you that there are more lines to be returned, and that an Accountability Check Excel report has been created and stored, thus saving the work.

12. After running the accountability check, examine the results and make any necessary modifications to the structure.
13. Rerun the check using the same settings by clicking  in the **Accountability Check** view.

Note:

- Rerunning an accountability check does not recreate an accountability check report or a result reported in an occurrence group.
- For information about narrowing the scope of the accountability check, see the *PLMXML Export Import Administration Guide*.

Run an MBOM assessment repair

After running an advanced accountability check on a linked MBOM and EBOM, you can search and compare nonequivalent lines using BOM line properties, and synchronize those lines in the MBOM with lines and properties from the EBOM.

1. Run an advanced accountability check on a linked EBOM (source) and MBOM (target) structure with nonequivalent line problems.
2. Choose **Tools**→**Accountability Check**→**MBOM Assessment Repair**.

In the **MBOM Assessment Repair** view, the **Structure for Repair** list displays MBOM scopes in need of repair, while the **Structure for Candidates** list displays EBOM scopes that are candidates that can potentially repair the MBOM scopes

3. From the **Stored Criteria** list, select criteria relevant to the synchronization.

The list may contain mandatory and optional properties relevant to repairing nonequivalent lines, such as the ability to compare or match a property such as an absolute transformation matrix. An administrator can define this list using the **MEMBOMAssessmentRepairDefaultSearchCriteria** and **MEMBOMAssessmentRepairSearchCriteriaList** preferences. Other relevant preferences include:

MEMBOMAssessmentRepairAbsXformAngularTolerance

Defines the proximity value (in degrees) under which variations in the rotation section of a transform are seen as equal. The default value is 0.1 degree.

MEMBOMAssessmentRepairAbsXformTranslationTolerance

Defines the proximity value (in millimeters) under which variations in the translation section of a transform are seen as equal. The default value is 0.001 millimeters.

MEMBOMAssessmentRepairClosureRule

The name of the closure rule used by the MBOM assessment search when **Missing in Target** in the advanced accountability check is not specified.

4. To define criteria relevant to your repair process:
 - a. In the MBOM, add columns containing relevant criteria.
 - b. Click **Edit** and add the property (column) names and relevant values to the criteria table.
5. Click **Search**.

Based on your criteria, in the **Search Result** section (04:31), the **Lines to Repair** column displays misaligned MBOM lines, color-coded using the same display options as those used in the advanced accountability check (■ = full match, ■ = missing in target, ■ = missing in source, ■ = partial match). If matches are found, the **Name** column displays the MBOM line at the top of the line and the EBOM lines below it. The **Repeats** column displays the number of repair lines for which the line is a candidate if that count is larger than 1.

Lines to Repair	Repair Method	Repeats	Name	bl_item_item
 000270/A;1-...			 000270/A;1-...	000270
			 000213/A;1-...	000213
 000250/A;1-...			 000250/A;1-...	000250
 000252/A;1-...			 000252/A;1-...	000252
		4	 000232/A;1-...	000232
 000271/A;1-...			 000271/A;1-...	000271
		4	 000232/A;1-...	000232
 000242/A;1-...			 000242/A;1-...	000242
 000271/A;1-...			 000271/A;1-...	000271
		4	 000232/A;1-...	000232
 000241/A;1-...			 000241/A;1-...	000241

6. If your administrator has not removed the functionality, to automatically preselect a repair method on one-candidate MBOM lines:

- With a partial match in the EBOM, select the **Partial Match** check box.
- That are missing in the EBOM, select the **Missing in Source** check box.

Missing in Source applies only to lines with no number in the **Repeats** column.

Methods are preselected but not yet executed on all MBOM lines that do not have multiple numbers of repair lines.

Note:

- If you select a repair method before selecting either check box, that repair method is not overridden by the automatic repair method. However, if you select and then deselect either checkbox, your manual repair method is cleared.
- An administrator can define the automatic repair methods for these two options using the **MEMBOMAssessmentRepairPartialMatchQuickAction** and **MEMBOMAssessmentRepairMissingInSourceQuickAction** preferences.

7. For each line to be repaired, click in the **Repair Method** column and select a method.
- **Replace** replaces the MBOM line with the EBOM line.
 - **Propagate** updates the MBOM line properties with those of the EBOM line properties.
 - (Missing in source lines with no repair candidates only) **Remove** removes the MBOM line.
8. Click **Repair**.

Tip:

You do not have to apply repair methods to all lines at once. You can apply methods a few lines at a time and observe their effect on the MBOM after which the repaired lines are grayed-out to indicate that the repair has executed. You can then make additional repairs or repeat the search as many times as you like before closing the **MBOM Assessment Repair** view.

A message reports how many of the selected repair methods were applied to the MBOM. If you elected to remove any MBOM lines, in the **MBOM Assessment Repair** view, those lines are grayed-out to indicate that the MBOM lines no longer exist. If you repeat the search, removed lines are no longer displayed.

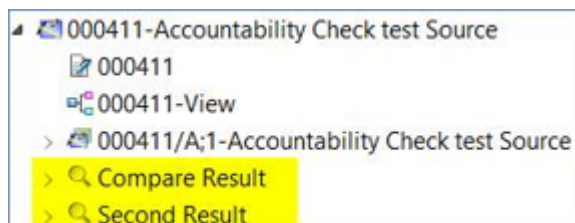
Set the result reporting options

The accountability check displays its results by highlighting the checked objects in the structure pane in a variety of colors that you can change, if desired. To help users who cannot differentiate colors well, a tool tip shows the name of the color. If the name is not available, the tooltip displays the RGB value.

1. Open the accountability check dialog box.
2. Click the **Reporting** tab.
3. Select one of the following:

- **Report in occurrence groups**

Teamcenter can store and display the result of the accountability check in an additional tab in the structure pane grouped by anomaly. This result is only computed for the source item and is stored in the database as a structure of **UsageCompareResultView** objects related to the item of the source revision. You can specify the name for the result of the check. By default, it is named **Compare Result**.



- **Report the selected check criteria**

Teamcenter offers you two methods to visualize the results of the accountability check. You can select one or both of the following:

- Select **Color the compared objects** to color the line and the matching lines according to the match results and color scheme that you set in the **Reporting** section.
- Select **Printable report** to capture the results of the accountability check in an Excel spreadsheet.

4. Check the display options you require:

Option	Description
Full Match	If the object (occurrence) in the source structure has one and only one equivalent in the target structure, both objects are set to the same background color. If you also selected the Partial Match option, a full match also means that all partial match criteria of the equivalent objects match, for example, properties or relations, if you use enterprise BOP structures. The default color is green.
Partial Match	For equivalent objects (occurrences), if one or more partial match criteria are not identical, both objects are set to the same background color. The default color is yellow.
Multiple Match	If objects have more than a single equivalent in either structure and all properties of the source objects are identical to the properties of target objects, all objects are set to the same background color. The default color is orange. Only available when you do not use net effectivity.
Multiple Partial Match	If objects have more than a single equivalent in either structure and in addition, one or more properties are not identical, all objects are set to the same background color. The default color is pink. Only available when you do not use net effectivity.
Effectivity mismatch	Only available when you use net effectivity. For equivalent objects (occurrences), if the net effectivities differ, both objects are set to the same background color. The default color is orange.
Partial & effectivity mismatch	Only available when you use net effectivity. For equivalent objects (occurrences), if one or more properties are not identical and the net effectivities differ, both objects are set to the same background color. The default color is pink.

Option	Description
Missing Target	If occurrences of the source structure are not found in the target, the source objects are set to this color. The default color is red.
Missing Source	If occurrences of the target structure are not found in the source structure, the target objects are set to this color. The default color is light blue.

- (Optional) Change the default color by clicking ... next to the color.
- Set the colors by choosing a color swatch, and setting HSB (hue, saturation, brilliance) or RGB (red, green, blue) values.

Set the equivalence options

- Open the accountability check dialog box.
- Click the **Equivalence** tab.
- Select the comparison options you require:

Option	Description
Equivalent Logical Designator	If you use enterprise BOP structures, the accountability check takes process logical designators into consideration as an additional comparison criteria when checking the process, operation, or partition lines for equivalence. This check box is available only when both structures are enterprise BOP structures.
Equivalent PublishLink Connection	If you use publish links, the accountability check highlights occurrences that are mapped using publish links. If a part occurrence is set to not require positioned design, it is also taken into consideration.

Note:

When checking accountability between structures, the direction of tracelinks is not considered.

Specify partial match criteria

You can specify which data to compare between equivalent lines. You can choose to compare a specific set of properties or, if you are comparing enterprise BOP structures, you can additionally compare any relation type of these lines to other lines. For example, you can compare assignment or predecessor relations.

1. Click the **Partial Match** tab.
2. On the **Properties** tab, select **Consider values of properties when searching for a partial match**.
3. To manually show or hide processing of rolled-up variant conditions when comparing an engineering BOM to a manufacturing BOM, select **Consider values of rolled up variant condition when searching for a partial match**.

Note:

The **Consider values of rolled up variant condition when searching for a partial match** check box is disabled if you are comparing a BOM and a BOP.

You can hide the consideration of rolled up variant conditions even if the **Rollup_Variant_Feature** is set to **true**.

4. Choose the properties that you want included in the accountability check by selecting them in the **Available Properties** list and clicking **+** to move them to the **Selected Properties** list.

The accountability check matches lines in the source and target that have the same properties as those you select in the **Selected Properties** list. Your administrator determines which properties are available for selection in the **AdditionalAccountabilityCheckProperties** preference. Any differences in the selected properties are identified as differences between the structures.

The values of the **DefaultAccountabilityCheckProperties** preference are ignored.

5. If you are comparing enterprise BOP structures, click the **General** tab and specify the object relation criteria for partial match.
6. If you are running an advanced accountability check after allocating operations or processes from a product to a plant BOP, but then create plant BOP- specific operations or processes that do not have origin links and therefore do not want them to appear as missing in source in the accountability check, click the **General** tab and select the **Ignore mismatches caused by creation of objects in the derived structure** check box.

The selected check box ensures that plant BOP- specific operations or processes are ignored while comparing both the structures. Only partial matches for allocated operations and/or processes between the product and plant BOP are displayed.

Specifying partial match criteria for enterprise BOP structures

In addition to comparing properties, when you compare processes, operations, and partitions in enterprise BOP structures, Teamcenter can check the following criteria:

- Product assignment

Teamcenter applies product assignment match criteria only to process and operation lines. It compares:

- Logical assignment definitions

Teamcenter identifies a match if, for each logical assignment of the first process or operation, it finds a distinct logical assignment of the second process or operation. That is, both logical assignments contain the same definition for the product logical designator they use. This assessment can take into account if the compared logical assignments are resolved or if the resolved assignments match.

- Manual product assignments

The identification of a product assignment is based on occurrence type and a match is identified if, for each line under the source process or operation, a distinct equivalent line is found under the target process or operation. They are equivalent if both lines have the same occurrence type and the same absolute occurrence.

The product assignment of the matching processes or operations are checked and must completely match to qualify as a full match. If the product assignments do not match, Teamcenter identifies a partial match.

Note:

For product assignment lines to match by either of the criteria described, they must be assigned from a structure and not from a library or other resource. Consequently, even if the BOP structure uses product items that are not represented in the BOM structure, you must collect them into another structure (for example, the MBOM) before assigning them. If you assign them directly to the BOP as items, the processes or operations to which they are assigned will never qualify for a full match by product assignment.

If one structure's process or operation has more assignments of a particular product than the other, this also qualifies as a partial match. Packed lines are taken into account when determining if the same number of product instances is present.

- Resource (tool) assignment

Teamcenter applies resource or tool assignment match criteria only to process and operation lines. It identifies a resource mismatch by comparing the immediate children of equivalent processes or operations and their respective resource assignments. A resource assignment is identified by its specific occurrence type.

It identifies a match if, for each resource assignment under the first process or operation, it finds an equivalent resource assignment under the second process or operation. It determines equivalence according to the item ID of the assigned resource. As the item ID is the same for different revisions of the same resource, different revisions are considered equivalent and do not cause the resource assignment to qualify as a partial match.

All resource assignments of the equivalent processes or operations must completely match or the processes or operations are considered as a partial match. If the processes or operations have different quantities of a particular resource, it is considered as a partial match. Packed lines are taken into account when determining if the same number of resource assignments is present. However, a difference in the order of the resource assignments does not constitute a mismatch.

- Parent partitions

Teamcenter applies parent partition match criteria to lines directly under partitions. In generic BOPs and product BOPs, these are partition lines and process lines. It identifies a match if the compared lines have equivalent partitions as parents, based on the internal partition ID, origin link, or logical designator.

- Predecessors

Teamcenter uses predecessors to determine the flow in the PERT chart. Equivalent lines that have different predecessors qualify as a partial match.

Teamcenter can optionally compare structure-specific operations. When structure-specific operations are not included in the comparison, Teamcenter checks if an operation is structure-specific. If it is, Teamcenter compares with the operation's predecessor.

- Descendants

Equivalent lines that have different child operations or processes qualify as a mismatch.

Specify object relation partial match criteria for enterprise BOP structures

When comparing enterprise BOP structures, you can compare various types of relations for the two structures.

1. On the **Partial Match** tab of the **Accountability Check** dialog box, click the **Assignments** tab.
2. Select **Consider product assignment when searching for a partial match**.
3. Select the type of product assignment mismatch to compare.
 - Select the types of consumptions you want the comparison to take into consideration.
 - Select **Logical assignment mismatch** to compare logical assignments.

You can choose to compare only the definitions or the definitions and their resolved assignments.

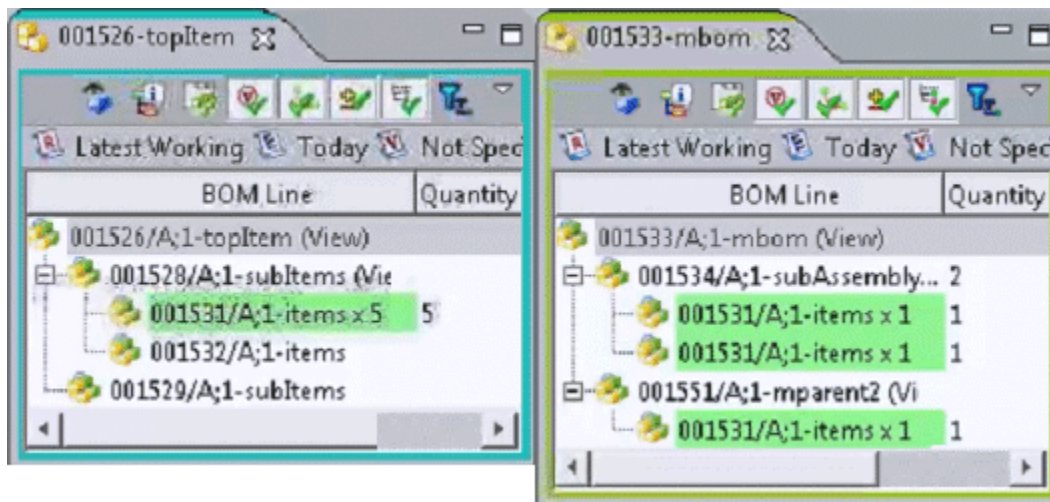
- Select **Check manual assignment partial match** to compare manual part assignments.

4. Select **Consider tool assignment when searching for a partial match**.
5. Select the types of tool assignments to compare.

You can select which types of assignments the comparison should take into consideration.

Roll up equivalent line quantities in accountability checks

If quantities in a set of source and target lines are different across those lines but add up to the same total, you can make them equivalent (a full match) in your final accountability check results.



1. Choose **Tools→Accountability Check→Advanced Accountability Check**.
2. In the **Advanced Accountability Check** dialog box, click the **Reporting** tab.
3. If it is not already enabled, select **Report the selected check criteria**.
4. In the **Display Options** group, select the **Multiple Match** ☒ check box.

The **Consider quantity rollup for multiple match** check box is enabled.

5. Select the **Consider quantity rollup for multiple match** check box ☒.

The **Multiple Match** ☒ check box is disabled and quantities in the set of source and target lines that add up to the same total will now appear equivalent (a full match) when you run an advanced accountability check.

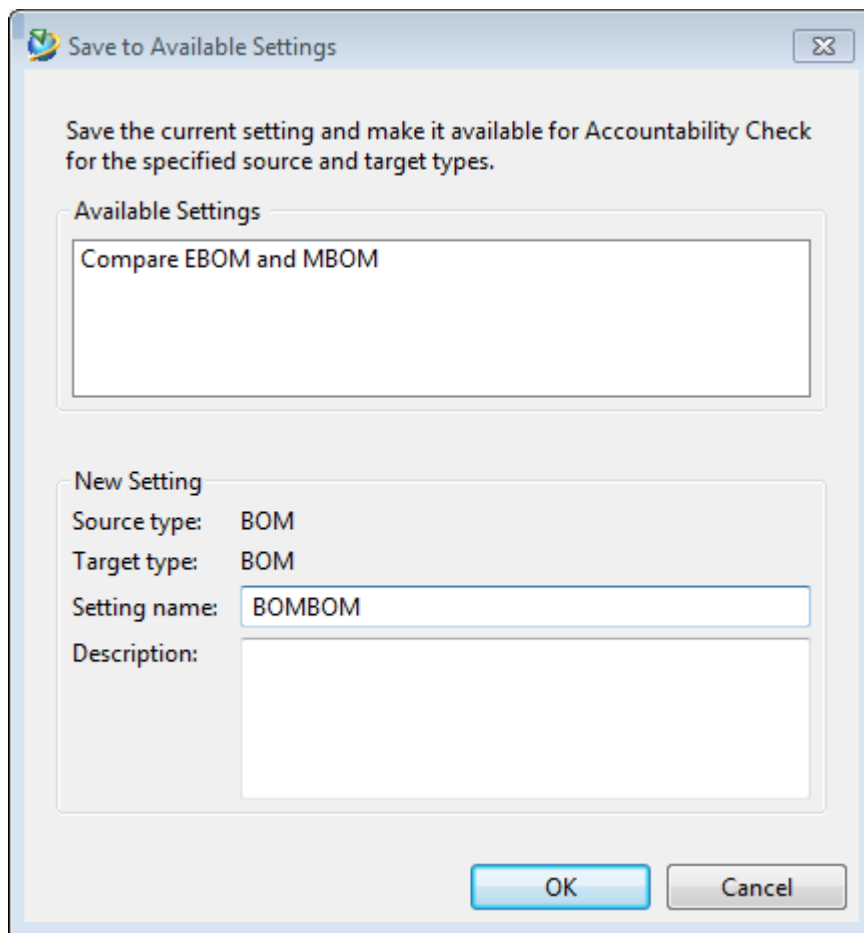
Note:

Deselect **Consider quantity rollup for multiple match** to reenable the **Multiple Match** ☒ check box.

Save accountability check settings

Saving accountability check settings is a task that should be performed by an administrator or power user.

1. Open the **Accountability Check** dialog box and select the desired options to run the check as described in *Run an advanced accountability check*.
2. When you have defined all the settings, click  at the bottom of the **Accountability Check** dialog box.
3. Add a name and description for the favorite and click **OK**.



The dialog box is titled "Save to Available Settings" and contains the following elements:

- Instruction:** "Save the current setting and make it available for Accountability Check for the specified source and target types."
- Available Settings:** A list box containing the text "Compare EBOM and MBOM".
- New Setting:** A section with the following fields:
 - Source type:** BOM
 - Target type:** BOM
 - Setting name:** BOMBOM
 - Description:** (Empty text box)
- Buttons:** "OK" and "Cancel" at the bottom right.

You can select the settings the next time you run an accountability check and it is run with the same settings that you save. An administrator can publish these settings for use by other users or for members of a specific group or role.

Note:

When an accountability check is rerun based on a saved setting, Teamcenter does not recreate a printable report or occurrence group results.

Modify and delete saved accountability check settings

To	Do this
Modify an existing saved setting	1. Open the Advanced Accountability Check dialog box and select the source and target structures. 2. In the Available Settings section, select a setting. 3. Click Load Settings and modify the settings to suit your needs. 4. Do any of the following: • Run the accountability check with the modified settings. • Save the modifications to an existing saved setting. • Save the modifications to a new setting.
Delete a saved setting	1. In the Advanced Accountability Check dialog box, click Manage Available Settings . 2. Select the setting from the list and click Delete.

Running the accountability check when using the Quantity attribute with packed lines

When viewing quantity in packed lines, you see an accumulated quantity of all packed lines. However, when you choose to compare the **Quantity** attribute, the accountability check uses the quantity that is actually typed in per packed line. For example, there is one line in the source structure for which you type in a quantity of 3. Additionally, you have two target equivalent lines, each with a quantity of 3. After packing the two target lines, you see a quantity of 6 in the **Quantity** column. Running an accountability check on these lines produces a multiple match instead of a multiple partial match because the quantity is 3 on each source and target line.

Narrowing the scope of the accountability check

Filtering and expanding source and target structures

You can narrow the scope of the accountability check by limiting it to only the lines pertinent to your use case.

The filter mechanism is based on closure rules that traverse the structures and take only those objects specified in the closure rules into consideration. The closure rules that are used in the accountability check are referred to as *inclusion rules* and are not available to use for importing and exporting.

By default, Teamcenter presents you with a set of inclusion rules. Your administrator can modify these inclusion rules or create new ones to suit your business needs.

For more information about configuring the inclusion rules, see [Configuring the inclusion rules](#).

Note:

When running the accountability check based on inclusion rules, there is no need to expand or unpack any of the structures. This improves the performance of the check.

When running the accountability check without inclusion rules, you must first expand and unpack the compared lines in the source structure.

For more information, see *Expanding structures to check*.

Expanding a structure based on closure rules also plays a role in which objects are taken into consideration in the accountability check. If you expand using an appropriate closure rule, you may not have to set an inclusion rule when running an accountability check.

Inclusion rules

Inclusion rule	Description
AccountabilityAll	Includes all lines.
AccountabilityLeavesOnly	Includes only leaf nodes; excludes all hierarchy nodes.
AccountabilityLinkedAssm OrLeaves	Includes assigned assembly nodes but excludes their children. If an assembly is not assigned, includes its leaf nodes.
AccountabilityProcess Consumption	Includes assigned nodes under a process or operation that are of occurrence type MEConsumed . Excludes all process and operation nodes.
AccountabilityProcess Assignments	Includes assigned nodes (including work areas, parts, and tools) under processes and operations. Excludes all

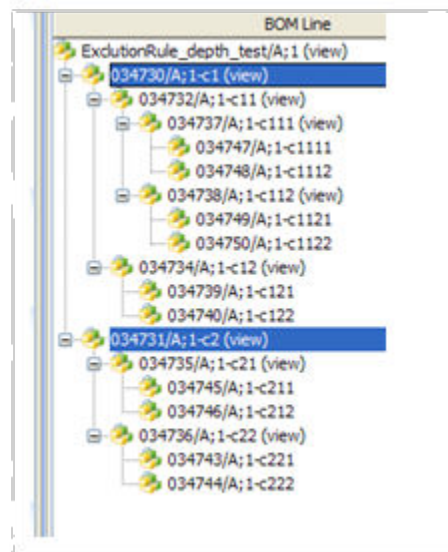
Inclusion rule	Description
	processes and operations nodes. If the assigned-from structure is not loaded, those nodes are also excluded.
AccountabilityProcessAll NoAssign	Include process and operation nodes.
AccountabilityProcessAll	Include process and operation nodes and all of their assigned nodes. If the assigned structure is not loaded, their nodes are excluded.
AccountabilityProcessOnly WithPA	Includes processes, operations, and process areas only.
ACPlantBOPDerivedProcesses AndOps	Includes only operations and processes that are linked to the source (for example, in a product BOP). This rule is used when comparing a product BOP to a plant BOP and skips plant-specific operations.

Note:

None of the inclusion rules include occurrence group nodes, but they can include the children under those nodes.

Specifying levels for comparison

If you use inclusion rules, you can limit the number of levels that the accountability check considers for comparison. In the following figure, processes **C1** (ID = **034730**) and **C2** (ID = **034731**) are selected as the source in an accountability check. To specify a level, run an advanced accountability check.



If you specify a level of **1**, the accountability check considers the following items for comparison:

c11, c12

c21, c22

If you specify a level of 2, the accountability check considers the following items:

c11, c12, c21, c22

c111, c112, c121, c122, c211, c212, c221, c222

Accountability check of variant structure

If you optionally propagate rolled-up variant conditions from the EBOM to the MBOM or from the product BOP to the plant BOP, the accountability check recalculates the rolled-up variant condition on the source line and compares it with any occurrence variant condition already stored on the associated target line. It then reports any partial match discrepancies between the variant conditions. To allow this check, you must add the **Variant Formula (bl_formula)** property to the list of properties in the partial match criteria in the **MEAdditionalPropagatableProperties** preference. The comparison is based on logical equivalence and is not a string comparison, for example:

- If you compare **Color=red & Size=medium** with **Size=medium & Color=red**, these variant conditions are logically equivalent.
- If you compare **Color=red & Size=medium** with **Color=red & Size=medium & Color=red**, these variant conditions are logically equivalent.

In the following example, you assign the EBOM to the MBOM and roll up the variants:

EBOM:

```

EGen1.1  Load if Option A = "abc"
  EGen 1.1.1  Load if Option B = "fgh"
    Part 1
    Part 2
  EGen 1.1.2  Load if Option B = "ijk"
    Part 3
    Part 4
EGen1.2  Load if Option A = "cde"
  EGen 1.2.1  Load if Option B = "fgh"
    Part 5
    Part 6
  Part 7  Load if Option B = "ijk"

```

MBOM:

```

Part 1  Load if Option A = "abc" AND Option B = "fgh"
Part 2  Load if Option A = "abc" AND Option B = "fgh"

```

```

Part 4 Load if Option A = "abc" AND Option B = "ijk"
Part 5 Load if Option A = "cde" AND Option B = "fgh"
MGen 1.1
  Part 3 Load if Option A = "abc" AND Option B = "ijk"
  Part 4 Load if Option A = "abc" AND Option B = "ijk"
  Part 7 Load if Option A = "cde" AND Option B = "ijk"

```

If you perform an accountability check and specify parts only, all colors except full match, and rolled up variant condition as a partial match option, the result shows no differences.

You then modify the parts under **EGen 1.1.2** in the EBOM as follows:

```

Egen 1.1.2 Load if Option B = "lmn" - changed the variant condition
  Part 3 Load if Option C = "opq" -added the variant condition
  Part 4 - no change
  Part 8 - added the line

```

(You changed the variant condition to line 1, added the variant condition to part 3, made no changes to part 4, and added part 8.)

If you now perform an accountability check, it identifies that **Part 3** is a partial match, **Part 4** is also a partial match, and **Part 8** is missing in the target. A tabular report shows the following results for the checked objects.

Source	Target	Match	Variant condition rollup
123456/A;1-Part 3	123456/A;1-Part 3	X	X
123457/A 1-Part 4	123457/A 1-Part 4	X	X
1234569/A 1-Part 8	*** Not Found	X	

The check assumes lines are equivalent due to a user performing an assign action (that is linking them) and not simply by having the same in-context ID. When you run an accountability check on equivalent lines with the same in-context ID, it considers rolled up variant conditions on the source line and compares them with the occurrence variant condition on the target line. This may give unexpected results when comparing the **Variant Formula** property, and you should take care when propagating such differences.

For example, **EBOM Top (000029)** and **MBOM Top (000035)** are linked. The assigned line **EBOM Sub Assembly (000031)** has a rolled-up variant condition.

BOM Line	ID In Context (To...	Variant Formu
000035/A:1-MBOM Top (View)		
000036/A:1-MBOM Assembly (View)		
000031/A:1-EBOM SubAssembly...	BoYBI6XoAABaqA	[000029]Option1 = 1 & [000029]Opt
000032/A:1-Part1		[000029]Option3 = 111
000033/A:1-Part2		[000029]Option3 = 222
000034/A:1-Part3		[000029]Option3 = 333

BOM Line	ID In Context (To...	Variant Formu
000029/A:1-EBOM Top (View)		
000030/A:1-EBOM Assembly (View)		
000031/A:1-EBOM SubAssembly...	BoYBI6XoAABaqA	Option1 = 1
000032/A:1-Part1		Option2 = 11
000033/A:1-Part2		Option3 = 111
000034/A:1-Part3		Option3 = 222
		Option3 = 333

If you change the in-context ID of **Part1** in the MBOM to make it equivalent to **SubAssembly** in the EBOM, the accountability check shows **Part1** as a mismatched line, even though it is not assigned. This occurs because the rolled up variant condition on the source line is compared with occurrence variant condition on the target line. As the target line is not assigned, it does not have a rolled-up variant condition.

BOM Line	ID In Context (Top ...	Variant Formu
000035/A:1-MBOM Top (View)		
000036/A:1-MBOM Assembly (View)		
000031/A:1-EBOM SubAssembly...	BoYBI6XoAABaqA	[000029]Option1 = 1 & [000029]Opt
000032/A:1-Part1	BoYBI6XoAABaqA	[000029]Option3 = 111
000033/A:1-Part2		[000029]Option3 = 222
000034/A:1-Part3		[000029]Option3 = 333

BOM Line	ID In Context (Top ...	Variant Formu
000029/A:1-EBOM Top (View)		
000030/A:1-EBOM Assembly (View)		
000031/A:1-EBOM SubAssembly...	BoYBI6XoAABaqA	Option1 = 1
000032/A:1-Part1		Option2 = 11
000033/A:1-Part2		Option3 = 111
000034/A:1-Part3		Option3 = 222
		Option3 = 333

If you select **Part1** and choose to propagate differences from the source to the target, **Part1** receives the rolled-up variant condition of the source. This occurs because, although the line is not assigned, it has the same underlying occurrence. **Part1** is now configured but not with the variant configuration you originally intended.

BOM Line	ID In Context (Top Lev...	Variant Formu
000035/A:1-MBOM TOP (View)		
000036/A:1-MBOM Assembly (View)		
000031/A:1-EBOM SubAssembly...	Cs8GY7gAABaqA	[000029]Option1 = 1 & [000029]Option2 = 11
000032/A:1-Part1	Cs8GY7gAABaqA	[000029]Option1 = 1 & [000029]Option2 = 11
000033/A:1-Part2		[000029]Option3 = 222
000034/A:1-Part3		[000029]Option3 = 333

BOM Line	ID In Context (Top Lev...	Variant Formu
000029/A:1-EBOM TOP (View)		
000030/A:1-EBOM Assembly (View)		
000031/A:1-EBOM SubAssembly...	Cs8GY7gAABaqA	Option1 = 1
000032/A:1-Part1		Option2 = 11
000033/A:1-Part2		Option3 = 111
000034/A:1-Part3		Option3 = 222
		Option3 = 333

Accountability Check [1]	
Source (000029/A:2-EBOM TOP (View))	
Full Results \ Equivalent Lines	
BOM Line	Item Type
0-000031/A:2-Part1	Item
0-000031/A:1-EBOM SubAssembly (View Item)	Item
0-000030/A:1-EBOM Assembly (View Item)	Item

When Teamcenter calculates the variant condition when allocating from a product BOP to a generic BOP, it only calculates for the line being allocated. Therefore, if you allocate a process with child processes or operations, it does not calculate the rolled-up variant condition for any children of the process being allocated. This results in a mismatch if you run an accountability check between the product BOP and the plant BOP. You have two choices in this case:

- Do not run the accountability check for a level lower than the one you allocate.
- Propagate the mismatch between the children of the process from the product BOP to the plant BOP.

Expanding structures to check

Whether or not you need to expand a target structure before running an accountability check depends on the settings of the following two preferences:

MECopyIdInContextToAssignedLine

MECopyIdInContextLowerLevels

Note:

If there are packed lines in the source window, the accountability check may report incorrect results for the quantity of an absolute occurrence of a component that is packed to a sibling. To avoid this situation, always unpack all lines before starting an accountability check.

Expanding a structure based on closure rules also plays a role in which objects are taken into consideration in the accountability check. If you expand using a closure rule, it may have the same effect as setting an inclusion rule.

Match nonequivalent lines using dynamic equivalence criteria

In some cases, you may want to locate matching lines in an engineering bill of materials (EBOM) and manufacturing bill of materials (MBOM) that have different properties and therefore are not reported as equivalent when you run an advanced accountability check. For example, the lines may have different item ID in context values, but you want to find them to ensure that they have the same material quantity, and later address the difference in their ID in context values.

To enable dynamic equivalence when running an accountability check:

- In the **Advanced Accountability Check** dialog box, on the **Equivalence** tab, select the **Dynamic Equivalence** ☒ check box.

Note:

Selecting the **Dynamic Equivalence** ☒ check box automatically selects the **Multiple Match** ☒ checkbox in the **Display Options** group on the **Reporting** tab of the **Advanced Accountability Check** dialog box. When **Dynamic Equivalence** is deselected, check boxes in the **Display Options** group return to their previous selections.

Note:

Your administrator must configure the **MEAccountabilityCheckDynamicIDICProperties** preference to list those line properties you want to use as dynamic equivalence criteria when you search for equivalent lines between EBOM and MBOM. If your administrator defines no values for this preference, item ID is the default attribute for comparison.

Understanding net effectivity

You can use net effectivity during the accountability check if the following is true:

- Defining unit effectivity on an occurrence is enabled.
- The ability to configure structures to show multiple units on multiple end items at once is configured.
- The net effectivity compare extension is registered.

When these points are fulfilled, you can compare the effectivity of matching source/target objects. However, the effectivity that you define on each object is not necessarily the actual effectivity. The actual effectivity is the intersection of all effectivities set on the path from the root node to the selected object. This intersection is referred to as *net effectivity*. In addition, when you compare two structures, the net effectivity includes the intersection of the effectivities of these two structures.

Create a printable Excel report

Teamcenter can create a printable Excel report containing the results of an accountability check. If you have write access to the target structure, Teamcenter stores the Excel file as a dataset on the top-level item revision of the target structure. If you do not have write access, Teamcenter stores the Excel file in the **Newstuff** folder.

1. Open the **Accountability Check** dialog box.
2. Select all necessary options to create the accountability report.
3. Click the **Reporting** tab and select **Report the selected check criteria**.
4. Select **Printable report**.
5. Assign a name for the new dataset.

If a dataset of this name and type already exists in the item revision, Teamcenter opens a dialog box where you can change the name or replace the dataset with the new one. You can change this behavior in the **TC_CRF_overwrite_existing_dataset_content** preference. If this preference is set to **1** (true), Teamcenter does not remove the dataset but replaces the content.

6. Click **OK**.

Teamcenter creates a report containing:

- General information such as the date and time of the check and the user ID and name.
- Compare options.
- Context data such as the source top level item, the target top level item, incremental change, and revision and variant rules.
- Accountability check results such as the source name, target name, match status, and all the checked properties. Multiple matched objects and missing source objects are displayed in separate sections.

Teamcenter adds the Excel file to a dataset attached to the target structure.

Note:

If you use the **MEAccountabilityCheckEnableNetEffectivity** preference to report net effectivity mismatches, the Excel report also reports those mismatches.

Net Effectivity Mismatches									
Mismatched Sources			Mismatched Targets			Mismatch Details			
BOM Line	Occurrence Effectivity	Find No.	BOM Line	Occurrence Effectivity	Find No.	End Item	Units	# in Source	# in Target
000054/A 1-a1	6-UP (000049) 1-9 (00005)	10	000054/A 1-a1		10	000049-EBOM	1-5	0	1
						000050-MBOM	10-UP	0	1
000056/A 1-a3	9-15 (000050)	30	000056/A 1-a3		30	000049-EBOM	1-15 21-UP	0	2
000056/A 1-a3	5-8 (000050)	10	000056/A 1-a3	5-8 (000050)	20	000049-EBOM	16-20	0	3
			000056/A 1-a3		30	000050-MBOM	1, 3, 16-UP	0	2
			000056/A 1-a3	5-8 (000050)	10	000050-MBOM	2, 4	0	3
			000056/A 1-a3		20	000050-MBOM	9, 11-15	1	2
			000056/A 1-a3	5-8 (000050) 16-20 (00	10	000050-MBOM	10	1	3
						000050-MBOM	6, 8	1	6
						000050-MBOM	5, 7	1	5
000058/A 1-a6	01-Aug-2015 00:00 to 28-	10	000058/A 1-a6		20	000050-MBOM	1, 3, 5, 7, 9	1	0
000059/A 1-a8	6 (000050)	20	000059/A 1-a8	8 (000049)	30	000050-MBOM	6	1	0
						000049-EBOM	8	0	1

Customize the Excel report

1. Create your own XSL style sheet.
2. Add it to the **Accountability Check Report (TC_2007_00_CUS_RPT_0002)** report in the Report Builder application.

3. Modify the **AccountabilityCheckReportStylesheetName** preference to contain the name of the new style sheet.

Note:

If you created a custom style sheet prior to upgrading to Teamcenter 11.4 or greater, by default, the Excel report uses a new style sheet called **acc_chk_rpt_excel.xsl**. Your customized stylesheet must have a different, unique name (for example, **my_acc_chk_rpt_excel.xsl**). When the value of the preference **MEAccountabilityCheckReportCombineLines** is true (default), the generated xml file will not support legacy stylesheets. To generate legacy data xml files, change the preference value to **false**.

Displaying the check result in occurrence groups

Reporting the check result in occurrence groups

Alternatively to reporting the accountability check results in colors, Teamcenter can report anomalies in occurrence groups that are displayed in an additional tab in the structure pane. These occurrence groups are stored as persistent objects in the database.

If you compare the base view of the entire product structure or a subassembly, the accountability check searches for every BOM line in the process plan. If you compare the manufacturing view of the product or a subassembly, the check only searches for a line in the process plan if the line's direct parent is an occurrence group. In the manufacturing view, if the BOM line's direct parent is not an occurrence group, you must allocate it to the view as a component of a subassembly in the original EBOM. For example, component **C** is part of subassembly **A** in the EBOM, while subassembly **A** is assigned to the manufacturing view under occurrence group **G**. Consequently, **C** also appears in the manufacturing view under **A**, then under **G**. The direct parent of **A** is an occurrence group, while the direct parent of **C** is **A**, which is not an occurrence group. When you compare structures, the utility searches for **A** but not for **C**. Typically, if you did not allocate to the manufacturing view, you would not expect to consume it in the process.

The scope of the comparison depends on the selections you made in the **Accountability Check** dialog box, as described in *Run an advanced accountability check*.

Note:

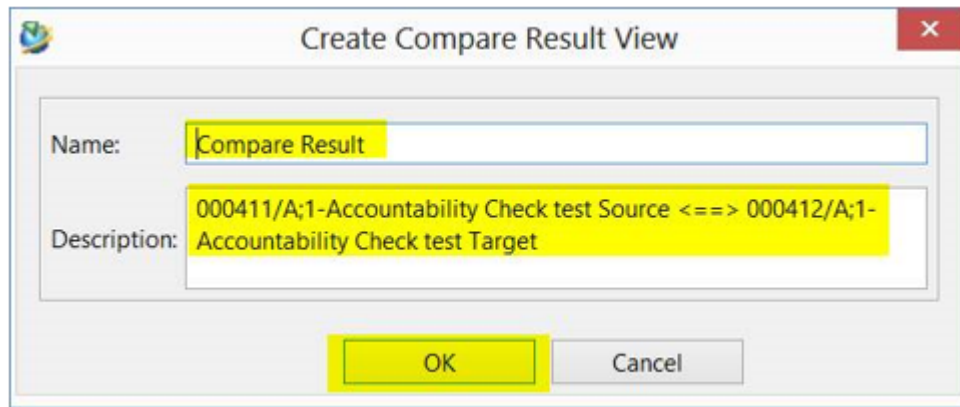
You cannot display the accountability check results in occurrence groups if you are using the enterprise BOP feature.

Generate the results grouped by anomaly

1. To generate the report:
 - a. Open the **Accountability Check** dialog box.
 - b. On the **Reporting** tab, click **Report in occurrence group**.

- c. Click **OK**.

The **Create Compare Result View** dialog is displayed.



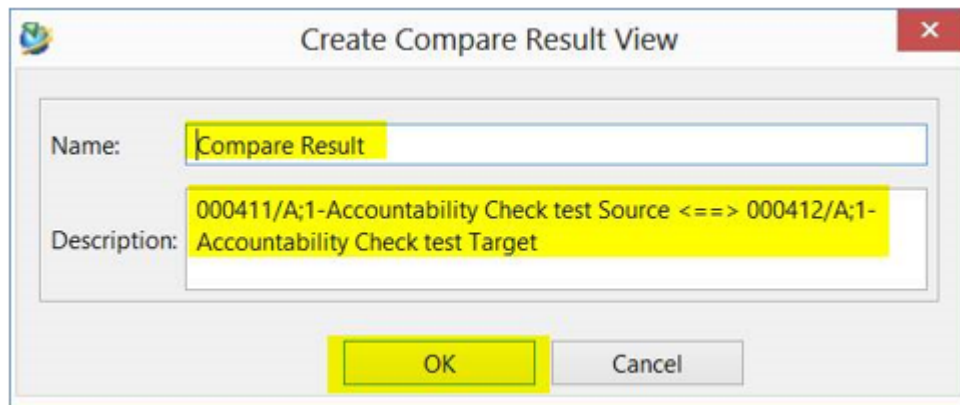
The screenshot shows a dialog box titled "Create Compare Result View". It has a "Name:" label followed by a text input field containing "Compare Result". Below it is a "Description:" label followed by a text input field containing "000411/A;1-Accountability Check test Source <==> 000412/A;1-Accountability Check test Target". At the bottom, there are two buttons: "OK" and "Cancel". The "OK" button is highlighted with a yellow border.

- d. Modify the system generated **Name** and **Description** as required.

The **Name** of the result view is displayed as the name of the additional tab. Multiple result views can be displayed at a time. If a view with the same name exists, the system displays a message asking if the result view should be overwritten or renamed. In this case, you must have write access to overwrite the existing view.

- e. Click **OK**.

Teamcenter creates **UsageCompareResultView** objects for each type of anomaly and displays them in the **Compare Result** tab.



This is an identical screenshot of the "Create Compare Result View" dialog box as shown in the previous image. It contains the same text in the "Name" and "Description" fields, and the "OK" button is highlighted.

Teamcenter creates occurrence groups for each type of anomaly and displays them in the **Compare Result** tab (an occurrence group tab). The names of the anomalies are fixed and are as follows:

- **Unused/Under-used**

Contains all occurrences in the source pane that do not match an occurrence in the target pane.

- **Completely Used**

Contains all occurrences in the source pane that match a corresponding occurrence in the target pane.

- **Over-used**

Contains all occurrences in the source pane that match more than one occurrence in the target pane.

- **Partial Match**

Contains all occurrences in the source pane that have mismatched properties compared to their corresponding occurrence in the target pane.

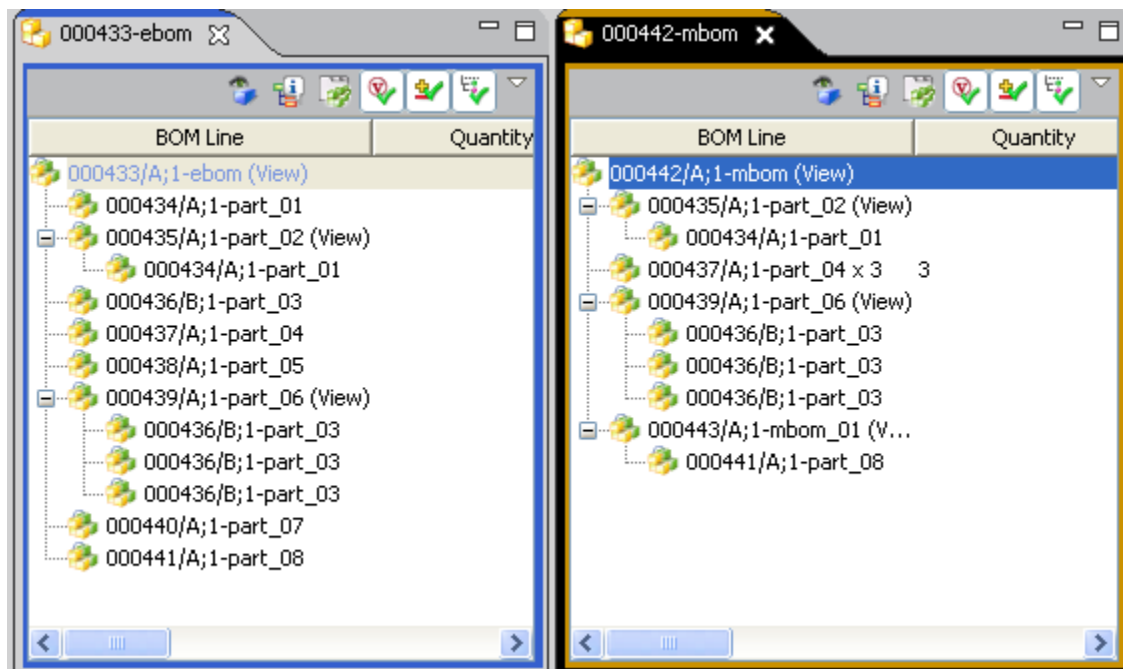
2. (Optional) Expand the subgroups to view the items contained in these groups and take appropriate action.

You must rerun the accountability check to view any changed results.

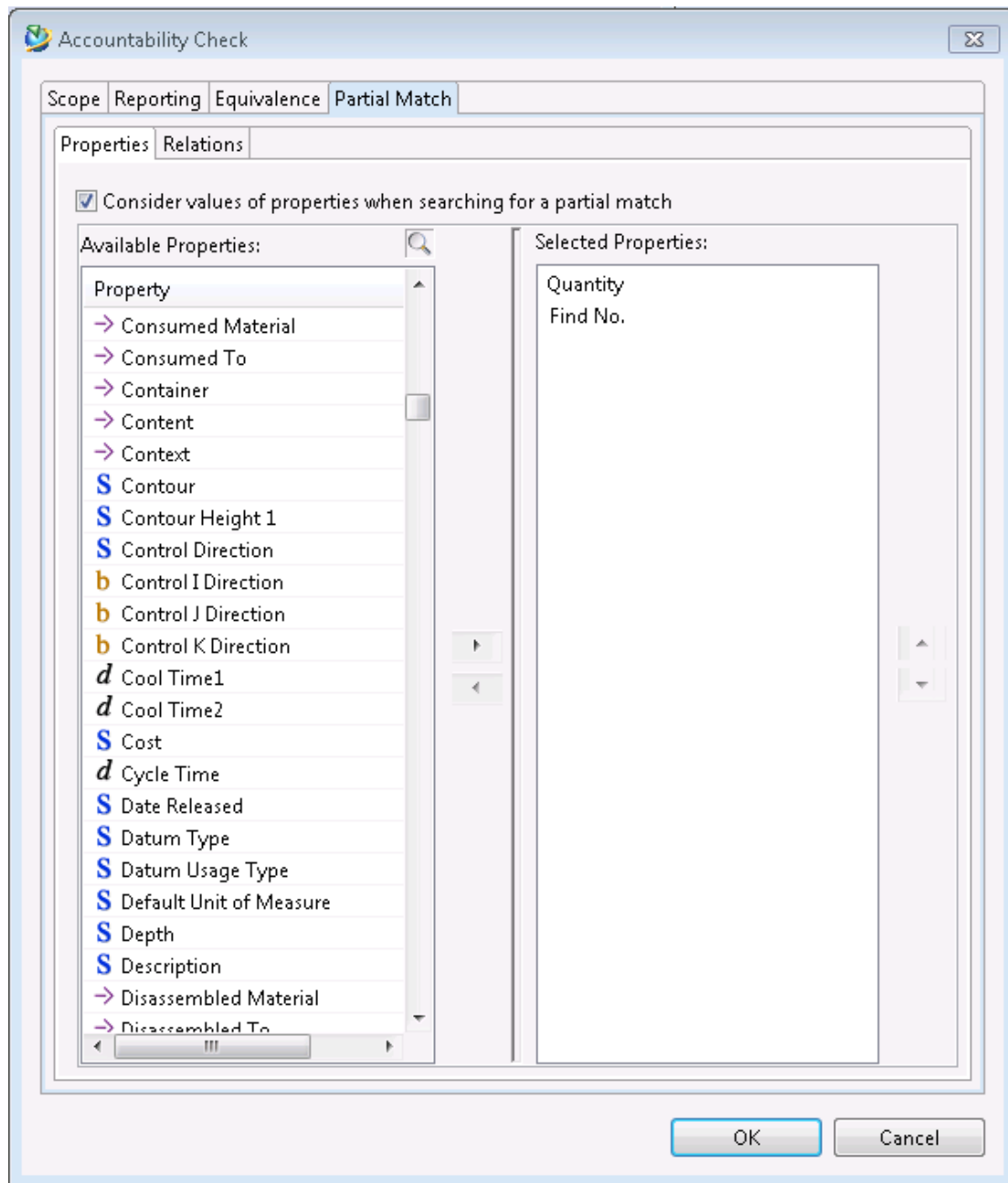
Accountability check examples

Example: viewing a property mismatch

In the following structure, an engineering BOM is compared to a manufacturing BOM.



An accountability check is performed with the following criteria.



The **Quantity** and **Find No.** properties are selected to be compared.

The results are as follows.

The screenshot shows the 'Accountability Check' window. It displays two BOM structures: 'Source (000433/A;1-ebom (View))' and 'Target (000442/A;1-mbom (View))'. Each BOM is shown in a table with 'BOM Line' and 'Item Type' columns. The Source BOM has five lines, with the first line highlighted in red. The Target BOM has five lines, with the first line highlighted in blue. Below these, a 'Partial Match' table compares the two BOMs. The table has three columns: 'Property Name', '000437/A;1-part_04 (Source)', and '000437/A;1-part_04 x 3 (Target)'. The 'Find No.' and 'Quantity' rows are highlighted in yellow, indicating differences between the source and target values.

Source (000433/A;1-ebom (View))	
BOM Line	Item Type
000433/A;1-ebom (View)	Item
000436/B;1-part_03	Item
000435/A;1-part_02 (View)	Item
000437/A;1-part_04	Item
000439/A;1-part_06 (View)	Item

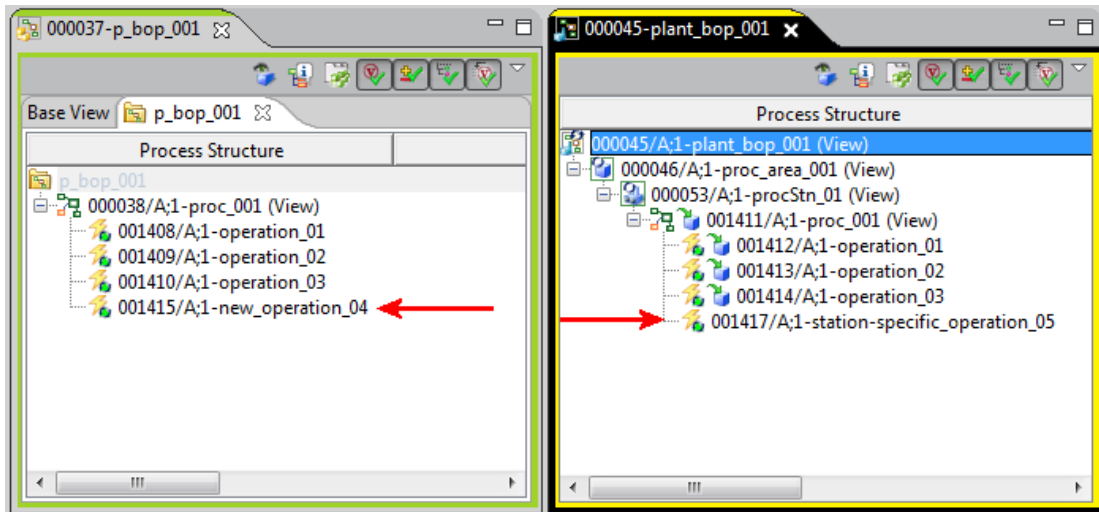
Target (000442/A;1-mbom (View))	
BOM Line	Item Type
000442/A;1-mbom (View)	Item
000435/A;1-part_02 (View)	Item
000437/A;1-part_04 x 3	Item
000439/A;1-part_06 (View)	Item

Partial Match		
Property Name	000437/A;1-part_04 (Source)	000437/A;1-part_04 x 3 (Target)
Find No.	40	20
Quantity		3

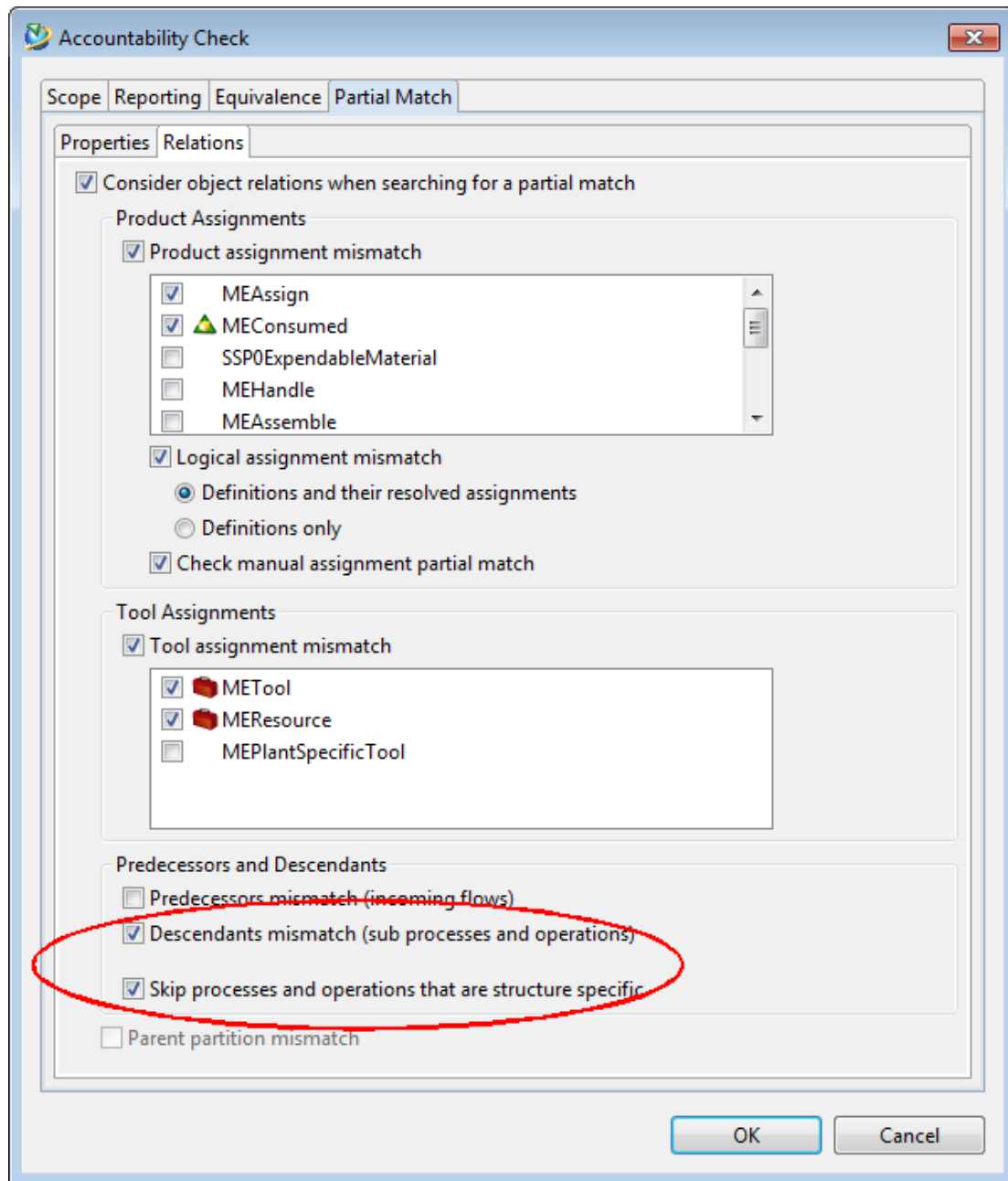
The **Find No.** and **Quantity** lines are marked in yellow as they differ. The quantity in the target is **3**, but there is no quantity entered for the source. Similarly, the find numbers are marked in yellow as they have differing values.

Example: viewing a hierarchy mismatch

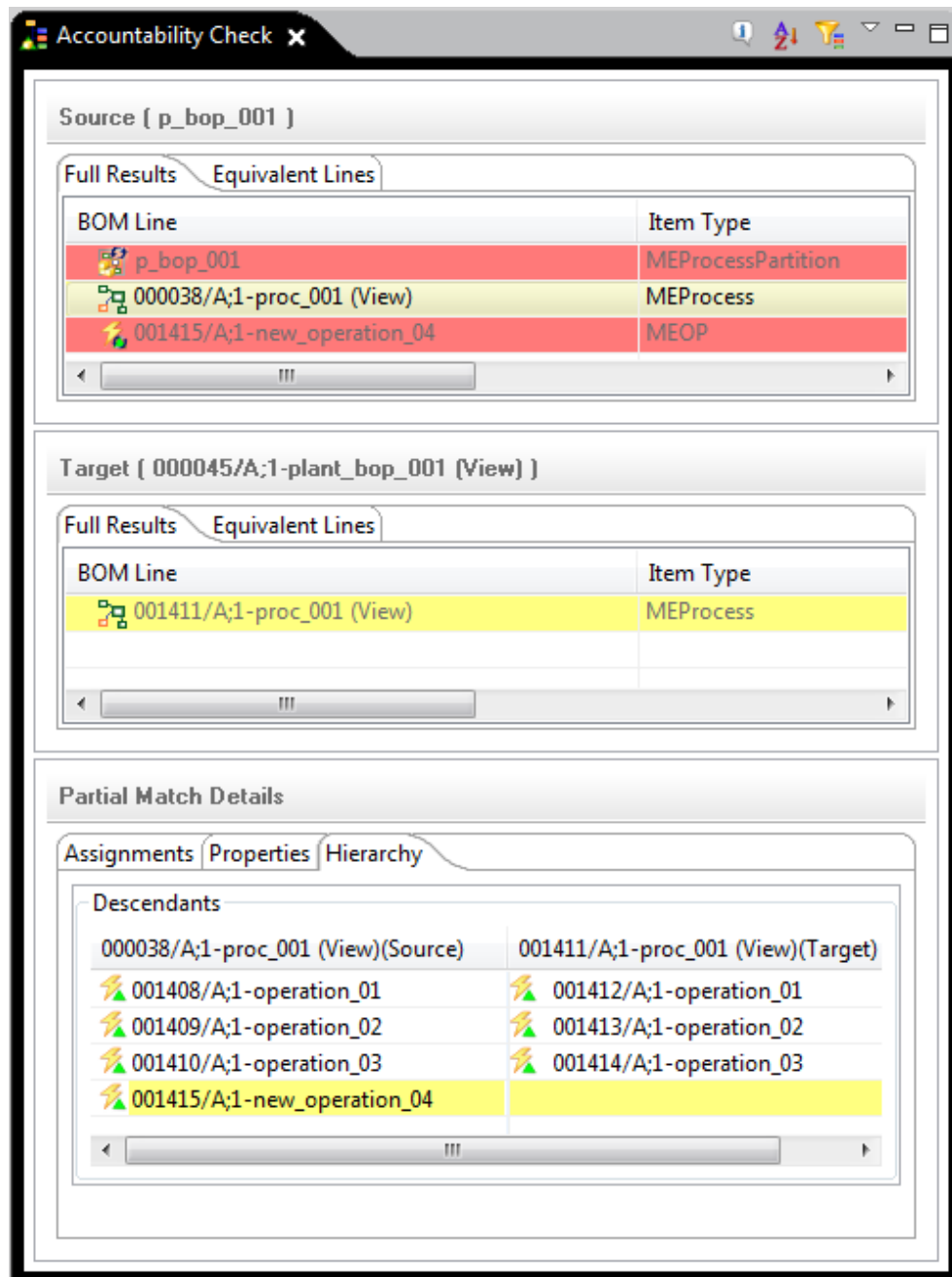
A product BOP containing a process with three operations is created, and the process is allocated to the plant BOP. After allocation, a new operation, **new_operation_04**, is added to the product BOP. In addition, a new operation, **station-specific_operation_05**, is added to the plant BOP only.



An accountability check is run with the following options.



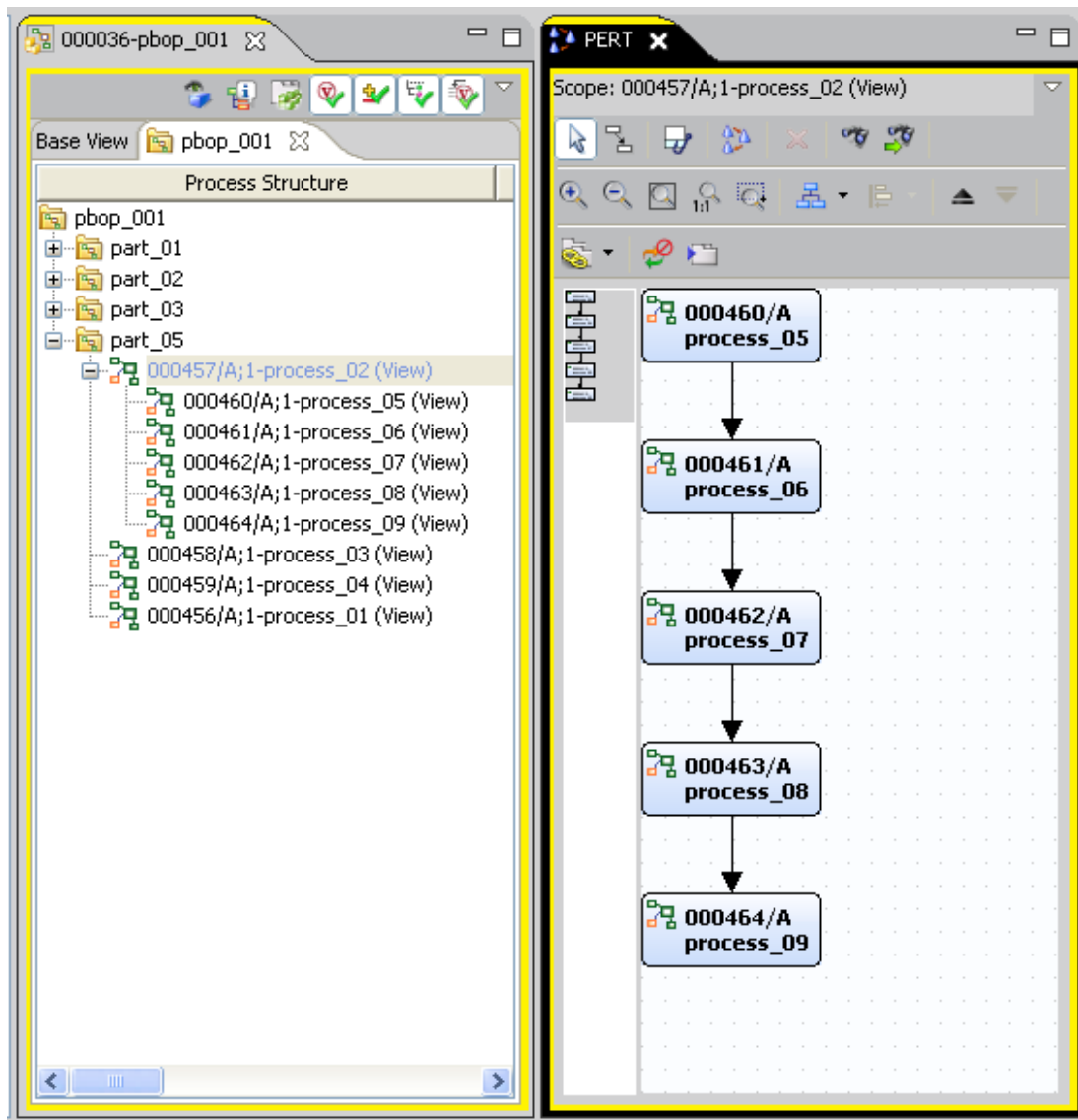
This produces the following results.



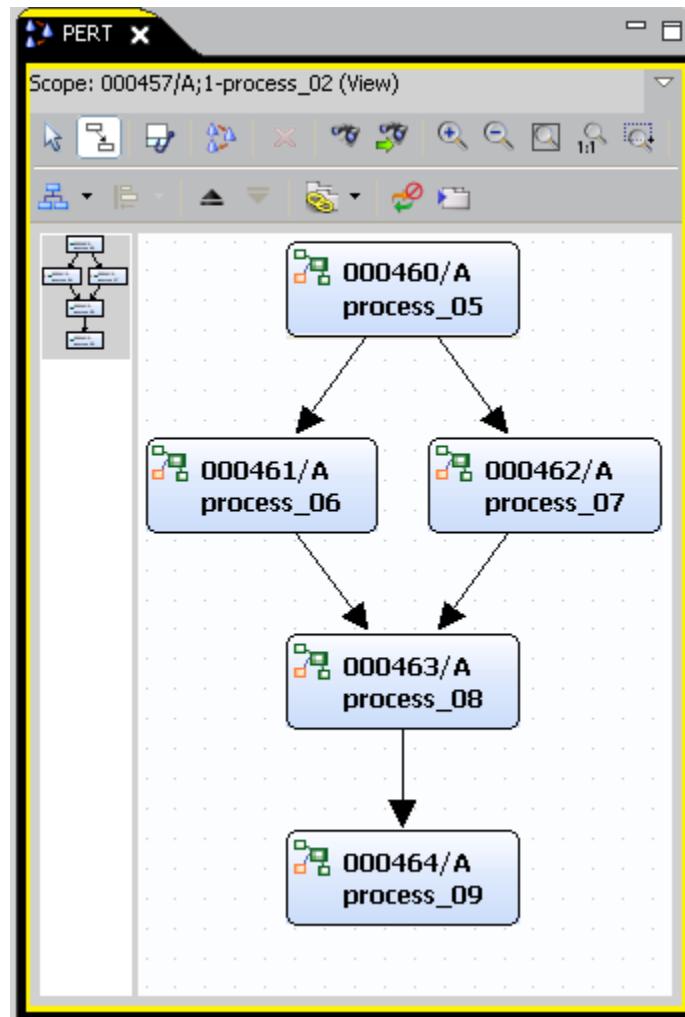
The new operation in the product BOP, **new_operation_04**, is listed under the source in the **Partial Match Details** section, but the target is empty. In addition, the new operation that was added to the plant BOP, **station-specific_operation_05** does not appear at all in the results, as the **Skip processes and operations that are structure specific** option was selected in the **General** tab when running the check.

Example: viewing a predecessor mismatch

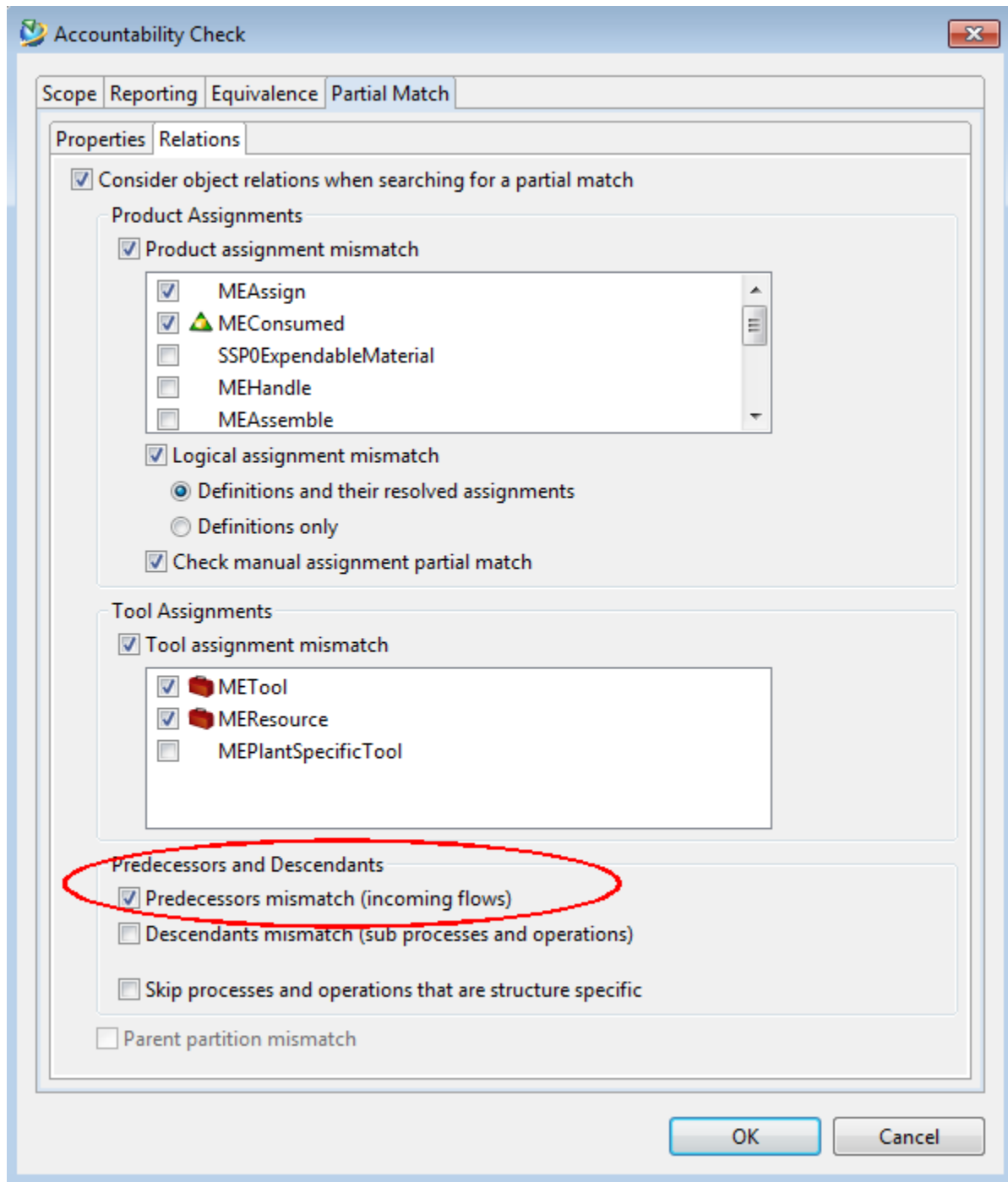
The following flows are created in the **PERT** view for the processes belonging to a product BOP.



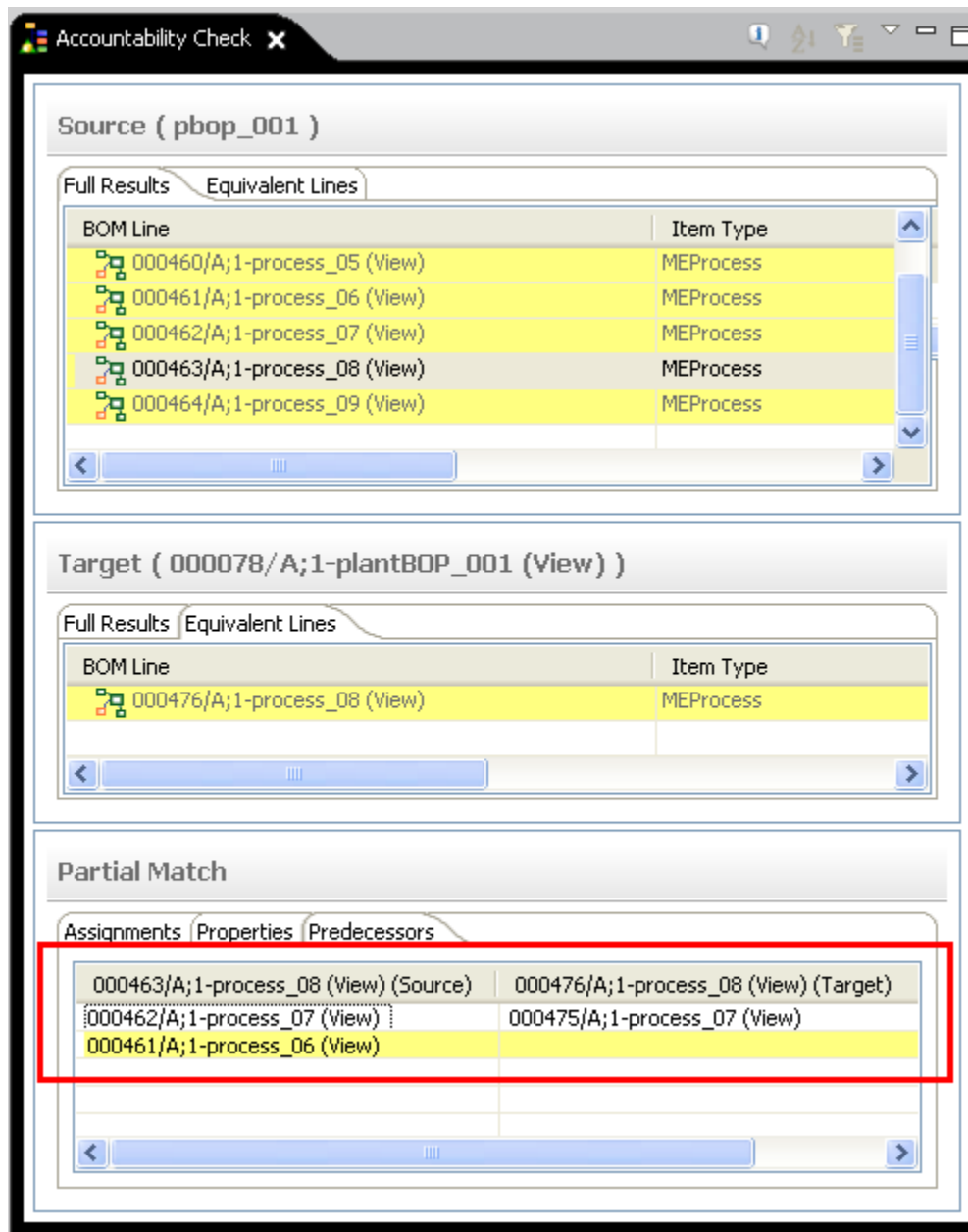
The top level process, **process_02**, is allocated to a plant BOP, and then the flows in the product BOP are subsequently changed.



Now there is a discrepancy in the sequence of processes between the product BOP and the associated plant BOP. An accountability check is run between these two structures with the following options.



The check produces the following results.



In the partial match results, the source (product BOP) shows two predecessors for **process_08** whereas in the target (the plant BOP), **process_08** has only one predecessor, **process_07**.

Running an accountability check or propagation in batch mode

Running an accountability check in batch mode

Teamcenter offers you two separate methods for running an accountability check in batch mode.

- Run an accountability check in the rich client using the **Accountability Check→Schedule Accountability Check** and **Accountability Check→Schedule Structure Propagation** commands.

Use this method if:

- You want an easy way to schedule an accountability check at a specific time.
- You do not have administrative privileges.
- Run an accountability check using a command line utility, **acc_check_client**.

Use this method if:

- You want to output to both Microsoft Excel and occurrence groups simultaneously.
- You want to output occurrence groups to both the source and target structures. For example, you can get **Missing in Source** results that you cannot get with the rich client commands or with a regular accountability check.
- You have administrative privileges.

Configuring batch accountability check and propagation

You can schedule an accountability check or structure propagation to run at a later date or time or at a specific recurring time. This is helpful if you are comparing large structures where the action is time-consuming or if you require comparison results on a regular basis. Teamcenter uses the Dispatcher application to run the comparison and propagation at a time you specify.

Your administrator must configure this feature before you can use it.

Schedule an accountability check report

1. Select the structures that you want to compare and choose **Tools→Accountability Check→Schedule Accountability Check Report**.

This dialog box is very similar to the regular **Accountability Check** dialog box with the exception of the **Reporting** tab and an additional **Scheduling** tab.

If you want to add structures you can do so within this dialog box.

2. Enter the comparison criteria in the **Scope**, **Equivalence**, and **Partial Match** tabs of the **Schedule Accountability Check Report** dialog box.
3. On the **Reporting** tab, type the name of the report.

The default report name prefix is **Accountability Check Report**. The final report dataset has a date timestamp appended to the report name prefix. The timestamp represents the time at the server. If your Teamcenter server is in another country, this time may be different than your own.

4. Select the types of results you want in the report.
5. On the **Scheduling** tab, schedule the time that you want the report to run. You can also choose to execute the task immediately.
6. Click **OK**.

Teamcenter sends the request to the Dispatcher and the user interface is immediately available for further work. If you choose to generate a report on a recurring basis, Teamcenter creates a request for each recurrence day. For example, if you choose to have a report generated on Mondays and Wednesdays, Teamcenter creates two Dispatcher requests. You can monitor the status of the Dispatcher request using the **Dispatcher Request Administration Console**.

If you create a request with multiple occurrences, the **Dispatcher Request Administration Console** displays the following:

- Start time

The time that the you submitted the request.

- End time

The time that the request ends. This can be:

- Determined by Teamcenter. If you schedule a daily or weekly accountability check with a specific number of occurrences, Teamcenter calculates the end date.
- Determined by you. If you schedule a daily or weekly accountability check with a specific end date, Teamcenter displays the end time that you enter.
- Time interval

This is the time that the Dispatcher waits between jobs assuming they are within the start time and end time range. If you select **Execute immediately**, the time interval is **0**.

When the report is generated, it is attached as a dataset to the target structure. If you do not have write access to the target structure, it is stored in the **Newstuff** folder in your **Home** folder.

Schedule structure propagation

You can propagate differences from a source structure to a target structure and schedule this propagation to take place at a specific time or at specific recurring times.

1. Select the source and target structures for the propagation and choose **Tools→Accountability Check→Schedule Structure Propagation**.

This dialog box is very similar to the **Schedule Accountability Check Report** dialog box with the exception of the **Reporting** tab.

2. Enter the comparison criteria in the **Scope**, **Equivalence**, and **Partial Match** tabs of the **Schedule Accountability Check Report** dialog box.
3. On the **Reporting** tab, click  to search for an existing folder in which Teamcenter should store the log file.
4. On the **Scheduling** tab, schedule the time that you want the propagation to take place. You can also choose to execute the task immediately.
5. Click **OK**.

Teamcenter sends the request to the Dispatcher and the user interface is immediately available for further work. If you choose to schedule the propagation to occur on a recurring basis, Teamcenter creates a request for each recurrence day. For example, if you choose to propagate the differences on Mondays and Wednesdays, Teamcenter creates two Dispatcher requests. You can monitor the status of the Dispatcher request using the **Dispatcher Request Administration Console**.

If you create a request with multiple occurrences, the **Dispatcher Request Administration Console** displays the following:

- Start time

The time that the you submitted the request.

- End time

The time that the request ends. This can be:

- Determined by Teamcenter. If you schedule a daily or weekly propagation with a specific number of occurrences, Teamcenter calculates the end date.
- Determined by you. If you schedule a daily or weekly propagation with a specific end date, Teamcenter displays the end time that you enter.
- Time interval

This is the time that the Dispatcher waits between jobs assuming they are within the start time and end time range. If you select **Execute immediately**, the time interval is **0**.

When the propagation is complete, Teamcenter creates a **PropagationLogs_Date_Time** dataset and stores it in the folder that you specified on the **Reporting** tab. This dataset holds a text file containing all the information written into the accountability check report such as the scopes of the source and target structures and propagated data types.

Working with collaborative designs

About collaborative designs in manufacturing

When you use 4th Generation Design (4GD) to author design data, you can assign or consume this data in a manufacturing representation of the data that is based on a BOM view revision structure. Teamcenter can bridge the gap between the two data models to allow you to perform accountability checks and propagate attributes from a collaborative design to a manufacturing structure (MBOM).

Note:

The term *MBOM* refers to a structure that is based on BOM view revisions and not on a collaborative design.

When developing the MBOM, the manufacturing planner performs some of the following tasks:

- Authors manufacturing assemblies in the BVR structure, while consuming design elements from the collaborative design.
- Adds provisional elements (placeholders) for parts not yet defined in the collaborative design.
- Adds nongeometrical elements to assemblies, for example, consumable raw material not modeled in CAD such as glue, oil, or water.
- Restructures assemblies by moving parts from one manufacturing assembly to another.
- Decomposes assemblies into subassemblies for creating kits.

Multi-BOM Management includes the Content Explorer as well as supports secondary views to view 4GD data without leaving the application. You can only load a subset definition as root into this view. You cannot load a collaborative design, a design element, or a workset as root. Loading a subset definition allows you to logically and flexibly slice the product (the collaborative design) into manageable sections (the recipe) and to use this definition to assign into the MBOM. At any point, you can view which parts (design elements) and manufacturing features (design features) have not been assigned or updated by activating the accountability check between the subset definition and the MBOM. The rich recipe query in a subset definition enables you to specify the logical representation of the product subset which dynamically displays the most updated product subset.

The general workflow for working with collaborative design data in manufacturing is as follows:

1. Create a 4GD subset definition in the Content Explorer that represents the scope of the design elements that must be included in the manufacturing BOM.
2. Open the subset definition in the Multi-BOM Management application.
3. Create a BOM structure to represent the manufacturing BOM.

4. Assign design elements from the subset definition to the MBOM with the goal of assigning all relevant design elements to the MBOM.

Note:

You can only assign design elements to precise BOM view revisions.

5. Use the MBOM to support process structures and downstream integrations.
6. After changes are made to the design, compare the design structure to the MBOM using an accountability check to find differences and propagate these differences to the MBOM where necessary.

Install and configure 4GD for manufacturing

1. Install and configure 4GD.
2. Install additional software components using Teamcenter Environment Manager (TEM) **Manufacturing support for 4th Generation Design** options.
3. Set the following Business Modeler IDE global constants:

Mpd0CpdBomPartialMatchProperties

Specifies a list of properties available for the partial match comparison.

Mpd0CpdBomPropagableProperties

Specifies a list of properties available for propagation from a design element to a BOM line.

4. Set the following preferences:

**CCObject_Mdl0SubsetDefinition_-
default_relation**

Specifies the relation that is created when a subset definition is pasted under a collaboration context. The paste action looks at this preference to get the proper relation type to create according to the parent and child types. This is similar to the existing **CCObject_StructureContext_-
default_relation** preference.

CCObject_DefaultChildProperties

Specifies a list of properties that can be used as children of a collaboration context.

4GD user interface elements within Multi-BOM Management

In Multi-BOM Management, 4GD collaborative designs are hosted in the **Content Explorer** view. When hosted in Multi-BOM Management, you can open only a subset definition as a root structure. The **Content Explorer** view then displays 4GD objects contained within this subset definition.

Load 4GD objects in Multi-BOM Management

You can load subset definitions in Multi-BOM Management. When you open a subset definition, it is opened in the Content Explorer and Teamcenter adds a node for it in the **Collaboration Context Tree** view. The name of the subset definition is also added to the **Open Items** list.

Although you can open other types of collaborative design objects in the Content Explorer in Multi-BOM Management, these are for reference purposes only. Multi-BOM Management does not recognize them. You can load multiple subset definitions simultaneously. You can also load the same subset definition multiple times. Any changes made in a Content Explorer view are then reflected in the other views containing the same subset definition.

Do one of the following:

- Open the subset definition by name.
 1. In the toolbar, click **Open by Name** .
 2. Click the **Open Subset by name**  button.
 3. Type the name of the subset definition.

You can use wildcard characters to facilitate your search.

4. Click **Search** or press the Enter key.

All subset definitions that match your search criteria are listed in the table.

5. Double-click a subset definition in the table.

The subset definition is opened in the Content Explorer.

- Send a subset definition to Multi-BOM Management.

You can load a subset definition as part of a collaboration context or as a stand-alone object.

- Open a subset definition from within the Content Explorer by doing one of the following.
 - Click the name in the link in the header.

- Right-click the subset definition and choose **Open With**→**Content Explorer**.
- Select the subset definition from the list of recently viewed objects in an empty Content Explorer.

Opening Multi-BOM Management-specific secondary views

You cannot open Multi-BOM Management-specific secondary views (such as the **PERT**, **Gantt**, or **Work Instructions** views) from within the Content Explorer. Once you assign a design element to a line in a BOM structure, you can open the secondary views on the BOM line representing the design element.

Using the Collaboration Context Tree view with 4GD

When you load a subset definition into the Content Explorer in Multi-BOM Management, it is listed in the Collaboration Context Tree.

The following points are noteworthy when working with subset definitions in the Collaboration Context Tree.

- Because the Content Explorer saves the configuration of the subset definition immediately if it changes, including the revision rule, effectivity rule, and recipe, the following configuration commands in the Collaboration Context Tree are blocked:
 - **Save as New Configuration Context**
 - **Apply Configuration Context**
 - **Restore View Configuration**
- If you have a collaboration context that contains both a structure context and a subset definition, the **Save Configuration** command saves the configuration of the structure context but ignores the configuration of the subset definition.

Using subset definitions in collaboration contexts

You can save subset definitions in collaboration contexts. The behavior is similar to saving structure contexts to a collaboration context.

If you use the **Save As** command, Teamcenter clones the subset definition (not the design elements themselves) and pastes the new subset definition to the collaboration context. When you move a subset definition into an existing collaboration context, the collaboration context references that subset definition directly.

Viewing objects in 4GD

When working with 4GD objects within Multi-BOM Management, there are two types of viewers with which you work. The 4GD 3D viewer is embedded in the Content Explorer. This viewer allows you to view all objects associated with 4GD data.

For all other structures with which you work in manufacturing, you can continue to use the **Graphic** view that you open from a primary structure view. When you open this view, Teamcenter adds a **Graphics** menu to the toolbar.

You can open both of these viewers simultaneously.

Modifying 4GD data in Multi-BOM Management

Manufacturing users can perform a limited number of editing tasks on 4GD data within Multi-BOM Management. If that is not desirable for your use case, your administrator can block access to 4GD data by defining appropriate access rules.

Assigning from a collaborative design to an MBOM

Assigning a design component from a product design into an MBOM structure

To help you build a manufacturing bill of materials, you can assign design components from a product design into a product structure representing the MBOM. To help you with this process, there is a dedicated **4GD-MBOM Reconciliation** perspective. You can open this perspective using all the usual methods.

You can only assign in one direction (from a product design into an MBOM) within a collaboration context or a subset definition to MBOM lines representing parts in a BOM view revision-based product structure. The source object can only be one of the following:

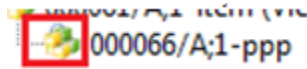
- Shape design component
- Reuse design component
- Subordinate design component

You cannot assign a promissory design component (that does not yet have a shape design or item underneath) to an MBOM.

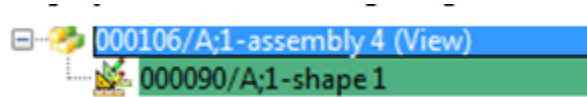
Caution:

Although Teamcenter allows you to assign a subordinate design component that is not contained in the subset definition recipe to an MBOM, do not do so as this subordinate design component displays as **Missing in source** when running an accountability check.

After assigning, the BOM lines containing design components function as any BOM lines in Multi-BOM Management with regards to secondary views that you can open or commands that may be run on them. For reuse or subordinate design components, the assigned BOM lines display the item revision symbol.



Shape design components assigned to BOM lines display the shape item symbol.



You can assign using any of the following methods.

- Drag and drop or copy and paste

Teamcenter creates a new BOM line for the assigned design component, as well as for any subordinate design component that the design component has.

- **Paste As** menu command

The behavior of the **Paste As** command is similar to the drag and drop behavior but additionally allows you to specify an occurrence type.

- **Paste Special** menu command

You can paste a design component only as a component of a selected assembly. You can use the **Paste Special** command to specify the number of occurrences, quantity per occurrence, and the find number, as well as the occurrence type.

You can assign the same design components several times within an MBOM structure. Each assignment creates a separate BOM line that is linked to the original design component.

Note:

You cannot assign design components that are checked out.

Assigning design features to an MBOM

If you work with design features in 4GD, you can assign these features to the MBOM when working in Multi-BOM Management. The design features are stored in design container elements in 4GD. During the assignment action, Teamcenter copies the mapped property values from the design feature to the corresponding properties on the BOM line of the manufacturing feature. Attribute groups can be mapped to a form either on the occurrence or on revision, depending on the mapping.

The types of features supported is limited to the weld types that NX supports. Beginning with NX 9, **Arc Fillet Weld**, **Arc Groove Weld**, and **Surface Weld** types are supported.

For more information about weld types that are supported by NX, see the NX documentation.

Design features are connected to two or more parts. On assignment, the relations are preserved. If you assign a design feature together with the related design elements (or the design elements are already assigned), the relations between them are mapped to relations between the parts and the manufacturing features in the MBOM structure.

Once you assign design features, you can run an accountability check of the subset definition against the MBOM to ensure that all welds are assigned and to compare properties. You can propagate any differences you find.

The following constants affect the behavior of the assignment process:

- **Cpd0DFToBOMPropertyMapping** global constant

Specifies the design feature properties that are mapped to form properties on a BOM line.

- **Cpd0DFPropertiesForMBOM** global constant

Specifies the initial set of properties carried over during assignment. Your administrator can define a different set of properties for assignment based on a feature type.

- **CPD0AttachToItemRevision** business constant

Specifies whether attachments are associated to the item revision or BOM line in the context of the root level.

- **Cpd0ItemTypeForDesignFeature** business constant

Specifies what type of item is automatically created when the corresponding design feature is assigned to the MBOM.

Assign design features to an MBOM

1. In the **Content Explorer** view, right-click the design feature that you want to assign and choose **View Properties**.
2. Find and note the parts listed under the **Connected Elements** property.
3. Close the **Properties** dialog box and select the parts and the weld.
4. Copy these and paste them under the appropriate part in the MBOM.

Teamcenter creates a manufacturing feature and copies over the properties from the design feature as described in *Manufacturing Process Planning — Deployment and Administration*.

Comparing collaborative designs to manufacturing structures

Running an accountability check between a collaborative design and an MBOM

You can compare collaborative designs to BOM view revision-based MBOM structures using the accountability check. The accountability check:

- Finds BOM lines that are equivalent to design elements.
- Qualifies equivalent lines in the two structures as partial matches by comparing properties.
- Displays the results in the 4GD Content Explorer, in the MBOM structure view, and in the **Accountability Check Results** view.
- Displays the results of the check in a report.
- Shows details about why a set of lines is marked as a partial match.
- Propagates differences from the design structure to the manufacturing structure.

You can only run the accountability check in one direction—from the design structure to the manufacturing BOM.

Considerations when running an accountability check with collaborative designs

- You can select individual design elements, partitions, or the entire subset definition as a source for the accountability check.
- Teamcenter cannot report the results in occurrence groups when comparing with a collaborative design.
- When you select a 4GD structure as the source of an accountability check, the **Partial Match** tab displays an additional tab, the **Design Element Properties** tab, from which you can select properties to compare. The list of available properties is contained in the **Mpd0CpdBomPartialMatchProperties** global constant.

Compare effectivity when running an accountability check

In 4GD, effectivity is represented with multiple properties, meaning it is a complex property. In manufacturing, occurrence effectivity is stored in one property only. When these effectivities are compared, only one of the complex values is mapped to the effectivity BOM line property and is displayed as part of the comparison details.

1. While running an accountability check, select the **Consider Effectivity for Partial Match** check box in the **Design Element Properties** pane.
2. Specify the properties that you want to compare by selecting them in the **Available Properties** list and moving them to the **Selected Properties** list.

The list of properties available for comparison is contained in the **Mpd0CpdBomPartialMatchProperties** global constant.

3. Click **OK** to run the accountability check.

The **Effectivity** tab is displayed in the **Partial Match Details** section.

Propagating properties from a collaborative design to an MBOM

An accountability check compares the properties on individual lines in the source and target structures. If, after assignment, the source or target structures are changed, the property values on these lines can differ, and the lines are flagged as partial matches. You can propagate the source property values to the target properties or, in this case, from the design elements to the BOM lines to which they are assigned. The list of the properties that you can propagate is contained in the **Mpd0CpdBomPropagableProperties** global constant. This list of properties is a subset of the properties that are compared in the accountability check and that are specified in the **Mpd0CpdBomPartialMatchProperties** global constant.

Note:

- You cannot propagate effectivity from a subset definition or design elements to an MBOM.
- Although you can see the results of the propagation immediately in the structure view and the **Accountability Check Results** view, you cannot see them in the details. You must update the details by selecting another line and then reselecting the original line.

Comparing design features with manufacturing features

When performing an accountability check between design and manufacturing features, you can compare the following:

- Connected parts

Only the **connected-to** relationship is compared between design and manufacturing features. The parts themselves are not compared. A multiple match occurs if a connected part is assigned multiple times.

- The properties specified in the **Mpd0CpdBomPartialMatchProperties** global constant
- The attribute groups specified in the **MEAccountabilityCheckMappedAttrGrpsForComparison** preference

If one property within an attribute group differs from its mapped property in the manufacturing feature form, the accountability check marks the attribute group/form as a mismatch.

You can propagate the following:

- The **connected-to** relationships providing the connected parts already exist in the MBOM
- The properties specified in the **Mpd0CpdBomPropagableProperties** global constant
- The attribute groups specified in the **MEAccountabilityCheckMappedAttrGrpsForPropagation** preference

If the target weld is released, propagation of this weld is blocked and results in an error in the propagation log file.

If the parent of the weld in the MBOM is blocked for change (released, remote, or no permission), propagation of connected objects of this weld is blocked and results in an error in the propagation log file.

Run an accountability check as described in *Run an advanced accountability check*. Additionally note the following:

- You can only run an accountability check using the subset definition as source and the MBOM as target.
- When you compare connected parts, select the **Consider connected objects for partial match** option on the **General** tab of the **Partial Match** tab.
- You can select the properties to be compared and propagated on the **DE/DF Properties** tab.
- You can compare and propagate attribute groups on the **Attribute Groups** tab.

Managing variant information when assigning and comparing

If the collaborative design contains variant information, this information is copied to the item revision to which you assign the design element or design feature. You can see this information by enabling the **Variant Formula** column in the structure view. When you compare the two structures, the accountability check compares the variant information on a logical basis. For example, **Option1 = A AND Option2 = B** is logically equivalent to **Option2 = B AND Option1 = A**.

Your administrator can affect the behavior of variant assignment in the following global constants:

Cpd0DEToBOMPropertyMapping and Cpd0DFToBOMPropertyMapping	Describe the mapping of variant formulas between the manufacturing bill of material and a design element or feature.

**Cpd0DEPropertiesForMBOM
and
Cpd0DFPropertiesForMBOM**

Specify the variant condition that is copied to the MBOM when assigning design elements or features.

The behavior for the comparison and propagation of variant information is determined by the values of the **Mpd0CpdBomPartialMatchProperties** and **Mpd0CpdBomPropagableProperties** global constants.

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.

Using Multi-Site Collaboration

About using Multi-Site Collaboration in manufacturing

You can use Multi-Site Collaboration to share structures with other sites. If you use it to share collaboration context objects, take the following into consideration:

- Export all revision rules at the original site using **plmxml_export -xml_file=file_name -class=revisonrule** and use **plmxml_import -xml_file=file_name** at the importing site before using Multi-Site Collaboration with collaboration or structure context objects.
- Export individual structures prior to exporting a collaboration or structure context in order to get the proper revisions of the objects in the structures.
- The configuration context does not affect which revisions are exported if you export a BOM with a collaboration or structure context.
- To be able to consume exported objects at the remote site when you do not have write access to the product item, create a new item at the remote site that acts as the local product root, and copy the product under it.

4. Creating manufacturing BOMs

Creating product structures

About product structures

A *product structure* is a hierarchy of each of the product component items arranged in parent-child relationships and is the basis for the process definitions. The products contained within the product structure may contain manufacturing features such as holes, pockets, and weld points to be manufactured using manufacturing processes. *Notes* or *occurrence notes* containing manufacturing values or parameters may also be attached to the structure.

A product structure can have various configurations, also known as product revisions, to capture the variations in a product.

Multi-BOM Management opens each product as a separate structure view. You can also view product structures using Structure Manager.

If the product structure contains an that is owned by another site, it is initially labeled as **REMOTE OBJECT** (this is sometimes called a *stub*). To import the associated CAD data and attachments, select the assembly and choose the **Tools→Import→Import Remote** menu command. If the import request is successful, you see the full properties and attachments of the assembly, rather than the stub. You can import individual components and part family members in this way. To configure the import of part family members, choose the **Tools→Import→Import Remote Options** option and click the **NX Part Families** tab.

You can create product structures with CAD systems within Multi-BOM Management or Structure Manager.

Restructuring 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:

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. 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.

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.

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.

You cannot use the **Replace** feature on any type of process or consumed line in manufacturing structures.

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.

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**.

Working with global alternates

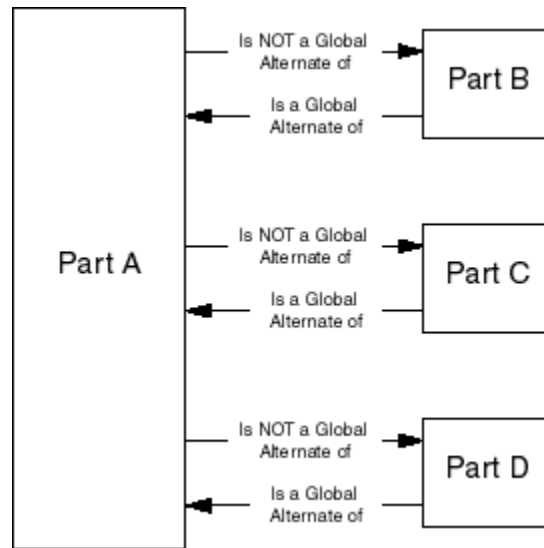
Global alternates overview

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:

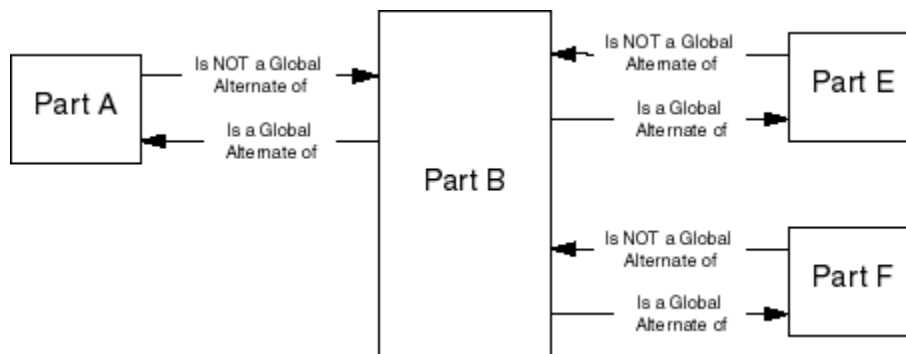
If the parts are interchangeable only in specific products or assemblies, use *substitutes* rather than global alternates.

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.



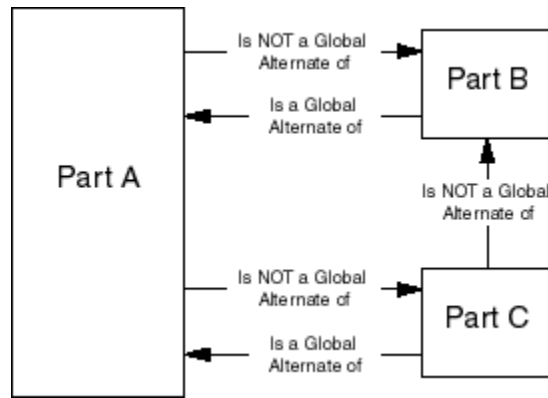
Global alternates – single direction

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.



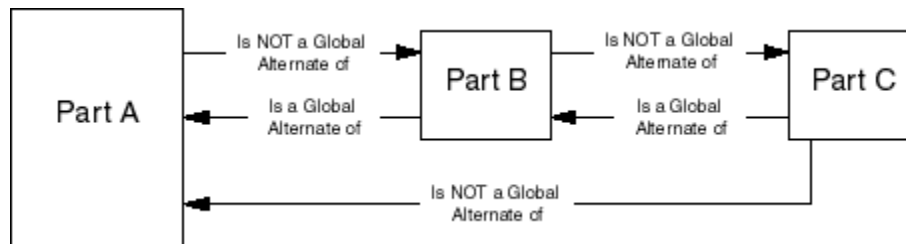
Global alternates – multiple alternates

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. 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.

Open an existing product revision

When you open a product, the first BOM view revision (BVR) of that product opens by default. Your administrator can set the **MEManufacturingDefaultBVR** preference at your site to open another BVR if necessary.

Use one of the following methods to open a product:

- Find the product item in My Teamcenter. Using the mouse, drag the item or its revision to the Multi-BOM Management application button in the navigation pane.

- Find the product item in My Teamcenter. Choose **Send To→Multi-BOM Management** from the shortcut menu.
- Open a process revision in Multi-BOM Management. The product revision that has been most recently assigned as a target item by this process is opened by default.
- Open a product revision in Multi-BOM Management using the **Open Product** dialog box.

Create a new structure using Multi-BOM Management

1. Choose **File→New→Item**, or click **Create New Item** .
2. In the **New Item** dialog box, select one of the item types from the list.

Note:

You cannot add a resource item type to an item in Multi-BOM Management.

For more information on creating additional item types, see *BMIDE for Data Model Design*.

3. Click **Next**.
4. Enter the ID number to be assigned to this new product. If this new product is a revision of an existing one, type the ID of the existing product. You can assign a unique revision number in the **Revision** field.

To let the system automatically assign a unique ID, click **Assign**.

5. Type a name for the new product. Make it unique so you can search the database using this term.
6. Select **Show as new root** to specify that the newly created item is opened as a root object. It is not pasted to the selected item. If you do not select this option, the new item is pasted as a child of the selected item.

If the **Show as new root** option is selected but unavailable, Teamcenter does not allow you to create a new object under the selected object, for example, if you try to create a work area under a process.

7. Type a product description.

At this point, you have all the information required to create a new item.

8. (Optional) Select a unit of measure from the **Unit of Measure** list.

9. (Optional) Click **Next** to add optional information, such as filling out the item's forms, or checking the item out.
10. (Optional) Click **Define Options** to specify the following:
 - Select **Use item identifier as default display** or **Use revision identifier as default display** if you created an alternate identifier for the item and want to use it as the default display object.
 - Select **Check Out Item Revision on Create** to check the newly created item out of the database immediately upon creation.
11. Click **Finish** to create the new product.
12. Click **Close** to close the **New Item** dialog box.

Creating a new structure using a CAD system

Importing the product from a CAD system is the primary method for populating the database with a new product. The CAD system lets you design the product structure and the detailed geometry of each component before you import the structure into Multi-BOM Management.

Authoring MBOM

Reasons for creating an MBOM

When working in the manufacturing environment, Siemens Digital Industries Software recommends that you create a manufacturing bill of materials (MBOM) from your engineering bill of materials (EBOM). There are several reasons for this:

- Generally, manufacturing engineers do not have write privileges on the EBOM and cannot modify it. For example, a design engineer may specify that a part is going to be purchased and sets a property value to **buy**. Subsequently, the manufacturing department determines that it is more economical for them to make this part. They want to change that property to **make** but do not have the privilege to do so.
- Assembling a part requires a structure that is different from the EBOM structure. For example, in the BOM, the exhaust manifold is part of the engine compartment. During assembly, however, the exhaust manifold must be added after the body is built onto the chassis as the exhaust pipe must be put through the bumper. This type of regrouping and adding of manufacturing-specific parts is most efficiently performed in a separate manufacturing BOM structure.
- Especially for final assembly, companies often have manufacturing parts that they consume in different MBOMs. These can only be created in a structure to which you have write access.
- There may be changes to an EBOM that should not immediately be reflected in the process structure. For example, you may want to continue manufacturing using the current parts to use up existing

inventory. By using an MBOM, the manufacturing engineers have control over when the changes to the EBOM are reflected in the manufacturing process.

- Some companies do not author the EBOM in Teamcenter. It is imported from another system so that the EBOM in Teamcenter is a replication of the status of the EBOM in another system. Using an MBOM provides you with a buffer for these changes so that you can monitor and process them in a controlled manner.

Note:

You cannot open an MBOM in Siemens Digital Industries Software NX.

Automatically creating an MBOM from an EBOM

Teamcenter provides you with several automatic methods to create a manufacturing bill of materials (MBOM) from an EBOM (engineering bill of materials).

- **Create an MBOM from a recipe**

Create an MBOM from a template that contains a recipe for searching the EBOM for required parts. The recipe can contain a variety of search attributes such as an attribute search, spatial search, ID search, or combinations of search criteria.

This type of creation mechanism works well for *make to shelf* industries where the products are standardized such as the automotive or home appliance industries.

- **Use the `me_create_mbom` utility**

The **`me_create_mbom`** utility creates an MBOM based on a specific EBOM but replaces make parts or phantom levels in the EBOM with manufacturing-specific parts and directly copies over buy parts.

Your administrator can take advantage of user exits in this utility that allow you to embed your own logic into the utility.

Your administrator can create a workflow to run this utility using the **ME-create-mirror-AH** and the **ME-update-mirror-mbom-A** action handlers.

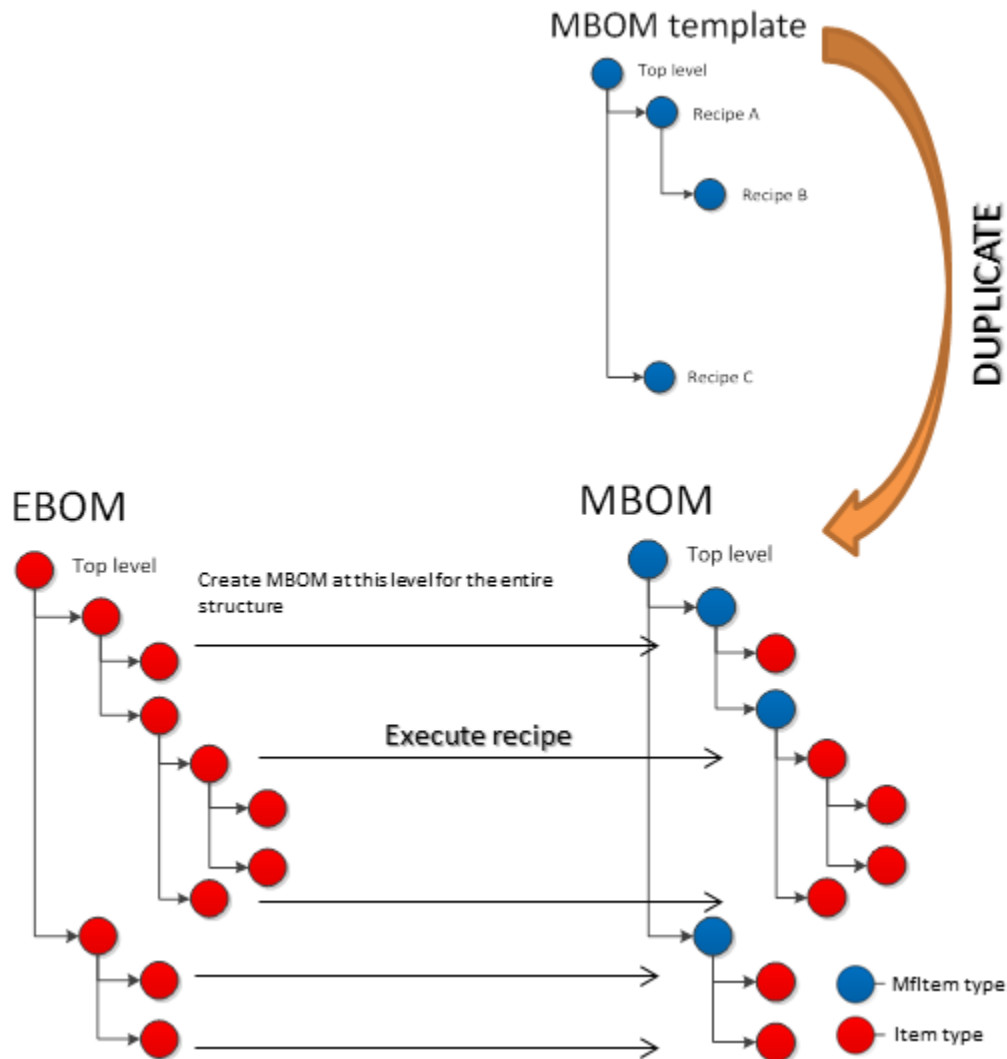
This type of MBOM creation method works well for *configure to order* customers such as heavy machinery.

Note:

Neither of the methods to create MBOMs supports part replacement through propagation.

Create an MBOM from a recipe

You can automatically create an MBOM based on a recipe. A recipe consists of search criteria saved on each node of an MBOM template that define the parts to assign to that specific node.



Beginning with an MBOM template that contains phantom levels, you define a recipe for each part that is to be manufactured. When you run the search, Teamcenter searches in the specified EBOM for parts that fulfill the criteria and assigns them to the MBOM.

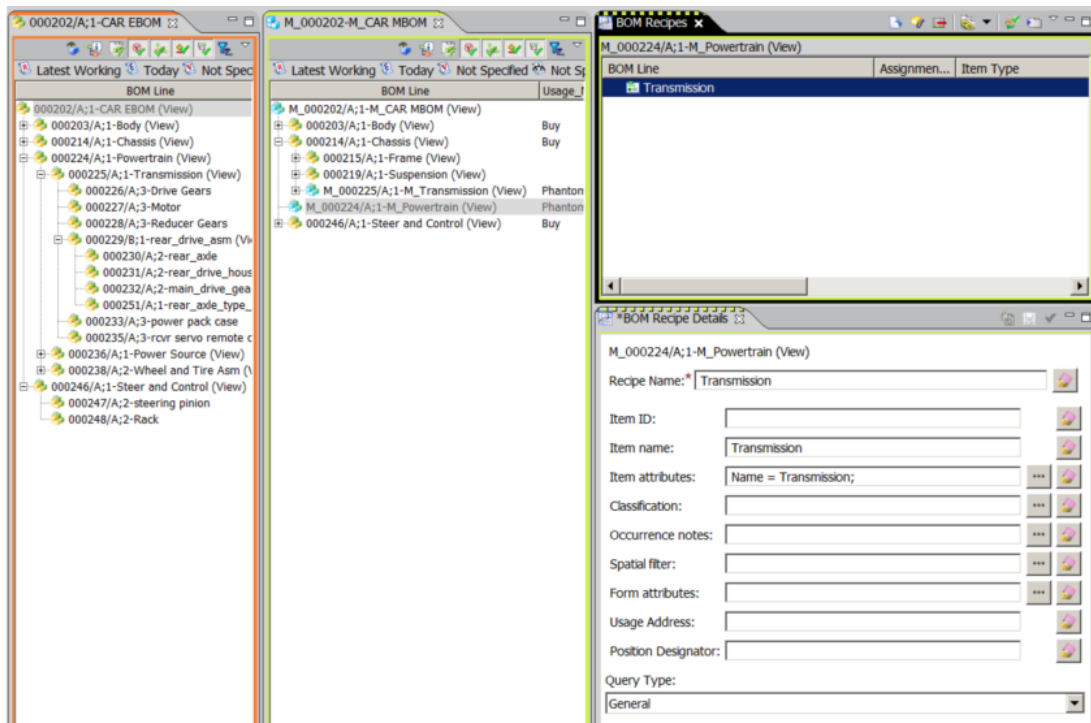
Unless a cloning rule is set up to ignore MBOM recipes, when you clone an MBOM that contains recipes, Teamcenter clones the recipes as well.

1. Open the MBOM template on which you want to save recipes.

This MBOM must already be linked to an EBOM structure.

2. Right-click a node on which you want to save a search criteria and choose **Open With→BOM Recipes**.
3. In the **BOM Recipes** view, click **Create/Update Recipe** .
4. In the **BOM Recipe Details** view, enter a name for the search and the search criteria that describe the parts that you want to add to the MBOM at the selected node.

What you enter as search criteria is company-specific but may include usage address, position designator, or a function-based numbering scheme making up the ID.



You can add multiple criteria to one search box by separating them with a semicolon.

5. Click **Validate BOM Recipe** .

Teamcenter runs the search on the EBOM and lists the parts that fulfill the search criteria in the **BOM Recipe Validation Results** view. Use this step to verify that you have entered the correct criteria.

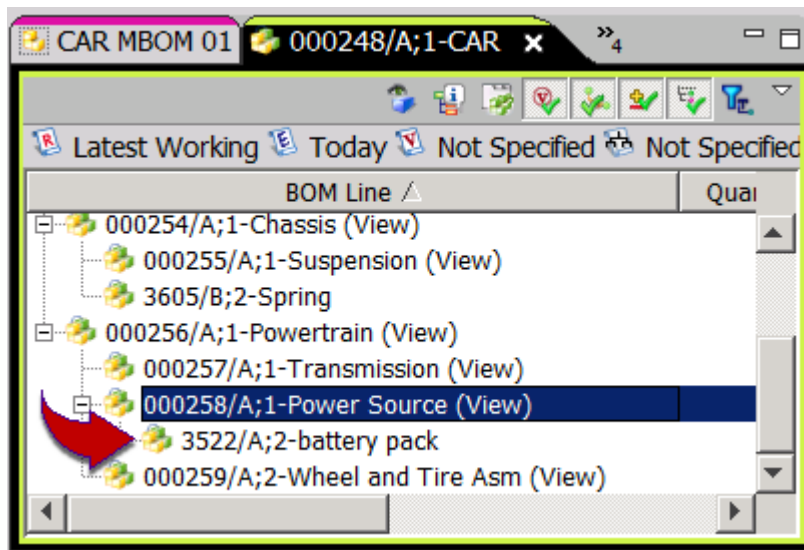
6. In the **BOM Recipe Details** view, click **Create New Recipe** .

Teamcenter lists the new recipe in the **BOM Recipes** view. You can save multiple recipes on an MBOM node.

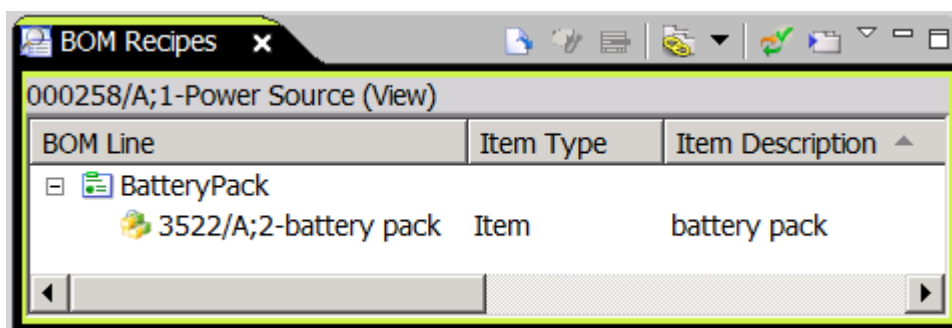
7. Do one of the following:

- To resolve one node of the MBOM template, select the recipe in the **BOM Recipes** view and click **Resolve BOM Recipe** .
 - To resolve multiple nodes of the MBOM template, select a node in the MBOM template and choose **Tools**→**Resolve BOM Recipe**.
8. In the **Resolve BOM Recipe** dialog box, select whether to remove the previously assigned parts and click **OK**. If you open the dialog box from the **Tools** menu, you can choose to resolve all nodes underneath the selected node by selecting **Resolve recipe recursively**.

Teamcenter adds the parts from the EBOM that fulfill the search criteria to the MBOM.



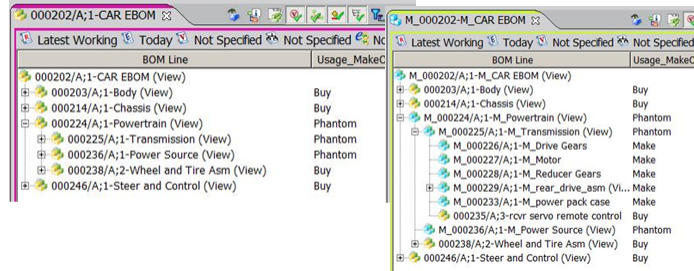
Additionally, the resolved parts are listed under the recipe in the **BOM Recipes** view.



You cannot directly copy a BOM recipe. You can, however, select a recipe in the **BOM Recipes** view, and then select a different node in the MBOM. The search criteria are still visible in the **BOM Recipe Details** view where you can save them as a new recipe on a different MBOM node.

Creating an MBOM using the me_create_mbom utility

The **me_create_mbom** utility creates an MBOM based on a specific EBOM, but replaces *make* parts or phantom levels in the EBOM with manufacturing-specific parts and directly copies over *buy* parts.



Except in specific cases (see preferences below), do not use this utility to update the MBOM. To update an MBOM, use an accountability check or an advanced accountability check.

You can create a manufacturing bill of materials (MBOM) from an engineering bill of materials (EBOM) automatically using the **me_create_mbom** utility. This utility creates a new MBOM root node, and then either:

- Copies over engineering parts that are designated as **Buy** or **Phantom**.
- Replaces the parts designated as **Make** with new manufacturing parts containing the same in-context ID (IDIC) as the engineering part for future comparison.

Example:

```
me_create_mbom -u=kj -p=kj -g=Engineering
-key="item_id=000159,object_type=Item" -revrule="Latest Working"
-mrevrule="Latest Working" -log=D:\workdir\create3.csv -usemfk
```

Caution:

Log off any interactive session that uses the same structures as the structures you update with the utility before you use the utility to avoid failures due to locking of objects in that user session.

The utility is affected by the values of these preferences:

- **MEMBOM_Mirror_MakeRules**

This preference specifies a BOM Line property, such as **bl_item_object_type**, and property value pair that serve as input for the decision as to whether to create a manufacturing-specific part.

There are two ways to view defined BOM Line property names:

1. In the BMIDE, you can check the properties defined for the object BOM Line.
2. In Structure Manager, if you right-click on the column title line and choose Insert Column(s)..., you get a list of the defined BOM Line properties.

Note:

This preference accepts only a string value.

If you require a boolean or other attribute, you should write your own Business Modeler Framework extension to control a make or buy decision.

Preference syntax

KEY:<BOMLinePropertyInternalName>,VALUE:<PropertyValue>,ACTION:<ActionValue>

- <BOMLinePropertyInternalName> is the property on which the value criterion will apply (e.g. "GCS CP").
- <PropertyValue> is the value used by the criterion.
- <ActionValue> is the action to undertake on the BOM node.

Valid values are **PartLink** (links a Design node to Part node) and **PartAssign** (links and assigns a Design node Under a Part node).

Note:

ACTION is only meant for Design/Part like structures. If more than one value for a given property can determine the action, the operator OR (|) can be used as follows: "KEY:<BOMLinePropertyInternalName>,VALUE:<PropertyValue1>,ACTION:<ActionValue1>|VALUE:<PropertyValue2>,ACTION:< ActionValue2>" (e.g. "KEY:GCS CP,VALUE:Make|VALUE:MakePart,ACTION:PartAssign|VALUE:MakeLink,ACTION:PartLink"). If there is no preference value, the item is shared between Engineering BOM (EBOM) and Manufacturing BOM (MBOM) structures.

A common criteria may be, for example, whether you make or buy a part. Any parts designated as **Make** or **Phantom** (for organizational purposes) in the EBOM are replaced by manufacturing-specific parts in the MBOM. In this case, the value of this preference may look like this:

KEY:Usage_MakeOrPurchase,VALUE:Make|VALUE:Phantom

You can use a custom property in this preference. If you do not assign any value, the utility carries over the parts from the EBOM directly.

Note:

You should write your own Business Modeler Framework extension to control a make or buy decision.

- **MEMBOM_Mirror_TypePrefixSuffix**

This preference specifies the item type for the new manufacturing-specific item and any prefix or suffix to add to the item ID of the part in the EBOM that is being replaced by a new part in the MBOM. If you use custom manufacturing business object types, you can add this type to the value of this preference.

The default value of -usemfk is false. If true, and only the object type is present in **MEMBOM_Mirror_TypePrefixSuffix**, use that type and the ebom item id for MFK value. If you set the command line option -usemfk to true and specify *only* the item type, you can enter multifield keys.

If your company uses naming rules for new items, you must ensure that the prefix that you assign in this preference corresponds to the naming rules for the manufacturing item. Alternatively, you can remove all naming rules for manufacturing items. A conflict with item naming rules leads to this error message:

```
ERROR on line:250 creating mbom
74006: Valid pattern is aannnnnn. creating mbom
74007: Supplied item_id value "M_qp130410" is invalid. creating mbom
7007: Invalid Tag - the requested object does not exist creating mbom
```

- **MEMBOM_Mirror_ReplaceMakeOnChange**

This preference specifies the behavior when, after creation of an MBOM, you change a make/buy property value from **Make** to **Buy**. At update, by default, Teamcenter simply appends the buy part to the existing structure without removing the make part already in the MBOM. If you set this preference to **TRUE**, at update, Teamcenter replaces the make part in the MBOM with the buy part from the EBOM, avoiding duplication of parts.

- **MEMBOM_Mirror_RemoveLineWithIDIC**

This preference is applicable to updating an MBOM with the utility. It specifies that if the in-context ID (IDIC) of a line in the MBOM is not found in the EBOM, or if a line in the MBOM has no IDIC, it is not removed at update if it is already stamped with an IDIC.

- **MEMBOM_Mirror_IDICOnChildren**

This preference determines whether the IDIC is retained on a make part in the MBOM when updating it using the utility after changing a make part to a buy part in the EBOM. When updating, if the **MEMBOM_Mirror_ReplaceMakeOnChange** preference is set to **FALSE**, both the original make part

and the buy part exist in the MBOM after updating. This causes the accountability check to display multiple matches. Removing the IDIC on the make part ensures that there is only one match in an accountability check. If the **MEMBOM_Mirror_ReplaceMakeOnChange** preference is set to **TRUE**, the make line is replaced with the buy line from the EBOM so this preference is irrelevant.

- **MEMBOM_Mirror_IgnoreRules**

This preference uses the keyword **ACTION** to skip an EBOM node or to traverse below an EBOM node while ignoring that EBOM node. The children of the traversed EBOM node become the children of the corresponding MBOM parent.

- **MEMBOM_Mirror_AlignProperties**

This preference controls which properties and attachments are copied from the EBOM to the MBOM by enabling the alignment of properties on **Make** items and revisions. The **Make** nodes are of different types than the original EBOM nodes.

The following examples of running the utility demonstrate its use and the differences in output caused by changing the utility arguments. The initial values of the preferences are as follows.

```
MEMBOM_MakeRules=KEY:Usage_Product,VALUE:Make|VALUE:Phantom
```

```
MEMBOM_RemoveLineWithIDIC=FALSE
```

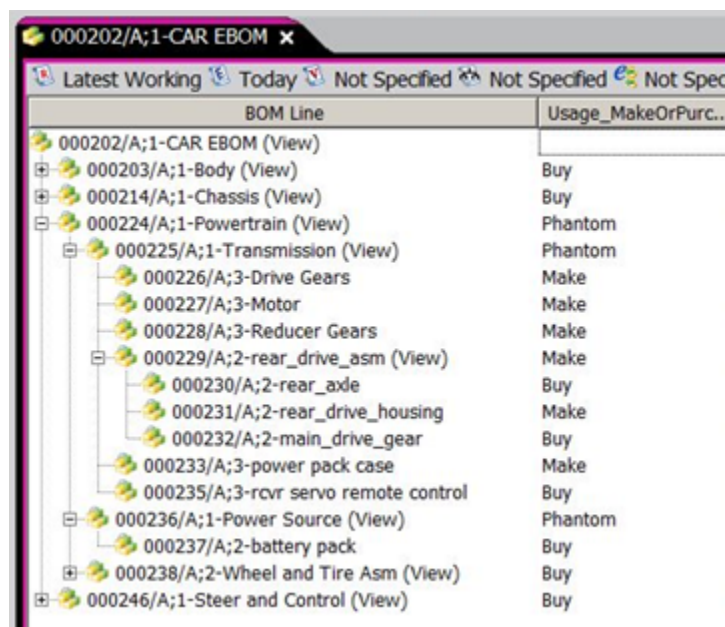
```
MEMBOM_TypePrefixSuffix=Company,,
```

Note:

No prefix is used in this course due to the naming rule conflict.

Creating an MBOM

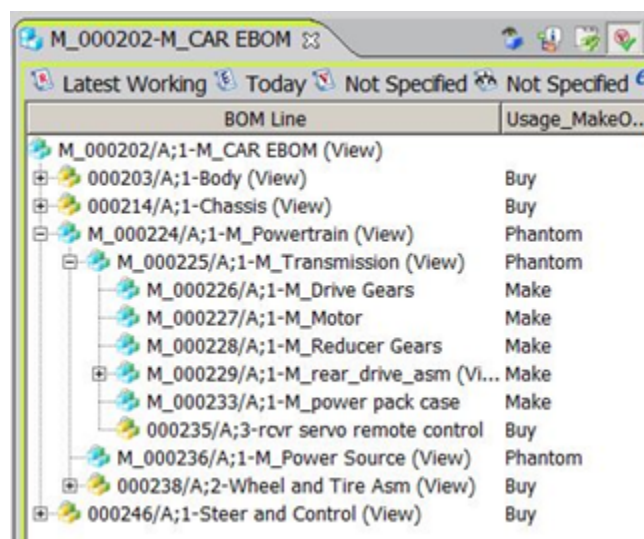
For the following EBOM:



Run the utility:

```
me_create_mbom -u=user-name -p=password -g=group -ebomroot=000202
-revrule="Latest Working" -mrevrule="Latest Working"
```

Produces the following MBOM:



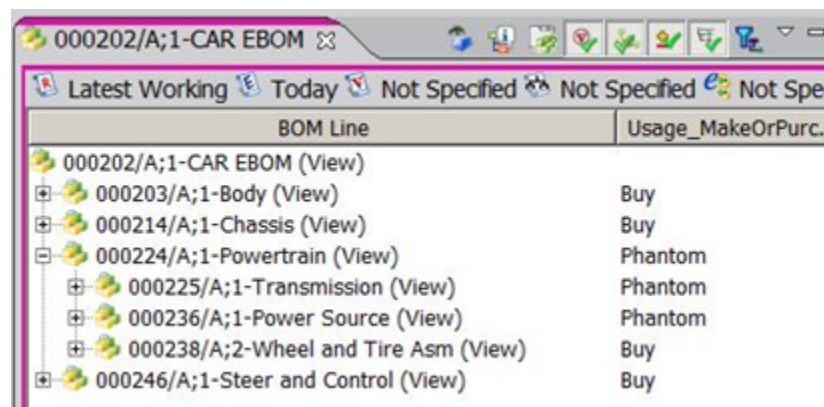
Note the following:

- The top-level node is replaced with a manufacturing-specific part.
- The make and phantom parts are replaced with new manufacturing-specific parts.

- The buy parts of the EBOM are directly copied over to the MBOM.
- An IDIC is generated for all parts except for those below a buy part.
- The in-context ID (IDIC) of the new parts is the same as the original part in the EBOM. This is true if the IDIC is already present in the EBOM part.
- When you right-click the top node of the EBOM or MBOM and choose **Link/Associate→Link Structures**, you can see that the utility has linked the two structures.

Creating the MBOM to a specific level

For the following EBOM:

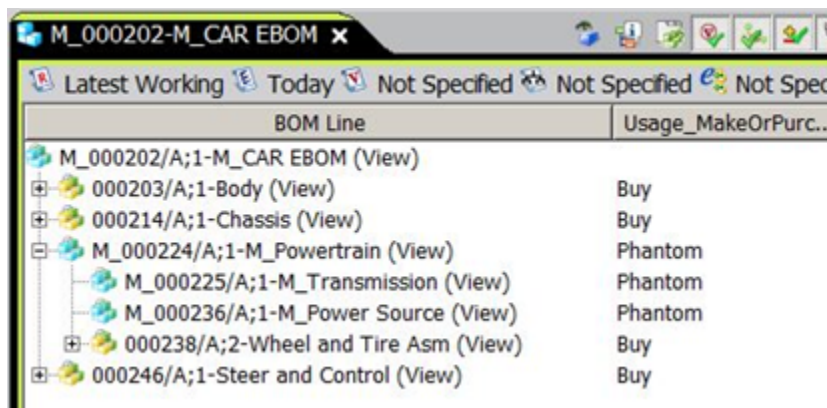


BOM Line	Usage_MakeOrPurc..
000202/A;1-CAR EBOM (View)	
000203/A;1-Body (View)	Buy
000214/A;1-Chassis (View)	Buy
000224/A;1-Powertrain (View)	Phantom
000225/A;1-Transmission (View)	Phantom
000236/A;1-Power Source (View)	Phantom
000238/A;2-Wheel and Tire Asm (View)	Buy
000246/A;1-Steer and Control (View)	Buy

Run the utility:

```
me_create_mbom -u=user-name -p=password -g=group -ebomroot=000202
-revrule="Latest Working" -mrevrule="Latest Working" -depth=2
```

Produces the following MBOM:



BOM Line	Usage_MakeOrPurc..
M_000202/A;1-M_CAR EBOM (View)	
000203/A;1-Body (View)	Buy
000214/A;1-Chassis (View)	Buy
M_000224/A;1-M_Powertrain (View)	Phantom
M_000225/A;1-M_Transmission (View)	Phantom
M_000236/A;1-M_Power Source (View)	Phantom
000238/A;2-Wheel and Tire Asm (View)	Buy
000246/A;1-Steer and Control (View)	Buy

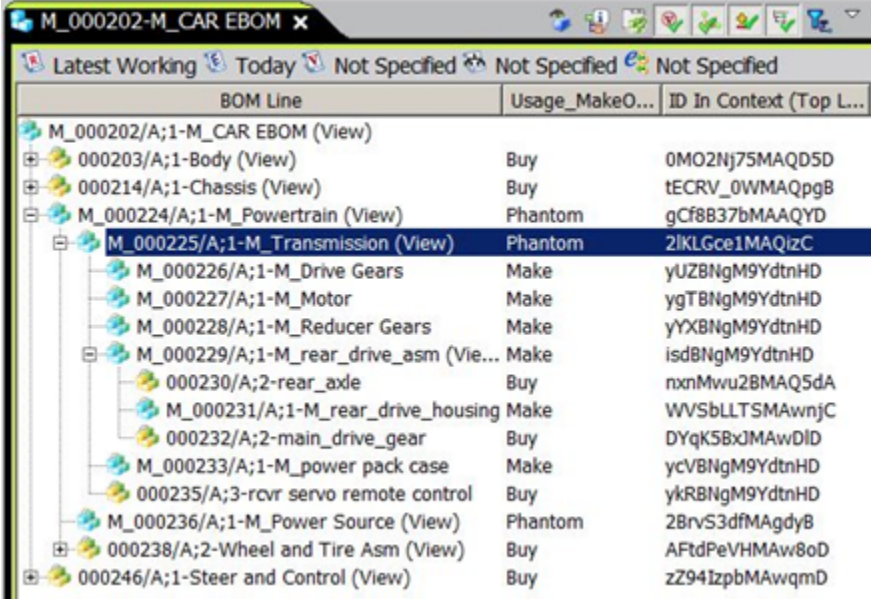
Note that the new MBOM contains only two levels of structure. The remaining levels in the EBOM are ignored.

Updating the MBOM from a specific line

You now update the MBOM above, but only for the M_000225 line and down, requiring the following utility command:

```
me_create_mbom -u=your-user-name -p=your-password -g=your-group
-ebomroot=000202 -scopeid=000225 -revrule="Latest Working"
-mbomroot=M_000202 -mrevrule="Latest Working"
```

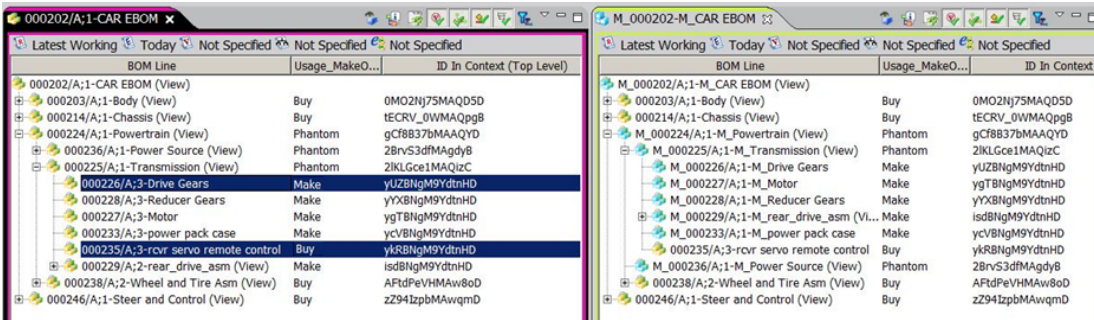
The utility creates the following MBOM:



BOM Line	Usage_MakeO...	ID In Context (Top L...
M_000202/A;1-M_CAR EBOM (View)		
000203/A;1-Body (View)	Buy	0M02Nj75MAQD5D
000214/A;1-Chassis (View)	Buy	tECRV_0WMAQpgB
M_000224/A;1-M_Powertrain (View)	Phantom	gCf8837bMAAQYD
M_000225/A;1-M_Transmission (View)	Phantom	2lKLGe1MAQzC
M_000226/A;1-M_Drive Gears	Make	yUZBNgM9YdtnHD
M_000227/A;1-M_Motor	Make	ygTBNgM9YdtnHD
M_000228/A;1-M_Reducer Gears	Make	yYXBNgM9YdtnHD
M_000229/A;1-M_rear_drive_asm (Vie...	Make	isdBNgM9YdtnHD
000230/A;2-rear_axle	Buy	rxnMwu2BMAQ5dA
M_000231/A;1-M_rear_drive_housing	Make	WVSbLLTSMawnjC
000232/A;2-main_drive_gear	Buy	DYqK58xJMAwDID
M_000233/A;1-M_power pack case	Make	ycVBNgM9YdtnHD
000235/A;3-rcvr servo remote control	Buy	ykRBNgM9YdtnHD
M_000236/A;1-M_Power Source (View)	Phantom	2BrvS3dfMAgdy8
000238/A;2-Wheel and Tire Asm (View)	Buy	AFtdPeVHMAw8oD
000246/A;1-Steer and Control (View)	Buy	zZ94IzpbMAwqmd

Changing Make to Buy and Buy to Make in the EBOM

For the following EBOM and MBOM:

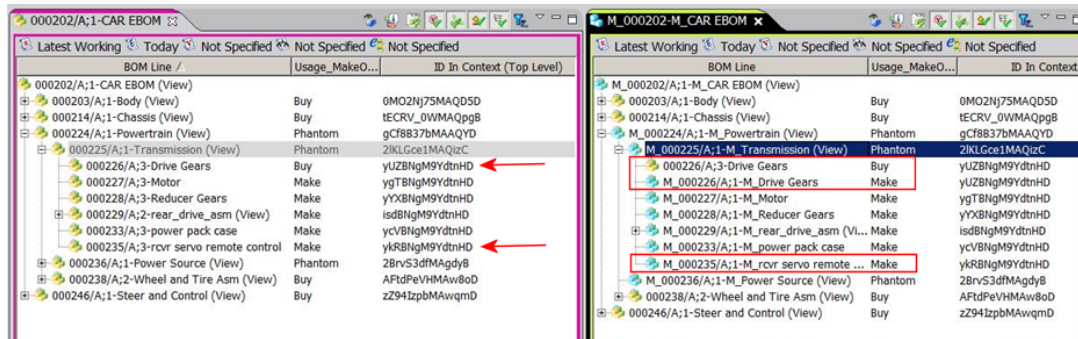


BOM Line	Usage_MakeO...	ID In Context (Top Level)
000202/A;1-CAR EBOM (View)		
000203/A;1-Body (View)	Buy	0M02Nj75MAQD5D
000214/A;1-Chassis (View)	Buy	tECRV_0WMAQpgB
000224/A;1-Powertrain (View)	Phantom	gCf8837bMAAQYD
000225/A;1-Transmission (View)	Phantom	2lKLGe1MAQzC
000226/A;3-Drive Gears	Make	yUZBNgM9YdtnHD
000228/A;3-Reducer Gears	Make	yYXBNgM9YdtnHD
000227/A;3-Motor	Make	ygTBNgM9YdtnHD
000233/A;3-power pack case	Make	ycVBNgM9YdtnHD
000235/A;3-rcvr servo remote control	Buy	ykRBNgM9YdtnHD
000229/A;2-rear_drive_asm (View)	Make	isdBNgM9YdtnHD
000238/A;2-Wheel and Tire Asm (View)	Buy	AFtdPeVHMAw8oD
000246/A;1-Steer and Control (View)	Buy	zZ94IzpbMAwqmd

You change the **Make** value to **Buy** for the drive gears and change the **Buy** value to **Make** for the rcvr remote control in the EBOM and run the utility as follows:

```
me_create_mbom -u=user-name -p=password -g=group -ebomroot=000202
-scopeid=000225 -revrule="Latest Working" -mbomroot=M_000202
-mrevrule="Latest Working" -update
```

The results are as follows:



When the rcvr remote control part is changed from a **Buy** to a **Make**, the utility replaces the buy part in the MBOM during update. Buy to make behavior is not affected by preference settings. For the make to buy change (the drive gears), the behavior depends on two preferences:

- The **MEMBOM_Mirror_ReplaceMakeOnChange** preference is set to **FALSE**. The make part is not removed from the MBOM. The buy part is added to the structure.

The IDIC values on the make part are determined by the **MEMBOM_Mirror_IDICOnChildren** preference.

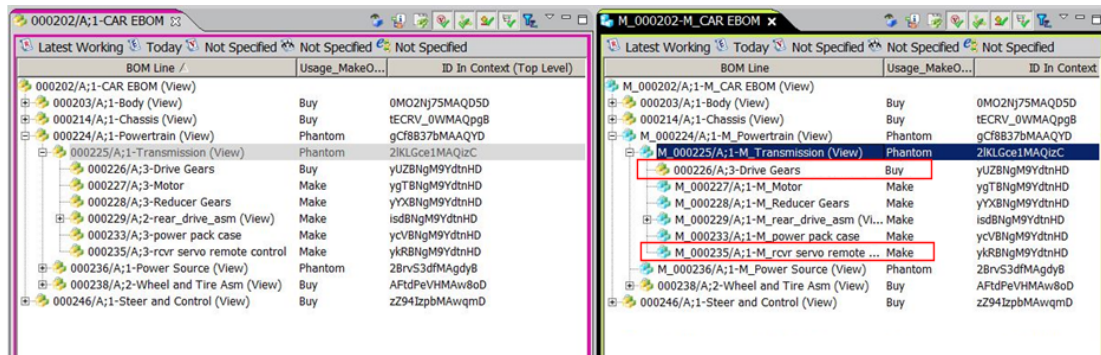
- If **MEMBOM_Mirror_IDICOnChildren** is set to **FALSE** (or does not exist), the IDIC on the make part in the MBOM is retained. Performing an accountability check between the EBOM and MBOM results in multiple matches as the MBOM contains both a make and a buy part with the same IDIC.
- If **MEMBOM_Mirror_IDICOnChildren** is set to **TRUE**, the IDIC on the make part in the MBOM is deleted and an accountability check displays the make part as missing in source.

Caution:

You must exercise caution when removing an IDIC on any part. This can cause problems in other areas, for example, if the part is consumed in an process structure, you lose the link to that line.

- The **MEMBOM_Mirror_ReplaceMakeOnChange** preference is set to **TRUE**.

The buy part (drive gears) replaces the make part. The result of the MBOM after update is as follows:

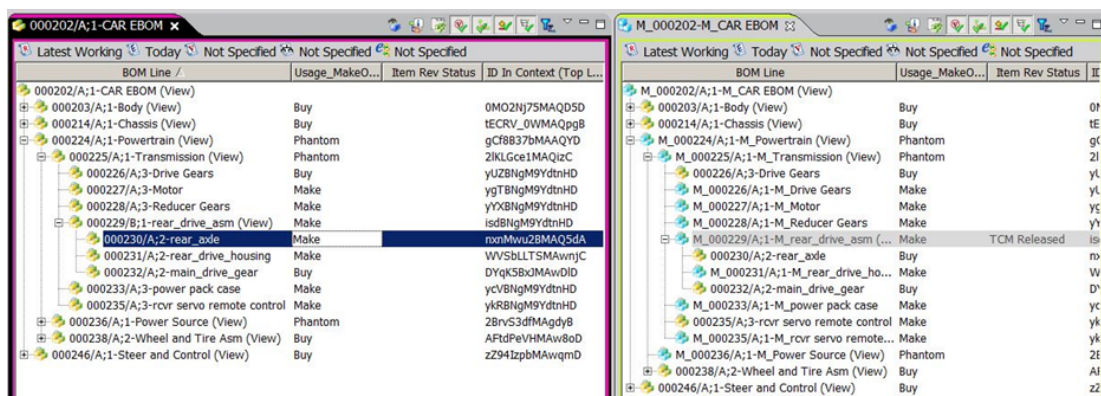


In summary, the behavior of the preferences is as follows:

MEMBOM_Mirror_ReplaceMakeOnChange	FALSE	The buy part is added to MBOM and the previous make part is kept in the structure but its IDIC is removed.
MEMBOM_Mirror_IDICOnChildren	TRUE	
MEMBOM_Mirror_ReplaceMakeOnChange	FALSE	The buy part is added to MBOM and the previous make part is kept in the structure but its IDIC is <i>not</i> removed.
MEMBOM_Mirror_IDICOnChildren	FALSE	
MEMBOM_Mirror_ReplaceMakeOnChange	TRUE	The buy part is added to MBOM and the previous make part is <i>removed</i> in the structure, irrespective of the value of MEMBOM_Mirror_IDICOnChildren .
MEMBOM_Mirror_IDICOnChildren	TRUE/FALSE	

Updating a released node in the MBOM

In the following EBOM and MBOM, **M_000229/A;1-M_rear_drive_asm** is released and then the make/buy property on its child, **000230/A;2-rear_axle**, is changed from **Buy** to **Make**.

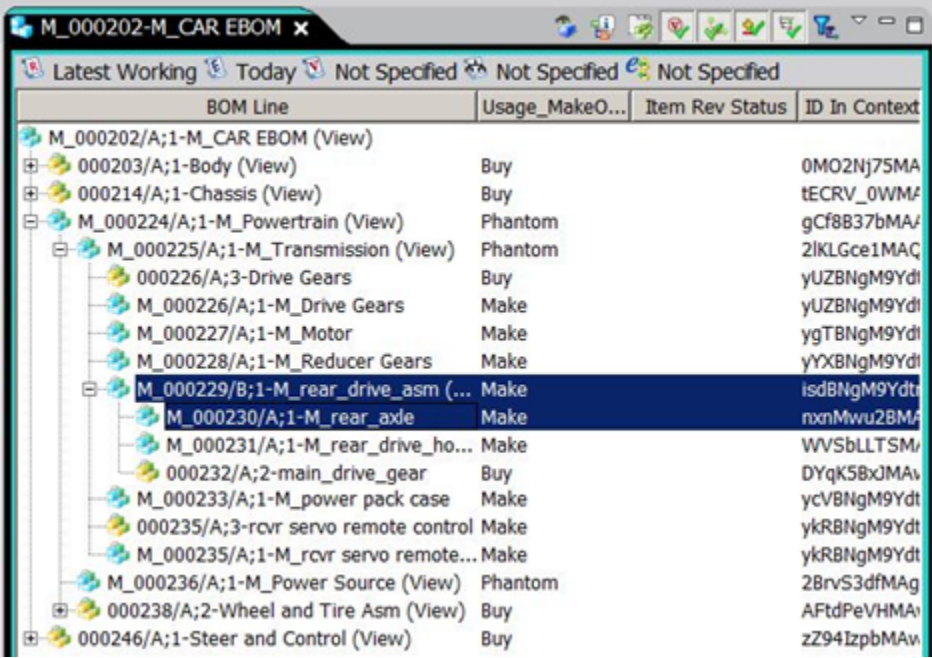


You revise the MBOM part so you have write access and run the update utility.

You run the utility with the **-actiononrelease** argument set to 2.

```
me_create_mbom -u=your-user-name -p=your-password -g=your-group
-ebomroot=000202 -scopeid=000225 -revrule="Latest Working"
-mbomroot=M_000202 -mrevrule="Latest Working" -actiononrelease=2 -update
```

The results are as follows:



BOM Line	Usage_MakeO...	Item Rev Status	ID In Context
M_000202/A;1-M_CAR EBOM (View)			
000203/A;1-Body (View)	Buy		0M02Nj75MA
000214/A;1-Chassis (View)	Buy		tECRV_0WMA
M_000224/A;1-M_Powertrain (View)	Phantom		gCf8B37bMA
M_000225/A;1-M_Transmission (View)	Phantom		2IKLGce1MA
000226/A;3-Drive Gears	Buy		yUZBNgM9Yd
M_000226/A;1-M_Drive Gears	Make		yUZBNgM9Yd
M_000227/A;1-M_Motor	Make		ygTBNgM9Yd
M_000228/A;1-M_Reducer Gears	Make		yYXBNgM9Yd
M_000229/B;1-M_rear_drive_asm (...)	Make		isdBNgM9Yd
M_000230/A;1-M_rear_axle	Make		rxnMwu2BM
M_000231/A;1-M_rear_drive_ho...	Make		WVSbLLTSM
000232/A;2-main_drive_gear	Buy		DYqK5BxJMA
M_000233/A;1-M_power pack case	Make		ycVBNgM9Yd
000235/A;3-rcvr servo remote control	Make		ykRBNgM9Yd
M_000235/A;1-M_rcvr servo remote...	Make		ykRBNgM9Yd
M_000236/A;1-M_Power Source (View)	Phantom		2BrvS3dfMA
000238/A;2-Wheel and Tire Asm (View)	Buy		AftdPeVHMA
000246/A;1-Steer and Control (View)	Buy		zZ94IzpbMA

The utility revises the part and replaces the old revision with the new one.

Changing properties in the EBOM

To detect property changes in the EBOM, run an accountability check between the EBOM and MBOM. You can propagate any property differences using the accountability check mechanism.

Attachments

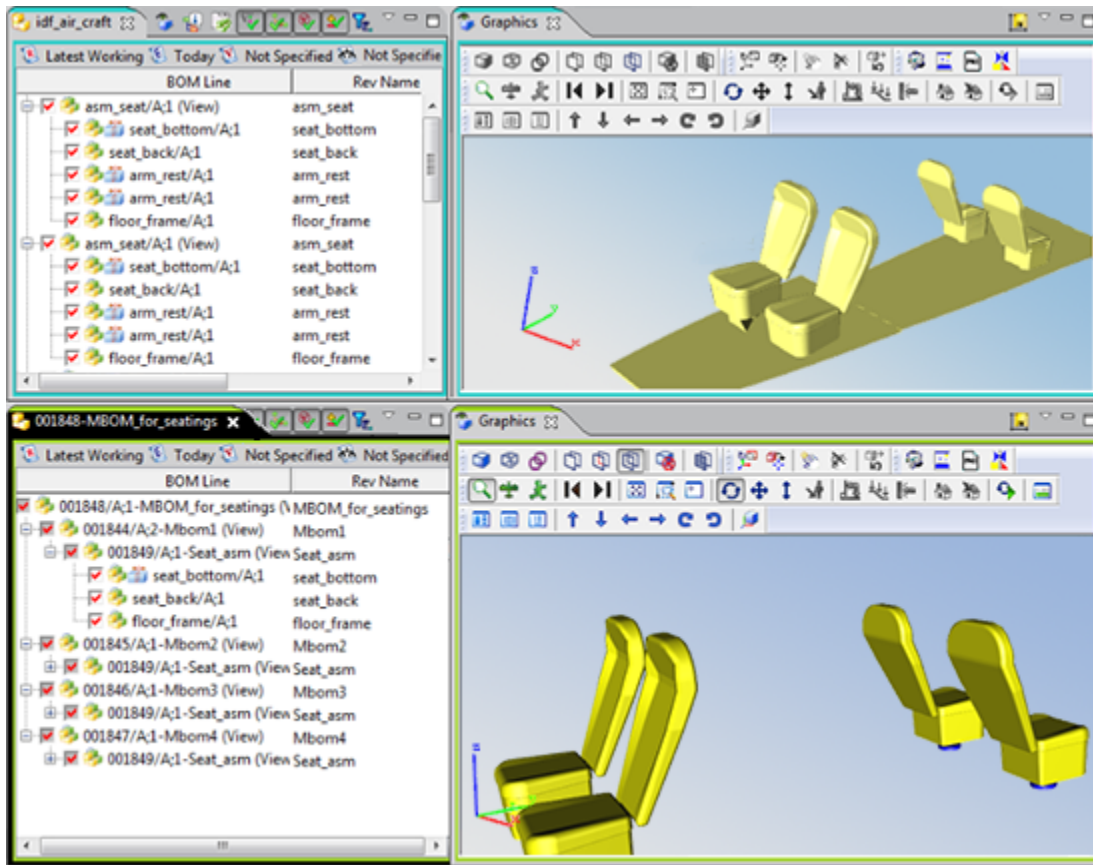
Attachments are always synchronized as the attachment is created as a reference on the new make part. Any changes to the attachments on the EBOM side are automatically reflected in the MBOM. If you add a new attachment to the EBOM, you must run the update to see it in the MBOM part.

Managing reused assemblies in an MBOM

What is a reused assembly?

Manufacturing needs are often different from design needs, and the engineering design is created in a CAD package that sometimes cannot be changed by manufacturing personnel. Manufacturing engineers

often need to create a manufacturing subassembly in an MBOM from parts in an EBOM. They then need to align the assigned parts in the MBOM with those in the EBOM.



If parts are added to the EBOM that are reused multiple times in the MBOM, such as chair parts in this example, you can update the MBOM by copying those parts to a single reusable assembly. If the same sets of parts in the reusable assembly exist in the EBOM multiple times and are located and oriented in a repeated pattern relative to each other, you can create a reusable assembly from those parts in the MBOM. You can then search the EBOM for other collections of the same parts and patterns and add the same assembly to the MBOM for each collection. Those parts share the same item ID or part number, thereby reducing your inventory and the complexity of your manufacturing process. The reused assemblies are automatically aligned with the EBOM and transformed in the graphical view.

Note:

- If the reusable parts all exist at the same location (for example, 0,0,0), they are ignored.
- Welds, mirrored transforms, and scaled transforms are not supported.
- Patterns in which the same part could exist in multiple assemblies—such as a line of five parts that are ten inches apart and a subassembly that contains two parts ten inches apart—are not supported. All possible combinations that match the reusable assembly's pattern are returned in the search.

- Parts in the EBOM that are configured out using variants, effectivity, and other overrides are still considered when you create a reusable assembly.
- If you have a second EBOM with parts copied from an original EBOM, they share the same in-context IDs (IDICs). If you set the second EBOM as the scope to be used in an MBOM assembly reused from the original EBOM, Teamcenter will search and return found parts in a collection from the second EBOM.

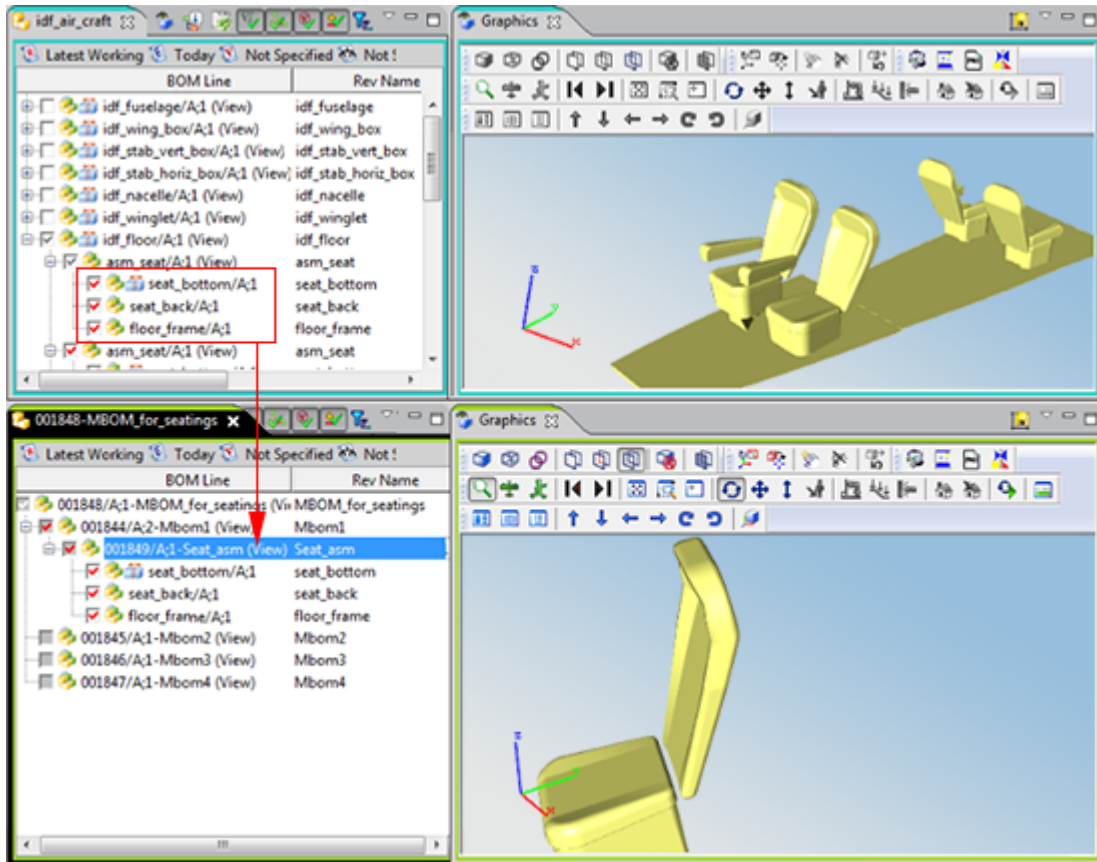
Create a reusable assembly

To reuse an assembly in an MBOM, you must first create a reusable assembly from parts collected from the EBOM.

1. In the EBOM, locate a collection of parts that occurs multiple times and in multiple locations in the product design.



2. In the MBOM, create an assembly item, including phantom nodes and other items as needed.
3. In the EBOM, select the parts to be used in the reusable assembly, and in the MBOM, paste them to the assembly item.



4. Right-click the reusable assembly, choose **Insert Column**, and add the **Reuse Assembly** column to the MBOM view.

Note:

You can also add this column by right-clicking a BOM line, choosing **Edit Properties**, and selecting the **Reuse Assembly** ☒ check box.

5. In the **Reuse Assembly** column, in the top line of the reusable assembly, type **1**.

The assembly is ready to be reused in your MBOM.

Reuse an assembly

Once you create a reusable assembly in your MBOM, you can search for identical collections in your EBOM and reuse the assembly so that it is automatically aligned and transformed with the EBOM.

Note:

If you want to search for a single part in your EBOM, you can set the **ME_reuse_override_immediate_context** preference to automatically search from the top line

in the EBOM. You must also set the **ME_reuse_use_absxform_id_for_multiple_align** preference to a value of **1**. The single part is the CAD-Part alignment case for standard parts that are repeated many times (for example, nuts and bolts).

1. In the MBOM, select the top line of the reusable assembly and choose **Tools→Manufacturing Alignment→Reuse Assembly**.

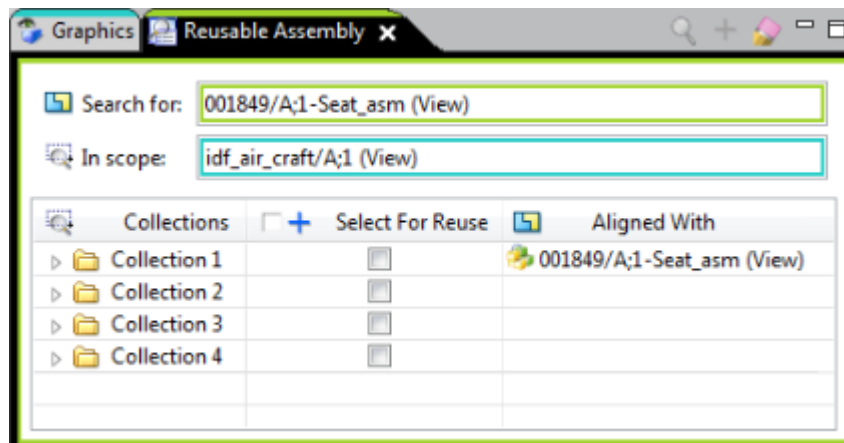
In the **Reuse Assembly** dialog box, in the **Search for** text box, the reusable assembly parent name is displayed.

2. In the EBOM, select a structure at a level high enough to contain collections of parts identical to those in your reusable assembly and click .

In the **Reuse Assembly** dialog box, the selected structure is displayed in the **In scope** text box.

3. Click **Search**.

The **Reusable Assembly** view is displayed, showing collections of parts that match those in your reusable assembly but have specific locations and orientations relative to each other. In the **Aligned With** column, the line where you created your reusable assembly in the MBOM is shown to be aligned. The remaining collections represent opportunities for reuse.



Note:

If no match is found because a part does not have an in-context ID (ICID), you can use the **ME_reuse_use_absxform_id_for_multiple_align** preference to search for patterns and automatically align parts.

Warning:

The search results are not updated if you modify or reconfigure the EBOM or MBOM structure while working in the **Reusable Assembly** view. If you do so, rerun the search to ensure the search results are consistent with the current data.

4. In the **Select For Reuse** column, do one of the following.
 - To select individual collections for reuse, select the check boxes for those collections.
 - To select all collections, click the **Select For Reuse** header.

Note:

The check box icon in the header ☐ does not change.

Tip:

To clear all collections, click the header again.

5. On the **Reusable Assembly** toolbar, click .
6. In the MBOM, select the parent under which you want the selected collections to be created, and in the **Reusable Assembly** dialog box, click .
7. Click **Create**.

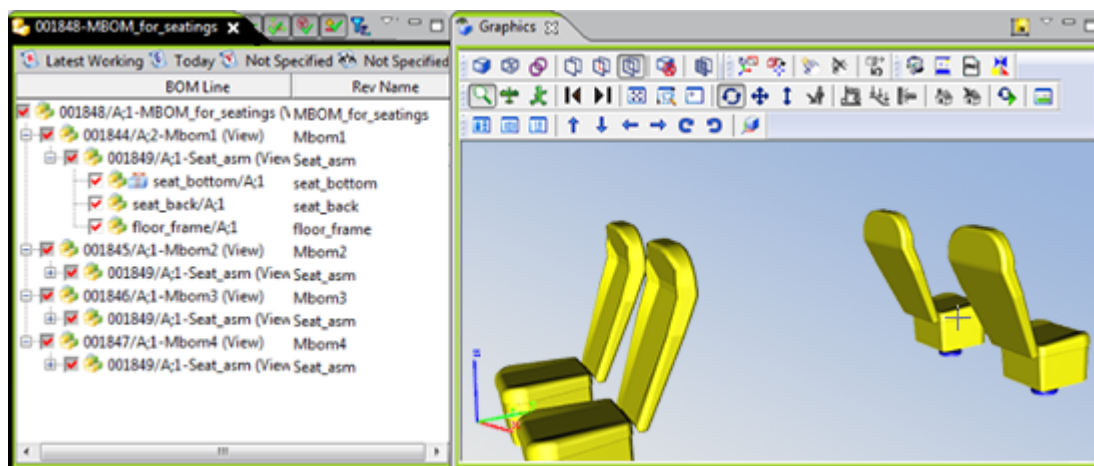
The reused assembly nodes are added to the MBOM. In the **Reusable Assembly** view, the check boxes you selected are cleared to indicate that the reuse is successful. The **Aligned With** column is updated to show which collections are now aligned. If the collections have packed lines or were aligned multiple times, quantities are reported (for example, **x 3**).

Note:

The precision of transform comparisons can be modified using the **ME_reuse_asm_xform_precision** preference.

8. (Optional) Add the same or different collections to other assemblies in the same MBOM structure.

After you complete creating your reused assemblies, they should look identical in the MBOM and EBOM **Graphics** views.



9. (Optional) Run an advanced accountability check to verify that the reused components are correctly mapped to the EBOM.

Add and align parts in a reused assembly

In cases where changes are made to parts in the EBOM (for example, one or more arm rests of a chair assembly have moved, the chair itself and therefore all of its parts have moved, more than one chair location needs to be adjusted, or parts are added), you must realign the assembly with the EBOM to ensure that all reused assemblies in the MBOM reflect those changes. You can add new parts to and align moved parts in a single reuse instance or to all instances in your MBOM.

1. If the EBOM and MBOM are not already linked, link them using the **Link Associate→Link Structures** command.
2. (Optional) If you are viewing unconfigured structures, turn them off so that you have 100% BOMs by deselecting the *show unconfigured* toggles.



While you can run the alignment without fully configuring the structures, not all lines may be aligned.

3. In the EBOM, copy any parts to be added, and in the MBOM, paste the parts to any appropriate reused structure.
4. In the EBOM and MBOM, select the structures to be aligned and choose **Tools→Manufacturing Alignment→Align Reused Assemblies**.

The **Line to be aligned** and **Line to align with** boxes should match.

5. If it is not already selected, from the **Reused assembly** list, select the reused assembly.

6. Do one of the following.
 - To align only the reused assembly selected in step 4, rather than all reused assemblies (default), select **Align reused assembly**.
 - To align all reused assemblies, select **Align all reused assemblies**.
7. To align all properties in the **MEAlignedPropertiesList** site preference, select the **Align properties** ☒ check box.
8. Click **Align**.

The parts and reusable assembly are aligned as you specified.

In-context authoring

Cloning, copying, and replacing in-context assemblies

When you edit an assembly in context, you can modify occurrence properties of the lines beneath the top selected line in the context of that line only. No matter how many places the in-context lines occur under other top structures, the changes will only affect this line. For more information on in-context editing, see *Performing in-context editing*.

If you have an assembly with in-context edits that is almost identical to another required assembly—for example, you have a parent with a specific occurrence effectivity and you need to create a new parent with different effectivity—you can save time by using one assembly as a template for another. In MBOM **Product** or **Workarea** views, you can:

- Use the **Clone Assembly in Context** to split an MBOM structure into two structures by cloning it within the same MBOM. You can also copy, reference, or exclude attachments from the structure being cloned and change the occurrence effectivities of both the items being cloned and the cloned structure.
- Copy an assembly with in-context edits and paste it elsewhere in the same MBOM using the **Paste Assembly in Context** command. This command creates a new absolute occurrence of the assembly while retaining in-context edits and attachments. Standard Teamcenter copy and paste commands do not retain any edits made in the assembly in the context of the parent lines above the line you are copying and pasting, so without this capability, you would have to remake these missing in-context edits.

To define different item types for different manufacturing nodes or simply change the item type of a manufacturing node because your manufacturing plan has changed, use the **Replace Assembly with Any Item Type** command. This command replaces the top item of an assembly with an item of a different item type and retains the original item's in-context edits. Using this command, you can also copy, reference, or exclude attachments from the original item.

Clone an in-context assembly

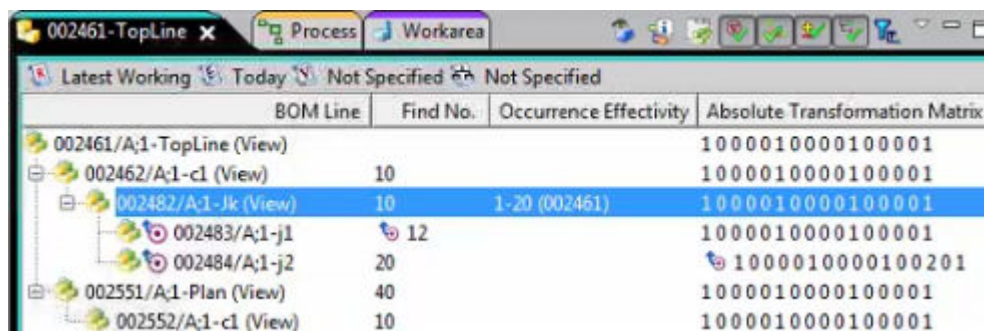
You can clone an assembly with in-context edits from a line in an MBOM to a different line in the same MBOM. This command:

- Retains all in-context edits in the cloned assembly.
- Lets you copy, reference, or exclude in-context attachments from the structure being cloned.
- Optionally splits occurrence effectivity dates or ranges between the assembly being cloned and the cloned assembly.

Note:

- Existing BOM lines are not changed, only direct attachments that are on new items that are cloned. This command can also control in-context attachments in the cloned structure.
- Cloning rules are defined by your administrator using the **MECopyAssemblyInContextTemplates** preference. This preference points to the **Item.Item.CopyAssemblyInContext** preference, which lists the cloning rules for the case in which the source is the first item and the target is the second item. By default, all items are cloned. Your results may not follow the same rules as those in this example.

1. If you are editing in context, hide in-context editing mode.
2. In the MBOM **Product** or **Workarea** view, select the line to be cloned.



BOM Line	Find No.	Occurrence Effectivity	Absolute Transformation Matrix
002461/A:1-TopLine (View)			1000010000100001
002462/A:1-c1 (View)	10		1000010000100001
002482/A:1-Jk (View)	10	1-20 (002461)	1000010000100001
002483/A:1-j1	12		1000010000100001
002484/A:1-j2	20		1000010000100201
002551/A:1-Plan (View)	40		1000010000100001
002552/A:1-c1 (View)	10		1000010000100001

3. Choose **Edit→In Context→Clone Assembly in Context**.

In the **Clone Assembly In Context** dialog box, the selected line is displayed in the **Copy Of** box.

4. In the same MBOM, select the equivalent line to which you want to clone the assembly, and next to the **Paste To** box, click .
5. Click **Next**.

6. (Optional) In the **Assign information** section, in the **ID** box, type an ID or click **Assign**, and optionally, in the **Name** box, type a name for the cloned assembly.

If you do not type a name, the assembly inherits the name of the structure you selected in step 2.

7. Click **Next**.
8. For each attached object, in the **Define Attached Objects** section, from the **Copy Option** column, select how the attachments should be handled.
 - **Copy Reference** creates a reference to the object attached to the structure that you are cloning.
 - **Copy Object** copies the object to the cloned structure.
 - **No Copy** creates neither a reference or copy of the object in the cloned structure.
9. Click **Next**.
10. (Optional) In the **Related Objects Information** section, expand the related structure items being cloned, type or assign new item revision IDs or related object names, and modify any user data as needed.

If you do not change the revision IDs, they are automatically assigned. If you do not change the related object names, they retain the names of the structures being cloned.

11. Click **Next**.
12. (Optional) In the **Occurrence Effectivity Cutback** section, set occurrence effectivity.
 - a. To set a new effectivity for:
 - The structure being cloned, click  next to the original assembly.
 - The cloned assembly, click  next to the cloned assembly.
 - b. In the **Occurrence Effectivity** dialog box, define the appropriate effectivity for the structure being cloned or the cloned assembly.
13. Click **Finish**.

The assembly is cloned with all in-context edits intact.

BOM Line	Find No.	Occurrence Effectivity	Absolute Transformation Matrix
002461/A:1-TopLine (View)			1000010000100001
002462/A:1-c1 (View)	10		1000010000100001
002482/A:1-Jk (View)	10	1-20 (002461)	1000010000100001
002483/A:1-jk1	12		1000010000100001
002484/A:1-jk2	20		1000010000100201
002551/A:1-Plan (View)	40		1000010000100001
002552/A:1-c1 (View)	10		1000010000100001
002562/A:1-Jk (View)	10		1000010000100001
002483/A:1-jk1	12		1000010000100001
002484/A:1-jk2	20		1000010000100201

Copy and paste an in-context assembly

You can copy an assembly with in-context edits and paste it elsewhere in the same MBOM. This command creates a new absolute occurrence of the assembly while retaining in-context edits and attachments.

Note:

Cloning rules are defined by your administrator using the combined **MEDuplicateAssemblyInContextTemplates** and **Item.Item.DuplicateAssemblyInContext** preferences. Your rules may not match the rules in this example.

1. If you are editing in context, hide in-context editing mode.
2. In the MBOM **Product** or **Workarea** view, right-click the line to be copied and choose **Copy**.
3. In the same MBOM, right-click the equivalent line to which you want to paste the assembly.
4. Choose **Edit→In Context→Paste Assembly in Context**.

A new instance of the assembly is created with all in-context edits and attachments as specified in the cloning rules intact.

Replace an in-context line or assembly with a new item type

You can replace a manufacturing bill of materials (MBOM) or bill of equipment (BOE) line or assembly with a new item that has a new item type and retain the original line's or assembly's in-context edits. The procedure is similar to the **File→New** item command, but lets you retain in-context edits and also copy, reference, or exclude attachments from its original structure.

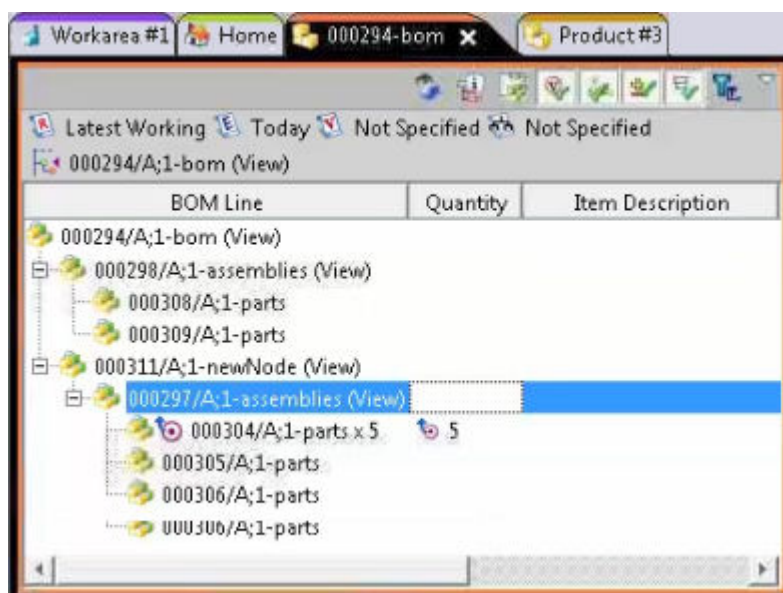
Since by default you cannot copy and paste items from the plant structure to the process structure as anything other than the type **item**, you can use the **Replace Assembly with Any Item Type** command to create a new item of a different item type and that type becomes the default paste option. For

example, you could use the command to replace the item type as a resource (**MEResource** occurrence type) and the system lets you copy and paste items as resource by default.

Note:

Cloning rules are defined by your administrator using the combined **MEReplaceAssemblyInContextTemplates** and **Item.Item.ReplaceAssemblyInContext** preferences. Your rules may not match the rules in this example.

1. If you are editing in context, hide in-context editing mode.
2. In the MBOM or BOE **Product** or **Workarea** view, select the in-context line/assembly for which you want to change the item type.



3. Choose **Edit→In Context→Replace Assembly with Any Item Type**.
4. In the **New Item** dialog box, select the new item type and click **Next**.
5. In the **ID** and **Revision** boxes, type an ID and revision or click **Assign**.
6. In the **Name** box, type a name for the new item and click **Next**.

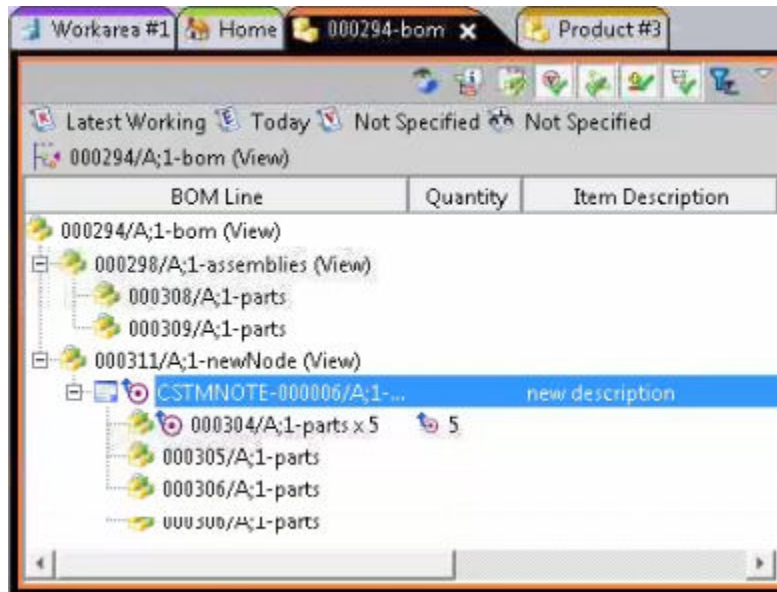
Properties from the in-context line or assembly for which you want to change the item type, such as name, description, and unit of measure, are prepopulated. Your administrator can map common item and revision properties between item types, and define custom item types and properties, using the **MEReplaceAssemblyInContextAlignProperties** preference.

If you click **Next**, the remaining prompts are similar to those in any **New Item** dialog box. You may click **Finish** at any time to accept defaults. Some attributes are prepopulated with the attributes of the original in-context line/assembly. Clicking **Next** lets you modify the defaults.

7. Click **Finish**.

The selected line is replaced with the new item type, ID, revision, and name, with all in-context edits intact.

Now when you use the **Copy**, **Paste**, **Copy As**, or **Paste As** commands, the new item type is the default when you paste.



Using PMM data to generate an MBOM

PMM data flow in Multi-BOM Management

You can generate and update a BOM view revision (BVR) structure using the Product Master Management (PMM) solve recipe in Multi-BOM Management and then use the BVR structure to generate an MBOM in Multi-BOM Management. The solve is a tool to identify all the part usages for an order string that meet specified criteria and to present those usages as a single unit product master.

You must update the BVR if:

- The PMM scope or recipe is changed.
- A versionable property of a part, line of usage (LOU), or solution is changed.
- A nonversionable property of a part, LOU, or solution is changed.

- A new LOU or solution is found in the query.

Define PMM scope

To begin creating a BOM view revision (BVR) from Product Master Management (PMM) data in Multi-BOM Management, you must define the scope of that BVR by locating the PMM data in Teamcenter. As part of your workflow, PMM data to be imported, such as partition or subassembly names, product type, vehicle line, model name or ID, and effective in and out dates, should be provided by Multi-BOM Management.

1. In Multi-BOM Management, create a new structure of the **Item** type.
2. Select the new structure and add one or more items of the **Item** type, naming each for the appropriate partitions it contains.
3. Right-click the top node in the structure and choose **PMM Scope→Create/Update PMM Scope**.
4. In the **Create or Update PMM Scope** dialog box, enter the required search criteria, select the appropriate package from the results, and click **Create**.

A new icon  is displayed on the top line to indicate that a PMM scope object is created and is associated with the selected node.

Manually generate a BVR structure from PMM data

For each partition or subassembly, you can generate a BOM view revision (BVR) in Multi-BOM Management from Product Master Management (PMM) data.

1. If you have not already done so, define the PMM scope.
2. Right-click a partition or subassembly node and choose **PMM Recipe→Create/Update PMM Recipe**.
3. In the **Create or Update PMM Recipe** dialog box, enter the required search criteria, select the appropriate recipe from the results, and click **Create**.

A partition icon  is displayed on the subassembly to indicate that a PMM recipe object is created and is associated with the selected node.

Update a PMM BVR from the command line

Using the Teamcenter command line utility, you can update a Multi-BOM Management BOM view revision (BVR) with Product Master Management (PMM) data.

1. Set the preference **PortalDesignContextSearchEnginePreference** value to **CachelessSearchEngineFactory**.

- For each partition or subassembly, open a Teamcenter command prompt and run the utility.

```
pmm_updps -u=<username> -p=<password> -g=<group> -item_id=<Top-nodes-ItemID>
```

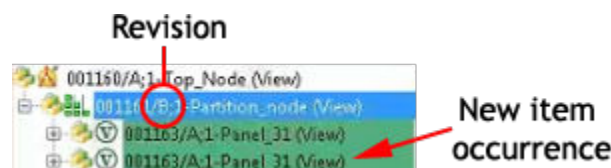
A solve query is sent to PMM, PMM performs a partial solve, and a BVR is generated for selected nodes. Information related to part, LOU, and solution is fetched. Associated designs are searched for in Teamcenter. If found, they are associated with the selected nodes.

Update a BVR structure with PMM changes

When you are informed through your workflow of changes made in Product Master Management (PMM) to a BOM view revision (BVR) previously generated in Multi-BOM Management from PMM data, you must refresh the BVR in Multi-BOM Management. The **Refresh from PMM** command uses the default "Any Status; No Working" revision value for configurator data. For information about customizing this revision value, see *Configuring and Customizing Product Master Management*.

- Select one or more subassembly nodes to be updated, right-click any selection, and choose **Refresh from PMM**.

The Product Master Management information is updated for the selected part and changes to the key line of usage (LOU) attributes create a new revision. In the BVR, a new item occurrence is created with the new revision displayed on the node that you updated.



You or your administrator can set the preference **PMM_PS_UseExistingTclItems** to specify the property mapping between the Teamcenter item and PMM part.

- If the preference is not set, while querying the items from the Teamcenter database, if they do not exist, new items, item revisions (with revision effectivity applied), and corresponding forms (Part Form and Part Revision Form) are created in Teamcenter. These forms and the aligned design items are attached to these items. The newly created items are used for creating the BVR.

Part, line of usage (LOU), solution, and solution group usage (SGU) customization is supported when this preference is not set.

- If the preference is set, while querying the items from the Teamcenter database, if they do not exist, the **Refresh from PMM** action or the command line utility displays an error. If the items exist, the **Refresh from PMM** action neither revises the items nor applies the revision effectivity to them. It also does not create the Part Revision Forms. It only creates the Part Forms and attaches them to the items. The items are then used for creating the BVR. The aligned design items are not attached to the existing Teamcenter items.

Part customization is not supported when this preference is set.

Output that is displayed in Manufacturing Process Planner when there is an update to Product Master Management data includes the following.

Note:

A pink node revision represents a part version in PMM. Pink node revision effectivity is mapped to part version effectivity.

- In some cases, a part version in PMM is mapped to multiple pink nodes in the BVR because a part can have multiple design revisions. A usage of the part, or different usages of the same part, can be aligned to solutions which have different design revisions.

Pink node occurrence corresponds to usage/occurrence of a part with associated design—line of usage (LOU) + solution.

- Effectivity on a pink node occurrence is combined with effectivity of the part version, LOU version, solution group usage (SGU) version, and solution version.

If a PMM scope or recipe is changed, all the cases that follow may occur and the existing BVR is updated.

Update	Details
Versionable property change on LOU	If the LOU is versioned, the occurrence effectivity of the previous occurrence is cut back and a new occurrence is added in the product structure for the new version of LOU with the overlapping effectivity dates mapped to its occurrence effectivity.
Versionable property change on part	A new revision of the existing item is created. The previous revision's revision effectivity dates are cut back and the new part's version effectivity dates are mapped with the new item's revision effectivity dates.
Versionable property change on solution	If a solution is versioned, the occurrence effectivity of the previous occurrence is cut back and a new occurrence is added in the product structure for the new version of the solution with the overlapping effectivity dates mapped to its occurrence effectivity.
Versionable property change on SGU	If the SGU is versioned, the occurrence effectivity of the previous occurrence is cut back and a new occurrence is added in the product structure for the new version of the SGU with the overlapping effectivity dates mapped to its occurrence effectivity.
Nonversionable property change on LOU	If there is a nonversionable update on the LOU, the existing occurrence effectivity is updated to the modified effectivity of the LOU (overlapping effectivity dates are mapped).
Nonversionable property change on part	If there is a nonversionable update on the part, the existing revision effectivity is updated to the modified effectivity of the part.
Nonversionable property change on solution	If there is a nonversionable update on the solution, the existing occurrence effectivity is updated to the modified effectivity of the solution (overlapping effectivity dates are mapped).
Nonversionable property change on SGU	If there is a nonversionable update on the SGU, the existing occurrence effectivity is updated to the modified effectivity of the SGU (overlapping effectivity dates are mapped).

Quantity update on LOU	If quantity is updated and the LOU is versioned, the occurrence effectivity of the previous occurrence is cut back and a new occurrence is added in the product structure for the new version of the LOU with the overlapping effectivity dates mapped to its occurrence effectivity.
Position designator update on solution	If the position designator is updated and the solution is versioned, the occurrence effectivity of the previous occurrence is cut back and a new occurrence is added in the product structure for the new version of solution with the overlapping effectivity dates mapped to its occurrence effectivity.
Part update on LOU	If a part is updated and the LOU is versioned, the occurrence effectivity of the previous occurrence is cut back and a new occurrence is added in the product structure for the new version of LOU with the overlapping effectivity dates mapped to its occurrence effectivity.
Partition update on LOU	If a partition is updated and the LOU is versioned, the occurrence effectivity of the previous occurrence is cut back and a new occurrence is added in the product structure for the new version of the LOU with the overlapping effectivity dates mapped to its occurrence effectivity.
Expression update on LOU	If an expression is updated and the LOU is versioned, the occurrence effectivity of the previous occurrence is cut back and a new occurrence is added in the product structure for the new version of LOU with the overlapping effectivity dates mapped to its occurrence effectivity.
Expression update on solution	If an expression is updated and the solution is versioned, the occurrence effectivity of the previous occurrence is cut back and a new occurrence is added to the product structure for the new version of the solution with the overlapping effectivity dates mapped to its occurrence effectivity.
New LOU found in query for the same part	If a new LOU is found for the same part, it creates a new occurrence and sets an occurrence effectivity and variant condition.

New solution found in query	If a new solution is found for the same part, it creates a new occurrence and will set occurrence effectivity and variant condition.
New part found in query	If a new part is found in the solve query, it creates a new item and item revision. It then creates a part form and relates it to an item. It then creates a part revision form and relates it with an item revision. Both forms can be seen using the relations.
Logically deleted LOU or discontinued LOU	If a LOU is logically deleted, its existing occurrence's effective in-and-out-dates are the same and the occurrence is configured out.
Reconfigured LOU or continued LOU	If a logically deleted or discontinued LOU is reconfigured in, its existing occurrence's effective in-and-out-date is modified accordingly and the occurrence is configured in for those dates.
Logically deleted solution	If a solution is logically deleted, its existing occurrence's effective in-and-out-date is the same and the occurrence is configured out.
Reconfigured solution	If a logically deleted or discontinued solution is reconfigured in, its existing occurrence's effective in-and-out-dates are modified accordingly and the occurrence is configured in for those dates.
Logically deleted parts	If a particular part's version is logically deleted, the revision effectivity of the corresponding item revision is modified. Because its effective in-and-out-date is identical, that particular revision of the item is configured out.
Reconfigured parts	If a particular part's version that was logically deleted is reconfigured, the revision effectivity of the corresponding item revision is modified and the particular revision of the item is configured in.
New design aligned to a solution	If a new design item is aligned to a particular revision of a solution, a new occurrence of the solution is added in the product structure and the new design item is attached to the existing item of the part that was consumed by the solution.

New design item aligned to all solutions	If a new design item is aligned to a particular revision of a solution, a new occurrence of the solution is added in the product structure and the new design item is attached to the existing item of the part that was consumed by the solution.
Custom property mapping: LOUs and solutions	Custom property mapping for LOUs and solutions.
Custom property mapping for parts	Set custom property mapping for parts.

Custom property mapping for LOUs and solutions

The **CbaOPSCustomProperties** global constant maintains the mapping between PMM classes and attributes to the Teamcenter unified architecture platform BOM line properties and item revision properties. The latter is stored in the form **CbaOPPartRevisionForm**. This constant, which is empty by default and is available for adding custom attribute mapping, lets you set item/item revision/item master form/item revision master form properties as per the mapping defined by end user.

The format of constant values is:

PMM-Class-Name.PMM-Class-Attribute-Name:Tc-Class-Name.TC-Property-Name

Example:

- *ULineOfUsage.STOCKDISPOSITION:CbaOPMMNoteType.StockDisp* sets the value of *CbaOPMMNoteType.StockDisp* to the value specified by *ULineOfUsage.LINEOFUSAGETUID*.
- *USolution.SOLUTIONID:CbaOPMMNoteType.solution_id* sets the value of *CbaOPMMNoteType.solution_id* to the value specified by *USolution.SOLUTIONID*.
- *UPartNumber.PARTBASE:CbaOPPartRevisionForm.part_number* sets the value of *CbaOPPartRevisionForm.part_number* to the value specified by *UPartMaster.PARTBASE*.

CbaOPMMNoteType stores customized note properties for lines of usage (LOUs) and solutions. You must map these properties in the global constant.

To store stock disposition on the note type **Cba0NoteType**, you must maintain this entry in the dictionary file.

Example:

- For LOUs, add the *ULineOfUsage.STOCKDISPOSITION* field name in the dictionary of *MFGIntegration_LineOfUsageInfo* line of usage.

- For solutions, make an entry for the field in the **MFGIntegration_SolutionInfo** dictionary.

In the Business Modeler IDE, you can use the **Cba0PSCustomProperties** global constant to map custom attributes. By default, this constant is empty.

Add these default values:

- *ULineOfUsage.STOCKDISPOSITION:Cba0PMMNoteType.StockDisp*

This sets the value of *Cba0PMMNoteType.StockDisp* to the value specified by *ULineOfUsage.STOCKDISPOSITION*.

- *USolution.SOLUTIONID:Cba0PMMNoteType.Solution_ID*

This sets the value of *Cba0PMMNoteType.Solution_ID* to the value specified by *USolution.SOLUTIONID*.

- *UPartNumber.PARTBASE:Cba0PartRevisionForm.cba0part_number*

This sets the value of *Cba0PartRevisionForm.cba0part_number* to the value specified by *UPartNumber.PARTBASE*.

Set custom property mapping for parts

Two business objects apply to customizing parts:

- **Cba0PartForm** is derived from the form business object that is attached to items with an item to part form relation.
- **Cba0PartRevisionForm** is derived from the form business object that is attached to item revisions to store the property with the relation item revision to part revision form.

Attribute name	Data type	Storage type	Description
cba0PartId	String	Persistent	Stores PartId received in PMM response

To store the part number received in the PMM response, add the attribute **cba0Part_Number** in the **cba0PartRevisionFormStorage** class. This stores the value of the part number from PMM to the **cba0Part_Number** attribute on the part form.

Enable the part number as follows:

1. Deploy the template from the Business Modeler IDE so that the database contains all the changes.
2. Launch the rich client and in Teamcenter, choose **Edit→Options**.

3. On the **General** tab, add the preference **Item To Part Form Relation** and click **Apply**.
4. For item revisions, add the **Item Revision To Part Revision Form Relation** preference.
5. Create a BOM structure and send it to Multi-BOM Management.
6. Define scope on the top node and the recipe on the child node, right-click any selection, and choose **Refresh from PMM**.
7. Expand the scope and recipe nodes.

The value for **StockDisposition** and **Solution ID** that comes as a response from PMM is set in the **Note Type** column.

BOM Line	Note Type
000062/A;1-SCOPE_1ZS69 (View)	
000063/C;1-Recipe_04 (View)	
000057/B;1-Custom_part (View)	Cba0PMMNoteType.StockDisp = NOST Cba0PMMNoteType.Solution_ID = 25

8. Go to My Teamcenter, expand the item revisions, and open the part form.

The part name response from PMM is assigned to the **Part Number** attribute (**cba0Part_Number**).

Working with occurrence groups

Introduction to occurrence groups

Occurrence groups help you scope data from a very large structure to a more manageable structure that contains only those objects that you currently need for your work. If you have a very large structure, for example, you can create subsets of this structure in occurrence groups that are tailored to the needs of different departments.

An occurrence group structure is attached to the main structure (the *base view*) and can only hold occurrences from that structure. An occurrence under an occurrence group is the same occurrence as in the main structure. Making changes in the occurrence group structure is the same as making these changes in the main structure. You can think of an occurrence group as holding shortcuts to the occurrences in the main structure. You can have multiple shortcuts to the same occurrence, that is, you can assign the same occurrence to multiple occurrence groups. You can create multiple occurrence group structures, each one holding a different list of occurrence groups and a different list of occurrences from the main structure.

Note:

You can create incremental change information about occurrence groups and their content (children). However, configuring the view to show or hide configured changes does not work

for this information. Only incremental change information that is common with the base view (in the item structure) is filtered.

Create an occurrence group

1. Select a line in the base view.
2. Choose **File → New → Occurrence Group** or click .

Teamcenter displays the **New Occurrence Group** dialog box.

3. Select the type of occurrence group and click **Next**.
4. Type a name and description of the new occurrence group and click **Finish**.

Teamcenter creates a new root occurrence group and displays it as a new tab next to the **Base View** tab.

5. Drag components, subassemblies, and other occurrence groups from the source view and drop them into the new occurrence group or use copy and paste.

Note:

Open the structure twice to be able to have both the root structure and the occurrence group visible at the same time.

Create an occurrence group within an existing occurrence group

1. Select an existing occurrence group within an occurrence group structure.
2. Choose **File→New→Occurrence Group**.

Teamcenter displays the **New Occurrence Group** dialog box.

3. Type a name and description of the new occurrence group and click **OK**.

Teamcenter creates a new occurrence group under the selected occurrence group.

Configuring an occurrence group structure

An occurrence group structure holds shortcuts to the original occurrences in the base view. Therefore, all configurations applied on the base view are also applied on all occurrence group structures, and vice versa.

Removing a line under an occurrence group

When working in an occurrence group structure, the **Remove Line** command can have two different meanings depending on the selected object:

- Selecting an occurrence directly under an occurrence group

The **Remove Line** command removes the occurrence from that specific occurrence group. The occurrence still remains in the base view. Any other shortcut to this occurrence under another occurrence group is not removed.

- Selecting an occurrence that is not directly under an occurrence group (that is, a part below an assembly under the occurrence group)

The **Remove Line** command removes the occurrence from its parent assembly. This also affects the base view and any other occurrence group containing this assembly. Moreover, if this occurrence was also directly assigned under an occurrence group, it is automatically removed from that occurrence group.

Creating a new occurrence under an occurrence group

When working in an occurrence group structure, you can also add a new occurrence by using either the **New** command or by copying and pasting. Adding an occurrence to an occurrence group also adds it to the base view as follows:

- If the new object is created directly under an occurrence group, it is added to the root object in the base view.
- If the new object is created under an occurrence in an occurrence group, it also appears under the same occurrence in the base view.

Show or hide an occurrence group structure

If you have multiple occurrence groups attached to a base view, you can decide which one to show and which to hide.

1. Choose **Show/Hide Occurrence Groups** from the view menu or click  in the structure view toolbar.

Teamcenter displays a dialog box listing all available occurrence groups.

2. Select the one you want to show or hide.

Alternatively, select **None** or **All**.

If you loaded a structure directly, this mode is not saved for the next session. If you loaded a structure within a structure context, the list of visible occurrence groups is managed by the structure context. The last state is saved and loaded in the next session.

Synchronizing occurrence group configuration with the base view

There are several points to note about synchronizing the occurrence group configuration with the base view configuration.

- The configuration between the occurrence group and the base view is synchronized.
- Setting the revision rule, effectivity, occurrence type filter, variant configuration, and show unconfigured data in the occurrence group changes this configuration in the base view, and vice versa.
- All the occurrence groups that are not currently visible are updated when they become visible.

5. Managing EBOMs-MBOMs

Comparing the EBOM and MBOM

The manufacturing engineer creates a manufacturing structure (MBOM or manufacturing bill of materials) from the product structure (EBOM or engineering bill of materials). The MBOM is a different arrangement of the EBOM that can be optimized for manufacturing purposes. You must specify two structures to be the EBOM and MBOM using the **Link Structures** command. When you link an EBOM with an MBOM, their BOM view revisions are linked by an **METarget** relation.

To ensure that all required parts in the EBOM are contained in the MBOM you can run an advanced accountability check. This feature uses the in-context ID (IDIC represented by the **AbsOccID** property) to establish logical equivalence between aligned occurrences. If you want to use this feature, you cannot use the in-context ID for any other purpose. Using an accountability check, you can see if parts have been added or removed from the EBOM, discern any property changes, propagate any changes from the EBOM to the MBOM, or run the accountability check at a scheduled time.

If you use Multi-Site Collaboration and want to consume a remote EBOM in the MBOM, you must create the in-context IDs for the BOM lines to be consumed at the owning site before you export the EBOM to a remote site. Otherwise, a check does not report differences between the structures.

Operation of these features is controlled by preferences.

Caution:

- You cannot link an EBOM to an MBOM contained in a composition structure context. If you use a structure context to hold the MBOM, you cannot use the alignment check feature.
- Cutting and pasting the same line back into an MBOM creates a new occurrence without an in-context ID. This removes the equivalence between the new occurrence and the original source part in the EBOM and causes the pasted line to be displayed as missing in the other structure in an accountability check.

Assign occurrences between structures

1. Open the EBOM root line (source) and MBOM root line (target) in separate structure views. It is helpful to detach one view so you can display the structures side-by-side.

Tip:

Use the **Manufacturing - BOM Reconciliation** perspective when performing EBOM-MBOM alignment. This perspective already contains the required views for this task without you having to modify the layout of the **Multi-BOM Management** perspective.

2. Configure the EBOM and MBOM appropriately. The root lines of the structures provide the context for assignments.
3. Select the MBOM root structure and choose **Tools→Link/Associate→Link Structures**.

Teamcenter displays the **Link Structures** dialog box.

4. Select the EBOM structure root that you want to link and click  in the **Link Structures** dialog box.

Caution:

You cannot link an MBOM structure contained in a composition structure context to an EBOM structure.

Teamcenter links the EBOM root and the MBOM root. When these structures are linked, all further assignments into the MBOM from the EBOM create logically equivalent MBOM occurrences. The occurrences in the EBOM and MBOM are associated based on the in-context ID (IDIC) and the defined properties copied from the EBOM to the MBOM.

Note:

The **MEAlignedPropertiestoExcludeFromInitialization** preference defines the list of BOM line properties that are not copied to an aligned target occurrence when it is initialized.

If the line you are assigning contains in-context attachments, see *Carrying forward in-context attachments*.

5. Rearrange the MBOM for manufacturing purposes. The aligned occurrences and their properties remain linked.

Note:

If you assign a line containing children from the EBOM to the MBOM, only the parent line is given an IDIC. If you remove that parent line from that MBOM, the children move up a level in the hierarchy, but because they do not have an IDIC, they do not show up as a match when running an accountability check between the two structures. Use the **MECreateldInContextforAssignedchildlines** preference to specify that Teamcenter assigns an IDIC to the child lines when assigning the parent from the EBOM to the MBOM.

Carrying forward in-context attachments

If you work with an engineering bill of materials (EBOM) and a manufacturing bill of materials (MBOM), when you assign structures from the MBOM to the EBOM, you can carry forward attachments that are associated in-context in the EBOM. The same information is available in the bill of processes (BOP), when MBOM occurrences with in-context information are assigned to the BOP.

Three preferences manage in-context attachments. One preference manages how in-context attachments from the MBOM are made available in the BOP. Your Teamcenter administrator sets the preference values. It is helpful to know how these preference values control the behavior of in-context attachments in your environment.

Caution:

If preference values are not set, attachments are not carried over when you perform an assign operation.

- *MEAssignAttachmentAndRelationToUseInCopyRule* – indicates which datasets are carried forward as in-context attachments, and whether the datasets are treated as a reference or a copy.

For example, set the value to `DirectModel:IMAN_Rendering:Reference` to carry forward flexible (deformable) parts as in-context attachments referenced in the MBOM.

- *MEAssignAttachmentContext* – sets the context for the in-context attachment of an assigned occurrence from the EBOM to the MBOM, as either set the top line of the MBOM or a direct parent of the occurrence assigned from the EBOM to the MBOM.
- *MEAssignPropertiesInContext* – carries forward the in-context overridden value of a property on an occurrence or its child in an EBOM when assigning that occurrence from the EBOM to the MBOM. This feature is supported for the absolute transform matrix (`bl_plmxml_abs_xform`) only.
- *MEAssign_support_incontext_below_consumed* – makes in-context datasets available as attachments and transforms overrides for child lines of consumed lines from the MBOM to the BOP.

Occurrence effectivity options from EBOM to MBOM

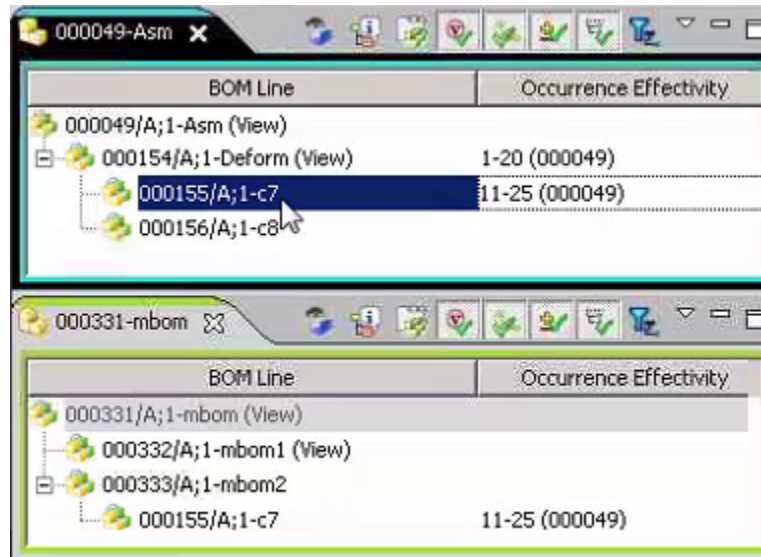
Using the **MEAlignedPropertiesList** and **MEEffectivityAssignmentMode** preferences, your administrator can configure a linked EBOM and MBOM so that the *unit-based* occurrence effectivity of the EBOM (source) is automatically established in the MBOM (target) after a line or assembly has been assigned to the target. This option helps you avoid errors resulting from manually entering the occurrence effectivities yourself.

Depending on your administrator's settings, when you assign a line in an EBOM to an MBOM, the assigned line may:

- Inherit only the occurrence effectivity defined on the EBOM line, if such effectivity exists. This is the default behavior.

Example:

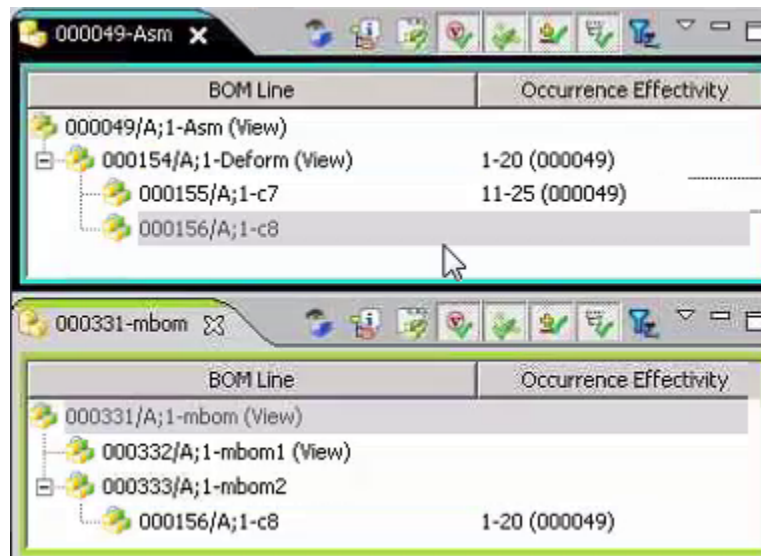
Assigning EBOM line **000155/A;1-c7** to the linked MBOM inherits its effectivity from that line, not from any line with a different effectivity higher in the structure.



- Inherit the effectivity of its parent if it has no effectivity of its own.

Example:

Assigning EBOM line **000156/A;1-c8** to a linked MBOM results in the assigned line inheriting its effectivity from its parent line because it has no effectivity. If you assign EBOM line **000156/A;1-c7** to the MBOM, it retains its own effectivity of 11-25.



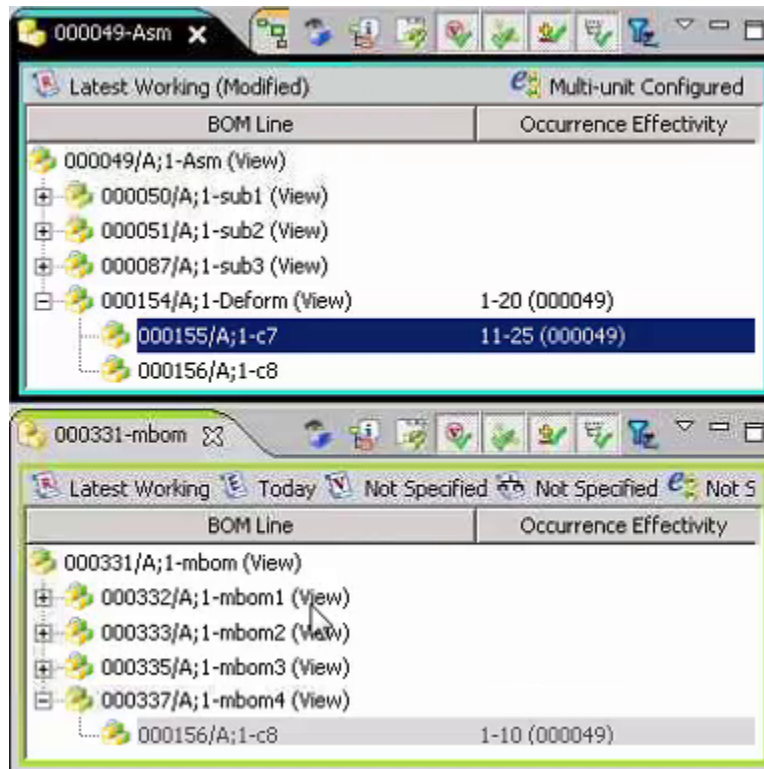
- Display a calculated net effectivity value.

Net effectivity calculates the intersection of effectivities set on the path from the EBOM line to be assigned up the parent chain. Starting from the selected EBOM line, and including the EBOM line itself, net effectivity traverses up the parent chain until it finds the first parent with an explicitly

defined occurrence effectivity. The occurrence effectivity defined on that parent becomes the MBOM line's net effectivity. If an effectivity is defined in the BOM window's revision rule, the computation will intersect the parent's occurrence effectivity with that defined in the revision rule. The result of the intersection is the final net effectivity.

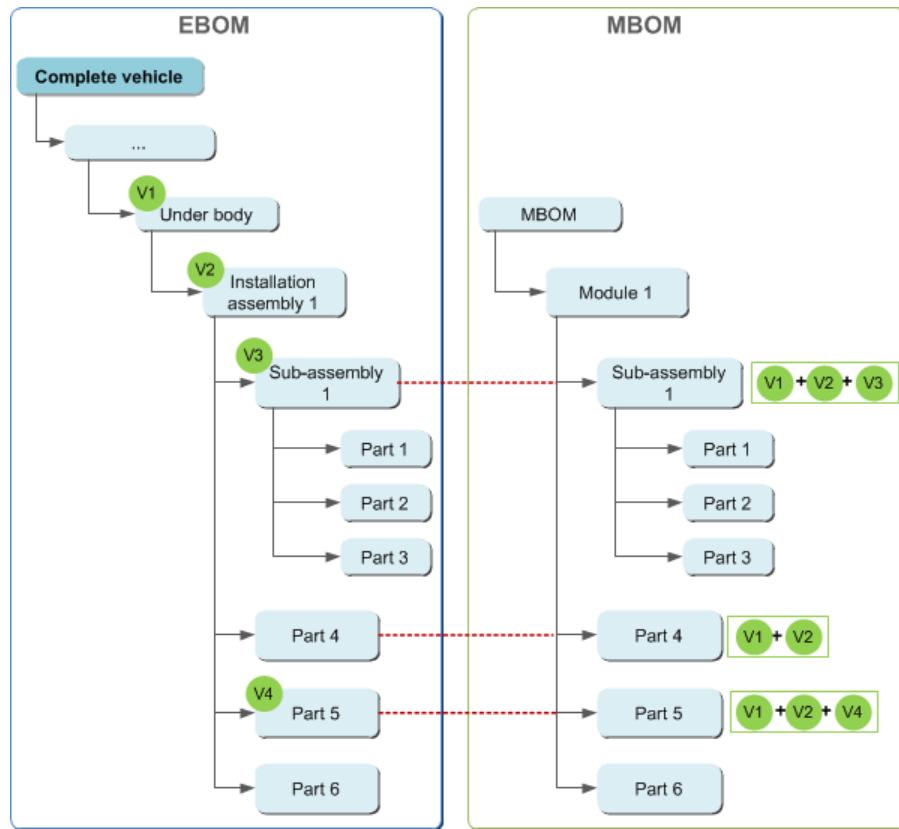
Example:

The top line of the EBOM shown is associated with a multi-unit configured effectivity group with values of 1-10 (not visible). Line **000156/A;1-c8** has no effectivity, but its parent, **000154/A;1-Deform** has a value of 1-20. Net effectivity calculates the available range shared by the multi-unit configured effectivity group value (1-10) and the **000154/A;1-Deform** value (1-20), which is 1-10.



Rolling up variant conditions

You can optionally propagate **rolled-up variant conditions** when you assign parts from the EBOM to the MBOM or from a product BOP to a plant BOP. As a result, the BOM lines in the MBOM or plant BOP hold the same variant conditions as the corresponding BOM lines in the EBOM or product BOP. Teamcenter copies the variant condition on the source line, rolls up the variant conditions of all parents of the source line, and then propagates the rolled-up variant condition to the target MBOM line, as shown.



The top levels of the EBOM and MBOM must be linked for correct propagation of rolled-up variant conditions. Teamcenter calculates the rolled-up variant condition by traversing from the source line to the linked top or up to the installation assembly level, and then adding together all the variant conditions found during the traversal.

If the source line does not have variant conditions, Teamcenter calculates the rolled-up variant condition by considering the variant conditions of the parent and all levels above.

The accountability check is modified to recalculate the rolled-up variant condition on the source line and compare it with the variant condition already stored on the associated MBOM line. It then reports any partial match discrepancies between the variant conditions.

By default, rolling up of variant conditions is disabled and must be enabled by setting the **Rollup_Variant_Feature** site preference to **true**. You should also set the **RollUp_Variant_Traverse_Level_Is_InstallationAssembly** preference to determine the level to which rolled-up variant conditions are calculated. If this preference is set to **TRUE**, Teamcenter calculates the rolled-up variant condition by traversing up to the installation assembly level in the structure. If the preference does not exist or is set to **FALSE**, it calculates the rolled-up variant condition by traversing up to the linked top.

If the rolled up variant expression is too long, your administrator can create the **Rollup_Variant_Optimized_Format** preference and set it to **TRUE**. Teamcenter then optimizes the rolled up variant expression for storage and display.

The following installation assembly preferences must also be set:

- **PortalDesignContextIsInstallationAssemblyMethod**
- **PortalDesignContextIsInstallationAssemblyMethod.hasIRType.Type**
- **PortalDesignContextIsInstallationAssemblyMethod.has_bomline_prop.name**
- **PortalDesignContextIsInstallationAssemblyMethod.has_bomline_prop.value**

Note:

For the EBOM/MBOM scenario, Teamcenter calculates a rolled-up variant condition only if an assignment is made from the EBOM to the MBOM and both structures are linked.

Rolled-up variant condition supports the Teamcenter Product Configurator and classic model, not with modular variants.

The rolled-up variant condition is saved in optimized form in the database but, when you view it, you see a summation (**AND** calculation) of all variant conditions from the source line to the linked top. Consequently, the rolled-up variant condition displayed on the target line may contain some redundant clauses. This helps you decompose the variant condition to its constituent building block expressions.

Additional preference settings:

- Set **PSM_enable_product_configurator** to **true**.
- Set **Rollup_Variant_Feature** to **true**.
- Add **bl_formula** to the **MEAlignedPropertiesList** preference.
- Make sure **bl_formula** is not in any preferences beginning with **MEAlignedPropertiesToExclude...**

When Teamcenter calculates the variant condition when allocating from a product BOP to a generic BOP, it only calculates for the line being allocated. Therefore, if you allocate a process with child processes or operations, it does not calculate the rolled up variant condition for any children of the process being allocated. This results in a mismatch if you run an accountability check between the product BOP and the plant BOP. You have two choices in this case:

- Do not run the accountability check for a level lower than the one you allocate.
- Propagate the mismatch between the children of the process from the product BOP to the plant BOP.

Run an alignment check

Perform an alignment check

If the EBOM is modified, broken links or other anomalies may occur. To identify and resolve such issues, run an alignment check to assess the alignment (logical equivalence) of occurrences in the EBOM and MBOM.

1. Open the two structures in separate structure views. Teamcenter considers all contexts for the lines in scope. The check compares specific properties of the logically equivalent occurrences that are under the designated scope.
2. If packed lines are present, unpack the structures before performing the alignment check.
3. Select a line in the source structure as scope for the alignment check.
4. Choose **Tools**→**Alignment Check** .

Teamcenter opens the **Alignment Check** dialog box with the source structure already selected.

5. In the target structure, select the line you want as scope and click **Add selected**  in the **Alignment Check** dialog box.
6. Click **OK**.

Teamcenter initiates the assessment and, when it is complete, displays the **Structure Alignment Check** dialog box showing the results.

The upper table shows all pairs of occurrences, regardless of whether they match. Pairs with matched data are marked with a ✔ symbol, while pairs with mismatched data are marked with a ✖ symbol.

The lower table shows all the properties of the currently selected pair of occurrences, allowing you to visually identify mismatched properties.

Note:

The **MEAlignedPropertiestoExcludeFromDetection** preference defines the list of any BOM line properties that are not compared between aligned occurrences.

7. (Optional) Click **Save As Report** in the dialog box.

Teamcenter displays a **Structure Alignment Check Report** dialog box that allows you to choose a name or accept the default report name.

8. (Optional) Synchronize the data of all occurrence pairs or selected occurrence pairs, as follows:
 - a. Choose each pair of occurrences whose data you want to synchronize by selecting the corresponding check boxes in the **V** column of the **Alignment Check Results** table in the **Structure Alignment Check** dialog window. To select all lines for synchronization, click .
 - b. Click **Update**.

Teamcenter updates the properties of the target lines of all selected pairs. After the update completes, the **Match** status of the selected pairs is updated and the corresponding check boxes disabled.

If any of the selected pairs cannot be synchronized, Teamcenter displays an error message.

Note:

The **MEAlignedPropertiestoExcludeFromSync** preference defines the list of BOM line properties that are not copied to an aligned target occurrence when it is synchronized.

Note:

The results of the alignment check may be incorrect and an attempt to synchronize aligned occurrences may fail if the precision of aligned occurrences does not match, that is, one occurrence is precise and the other is imprecise.

Teamcenter assumes you use the same unit of measure (UOM) value for the same item throughout the system. The comparison does not check if the quantity differs between occurrences because different UOMs are used. In this case, the result may indicate a mismatch, but it would be incorrect to update the quantity without also updating the UOM value.

Compare properties

You can optionally identify individual properties that are mismatched between the source and target lines. This avoids the necessity to inspect all the properties of the mismatched lines to determine if synchronization is required.

1. Run the structure alignment check as described in *Perform an alignment check*.
Teamcenter displays the **Structure Alignment Check** dialog box.
2. In the **Alignment Check Results** list, select the appropriate structure line and click **Show in Tree**.
Teamcenter highlights the source line in the main pane.
3. Select a row in the **Alignment Check Results** list, and then select the **Show only mis-matched properties** check box.

Teamcenter updates the **Properties Comparison** list to show only those properties that are mismatched.

Note:

If you do not select the **Show only mis-matched properties** check box, all properties are shown and mismatched properties are highlighted in bold. The properties are listed in alphabetic order after the **Object** property, which is always listed first.

4. (Optional) Click **Update Selected**.

Teamcenter updates the mismatched properties, synchronizing the source and target line pairs selected in the **Alignment Check Results** list.

Finding and interpreting alignment reports

- Alignment reports are stored in the My Teamcenter **Newstuff** folder if the **MEAlignmentCheckReportLocation** preference is set to **False** or are attached to the item revision of the top line of the structure if it is set to **True**.

You can retrieve an existing alignment check report for a selected occurrence (structure line) from the **Newstuff** folder or by opening the **Attachments** view from the top line of the MBOM.

- If a report with the specified name already exists, the **TC_CRF_overwrite_existing_dataset_content** preference controls if the existing report is overwritten. If this preference is set to **1**, the existing contents are replaced, otherwise the new report is appended.
- The creation and format of the report is determined by the following preferences:

- **MEAlignmentCheckReportDefinition**

This preference specifies the name of the report definition object that controls creation of the report. The default value is **AlignmentCheckReportDefinition**.

- **MEAlignmentCheckReportStylesheet**

This preference specifies the name of the style sheet used when creating alignment check reports. A default style sheet is provided, but you can create your own style sheet using the Report Builder application. The default value is **AlignmentCheckReport.xsl**.

- The report format is similar to that provided for the accountability check, as described in *Running accountability checks*. However, you should note the following differences:
 - The **Source** column includes no indentation because the alignment check only considers aligned nodes.

- The **Target** column cannot contain multiple targets. Instead, multiple target lines may be listed for a source line.
- The **Match** column may show a mismatch, even though the user already performed an update action. This occurs if the comparison properties differ from the synchronization properties. In this case, the column shows if the update action was performed successfully, not whether the lines now match.

Save and replace in context

The manufacturing engineer can create a new MBOM substructure from an existing one, while preserving the occurrence information on the line. Typically, this is done to create a new subassembly when it is not possible to revise the existing subassembly, possibly because the existing MBOM is still in use on the shop floor.

This situation arises in the aerospace industry to create a new kit from an existing one. It is also useful when manually creating an MBOM from an EBOM in cases where you do not want to use a different item type for manufacturing parts. Use this menu command on each level in the structure for which you want to create a manufacturing-specific part.

- Select the top line of the subassembly and choose **File→Save As→Replace Assembly In Context**.

Teamcenter creates a copy of the subassembly and propagates existing alignments to the copy. All relationships of the items in the kit are preserved, regardless of GRM rules. Options and variant rules are *not* carried over from the original line.

If this action is performed in the context of an incremental change, it is recorded.

Realign MBOM and EBOM assemblies

If your MBOM is significantly different from the linked EBOM from which it derives, it is possible that links between the two, as well as their properties, may become accidentally broken due to changes in the EBOM, MBOM, or both. This loss of equivalence criteria results in unreliable results when you run an accountability check and breaks the **Find in other Structure** function.

In many cases, you can fix the equivalence criteria in the EBOM and MBOM by aligning their properties so that the accountability check reports full matches. If parts have moved in either structure, this action also realigns their transformations.

1. If the EBOM and MBOM are not already linked, link them using the **Link Associate→Link Structures** command.
2. (Optional) If you are viewing unconfigured structures, turn them off so that you have 100% BOMs by deselecting the *show unconfigured* toggles.



While you can run the alignment without fully configuring the structures, not all lines may be aligned.

3. Select the top line of the EBOM and the top line of the MBOM, and choose **Tools→Manufacturing Alignment→Align**.

In the **Align** dialog box, your MBOM appears as **Line to be aligned** and your EBOM as **Line to align with**. By default, the command is set to align the selected assemblies (EBOM and MBOM) and all children of the selected top lines.

4. To align all properties in **MEAlignedPropertiesList** site preference, with the exception of reused assembly lines, select the **Align properties (for non-reused assembly lines)** ☒ check box.
5. Click **Align**.

An **Alignment Summary** prompt reports on the success of the command and the number of lines that were not aligned.

6. To view the alignment log, click **Yes**; to continue without viewing the log, click **No**.

The alignment log reports reasons for line alignment failures, such as multiple equivalent lines in the EBOM.

7. If multiple equivalent lines are identified, identify which are correct and rerun the align command on those selected lines only.
8. Run an accountability check to verify that the structures are aligned.

Realign lines in MBOM and EBOM structures

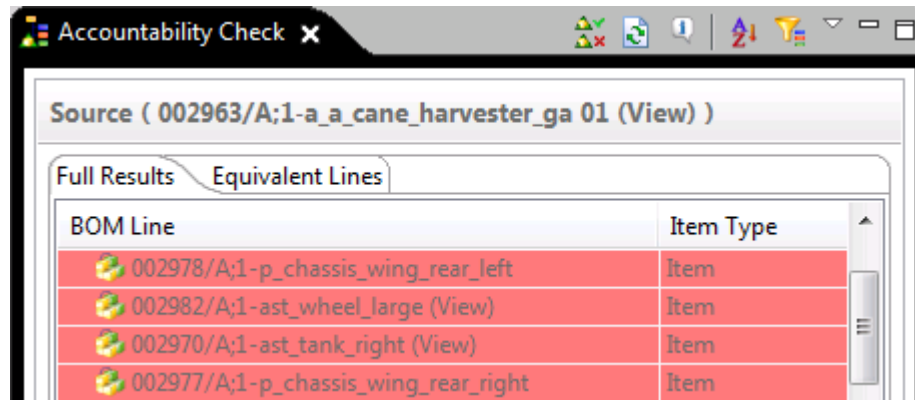
If an accountability check reports that lines in your MBOM are no longer linked to lines in the EBOM from which it derives, in many cases, you can fix the problem by aligning their properties so that the accountability check reports a full match. If parts have moved in either structure, this action also realigns their transformations.

1. If the EBOM and MBOM are not already linked, link them using the **Link Associate→Link Structures** command.
2. (Optional) If you are viewing unconfigured structures, turn them off so that you have 100% BOMs by deselecting the **Show Unconfigured** toggles.



While you can run the alignment without fully configuring the structures, not all lines may be aligned.

- Run an advanced accountability check, and from the advanced accountability result view, search result view, or BOM view, press Ctrl and select each line to be realigned.



- Choose **Tools**→**Manufacturing Alignment**→**Align Selected Lines**.

In the **Search Equivalent Lines** dialog box, the lines you selected appear in the **Lines to search for** list.

- In the EBOM, select the top line, and in the **Search Equivalent Lines** dialog box, next to the **Scope to search in** box, click .

In the **Align Selected Lines** dialog box, lines found in the EBOM are displayed in the **Source** column next to the lines you searched in the MBOM **Target** column.

Source	Target	Handled
002965/A;1-a_axle_front (View)	002965/A;1-a_axle_front (View)	X
002985/A;1-p_axle_rear	002985/A;1-p_axle_rear	X
002997/A;1-p_elevator_cowl	002997/A;1-p_elevator_cowl	X
002998/A;1-p_elevator_cowl_support	002998/A;1-p_elevator_cowl_support	X
003002/A;1-p_elevator_rear_pivot	003002/A;1-p_elevator_rear_pivot	X
003004/A;1-a_chopper_hydraulic_ram_0/ie	003004/A;1-a_chopper_hydraulic_ram	X

Tip:

To avoid scrolling, your administrator can control the number of lines to appear at one time in this list using the **MEAlignmentNumberToSearch** site preference (default = 15). You can then click **Previous** and **Next** to cycle through the line sets.

- Click in the list of source/target lines, and in the **Properties Comparison** group, review similarities and differences between source and target.

As you select the lines in the list, they are highlighted in the EBOM and MBOM.

- After you determine which lines should be aligned, select the lines to be aligned.

Tip:

To deselect or select all lines, click  or .

- To align all properties in the **MEAlignedPropertiesList** site preference, select the **Align properties for the repaired lines** ☒ check box.
- Click **Align**.

Aligned lines are indicated in the **Handled** column.

Source	Target	Handled
002965/A;1-a_axle_front (View)	002965/A;1-a_axle_front (View)	
002985/A;1-p_axle_rear	002985/A;1-p_axle_rear	
002997/A;1-p_elevator_cowl	002997/A;1-p_elevator_cowl	
002998/A;1-p_elevator_cowl_support	002998/A;1-p_elevator_cowl_support	
003002/A;1-p_elevator_rear_pivot	003002/A;1-p_elevator_rear_pivot	
003004/A;1-a_chopper_hydraulic_ram (View)	003004/A;1-a_chopper_hydraulic_ram (View)	

- Run an accountability check to verify that the structures are aligned.

Align single EBOM/MBOM lines with different item types

You can align single lines and their properties even if they have different item types.

Example:

You can align a line that has a part type with a line that has an item type.

- If the EBOM and MBOM are not already linked, link them using the **Link Associate→Link Structures** command.
- (Optional) If you are viewing unconfigured structures, turn them off so that you have 100% BOMs by deselecting the **Show Unconfigured** toggles.



- Run an advanced accountability check, and from the EBOM and MBOM views, select the two lines to be realigned.
- Choose **Tools→Manufacturing Alignment→Align**.

In the **Align** dialog box, the selected MBOM line is displayed in the **Line to be aligned** text box and the EBOM line is displayed in the **Line to align with** text box.

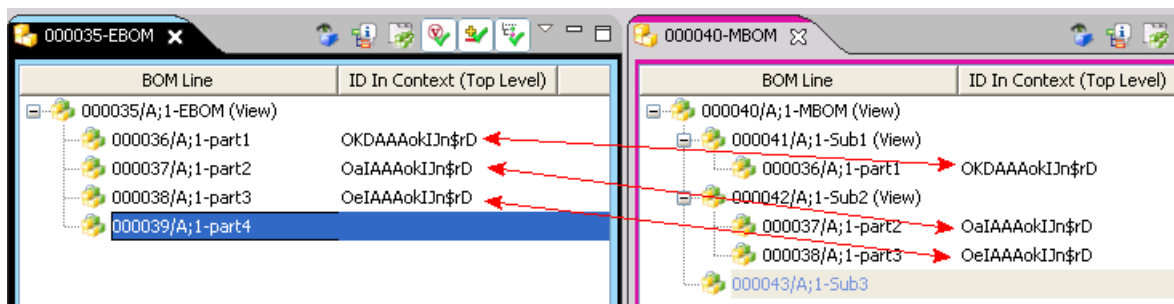
5. Select **Align the selected lines only**.
6. To align all properties in the **MEAlignedPropertiesList** site preference, select the **Align properties (for non-reused assembly lines)** ☒ check box.
7. Click **Align**.

In the prompt warning you that the two lines have different item types, click **Yes**.

8. In the **Alignment Succeeded** prompt, click **OK**.
9. Run an accountability check to verify that the structures are aligned.

Reconciling EBOM and MBOM in a Multi-Site environment

The determination of equivalence between the engineering bill of materials (EBOM) and the manufacturing bill of materials (MBOM) is based on the in-context ID (IDIC, also referred to as the absolute occurrence ID). When you paste a part from the EBOM to the MBOM, Teamcenter generates an identical, unique absolute occurrence ID for the part on both the EBOM and the MBOM. This mechanism is used when aligning structures to determine whether parts are missing in the source or target structures.



The ID is generated in the context of the top-level item. Even if you do not have write access to the top level of the EBOM, Teamcenter allows this ID to be generated and saved with the top-level item. If you are using Multi-Site and the EBOM is at the remote site, however, this mechanism does not work as Teamcenter must be able to check out the top level to generate the ID. A similar problem arises if you want to assign from an EBOM that exists on a remote site to a local process.

To enable a remote site to use the EBOM-MBOM mechanism in these situations, your administrator can generate in-context IDs on the EBOM that are available when you paste parts to the MBOM.

6. Managing part BOMs

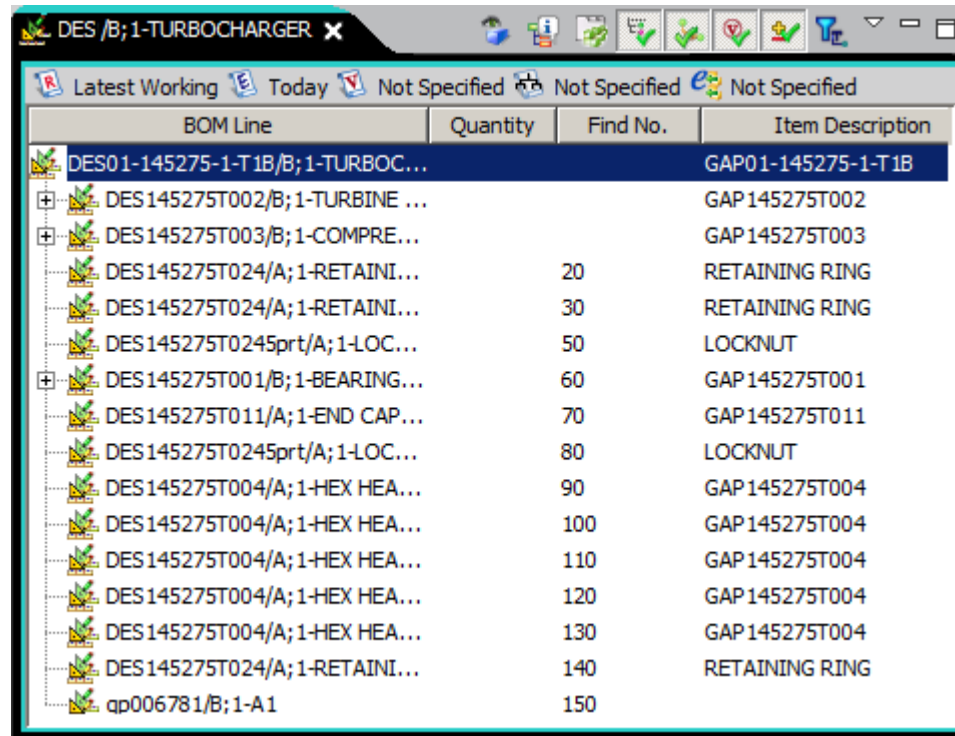
What is a part BOM and why use it?

A part bill of materials (BOM) takes its structure from a CAD model in a released state, such as NX or CATIA. The part BOM can be a collection of design or part items but is essentially a physical model that improves on the Teamcenter EBOM/MBOM relationship. Once the part BOM is created, it can be used to create a manufacturing BOM (MBOM), similarly to an EBOM.

In many cases, a Teamcenter part requires a connection to a CAD design so that the part BOM can be kept up-to-date with the CAD model. A part BOM delivers a lifecycle separation of CAD design and Teamcenter part life cycles to better support downstream applications like Process Simulate, Teamcenter Manufacturing, **SIMATIC**, Manufacturing Execution System Integration (MES), and Electronic Work Instructions. Although a part BOM is based on the traditional EBOM/MBOM paradigm, it is intended to offer a more controlled and predictable separation between the design BOM and part BOM in Multi-BOM Management.

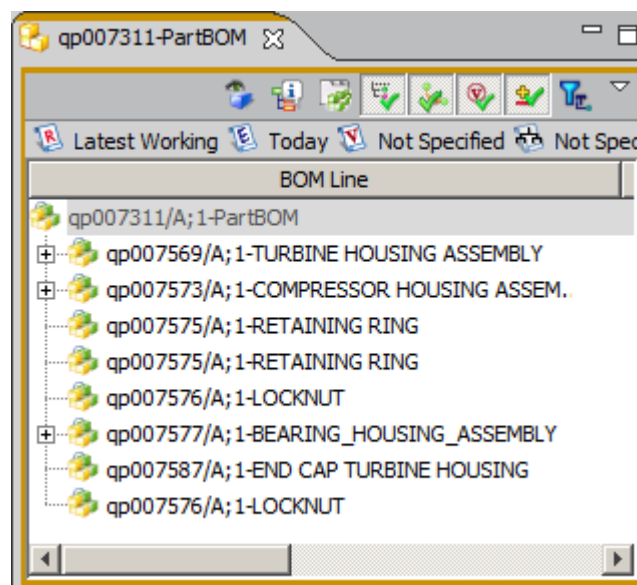
The part BOM is intended for a design engineer, the owner of the part or subassembly. The design engineer is responsible for all aspects of the part/subassembly definition, including ensuring that a new part is actually required and that a suitable part does not already exist in the part catalog, coordinating with the Enterprise Resource Planning (ERP) system to define the part number and material master, and authorizing CAD design work if 3D definition is needed. To create the part BOM, the design engineer would typically:

1. Receive a design BOM structure converted from a CAM/CAD application that consists of design elements.



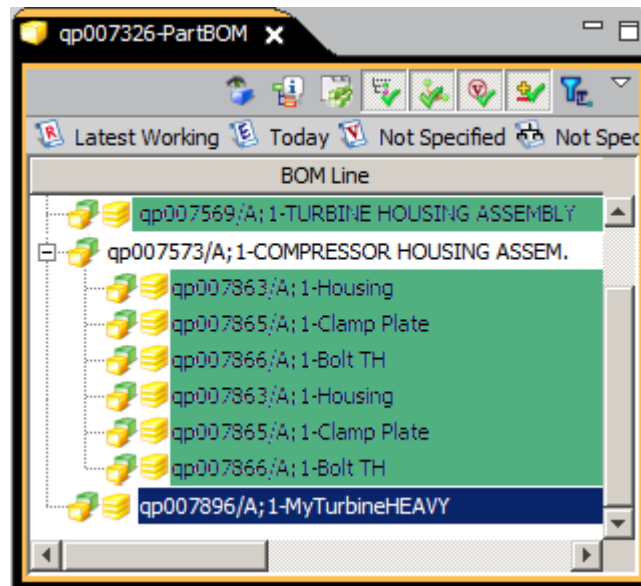
BOM Line	Quantity	Find No.	Item Description
DES01-145275-1-T1B/B; 1-TURBOC...			GAP01-145275-1-T1B
DES145275T002/B; 1-TURBINE ...			GAP145275T002
DES145275T003/B; 1-COMPRES...			GAP145275T003
DES145275T024/A; 1-RETAINI...	20		RETAINING RING
DES145275T024/A; 1-RETAINI...	30		RETAINING RING
DES145275T024prt/A; 1-LOC...	50		LOCKNUT
DES145275T001/B; 1-BEARING...	60		GAP145275T001
DES145275T011/A; 1-END CAP...	70		GAP145275T011
DES145275T024prt/A; 1-LOC...	80		LOCKNUT
DES145275T004/A; 1-HEX HEA...	90		GAP145275T004
DES145275T004/A; 1-HEX HEA...	100		GAP145275T004
DES145275T004/A; 1-HEX HEA...	110		GAP145275T004
DES145275T004/A; 1-HEX HEA...	120		GAP145275T004
DES145275T004/A; 1-HEX HEA...	130		GAP145275T004
DES145275T024/A; 1-RETAINI...	140		RETAINING RING
qp006781/B; 1-A1	150		

2. **Create a preliminary part or subassembly BOM** with parent and child parts that match the design BOM structure in the context of the manufacturing process, and link the preliminary to the design BOM.



BOM Line	Item Description
qp007311/A; 1-PartBOM	
qp007569/A; 1-TURBINE HOUSING ASSEMBLY	
qp007573/A; 1-COMPRESSOR HOUSING ASSEM.	
qp007575/A; 1-RETAINING RING	
qp007575/A; 1-RETAINING RING	
qp007576/A; 1-LOCKNUT	
qp007577/A; 1-BEARING_HOUSING_ASSEMBLY	
qp007587/A; 1-END CAP TURBINE HOUSING	
qp007576/A; 1-LOCKNUT	

3. Perform **alignments** between the design BOM and preliminary BOM to create the part BOM.



Note:

A system administrator can also create a part BOM from a design BOM using the **me_create_mbom** utility.

4. Use a workflow handler to propagate design revisions as part of your existing design review and approval to update:
 - Alignments and their relationships.
 - Part BOM line properties.
 - All BOMs and BOPs to which part BOM lines are assigned or consumed.
5. Regularly **run an advanced accountability check** between the design BOM and part BOM to ensure BOM lines match, and **update or remove** BOM lines as changes require.

Part BOM requirements

To create a part BOM from a design BOM:

- The **MEDesignToBom_Enabled** preference must be set to **true** (default = **false**).
- Part structures that are created in a part BOM using heavy alignment have parts with BOM view revisions (BVRs) that are not actually assemblies. Change any existing customizations to treat parts with BVRs as leaf lines if they are to be marked as end items.
- The design BOM items and structures must either be created in a CAD system or empty design items created by a manufacturing engineer as a work order for the designer.

- The design BOM must consist of design object types.
- The part BOM must consist of part object types.
- In the part BOM, add a precise clause to the top of the revision rules.

Example:

The **group** feature can be used to create the following clause: **Has Item Type (Design) {Precise}**.

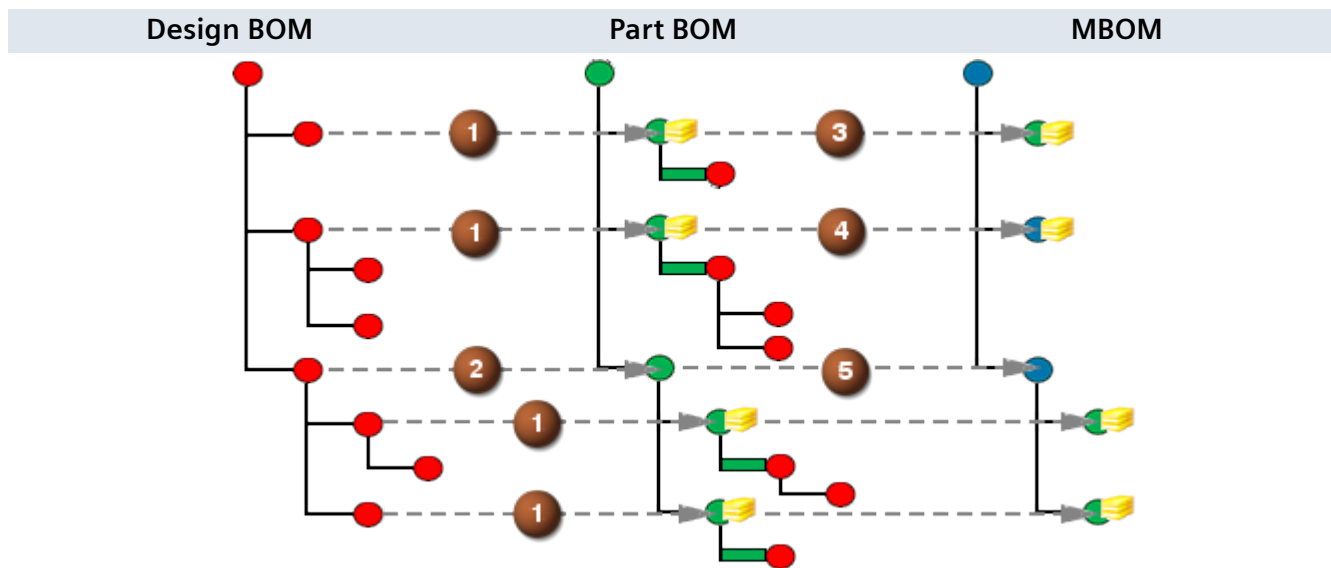
To calculate rolled-up variant conditions from the design BOM and add the logically equivalent variant condition to the aligned part line, add the **bl_condition_tag** property to the **MEDesignToBomAlignmentProperties** preference.

To avoid errors during heavy alignments, if you are using the **TCAAllowedChildTypes_<Part>** preference, you must modify it to allow design items. Similarly, if you use the **TCAAllowedParentTypes_<Design>** preference, modify it to allow part items.

Understanding part BOMs

To create a part BOM, you must first create a preliminary part BOM. Once the preliminary BOM parts and subassemblies are **created and linked** to the design BOM, you must align the design BOM with the part BOM. Part BOM part geometry and position are determined by design BOM geometry. To support situations in which you need 3D geometry and others in which you need only subassembly metadata, two types of alignment are available.

- A heavy alignment carries 3D data from the design BOM into the part BOM, generates an end item, and sets each part's unique ID in Context (IDIC) to the same value as that of the design BOM. It also aligns BOM line properties; in other words, BOM line attributes that are represented as column values in the part BOM and the design BOM views. An end item icon  is displayed on the heavily aligned item to indicate that any part BOM children are hidden. The design BOM line is copied as a child to the part BOM line and each line is highlighted in green, indicating that a precise BOM View Revision (BVR) has been set and that two levels of alignment have been applied: revision and occurrence. If the **Design Assignment State** column is visible in the part BOM, it displays a value of **2** to indicate a heavy alignment. A BVR precisely defines which revision the part BOM is using.
- A light alignment also aligns BOM line properties but does not appear as an end item and does not carry over 3D geometry. Use light alignments to align the parent of a design BOM subassembly to the parent of a companion part BOM subassembly. This is useful when the children of the design BOM subassembly need to be treated individually. You can then run heavy alignment on child nodes in that subassembly that need to be treated individually and retrieve 3D data for those nodes. If the **Assignment Level** column is visible, it displays a value of **1** to indicate a light alignment.



● design BOM design object ● Part ● Manufacturing part/assembly ■ Precise 📦 End Item

- 1 Heavy alignment includes both an occurrence and revision alignment, both of which are interrelated. An individual design BOM revision can be related to many part revisions, while an individual part revision can be related to 0 or 1 design revisions. Heavy alignment:
 - Applies an end item to the part BOM line, which hides all children of a subassembly.
 - Brings 3D geometry to the part BOM.
 - Treats a subassembly as a single part. If parts in a subassembly need to be accessed in multiple locations downstream, subassemblies should use light alignment on the subassembly and then apply heavy alignment to those parts.
- 2 Light alignment applies only occurrence alignment (part properties) but retains all children. Light alignment does not bring 3D geometry to the part BOM.
- 3 When applied from the part BOM to the MBOM, a heavy-aligned part can be assigned to an outsourced (buy) part.
- 4 A heavy-aligned part can also be assigned to the MBOM as an internally manufactured (make) part.
- 5 A light-aligned manufacturing assembly can be assigned to the MBOM as a collection of heavy-aligned parts, each of which is internally manufactured and assembled.

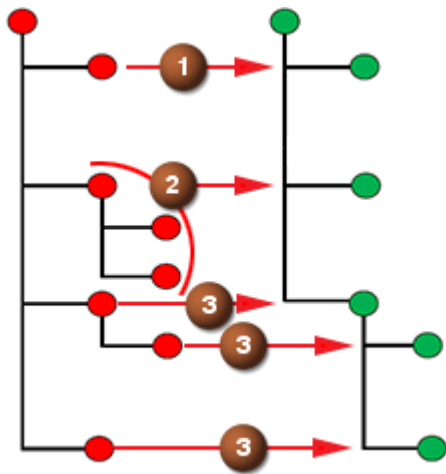
When you create a standard EBOM from a design BOM in Manufacturing Process Planner, the EBOM links to the parts in the EBOM. When you create a part BOM from a design BOM, the parts are not linked but are instead copied to the part BOM.

Create and link a preliminary part BOM to a design BOM

Before you can align a part BOM with a design BOM, you must create a preliminary BOM and link it to the design BOM. A preliminary part BOM is essentially a part BOM with a structure that can be aligned

with the design BOM but is more appropriate to the actual manufacturing process. Because some parts and subassemblies are made and some are outsourced, parts and subassemblies that exist in the part BOM can be defined as *end items* in the part BOM—single items that represent a combination of consumed end products, component parts, and/or materials that are not of interest in a manufacturing process.

Example:



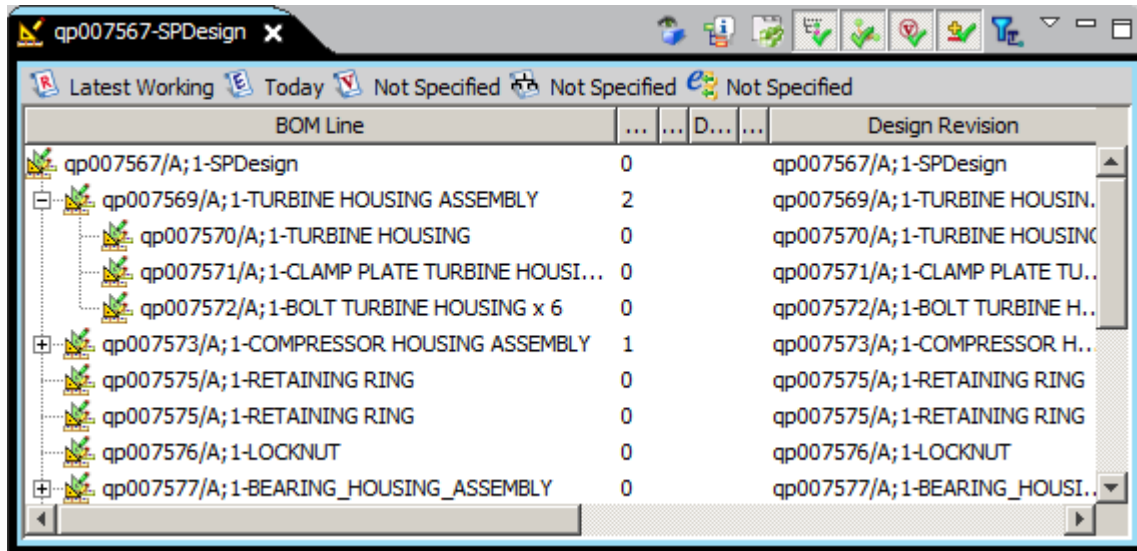
- 1 You can create your part BOM structure to align a single part in the design BOM ● to another in the part BOM ● using either:
 - A light alignment that aligns the part's BOM line properties and revision information but not a BOM view revision (BVR). Light alignments do not copy 3D geometry to the part BOM.
 - A heavy alignment that generates an end item with a precise BVR and an occurrence revision. Heavy alignments copy 3D geometry to the part BOM.
- 2 A heavy alignment that generates a single end item that represents an outsourced subassembly of parts.
- 3 A light alignment that aligns several parts' BOM line properties.

1. Ensure that no alignments have been created using the legacy Manufacturing Process Planner **Tools→Structure Alignment** options, and that the **MEDesignToBOM_Enabled** preference is set to **true**.

Note:

If you are using the **Rollup_Variant_Feature** preference, usually used to roll up variants on an EBOM to an MBOM, and you want the rolled-up variant conditions to be applied when you align a design BOM to a part BOM, add the **bl_condition_tag** property to the **MEAlignedPropertiesList** preference.

2. Open the design BOM for which you want to create a part BOM.



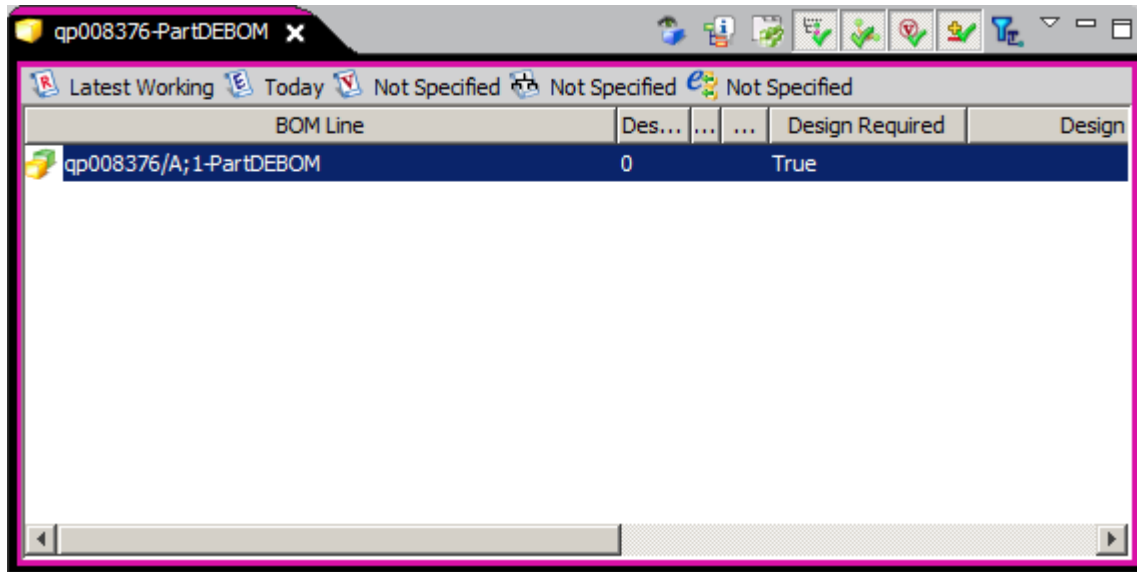
- With no lines in the design BOM selected, choose **File→New→Part**.

Note:

If 4th Generation Product Master is installed with Teamcenter on a 64-bit Linux server, you can only create legacy part objects (**File→New→Legacy Part**).

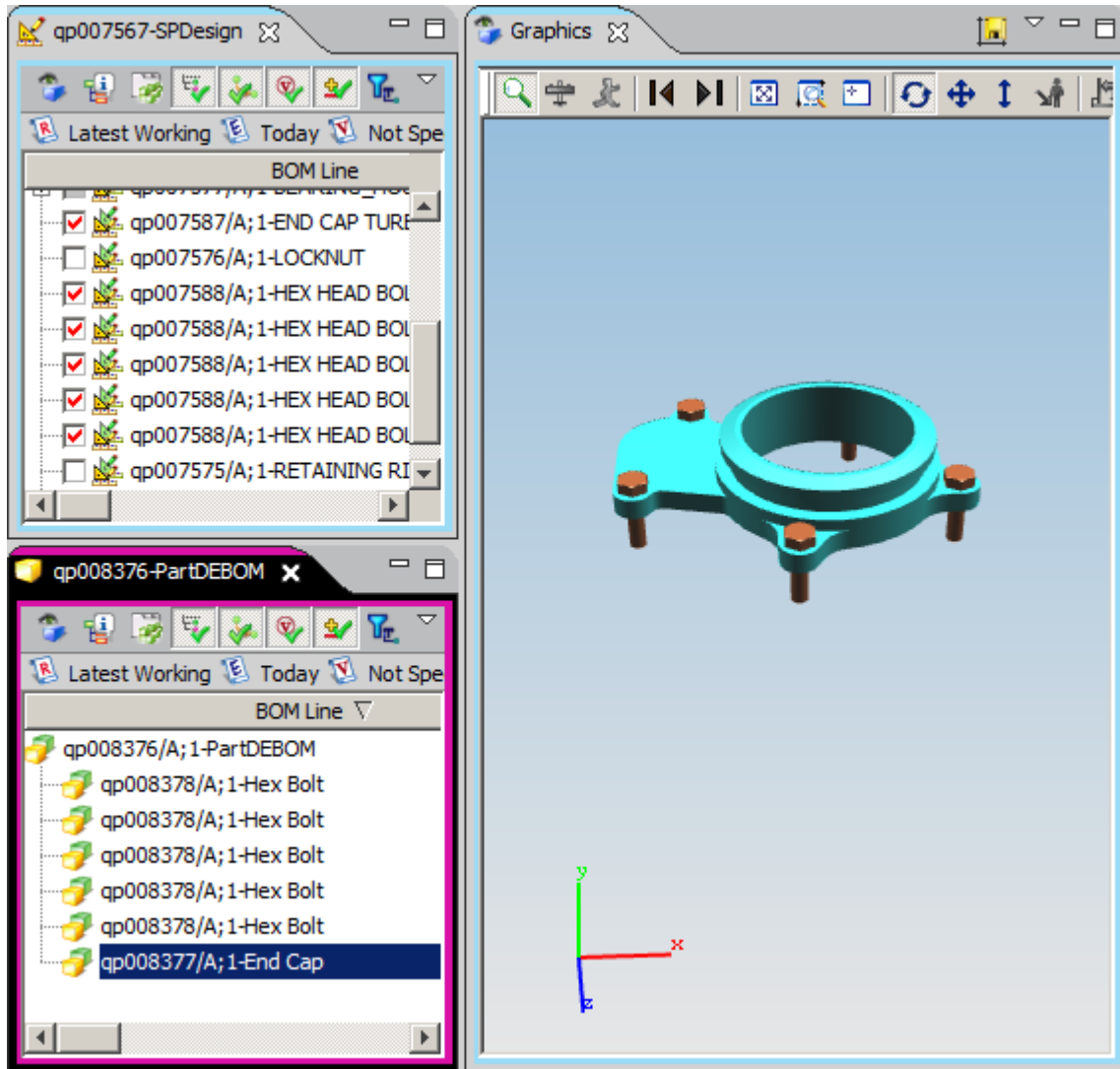
- In the **New Part** dialog box, click **Next**.
- In the **Part Information** section, type an ID/revision or click **Assign**, type a name for your part BOM, and click **Finish**.

A new BOM opens with the top line defined. By default, when you create a part, its **Design Required** attribute is set to **True**. To align with the design BOM, all parts must have this attribute set to **True**.



6. With the top line selected, add additional parts or assemblies to match the design BOM structure as needed.

In this example, note that all of the CAM BOM hex head bolts share the same ID, **qp007588**, indicating that they are reusable instances of one design. In cases like this, the part in the part BOM is copied and pasted rather than created so that all hex bolts in the part BOM retain a single ID, **qp008378**. You could also locate an existing part in Teamcenter that was created for a previous product using the **Attachments** pane.



7. Right-click the top line of the part BOM and choose **Link/Associate→Link Part to Design Top Line**.

If you later want to verify which design BOM is linked to a part BOM or vice versa, you can open the linked BOM using the **Linked to Product** find command.

8. Select the top line of the part BOM and in the **Link Part to Design Top Line** dialog box, click **Set/Add current selection**.
9. Click **OK** and in the resulting confirmation, click **OK** again.

The two structures are linked, and you are ready to align their components.

Manually align a part BOM to a design BOM

You can manually heavy- or light-align a part BOM to a design BOM. There are different benefits to heavy versus light alignments.

Create one or more heavy alignments

1. If you have not already done so, **create and link** a part BOM to a design BOM and ensure that all **requirements** are met.
2. Do either of the following.
 - Heavy align a single part or part subassembly.

Note:

If you apply heavy alignments to many children of a parent subassembly, you should always apply light alignment to the parent subassembly. If the parent of heavily aligned children is also heavily aligned and transform changes are applied to both, you will need to separately **update** both the parent and the child heavy alignments. If the parent is lightly aligned, you only need to update that alignment to the parent to update all parent and child transforms.

- a. In the part BOM, right-click the part or subassembly to be aligned and choose **Create Heavy Alignment to Design**.

Note:

You can also locate the design and create a heavy alignment using the **Search for Design and Create Heavy Alignment** command.

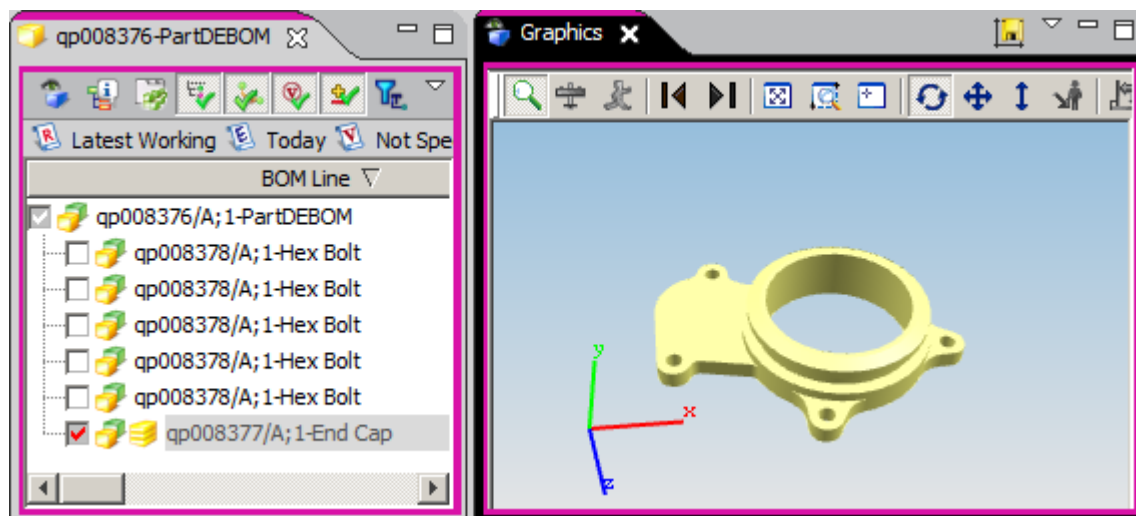
In the **Create Heavy Alignment to Design** dialog box, the part is displayed in the **Part** list box.

- b. In the design BOM, select the part or subassembly to be aligned, and next to the **Design** list box, click **Set/Add current selection** .
- c. Click **OK**, and in the confirmation, click **OK** again.

The part or subassembly is aligned to the design element and displays an end item icon . If you chose to align a subassembly, it is treated as a single element in the part BOM.

- d. Click **Show Graphics**  in the part BOM and show  the aligned part or subassembly.

If the designer has completed his work, the part or subassembly is visible in the graphics window.



- Heavy align multiple parts.

Note:

You can only align multiple parts with the same item ID. Use the **Copy** and **Paste** commands to create parts with the same item ID (for example, a collection of identical bolts), or find a reusable part in Teamcenter.

- Press Ctrl, and in the part BOM, select the parts to be aligned.

Note:

You can also locate the design and create a heavy alignment using the **Search for Design and Create Heavy Alignment** command.

- Choose **Create Heavy Alignment to Design**.

In the **Create Heavy Alignment to Design** dialog box, the parts are displayed in the **Part** list box as well as their total count.

- In the design BOM, select the same parts to be aligned, and next to the **Design** list box, click **Set/Add current selection**.

The design objects are displayed in the **Design** list box as well as their total count.

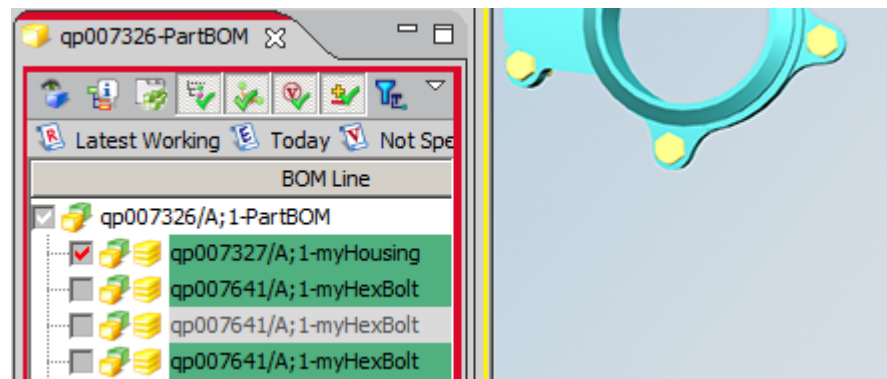
Note:

There is no guarantee that multiple selected bolts in the part BOM align in the same order as those selected in the design BOM.

- d. Click **OK**, and in the confirmation, click **OK** again.

The parts are aligned to the design element and display end item icons 📦.

- e. Click **Show Graphics** 🖨️ in the part BOM and show ☒ the aligned parts.



Create one or more light alignments

1. If you have not already done so, **create and link** a part BOM to a design BOM and ensure that all **requirements** are met.
2. Do either of the following.
 - Light align a single part or part subassembly.
 - a. In the part BOM, right-click the part or subassembly to be aligned and choose **Create Light Alignment to Design**.

Note:

You can also locate the design and create a light alignment using the **Search for Design and Create Light Alignment** command.

In the **Create Light Alignment to Design** dialog box, the part is displayed in the **Part** list box.

- b. In the design BOM, select the part or subassembly to be aligned, and next to the **Design** list box, click **Set/Add current selection** 📦.

- c. Click **OK**, and in the confirmation, click **OK** again.

The part or subassembly is aligned to the design element. If you chose to align a subassembly, all parts are aligned in the part BOM.

- Light align multiple parts.

Note:

You can only align multiple parts with the same item ID. Use the **Copy** and **Paste** commands to create parts with the same item ID (for example, a collection of identical bolts).

- a. Press Ctrl, and in the part BOM, select the parts to be aligned.

Note:

You can also locate the design and create a light alignment using the **Search for Design and Create Light Alignment** command.

- b. Choose **Design Alignment**→**Create Light Alignment to Design**.

In the **Create Light Alignment to Design** dialog box, the parts are displayed in the **Part** list box as well as their total count.

- c. In the design BOM, select the same parts to be aligned, and next to the **Design** list box, click **Set/Add current selection** .

The design objects are displayed in the **Design** list box as well as their total count.

Note:

There is no guarantee that multiple selected bolts in the part BOM align in the same order as those selected in the design BOM.

- d. Click **OK**, and in the confirmation, click **OK** again.

The parts are aligned to the design element.

Align a part BOM using a smart search

While you can manually apply heavy or light alignments to part BOMs from CAD BOMs, you can also search for design objects based on a variety of attribute criteria that exists in the system or is defined by your administrator, and create heavy or light alignments based on search results:

- If you never aligned part/CAD BOM items before.

- If you previously aligned them but the alignment somehow became broken.

1. Decide whether you want to perform a **heavy or light alignment**.
2. Right-click a part in the part BOM and choose **Search for Design and Create Heavy Alignment** or **Search for Design and Create Light Alignment**.

In the **Create Heavy Alignment to Design** or **Create Light Alignment to Design** dialog box, any CAD BOM objects found to share attributes in common with the selected part object in the part BOM are displayed.

3. Click **Set/Add current selection**  to align the objects.
4. For the current session only, if you want to search for other matching objects and want to automatically align the objects if a single exact match is found, select the **Do not show this dialog again for single exact matches** check box, and then click **OK**.

A message is displayed reporting that the CAD and part objects are aligned.

5. If you would rather not see this message again while aligning other objects, select the **Do not show this warning again in the session** check box.

Run a part BOM accountability check

To validate completeness between your part BOM and design BOM, you should run an advanced accountability check on a regular basis and as your workflow requires.

Note:

Completeness checks are not supported.

1. Select the root BOM line of the design BOM and then the part BOM, and choose **Tools→Accountability Check→Advanced Accountability Check**.
2. In the **Advanced Accountability Check** dialog box, on the **Scope** tab, ensure the top lines are correct.
3. Click the **Inclusion Rules** tab and select **Search lines per filtering rule**.
4. From the **Source filtering rule** and **Target filtering rule** lists, select **DesignToBomAll**.

Note:

Your administrator may create another option specific to your process.

- Click the **Partial Match** tab and **BOM Properties** subtab, and add the properties **Design Revision**, **Find No. Absolute Transformation Matrix**, and **ID in Context (Top Level)**

Caution:

When you create a BOM from a part BOM, if the assigned parts do not copy the absolute transform matrix **bl_plmxml_abs_xform** properties over to the new BOM, you must define separate business object types for MBOM containers. If this is not possible, ensure that the **is_designrequired** property is set to **false** for all MBOM containers.

- Apply any additional **advanced accountability check settings** that are required by your organization.
- Click **OK** to run the accountability check.

The check should report no nonequivalent lines, only a missing in source and missing in target alert for the top BOM lines, which should not match. If any alignments are incorrect, **update or remove** them.

Update or remove a part BOM alignment

Update a part BOM

You can update a part BOM by simply **aligning parts** with design BOM elements again or by **running** a part BOM advanced accountability check. If parts are still shown as matching in the accountability check even though alignment is removed, use the **Design Revision** property to detect misalignments in partial matches.

Note:

If you have apply and update a heavy alignment to a parent assembly that also contains heavily aligned children, and those children are affected by positioning transformations, you must also reapply heavy alignments to the children to update their transforms.

Remove one or more heavy or light alignments in the part BOM

You can remove an alignment if you make a mistake or a design change exists.

Warning:

Removing an alignment can impact other structures that use the same part. Avoid using the **Remove Alignment** command except in cases where the part revision in the part BOM needs to align with a new design item in the design BOM. For aligning to another revision of the same design Item, use the heavy or light alignment commands.

1. To remove one or more heavy or light alignments, respectively, in the part BOM, click a single part or press Ctrl and then select multiple parts with the same item ID.
2. Right-click a selected portion of the part BOM and choose **Design Alignment→Remove Alignment**.

In the **Remove Part Design Alignment** dialog box, all BOM lines that contain the part in the open part structure are displayed.

3. Click **OK**.
4. If you are removing alignments from other unselected BOM lines in the same structure, or if the alignment removal impacts any structure that contains its part revision, confirm that you want to remove the alignment from those structures by clicking **OK** in the warning.

The alignment is removed from the part or parts. Teamcenter removes any occurrence and item revision data, and heavy-aligned parts lose their end items and green precise color.

Note:

If you later choose to realign a part that was aligned and its alignment removed as part of a multiple selection, Teamcenter remembers that the multiple parts were previously similarly aligned and applies alignment to the other parts as well. These parts display a gray icon  until you unload and reload the part BOM.

Find linked part or design structures

You can quickly locate part structures that are linked to a design BOM, or design structures that are linked to a part BOM.

1. Do one of the following.
 - To find part structures linked to a design BOM, in the design BOM, right-click the design or part object to be found and choose **Find Linked Part Structure(s)**.
 - To find design structures linked to a part BOM, in the part BOM, right-click the part object to be found and choose **Find Linked Design Structure(s)**.

Note:

You must select only a single line to be found. You cannot select the top line of a design or part BOM to locate a linked structure.

2. In the **Find Linked Part Structures** or **Find Linked Design Structures** dialog box, select the structures you want to view and click **Open**.

The structures containing the part or design object are loaded in Teamcenter.

7. Managing body BOMs in body-in-white manufacturing

About features

Teamcenter allows you to define design or manufacturing features that are not part of the physical structure imported into the manufacturing bill of materials (MBOM). Manufacturing Process Management supports several feature types, including weld points, arc welds, and datum points. Teamcenter adds Instances of these features to an MBOM structure when the structure is imported from NX.

- Point welding, also called spot welding, uses electric resistance to join pieces with no metal filler.
- Arc welding uses an electric arc to pass current through an electrode to heat and fuse metal, including filler rod metal.
- A datum point is a textual feature used to restrict the transitional and rotational mating surface movement of a part in a manufacturing operation, so that parts can be fused together accurately using the welds.

You can use the two following operation types to help you manage your features:

- **MEContinuousJoinOP**

This operation is intended for use as an arc weld operation. You cannot assign datums or weld points to an **MEContinuousJoinOP** operation.

- **MEDiscreteJoinOP**

This operation is intended for use as a weld operation. You cannot assign datums or arc welds to an **MEDiscreteJoinOP** operation.

Feature basics

Feature basics

You can **manage and distribute** features with the **Manufacturing Features** view. The key to body in white manufacturing rough planning workflows is the distribution of manufacturing features to work stations. With Multi-BOM Management, you can:

- **Create** features and **edit** feature attributes.

- **Automatically assign** manufacturing features to plant BOP areas, stations, lines, and other structures simultaneously, as well as to features via **processes and operations**.
- Connect features to parts **manually**.
- Automatically **connect features to parts** using the **Auto Feature Part Connector** dialog box.
- **Search** for assigned, broken, and unassigned features.
- **Reset the scope** of the **Manufacturing Features** view, **filter** the view data, and **modify** the view column display.

Manage features with the Manufacturing Features view

The **Manufacturing Features** view is a dockable view that shows all the manufacturing features under the current product scope in a table-like view. It helps you manage scattered manufacturing features in a product structure in an easy and systematic way. Because the features displayed in the **Manufacturing Features** view are BOM lines, you can use the shortcut menu to perform many tasks.

1. Right-click an item revision in the product structure and choose **Open with → Manufacturing Features** view from the shortcut menu.

Teamcenter opens the **Manufacturing Features** view with the selected line in the product structure as the scope of the view. By default, Teamcenter displays all the features of the type chosen in the previous session below this selected line, including those contained in child parts. The configuration shown below the scope at the top of the view is the same as that of the product structure. If you change the product configuration, Teamcenter clears the **Manufacturing Features** view. You must then reset the scope.

You can open multiple **Manufacturing Features** views.

Note:

The **Manufacturing Features** view does not show connected parts that are not expanded.

2. Choose the feature that you want to display from the list of features by clicking the **Select Manufacturing Feature Type** button  at the top of the view.

You can choose from:

- **Arc Welds**
- **Datum Points**
- **Weld Points**

3. Do as many of the following as necessary.

Choose this from
the shortcut menu

Copy

Send to

Refresh

To

Assign a feature

Open a feature attribute in a notation or other application.

Refresh

Choose this from
the shortcut menu

Properties

To refresh the component and the view.
Views structure
line

Choose this from
the shortcut menu

Find in Source Views

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Choose this from
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-
4. **View** assignment indication.
 5. **Reset** the scope of the view.
 6. **Filter data** in the view.
 7. (Optional) **Modify** the column configuration.
 8. (Optional) Export data to a Microsoft Excel spreadsheet by clicking the **Menu** button ▼ and choosing **Objects to Excel** from the view menu commands.

You can export either selected data or all data. If the data is filtered based on some condition, only filtered data is available for export. Only textual data is exported to Excel. Teamcenter does not export graphics.

Create features

1. Select an item in a product structure.
2. Choose **File→New→Manufacturing Feature**.

Teamcenter displays the **New Manufacturing Feature** dialog box.

3. Select the type of feature that you want to create from the list of types and click **Next**.

You can select from:

- **ArcWeld**
- **Datum Point**
- **Fastener**
- **Fastener Group**
- **Weld Point**

4. Click **Assign** to automatically assign a unique ID.
5. Type a name for the new feature. Make it unique so you can search the database using this term.

By default, the display name for features is the name that you type here. You can configure the display name using the **MEMFGDisplayName** preference.

Note:

If you have multiple features that you want to have the same name, you must change the **MEMFGDisplayName** default value of **bl_occurrence_name** to **bl_item_item_id** and **bl_item_object_name**.

6. (Optional) Type a description for the feature.
7. Click **Next**.

Teamcenter displays the form associated with the revision of the feature.

8. (Optional) Enter item revision attributes and click **Next**.

You can use the **Manufacturing Search** view to find features based on the values entered in this form.

9. (Optional) If you are creating a weld point, type location information using the X, Y, Z coordinates and an orientation degree and click **Next**.

The units displayed in the location boxes are derived from the assembly with which you are working. The values you enter here are stored in the **SpotWeld** attribute form and on its occurrence.

You can change the location of a weld point later by using the **Graphics→Transformation→Persistent Transformation** command, but this new location information is no longer stored in the attribute form. It is stored on the weld point's occurrence only. In addition, after creating the features, you can change the values in the weld point's form, but the new values do not change the position of the weld.

10. (Optional) Enter data into the feature's form.

This form contains feature-specific attributes. If you entered location information in the previous step, the values are stored in this form.

If you create datums, you select which type of datum in the **Datum Type** box in this form. You can select from:

- **Datum Surface** (default)
- **Datum Pin**
- **Measurement Datum**

The feature's attribute form is attached to the latest revision of the newly created feature using a **TC_Feature_Form_Relation** relation.

11. Select a JT file to graphically represent the feature and click **Next**.

You can choose to use the default file, or select a customized file. The name of the dataset containing the default file is specified in the following preferences:

- For weld points: **MENEWMFG_DefaultWeldPointJTDatasetName**
- For datums: **MENEWMFG_DefaultDatumJTDatasetName**

The default JT file for datums is dependent on the **Datum Type** value you set in the attribute form.

The dataset is attached to the latest feature revision using the **TC_Feature_Form_Relation** relation.

Note:

There is no default JT file available for arc welds.

12. Click **Finish**.

Teamcenter creates the feature under the selected item in the product structure.

Edit feature attributes

Do one of the following:

1. In the **Attachments** view, double-click the feature form.

Teamcenter displays the form.

2. Check out the form and modify its values.
3. Check the form back in.

-or-

1. Add the form attributes as columns to the structure view.

Note:

Not all form attributes are available to add as columns. For example, you cannot add **Connected Part** attributes as columns.

2. Modify the attributes in the column cells.

Automatically assign welds to stations

You can automatically assign manufacturing features from a manufacturing bill of materials (MBOM) to plant bill of process (BOP) areas, stations, and lines simultaneously, and then refine the assignments later. This method of assignment is faster than manually assigning each weld or arc weld feature one at a time. Teamcenter searches through the consumed parts in the specified process structures and finds parts that have connected features. It then creates operations and assigns the features to those operations.

Note:

You must install the weld management environment manager template to use this functionality.

The type of structure to which you can select and apply features in the plant BOP is dependent on the values in the **ProcessStationForAutomatedMfgAssignment** preference. Use this preference to apply features to a process area, process line, process station, process, or station in a plant BOP.

This example demonstrates how to assign features to lines and stations in a plant BOP.

1. If you moved parts in your plant BOP between lines and stations so that they are consumed in different locations, update the PERT flows. While dynamic in-process assembly (DIPA) nodes do not appear in the BOP, they are created internally.
 - a. Select the top line of the plant BOP and choose **Tools → Update Flows**.
 - b. In the **Update Flows** dialog box, select **Include Structure Sub-Hierarchies** and click **OK**.
2. Right-click the source MBOM or target plant BOP for the assignment and choose **Automatic MFG Assignment**.

Note:

You can also select a process area, line, or station. Only welds from your selected scope will be assigned. If you select only the bill of materials, you must select the target process in the resulting dialog box. If you select only the target process, the dialog box displays all open product structures. You can add or remove source structures using the  or  buttons; you can remove target processes using the  button.

The order in which the processes are listed in the **Target Processes** list is the order in which the assignment mechanism processes the structures for assignment.

3. Click **OK**, and at the warning prompt, click **OK** again.

The assignment mechanism searches through the consumed parts in the specified process structures and finds the parts that have features connected.

4. (Optional) Open the Automatic Feature Assignment Report.

Teamcenter displays a report indicating which operations were created. It also indicates which features are assigned. Any features that are:

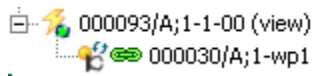
- Successfully assigned are displayed in the **Assigned MFGs** column.
- Already assigned in plant BOP structures but are connected to parts that are not consumed, removed, or changed in the product structure, are displayed in the **Obsolete MFGs** column.
- Already assigned in the plant BOP structures are displayed in the **Already Assigned MFGs** column.

Assign features to processes and operations

Do one of the following.

- In the structure view:
 1. Open the product structure containing the features in one structure view and the process structure in another.
 2. Copy the feature and paste it to the process or operation that should consume it or use the drag-and-drop option.
- In the **Manufacturing Features** view, drag a feature from the **Manufacturing Features** view to the appropriate process or operation in the structure view.
- In the **Manufacturing Features** view:
 1. Right-click a feature and choose **Copy**.
 2. Paste the feature into the process or operation that should consume it.

Teamcenter adds a consumed feature underneath the process or operation.



When you assign an arc or datum to a process structure, Teamcenter creates an override form that contains the attributes you want to edit in the process structure. The override form is attached with the **MfgOTCContextFeatureFormRel** relation and is added in the context of the operation or process to which the feature is assigned.

- For arc welds, the override form additionally contains attributes that can be populated from Process Simulate on Teamcenter.
- Do not change the type of datum in the datum override form. You can change the datum usage type.
- You can add all attributes from the override form as run-time properties to the structure view.
- After assigning a feature, editing attributes in the feature form does not change the override form, and vice versa.

Manually connect features to parts

1. Select at least one part in a product structure and one feature using the Ctrl key to make multiple selections.

2. Choose **Advanced** → **Connect MFG to Parts**.

Teamcenter connects the feature to all selected parts.

Search for features

You can perform feature searches in several ways.

- Use the **Structure Search view** to search for features.
- Also in the **Structure Search** view, search for features using the **Not assigned to** search criteria.

You can choose a process or operation as the scope for this search.

Reset the scope of the view

1. Select a different product line in a product structure.
2. Click the **Set Scope** button .

If the assignment filter or assignment indication is on, Teamcenter turns it off when loading a new scope.

Filter data in the view

You can filter the data in the view based on BOM line properties to show only a subset of the contents in the table.

1. Click the **Menu** button ▼ and choose **Filter** from the view menu commands.

Teamcenter displays the **Auto Filter** dialog box. This dialog box contains a list of all conditions that you create to filter data. The dialog box remembers any conditions you create, including those in other views.

2. Click **+** to add a new condition line.

Teamcenter displays the **Filter Condition Editor** dialog box.

3. Create a condition by combining BOM line properties, operators, and available objects and click **+**.
4. (Optional) Remove a condition by clicking **—**.
5. (Optional) Clear a condition by clicking .
6. (Optional) Negate the condition by clicking the **!{..}** button.

7. Click **OK**.

Teamcenter displays the new condition in the **Auto Filter** dialog box.

8. Select the condition that you want to apply to the table.

Teamcenter displays the filtered results in the view table.

Tip:

You can select more than one condition in the **Auto Filter** dialog box using the Ctrl key. The search result must fulfill all of the selected conditions (they are joined with the **AND** Boolean operator).

9. (Optional) To remove the filter, select **All** from the condition list or close the **Auto Filter** dialog box.

Modify the column display

1. Select a line in the table in which you want to modify the columns to make the table the active one in the view.

This is important in views that contain multiple tables.

2. Click the **Menu** button ▼ and choose **Columns** from the view menu commands located in the top-right corner of the view.

Teamcenter displays the **Column Management** dialog box.

3. Select the desired columns from the **Available Properties** list and move them to the **Displayed Columns** list with the right arrow.
4. (Optional) Modify the order the columns appear in the selected view table using the up and down arrows.
5. Do one of the following:
 - Click **Apply** to save the current state.
 - Click **Save** and type a name for the column configuration. You can restore a saved column layout by choosing **Apply Column Configuration** from the view menu commands and selecting the saved configuration from the list.

Comparing features

Comparing features in a source and target structure

You can compare two BOM structures containing manufacturing features (for example, welds and datums) using the **accountability check** in Multi-BOM Management. The comparison checks whether all the features in the source structure are found in the target structure. In addition, the comparison checks whether the features are connected to the same parts and, optionally, connected in the same order.

After completing the accountability check, you can then **propagate differences** you find from the source structure to the target structure. For example, if a weld is connected to Part A and Part B in the source structure and Part A and Part C in the target structure, running an accountability check results in a partial match and you can then change the connection in the target from Part C to Part B.

The two structures that you compare must be linked as an EBOM and MBOM using the **Link Structures** menu command.

You can also **create a printable Excel report** when comparing features in structures.

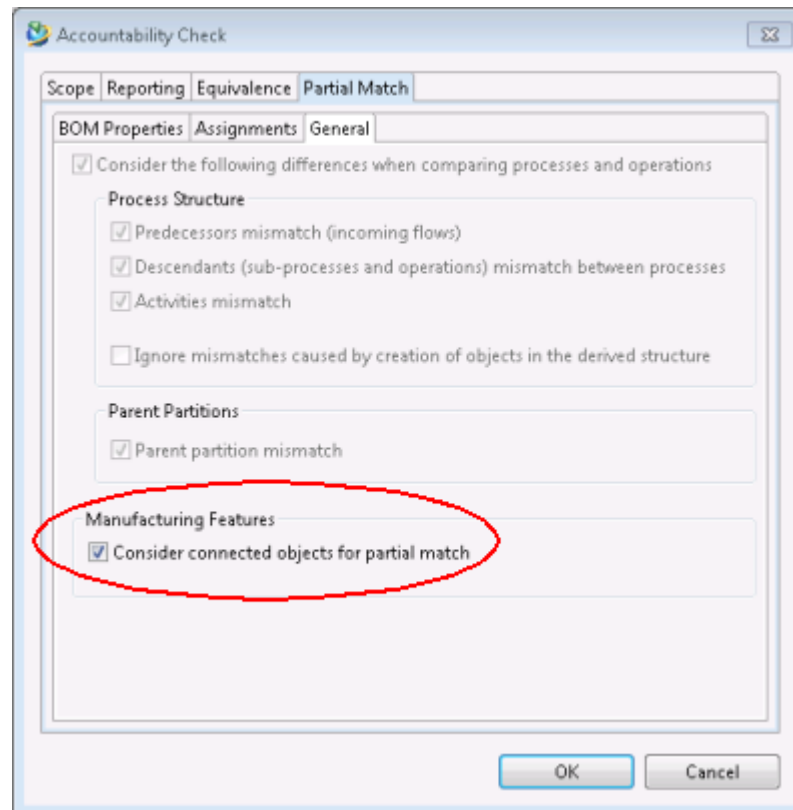
Compare features in two structures using the accountability check

There are several scenarios of interest when comparing features in two BOM structures. You may want to:

- Compare part connections without considering the order of the parts.
- Compare part connections while considering part order.

You can use the accountability check to compare part connections. If the check finds differences, such as a weldpoint connected to Part A and Part B in the engineering BOM but to Part A and Part C in the manufacturing BOM, these differences are marked as partial matches and displayed in the **Accountability Check Result** view. You can choose to propagate the differences from the engineering BOM to the manufacturing BOM.

1. Run an accountability check using an engineering BOM as source and a manufacturing BOM as target.
2. Select the **General** tab on the **Partial Match** tab.
3. Select the **Consider connected objects for partial match** option.



4. Select any other desired options and complete running the accountability check.
5. On the **Partial Match Details**, select the **Connected Parts** and the **BOM Properties** tabs and view the results.

Missing parts are displayed in yellow.

Note:

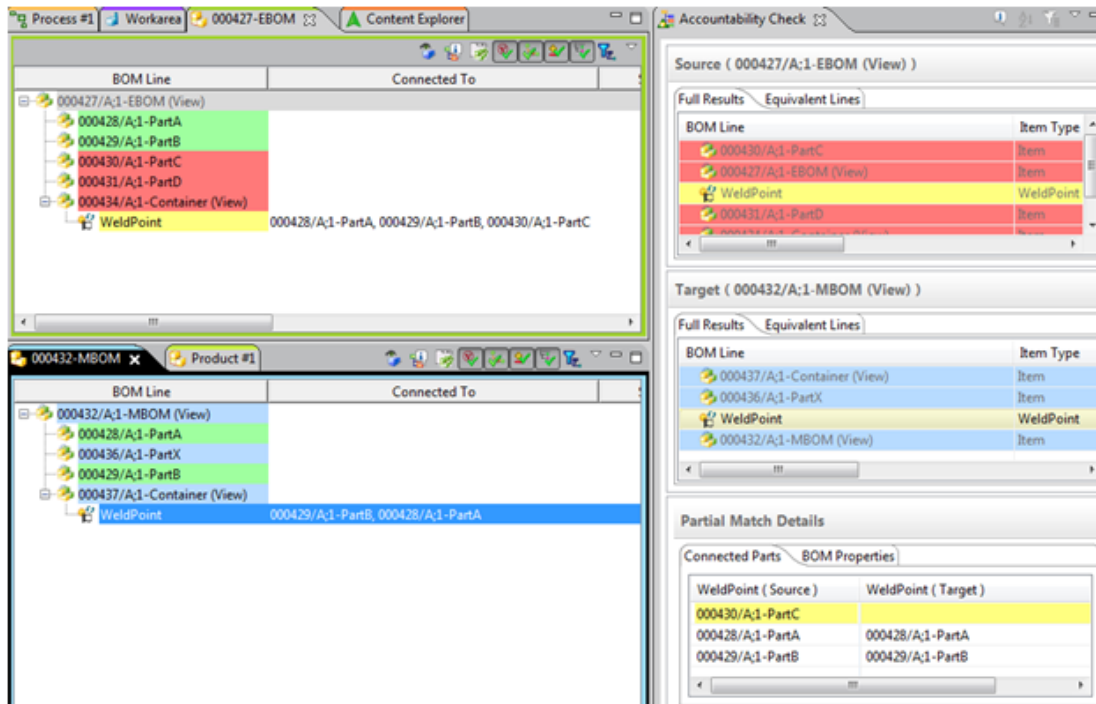
If you work with welds from NX, Teamcenter stores the order of the parts from NX in the **Stackup** property on the weld attribute form. Therefore, you must ensure that this property is published from NX. This comparison only works for item-based welds in a precise structure.

Propagate changes from the source structure to the target structure

Before you propagate, you must run an accountability check as explained in *Compare features in two structures using the accountability check*. If there is a mismatch, the results are shown in yellow for a partial match and red for missing in target in the **Accountability Check** view.

1. Select a yellow partial match line.

Teamcenter opens the **Partial Match Details** tab.



- Right-click the partial match line and select **Propagate** or choose **Tools→Accountability Check→Propagate**.

Teamcenter propagates any differences in part connections. If there are errors, Teamcenter displays a message informing where a log file is stored.

- Open the log file and rectify any errors. This can include copying parts that are missing in the target from the source to the target and rerunning the accountability check.

Create an Excel report of the feature comparison

You can create a printable Excel report when comparing features in structures.

To check the mismatch in parts for weld points, datums, or arc welds, you can add the **Connected To** property to the list of properties that are compared.

- Open the **Partial Match→BOM Properties** tab and add the **Connected To** property to the **Selected Properties** list.

Accountability Check Report				
Date	19/06/2013			
Time	19:47:54			
User	infodba			
Source filtering rule	AccountabilityAll			
Limit depth in source	-1			
Target filtering rule	AccountabilityAll			
Limit depth in target	-1			
Additional equivalence criteria				
Compare additional criteria				
Incremental change				
Source top level item	000025/A;1-ss_EBOM (View)			
Source revision rule	Latest Working			
Source variant rule	Unspecified			
Source context				
Source Line	000025/A;1-ss_EBOM (View)			
Target top level item	000037/A;1-ss_MBOM (View)			
Target revision rule	Latest Working			
Target variant rule	Unspecified			
Target context				
Target Line	000037/A;1-ss_MBOM (View)			
Checked Objects			Source Value (Target Difference Value)	
Source	Target	Match	Connected To	
000025/A;1-ss_EBOM (View)	***Not FouX			
000027/A;1-PartA	000027/A;V			
000028/A;1-PartB	***Not FouX			
000029/A;1-PartC	***Not FouX			
000030/A;1-PartD	000030/A;V			
000031/A;1-PartE	000031/A;V			
000032/A;1-PartF	***Not FouX			
000033/A;1-Container (View)	***Not FouX			
arcweld	arcweld	X	000027/A;1-PartA, 000029/A;1-PartC, 000028/A;1-PartB (000027/A;1-PartA)	
datum	datum	X	000029/A;1-PartC ()	
weldpoint	weldpoint	X	(000030/A;1-PartD, 000031/A;1-PartE)	
Missing Source Objects				
Not Found	000037/A;X		()	
Not Found	000038/A;X		()	
Not Found	000039/A;X		()	

Feature and part connections

About feature and part connections

You can compare features, such as weld points, arc welds, and datums, to their part connections using a variety of methods.

- **Show** connected features and **view** parts **connected** and **unconnected** to each feature.
- Automatically **connect many features to parts** using the **Auto Feature Part Connector** dialog box.

Show connected manufacturing features

1. Right-click one of the following:
 - A part in a product structure
 - A consumed part in a process structure
 - A part in the **Graphics** view
2. Choose **Show Connected Manufacturing Features**.

Teamcenter highlights all the features connected to the selected part in the associated views. Features that are currently hidden by configuration are not shown.

Tip:

- If you set the **MEShowConnectedRetainSelection** preference to **True**, the **Show Connected Manufacturing Features** command displays both features and parts in the structure views.
- If you turn on cross probing () , Teamcenter displays the connected features in all the visible views.

View connected parts

Do one of the following:

- In the **Auto Feature Part Connector** dialog box, select a row or a part and click **Display part**.
 - If you select a row, Teamcenter highlights all the parts connected to that feature in the structure pane.
 - If you select a part (a single cell in the table), Teamcenter highlights only that part in the structure pane.
- In the structure pane, select a feature in the product structure or a consumed feature in the process structure and choose **View→Show Connected Lines**.

Teamcenter highlights features connected by lines to the parts in the associated views.

Note:

- If you set the **MEShowConnectedRetainSelection** preference to **True**, the **Show Connected Lines** command displays both parts and features in the structure views.
- If you turn on cross probing () , Teamcenter displays the connected lines in all the visible views.
- You can add the **Connected to** column to provide an additional indication of connected parts.

- In the **Manufacturing Search** view, enter feature criteria to perform a feature search using the **Connected to** option.
- In the **Manufacturing Features** view, select a feature.

Teamcenter displays the names of all connected parts in the **Connected Parts** list at the bottom of the view. When you select these parts, they are highlighted in the source structure in the structure pane.

Tip:

Before you select a feature in the **Manufacturing Features** view, set the **MEExpandtoSelection** preference to **True** to ensure that the connected part can be highlighted in the structure pane.

View unconnected features

1. Select a part in the product structure as the starting point of the search.
2. Choose **Tools→Auto Feature Part Connector**.

Teamcenter opens the **Auto Feature Part Connector** dialog box that lists all the features found under the selected part.

3. Click the **Filter connected rows** button  in the **Manufacturing Features** view.

Teamcenter removes all the features that are already connected to at least one part from the list of features.

The following are preferences that affect Auto Feature Part Connector filtering:

- **MEAPCEnableTrueShapeFiltering** – This preference enables true shape filtering for the Auto Feature Part Connector command. The default value is **true**.
- **MEAPCSearchType** – This preference defines the type of the parts that are going to be searched by the Auto Feature Part Connector command. The default is **ITEM**. This preference can only accept one type at a time. If a different type is desired, you should change the value from **ITEM** to the relevant type.

Connect welds to parts using the Automatic Feature Connector

The **Automatic Feature Connector** dialog box enables you to assign large quantities of features to parts automatically, eliminating the need to assign each feature manually. The **Automatic Feature Connector** dialog box streamlines the process by searching for and displaying up to four parts within a configurable distance of the features. You can then confirm or reject the assignments as required.

1. Select a part in the product structure to be the starting point of the search.
2. Choose **Tools→Auto-feature Part Connector**.

Teamcenter opens a dialog box that lists all the features found under the selected part.

3. Click the **Settings** button .

4. Set a distance from the features that Teamcenter should search for candidate parts with which to connect each feature.
5. Click **OK**.
6. In the dialog box, click **Search**.

Teamcenter searches for all those parts within the specified distance from each feature and lists them in the part columns. It only lists up to four parts per feature. Parts that are already assigned to a feature are displayed in bolt green, and parts that are not yet assigned are displayed in black.

7. Do one of the following:
 - Remove a part from the list by clicking the **Remove part** button .
 - Add a removed part back to the list by clicking the **Add part** button .
 - Connect all the parts to a feature (all the parts in one line) by clicking **Accept**.
 - Connect all suggested parts with their respective features by clicking **Accept All**.

Note:

Weld points are configured by their parts. If you configure out a part in any way (variant, revision rule or incremental change), the weld points that are connected to this part are also configured out. You can configure whether this behavior occurs when at least one of the connected parts is configured out or all of them are configured out using the **MEShowWeldPointsConnectedToConfiguredOutParts** preference.

Set Suggestive Planner scope

Suggestive Planner helps you to eliminate full structure searches by suggesting that you assign consumable parts and manufacturing features from a product to a process without necessarily showing the original product bill of material (BOM). This procedure allows you to add, remove, or edit one or more suggested scopes in a bill of process (BOP).

1. Open a linked BOM and process view contained in a collaboration context (CC).
2. In a process view, right-click a process line with a partially assigned or unassigned assembly of parts and features, such as a station, and choose **Suggestive Planner**→**Set Product Scope**.
3. In the **Set Product Bucket** dialog box, in the BOM view, select the process line containing unassigned parts and features that are relevant to those in the process view, click **Scope** , and then click **OK**.
4. To edit or alter the scope, do the following.

- a. In the process view, right-click the process line to be edited and choose **Suggestive Planner**→**Set Product Scope**.
 - To add or edit one or more scopes from the BOM view, click each line to be added to or removed from the process view and click **Scope** .
 - To delete a BOM line scope, in the **Set Product Bucket** dialog box, select the **BOM Line name** and click **Remove Scope** .
 - b. Click **OK** to update the process view.
5. Do one of the following:
- **Use Suggestive Planner** in a process view.
 - **Use Suggestive Planner** with weld feature validation.

Use Suggestive Planner in a process view

You can employ, or assign other planners to employ, a process that uses Suggestive Planner to offer product or manufacturing features from a process view without displaying the BOM.

1. **Set** the Suggestive Planner scope.
2. In the process or a related Program Evaluation Review Technique (PERT) view, right-click a station or other process item within the scoped area, and choose **Suggestive Planner**→**Assign Suggested Product** or **Assign Suggested Features**.

With **Assign Suggested Product** selected, in the **Assign Suggested Product** dialog box, a list displays all unassigned parts and products.

With **Assign Suggested Features** selected, in the **Assign Suggested Discrete Features** dialog box, a list displays all unassigned parts that share a manufacturing feature connection to the available parts in that station.

Note:

If you select **All unassigned product**, all the unassigned parts from the scope are listed. If you select **Suggested product**, consumed parts from that station or the incoming DIPA are listed, if they have features that share connections, such as welds, to parts in the selected process.

3. If you choose to assign suggested products, do the following.
 - a. Select a different line in the process or PERT view and then, in the **Assign Suggested Product** dialog box, select that line in the **Station** list by clicking **Scope** .

The **Assign Suggested Product** dialog box only allows you to select a line with a process, such as a line or station. You can also click the process view's **Back**  or **Next**  buttons to step between selected lines of the same process type.

- b. Select one or more lines in the **Suggested Product** group and click **Assign**.

The items are removed from the **Suggested Product** group and show as consumed in the process or PERT view. If you now select **Suggested product** in the **Criteria** group, any of the new consumed products that have connections with the selected process or PERT view are also available for assignment.

4. If you chose to assign suggested features, do one of the following.

- Select a line in the process or PERT view and then, in the **Assign Suggested Discrete Features** dialog box, select a line in the **Station** list by clicking **Scope** .

Note:

The **Suggested Features** list box only allows you to select discrete weld spots (discrete spots, no continuous features or datums) and then add them to a line with a process type, such as a line or station.

Unassigned manufacturing features display as connected to parts within your scope in the process or PERT view. **Connected To (1)** and **Connected To (2)** columns in the **Suggested Features** list box indicate to which parts the features are connected.

- In the **Assign Suggested Discrete Features** dialog box, select one or more unassigned features, and in the **Assign to Operation** group, do one of the following.
 - To assign the features to a root operation at the end of a station, do not select any lines from the group, just click **Assign**.
 - To assign the features to a selected process item, select relevant lines from the **Assign to Operation** group, and then click **Assign**.

The features are removed from the **Suggested Features** group and show as consumed in the process or PERT view.

Use Suggestive Planner with weld feature validation

To validate weld assignments to process stations following product updates, use Suggestive Planner and weld validation to identify discrete manufacturing features assigned from a bill of materials (BOM) to a bill of process (BOP) before all the connected parts are assigned.

1. (Optional) If you want to assign manufacturing features to newly created operations under a suggested station using a default operation naming convention, set the name value using the preference **MEWeldValidationDefaultOperationName**.
2. (Optional) If you have weld feature types that require fasteners, define the fastener feature types to be added to the BOP, and add valid values for the weld point or arc weld property **Mfg0weld_type** to the preference **MEWeldValidationFastenerFeatureTypes**.

Example:

Weld Stud, Weld Nut. These values are necessary if a fastener and its weld feature type are assigned in the same station.

3. Select the BOM lines and the BOP process lines containing the partially assigned or unassigned parts and features you want to keep, reassign, unassign, and validate in the BOP, and set the Suggestive Planner scope.
4. In the BOP, right-click the BOP line to validate and choose **Feature Assignment Validation**.

In the **Feature Assignment Validation** dialog box, the **Suggested Assignment** tab lists previously assigned (current) and suggested assignments. The suggested assignment station is always the station where features were most recently connected to the parts.

Feature Assignment Validation

Line: 000342/A;1-BODYSIDE OUTER LEFT (View)

Suggested Assignment Unassign

Feature Name	Feature Type	Current Assignment	Suggested Assignment...
C4	Weld Spot	000343/A;1-KA010_...	000344/A;1-KA020_...
D1	Weld Spot	000344/A;1-KA020_...	000349/A;1-KA030_...
D2	Weld Spot	000344/A;1-KA020_...	000349/A;1-KA030_...
D3	Weld Spot	000344/A;1-KA020_...	000349/A;1-KA030_...
D4	Weld Spot	000344/A;1-KA020_...	000349/A;1-KA030_...
SA2	Weld Stud	000344/A;1-KA020_...	000350/A;1-KA040_...
SA1	Weld Stud	000349/A;1-KA030_...	000343/A;1-KA010_...

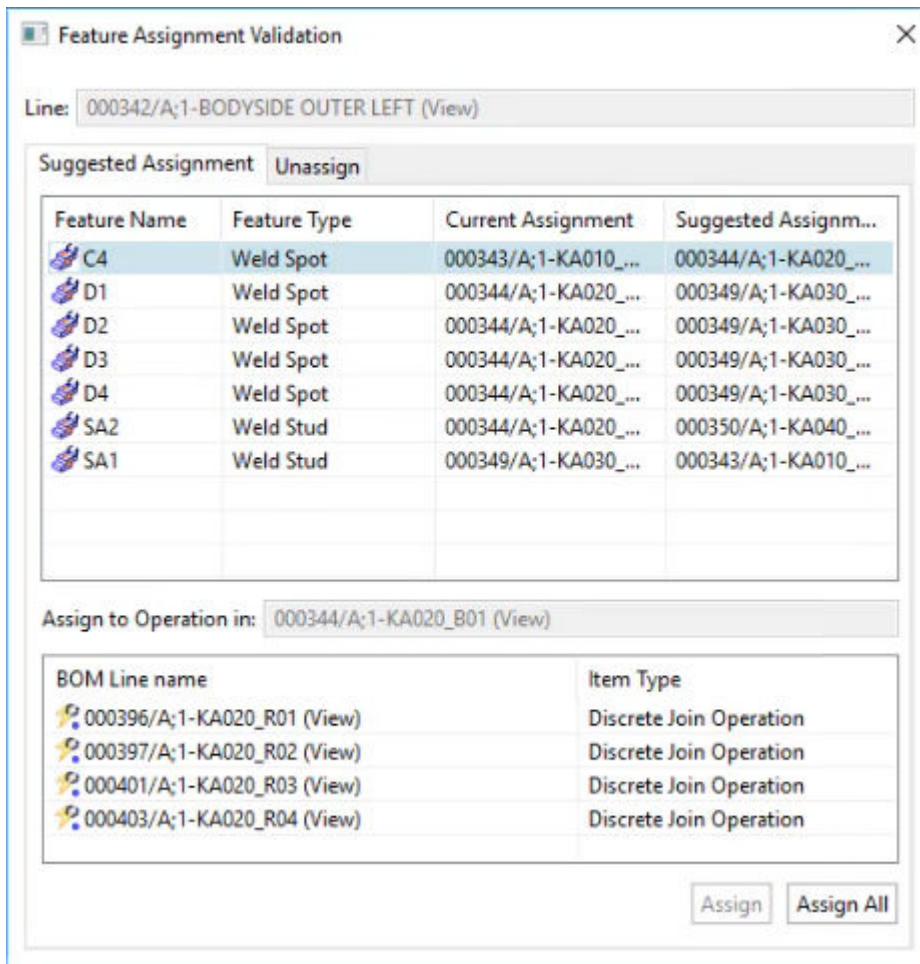
Assign to Operation in:

BOM Line name	Item Type

Assign Assign All

- In the **Suggested Assignment** list, select a feature to review, assign, or reassign.

In this example, the lower list shows existing discrete join operations in a station where the features can be assigned.



6. Do one of the following.

- Click **Assign**.

The features in the BOM lines reported in the lower list are assigned to the station.

- Click **Assign All**.

The features in the BOM lines reported in the lower list are assigned to a newly created operation under the **Suggested Assignment** location. If you set a name value using the preference **MEWeldValidationDefaultOperationName**, the operation uses that naming convention.

A dynamic in-process assembly (DIPA) does not display in the BOP but is internally created. If you defined fastener feature types to be added to the BOP for validation of feature assignments using the preference **MEWeldValidationFastenerFeatureTypes**, those fasteners and their associated weld features are assigned to the same operation.

7. Click the **Unassign** tab to review features with connected parts that are not assigned to those parts and click **Unassign**.

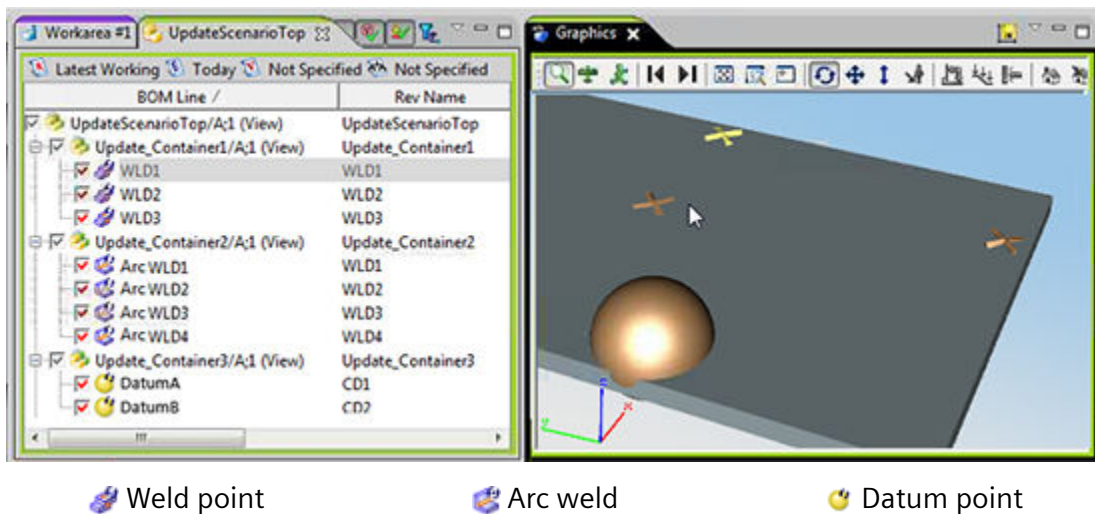
8. In the upper-right corner of the **Feature Assignment Validation** dialog box, click **X**.

View assignment indications in the BOP to review the effect of the feature assignments and unassignments, and if necessary, run feature assignment validation again.

Importing and exporting features

Importing features overview

Using a PLM XML file, you can import discrete and continuous manufacturing features—including weld points, continuous arc welds, and datum points—from external CAD or legacy systems using either **Teamcenter** or the **me_import_mfgs utility**. You can then manage the features in Teamcenter while maintaining their connections to parts. The import creates or updates manufacturing features under a specified container object. Teamcenter creates or updates attribute forms with the required values and adds a direct model dataset containing 3D JT data. Teamcenter updates connections to weld and datum point parts according to the part IDs.



When importing manufacturing features, you can identify a container (an item revision) to which the features are imported or specify the import location in the PLM XML file.

When importing manufacturing features:

- Teamcenter connects the features to parts, provided you already imported the parts into the database.
- The parts must have an ID that is unique and persistent in the external CAD system.
 - The unique ID can be stored on any occurrence note.
- Your administrator must define the name of the occurrence note in the **MEImportMFGsManufacturingFeatureIdAttributeName** **MEImportMFGsPartIdAttributeName**

preferences, as it can differ between CAD systems.

MEImportMFGsManufacturingFeatureIdAttributeName defines which BOM line property is used as the manufacturing feature ID. **MEImportMFGsPartIDAttributeName** defines which BOM line property is used as the part ID.

Note:

The preferences **MEImportMFGsManufacturingFeatureIdAttributeName** and **MEImportMFGsPartIDAttributeName** should be set to the value **Usage_ArchitectureId**.

- Existing features can also be identified using an ID that is unique and persistent in the external CAD system. Equivalently:
 - The unique ID can be stored on any attribute occurrence note.
 - You must define the name of the occurrence note in the **MEImportMFGsManufacturingFeatureIdAttributeName** preference, as it can differ between CAD systems.
- At the time of import, Teamcenter reads the transformation from the input PLM XML file, and by default, interprets the transformation as absolute location. Use the **MEImportMFGsUseAbsoluteLocation** preference to set the transformation to relative location. You can choose whether to make an incremental update or to update the entire container.

The **MENEWMFG_DefaultJTDatasetNameForSpecificWeldType** preference specifies the name of the JT dataset which is by default attached to the specific type of newly created Weld Point object. Valid values are in the format: weld_type:number_of_connected_parts:dataset_name. Possible values for the weld_type are geo, respot, and process. Possible values for the number_of_connected_parts are <2, 2, 3, 4, >4. The value for the dataset_name portion depends on the weld_type section.

The JT files representing weld points vary according to how many parts are involved in the connection.

Weld designation	Number of connected parts				
	Less than 2	2	3	4	More than 4
geo	rswp_2t_dim_ctrl.jt	rswp_2t_dim_ctrl.jt	rswp_3t_dim_ctrl.jt	rswp_4t_dim_ctrl.jt	rswp_4t_dim_ctrl.jt
respot	rswp_2t.jt	rswp_2t.jt	rswp_3t.jt	rswp_4t.jt	rswp_4t.jt
process	rswp_2t_pro_ctrl.jt	rswp_2t_pro_ctrl.jt	rswp_3t_pro_ctrl.jt	rswp_4t_pro_ctrl.jt	rswp_4t_pro_ctrl.jt
None	rswp_2t.jt	rswp_2t.jt	rswp_3t.jt	rswp_4t.jt	rswp_4t.jt

Note:

These representations do not apply to datums or weld arcs.

Import manufacturing features in Teamcenter

Using a PLM XML file, you can import features—including weld points, weld arcs, and datum points—into a structure using Teamcenter rather than add each one manually. In the PLM XML file, you can specify the JT name to which the features are connected. For weld points and datums, JT datasets are assumed to already exist in Teamcenter and the import connects the weld points and datums to the existing datasets. For weld arcs, the import creates new JT datasets.

1. Create containers (item revisions) for the features at the required level in the structure.

Note:

You can also specify the container in the PLM XML file to be imported.

2. Select the line under which you want to import the features.

Note:

If your PLM XML file contains manufacturing features for parts that are not in the selected line, or if you have variants configured out of the structure, all features are imported into the selected line. In the **Connected To** column of the view, features with hidden or configured-out parts have no value. They are reported as errors in a log file after the import completes.

3. Choose **Tools→Import Manufacturing Features**.

In the **Import Manufacturing Features** dialog box, the **Scope of Connected Parts** text box displays the line you selected.

4. Next to the **Imported File** text box, click **...** and browse to and select the PLM XML file that contains the import information.
5. (Optional) In the product structure, select a different container to which you want to import the features.
6. To specify a different feature container, next to the **Default Container of Manufacturing Features** text box, click  and browse to and select a folder.
7. If you want to import the entire contents of the import file into the container, in the **Advanced Settings** group, select the **Cleanup - delete manufacturing features if they are not included in the imported file** ☒ check box.

Features that are not listed are removed. If you do not select this option, you perform an incremental update. Only those features that are included in the PLM XML are changed. New features found in the import file that are not in the container are added to the container. Features in the container that are not in the import file are not changed.

8. If features in the PLM XML file exist outside the default container location in the structure, and you do not want them to be duplicated, select the **To avoid duplicates, search for the existing features under this scope** ☒ check box, click , and select the folder where these features reside.
9. Click **OK**.

Teamcenter imports the features, displays a warning concerning features that may have been configured out, and, optionally, displays a log file.

If you performed an incremental update, any features that have a released status before the import are revised. If they have a working status, Teamcenter updates the current revision.

10. (Optional) Right-click a feature and choose **Open with→Attachments** to verify that attributes and a JT file exist for that feature.

me_import_mfgs utility

Import manufacturing features using the me_import_mfgs utility

For very large imports or updates, use the manufacturing feature batch import utility to import manufacturing features from a command line. To access help on this process, run the following command:

```
me_import_mfgs -h
```

Example:

```
me_import_mfgs -u=myUserName -p=myPassword -g=myGroup
-rootid=myStructureTopLine -rootrev=A -revrule="Latest Working"
-input_file="D:\temp\feature_updates.xml"
```

Use the argument **-mode=keepExistingFeatures** or **-mode=refreshWholeContainer** to run incremental updates or complete updates. Complete updates delete any features below the **rootid**. The default value is **keepExistingFeatures**.

After the command has completed, the utility reports any issues at the prompt and creates a log file where you can look up details. If the structure is open in Teamcenter, you must refresh or reload it to see the effects of the import.

Manufacturing features export/import file format

You must export manufacturing features from the external system using the PLM XML file format and **ProcessSimulateExport** transfer mode to import them and their defined content into Teamcenter. The following is a sample of that format. For more specific examples and information, see [Export file details](#).

```
<?xml version="1.0" encoding="utf-8"?>
<!-- GENERATED BY: PLM XML SDK 7.0.3.296 -->
<PLMXML xmlns="http://www.plmxml.org/Schemas/PLMXMLSchema"
  schemaVersion="6" language="en-us" date="2015-06-24" time="14:47:54"
  author="Teamcenter P10000.1.0.50_20150526.00 -
  HHC@IMC--1443886670(-1443886670)">
  <Header id="id1" traverseRootRefs="#id9"
  transferContext="ProcessSimulateExport"></Header>
  <ProductRevision id="id23" name="part1" subType="ItemRevision"
  masterRef="#id21" revision="A">
  </ProductRevision>
  <ProductRevision id="id33" name="part2" subType="ItemRevision"
  masterRef="#id31" revision="A">
  </ProductRevision>
  <ConnectionRevision id="id50" name="arc" subType="ArcWeldRevision"
  masterRef="#id49" revision="A">
  </ConnectionRevision>
  <ConnectionRevision id="id69" name="wp" subType="WeldPointRevision"
  masterRef="#id68" revision="A">
  </ConnectionRevision>
  <Product id="id21" name="part1" subType="Item" ></Product>
  <Product id="id31" name="part2" subType="Item" ></Product>
  <Connection id="id49" name="arc" subType="ArcWeld" ></Connection>
  <Connection id="id68" name="wp" subType="WeldPoint" ></Connection>
  <ProductView id="id6" ruleRefs="#id2" rootRefs="id9">
  <AssociatedAttachment id="id41" attachmentRef="#id42"
  role="IMAN_Rendering"></AssociatedAttachment>
  <AssociatedAttachment id="id46" attachmentRef="#id47"
  role="TC_Feature_Form_Relation"></AssociatedAttachment>
  <AssociatedAttachment id="id65" attachmentRef="#id66"
  role="TC_Feature_Form_Relation"></AssociatedAttachment>
  <Occurrence id="id18" instancedRef="#id23" instanceRefs="#id25" >
  <UserData id="id20" type="InstanceNotes">
  <UserValue value="part1_id" title="GCS CP"></UserValue></UserData>
  <Transform id="id16">1 0 0 0 0 1 0 0 0 0 1 0 0 0 0 1</Transform></
  Occurrence>
  <Occurrence id="id28" instancedRef="#id33" instanceRefs="#id35">
  <UserData id="id27">
  <UserValue value="" title="OccurrenceName"></UserValue></UserData>
  <UserData id="id30" type="InstanceNotes">
  <UserValue value="part2_id&#xA;" title="GCS CP"></UserValue></UserData>
```



```

<Transform id="id26">1 0 0 0 0 1 0 0 0 0 1 0 0 0 0 1</Transform></
Occurrence>
<Occurrence id="id38" instancedRef="#id50" instanceRefs="#id54"
associatedAttachmentRefs="#id41 #id46" >
<UserData id="id39" type="AttributesInContext">
<<UserValue value="arc" title="OccurrenceName"></UserValue>
</UserData>
<UserData id="id40" type="InstanceNotes">
<UserValue value="arc_id" title="GCS CP"></UserValue></UserData>
<Transform id="id36">1 0 0 0 0 1 0 0 0 0 1 0 0 0 0 1</Transform>
  <Reference id="id52" type="connection" occurrenceRef="#id18"></
Reference>
<Reference id="id53" type="connection" occurrenceRef="#id28"></
Reference></Occurrence>
<Occurrence id="id57" instancedRef="#id69" instanceRefs="#id72"
associatedAttachmentRefs=" #id65" >
<UserData id="id58" type="AttributesInContext">
<UserValue value="wp" title="OccurrenceName"></UserValue></UserData>
<UserData id="id59" type="InstanceNotes">
<UserValue value="wp_id" title="GCS CP"></UserValue></UserData>
<Transform id="id55">1 0 0 0 0 1 0 0 0 0 1 0 0 0 0 1</Transform>
<Reference id="id71" type="connection" occurrenceRef="#id28"></
Reference></Occurrence></ProductView>
<DataSet id="id42" name="c21l" version="1" memberRefs="#id44"
type="DirectModel">
</DataSet>
<ExternalFile id="id44" locationRef="c21l.jt" format="jt"></ExternalFile>
<Form id="id47" name="002211_ArcWeldForm" subType="ArcWeld Attribute
Form" subClass="ArcWeld Attribute Form">
<Description>ArcWeld Attribute Form</Description>
<UserData id="id48" type="FormAttributes">
<UserValue value="" title="Connected_part_1"></UserValue>
<UserValue value="" title="Connected_part_2"></UserValue>
<UserValue value="" title="Connected_part_3"></UserValue>
<UserValue value="" title="Connected_part_4"></UserValue>
<UserValue value="" title="Connected_part_5"></UserValue>
<UserValue value="" title="Connected_part_6"></UserValue>
<UserValue value="" title="Connected_part_7"></UserValue>
<UserValue value="" title="Connected_part_8"></UserValue>
<UserValue value="" title="Connected_part_9"></UserValue>
<UserValue value="" title="Contour"></UserValue>
<UserValue value="" title="Contour_height_1"></UserValue>
<UserValue value="" title="Depth"></UserValue>
<UserValue value="" title="First_leg"></UserValue>
<UserValue value="" title="Groove_angle"></UserValue>
<UserValue value="" title="Groove_radius"></UserValue>
<UserValue value="" title="Group_id"></UserValue>
<UserValue value="" title="Height"></UserValue>
<UserValue value="" title="Id"></UserValue>

```



```

<UserValue value="" title="Method"></UserValue>
<UserValue value="" title="Output_type"></UserValue>
<UserValue value="" title="Penetration_depth_1"></UserValue>
<UserValue value="" title="Plug_diameter"></UserValue>
<UserValue value="" title="Process"></UserValue>
<UserValue value="" title="Root_opening"></UserValue>
<UserValue value="" title="Root_penetration"></UserValue>
<UserValue value="" title="Second_leg"></UserValue>
<UserValue value="" title="Setup"></UserValue>
<UserValue value="" title="Size"></UserValue>
<UserValue value="" title="Weld_length"></UserValue>
<UserValue value="" title="Weld_type"></UserValue>
<UserValue value="" title="Weld_volume"></UserValue></UserData></Form>
<Form id="id66" name="002212_SpotWeldForm" subType="SpotWeld Attribute
Form" subClass="SpotWeld Attribute Form">
<Description>SpotWeld Attribute Form</Description>
<UserData id="id67" type="FormAttributes">
<UserValue value="" title="Connected_part_1"></UserValue>
<UserValue value="" title="Connected_part_2"></UserValue>
<UserValue value="" title="Connected_part_3"></UserValue>
<UserValue value="" title="Connected_part_4"></UserValue>
<UserValue type="real" value="" title="Cool_time1"></UserValue>
<UserValue type="real" value="" title="Cool_time2"></UserValue>
<UserValue value="" title="Feat_comment"></UserValue>
<UserValue value="" title="Gov_mtl_thk"></UserValue>
<UserValue value="" title="Group_id"></UserValue>
<UserValue type="real" value="" title="Hold_time"></UserValue>
<UserValue value="" title="Id"></UserValue>
<UserValue type="real" value="" title="Max_current"></UserValue>
<UserValue value="" title="Metal_comb"></UserValue>
<UserValue type="real" value="" title="Min_current1"></UserValue>
<UserValue type="real" value="" title="Min_current2"></UserValue>
<UserValue type="real" value="" title="Nugget_dia"></UserValue>
<UserValue type="int" value="2" title="Number_of_sheets_welded"></
UserValue>
<UserValue type="int" value="" title="Number_of_welds_in_group"></
UserValue>
<UserValue value="" title="Output_type"></UserValue>
<UserValue type="int" value="" title="Pulse_num1"></UserValue>
<UserValue type="int" value="" title="Pulse_num2"></UserValue>
<UserValue type="real" value="" title="Pulse_time1"></UserValue>
<UserValue type="real" value="" title="Pulse_time2"></UserValue>
<UserValue type="real" value="" title="Resistance"></UserValue>
<UserValue value="" title="SPOT_KPC"></UserValue>
<UserValue value="" title="Spot_dimensional_ctrl"></UserValue>
<UserValue value="" title="Spot_kpc_justification"></UserValue>
<UserValue value="" title="Spot_process_ctrl"></UserValue>
<UserValue type="real" value="" title="Squeeze_time"></UserValue>
<UserValue value="" title="Stackup"></UserValue>

```

```

<UserValue value="" title="Standard"></UserValue>
<UserValue type="int" value="" title="Tol"></UserValue>
<UserValue value="" title="Weld_class"></UserValue>
<UserValue value="" title="Weld_designation"></UserValue>
<UserValue type="real" value="" title="Weld_force"></UserValue>
<UserValue type="int" value="" title="Weld_group_min"></UserValue>
<UserValue type="int" value="" title="Weld_group_total"></UserValue>
<UserValue type="real" value="" title="Weld_i_value"></UserValue>
<UserValue type="real" value="" title="Weld_j_value"></UserValue>
<UserValue type="real" value="" title="Weld_k_value"></UserValue>
<UserValue type="real" value="" title="Weld_time"></UserValue>
<UserValue value="" title="Weld_type"></UserValue>
<UserValue type="real" value="0" title="X_pos"></UserValue>
<UserValue type="real" value="0" title="Y_pos"></UserValue>
<UserValue type="real" value="0" title="Z_pos"></UserValue></UserData></
Form>
</PLMXML>

```

Import file details

Examples of the PLM XML features import format explaining weld point, arc weld, and datum features are detailed below.

For each weld point, arc weld, and datum point you import, the JT is determined by a unique dataset name that you must specify in the PLM XML file.

Example:

```
<ExternalFile id="id222 ext file" locationRef="Arc 5508.jt" format="jt"/>
```

```

<Occurrence id="id1" instantiatedRef="#id1_con"
associatedAttachmentRefs="#id1_att_form #id1_att_render"
parentRef="#id1_parent">

```

Weld points

In the following example, *id1* is a unique weld point ID that defines a single weld point. Everything with *id="id1 . . ."* is aligned with it, and its container is defined by the attribute *instantiatedRef="#id1_con"*.

```

<Occurrence id="id1" instancedRef="#id1_con" associatedAttachmentRefs="#id1_att_form
#id1_att_render" parentRef="#id1_parent">
  <UserData id="id1_instancenotes" type="InstanceNotes">
    <UserValue value="WP_4264" title="Usage_ArchitectureId"/>
  </UserData>
  <Transform id="id1_trafo">-1 0 0 0 0 1 0 0 0 0 -1 0 0.53625 -0.029585 -0.084999 1
  </Transform>
  <Reference id="id1_con1" type="connection" occurrenceRef="#id1_con1_occ"/>
  <Reference id="id1_con2" type="connection" occurrenceRef="#id1_con2_occ"/>
</Occurrence>
<Occurrence id="id1_con1_occ">
  <UserData id="id1_con1_occ_inst" type="InstanceNotes">
    <UserValue value="FrontFloor_000" title="Usage_ArchitectureId"/>
  </UserData>
</Occurrence>
<Occurrence id="id1_con2_occ">
  <UserData id="id1_con2_occ_inst" type="InstanceNotes">
    <UserValue value="FrontFloor_020" title="Usage_ArchitectureId"/>
  </UserData>
</Occurrence>
<Occurrence id="id1_parent">
  <UserData id="id1_parent_inst" type="InstanceNotes">
    <UserValue value="FrontFloor_MFG" title="Usage_ArchitectureId"/>
  </UserData>
</Occurrence>

```

Additional attributes define bill of materials (BOM) line information, including:

- A unique *UserValue* value and a title that serves as a connection to the part (<UserValue value="WP_4264" title="Usage_ArchitectureId"/>).
- A *Transform* location that connects the weld point (*id1_trafo*) in your structure.
- A parent location (Occurrence id="id1_parent") and value ("FrontFloor_MFG") that defines where in your structure to place the weld point.

Attributes defined later in the document define additional associated functionality.

```

<AssociatedAttachment id="id1_att_form" attachmentRef="#id1_form" role="TC_Feature_Form_Relation"/>
<AssociatedAttachment id="id1_att_render" attachmentRef="#id1_render" role="IMAN_Rendering"/>
<DataSet id="id1_render" name="Mfg_Tech_0001_Dataset_Weld_Geo" type="DirectModel"/>
<ConnectionRevision name="WP_4264" id="id1_con" masterRef="#id1_con_master" subType=
"WeldPointRevision" revision="A"/>
<Connection id="id1_con_master" name="WP_4264" subType="WeldPoint"/>
<Form id="id1_form" name="SpotWeldForm" accessRefs="" subType="SpotWeld Attribute Form" subClass=
"SpotWeld Attribute Form">
  <Description>SpotWeld Attribute Form</Description>
  <UserData id="id1_form_attr" type="FormAttributes">
    <UserValue value="WP_4264" title="Id"/>
    <UserValue type="int" value="2" title="Number_of_sheets_welded"/>
    <UserValue value="III" title="Weld_class"/>
    <UserValue value="Geo" title="Weld_designation"/>
    <UserValue type="real" value="-0.000000000000002" title="Weld_i_value"/>
    <UserValue type="real" value="0.000000000000002" title="Weld_j_value"/>
    <UserValue type="real" value="-1.000000000000000" title="Weld_k_value"/>
    <UserValue type="real" value="1" title="Weld_time"/>
    <UserValue value="Resistance Spot" title="Weld_type"/>
    <UserValue type="real" value="536.25" title="X_pos"/>
    <UserValue type="real" value="-29.59" title="Y_pos"/>
    <UserValue type="real" value="-85" title="Z_pos"/>
  </UserData>
</Form>

```

This could include associated attachments such as:

- Forms, including your own custom forms (id="id1_att_form").
- Weld point representations (id="id1_att_render").
- Other attachments need not be part of the import, such as dedicated datasets created inside Teamcenter (name="Mfg_Tech_0001_Dataset_Weld_Geo").
- Revision (subType="WeldPointRevision" revision="A"), item information, and custom form attributes such as ijk values and xyz positions. The latter is just textual information and does not impact the weld import, which was earlier defined in the transform matrix (id1_trafo").

Arc welds

Arc welds provide one additional feature in addition to arc points: the ability to import a JT file (Arc_5508.jt) from your local file system.

The JT file exists in a folder beneath the PLM XML import folder.

... > MFG_Import

Search MFG_Import

Name	Date modified	Type
Arc_5391.jt	12/19/2017 7:36 PM	JT File
Arc_5504.jt	12/19/2017 7:36 PM	JT File
Arc_5505.jt	12/19/2017 7:36 PM	JT File
Arc_5506.jt	12/19/2017 7:36 PM	JT File
Arc_5507.jt	12/19/2017 7:36 PM	JT File
Arc_5508.jt	12/19/2017 7:36 PM	JT File

```
<DataSet id="id222_render" memberRefs="#id222_ext_file" name="Arc_5508" type="DirectModel"/>
<ExternalFile id="id222_ext_file" locationRef="Arc_5508.jt" format="jt"/>
```

Feature datums

Datums (DatumPoint_1000002 below) are similar to weld points but have different forms.

```

<DataSet id="id2_render" name="MFG_DatumPoint_03" type="DirectModel"/>
<ConnectionRevision name="DatumPoint_1000002" id="id2_con" masterRef="#id2_con_master" subType=
"DatumPointRevision" revision="A">
  <UserData id="id2_conrev_attr">
    <UserValue value="1000002" title="Description"/>
  </UserData>
</ConnectionRevision>
<Connection id="id2_con_master" name="DatumPoint_1000002" subType="DatumPoint"/>
<Form id="id2_form" name="DLFForm" accessRefs="" subType="DLF Attribute Form" subClass="DLF
Attribute Form">
  <Description>DLF Attribute Form</Description>
  <UserData id="id2_form_attr" type="FormAttributes">
    <UserValue value="Part_1" title="Connected_part_1"/>
    <UserValue value="Part_2" title="Connected_part_2"/>
    <UserValue value="Part_3" title="Connected_part_3"/>
    <UserValue type="real" value="0" title="Dlf_i_value"/>
    <UserValue type="real" value="0" title="Dlf_j_value"/>
    <UserValue type="real" value="0" title="Dlf_k_value"/>
    <UserValue type="boolean" value="False" title="Fixed_location"/>
    <UserValue type="boolean" value="False" title="Mature"/>
    <UserValue type="real" value="0" title="Mfg0CSYS_i_value"/>
    <UserValue type="real" value="0" title="Mfg0CSYS_j_value"/>
    <UserValue type="real" value="0" title="Mfg0CSYS_k_value"/>
    <UserValue value="SphereDatum" title="Mfg0Datum_Type"/>
    <UserValue type="boolean" value="False" title="Mfg0cntrl_i_direction"/>
    <UserValue type="boolean" value="False" title="Mfg0cntrl_j_direction"/>
    <UserValue type="boolean" value="False" title="Mfg0cntrl_k_direction"/>
    <UserValue type="real" value="0" title="Mfg0x_pos"/>
    <UserValue type="real" value="0" title="Mfg0y_pos"/>
    <UserValue type="real" value="0" title="Mfg0z_pos"/>
    <UserValue type="real" value="0" title="wdm0axis_direction_x"/>
    <UserValue type="real" value="0" title="wdm0axis_direction_y"/>
    <UserValue type="real" value="0" title="wdm0axis_direction_z"/>
    <UserValue type="real" value="0" title="wdm0plane_normal_x"/>
    <UserValue type="real" value="0" title="wdm0plane_normal_y"/>
    <UserValue type="real" value="0" title="wdm0plane_normal_z"/>
  </UserData>
</Form>

```

Imported feature revisioning

When you import weld, datum, and arc weld features using the **me_import_mfgs** utility, Teamcenter compares information in the PLM XML file to what is already in the product structure and:

- Updates only the features that have changed.
- Adds new features that are not present in the structure.

Note:

To update a feature, at least one major property must be changed for that feature.

The following properties are used as keys for comparison.

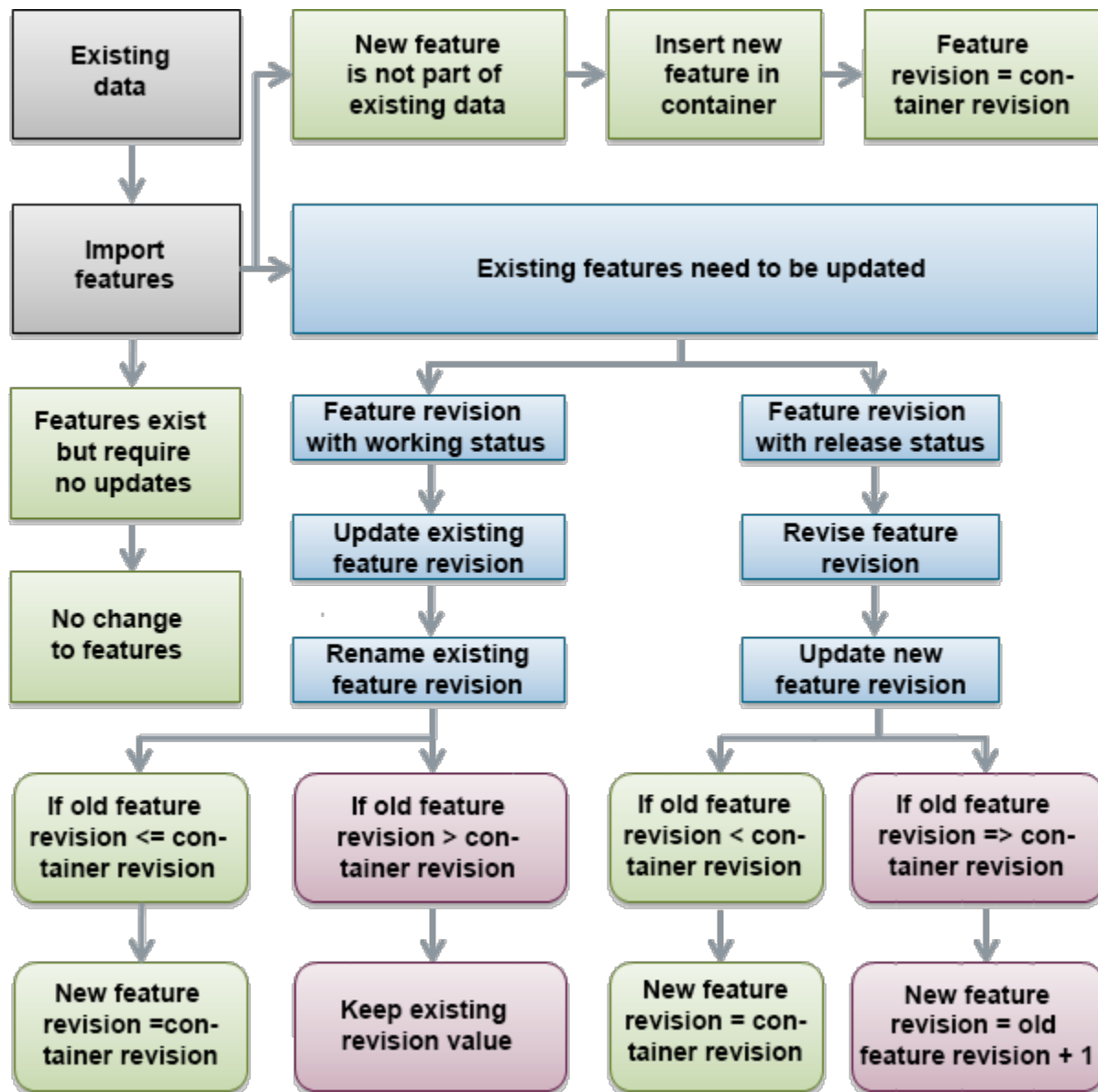
- Occurrence (occurrence name, relative transformation matrix, connected to relation)
- Revision attributes (revision name)
- Form attributes:

Weld points		Datums	Arc welds
Resistance	Type		Depth
Weld_class	Major control coordinate		Method
Weld_designation	Position (x_pos, y_pos, z_pos)		Process
Weld_type			Weld_type
Weld_force			Weld_length
Weld_time			Weld_volume

This diagram illustrates how feature revisions are handled. If the feature has a working status, then the existing revision gets updated but not revised, and is renamed. If the feature has a release status, a new revision is applied.

Note:

If the weld, arc weld, and datum manufacturing feature containers—the parents of welds you want to add, remove, or update in your BOM view revision (BVR)—are not writeable, the import will automatically revise those containers.



Printing and saving feature data

Print weld point table data

1. Click the **Print** button .
2. (Optional) Change the print format to **Text** (HTML is the default print format).
3. (Optional) Modify the print format settings by clicking the **Set results format** button  and entering one of the following:

Title	Adds a title you specify to the output.
Delimiter	Specifies the character that separates character strings in text file output.
Date	Adds the current date to the output.
Object Count	Adds the object count to the printed output.
Column Alignment	Aligns columns when using text format.

4. To save the file, open it in a Web browser or send it to a printer and complete the process that is appropriate to the file type and desired output.

Open HTML files in a Web browser

- a. Click the **Open in Web Browser** button .
- b. Execute your browser's print command.
- c. Return to the Teamcenter window and click **Close**.

Print a text or HTML file

- a. Click the **Print** button  in the lower-right corner of the **Print** dialog box.
- b. Define the printer to which the file is sent.

You can accept the default printer or select a different printer from the list.
- c. Click **Print**.
- d. Click **Close**.

Save output to a user-specified (HTML or text) file

- a. Click the **Save** button  in the lower-right corner of the **Print** dialog box.
- b. Navigate to the directory location where you want to save the file.
- c. Type the name of the file, including the **.htm**, **.html**, or **.txt** extension, in the **File name** box.
- d. Click **Save**.
- e. Click **Close**.

Export weld point table data to Excel

1. Click the **Export Table to Excel** button .

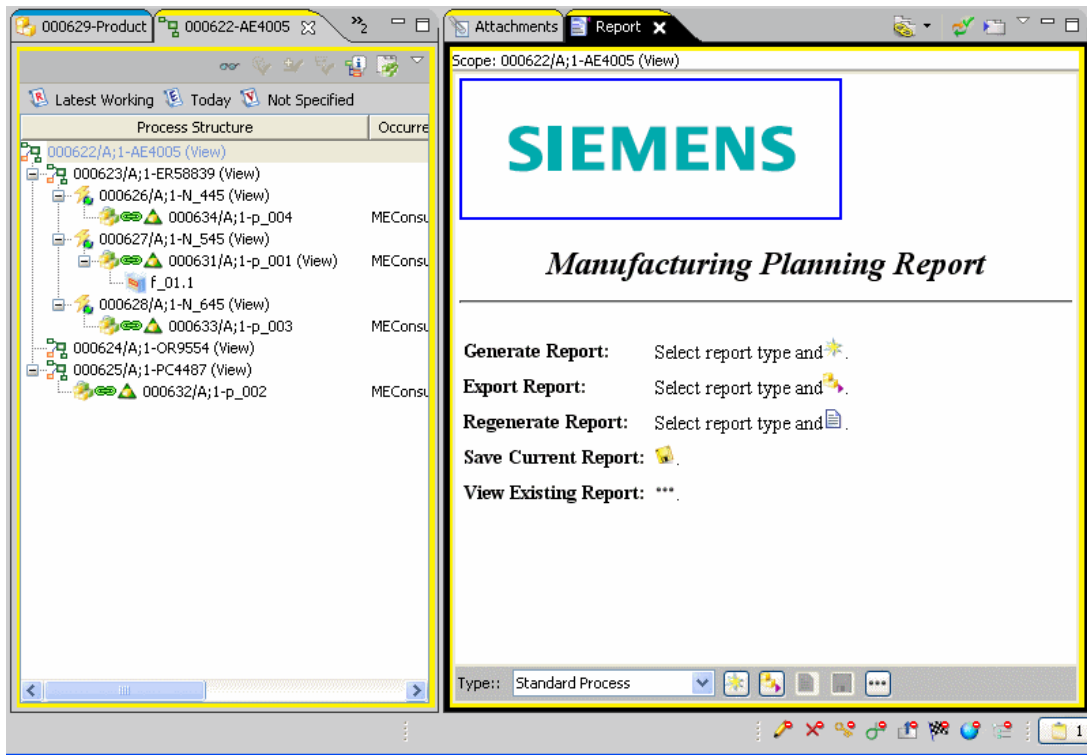
Teamcenter displays the **Save** dialog box.

2. Specify the path to the directory on your operating system where you want to save the file and click **Save**.

Teamcenter saves the table as a comma separated file that you can open in Microsoft Excel.

Generating reports for features

You can obtain several types of reports. For a selected , the **Report** view lets you generate a report of the selected type. For example, for a process, you can generate weld sequence, datum utilization, and datum coordination reports. For a product, you can generate an unallocated welds report.



Sample report

Use the menu at the bottom of the view to choose the criteria for a report, and click the buttons to select the desired action, such as generate, save, or view the report.

The weld process report is applicable to a station process structure built according to best practice. The report assumes that the station process root contains multiple operations directly below it. You must customize the report if the structure you use differs from this best practice.

View assignment indication

Assignment indication mode displays whether a feature is assigned to a process or operation in the target process.

1. Select a target process or operation in the structure pane and click  in the **Manufacturing Features** view.

A target process or operation is the process to which features in the source product structure are assigned.

Teamcenter adds the selected process or operation as target and displays its name in the target box.

2. Do one of the following:

- Click the **Show assignment indication** button .

Teamcenter marks all the features that are assigned to any process or operation under the selected target with the  symbol.

- Filter the features based on whether they are assigned or unassigned.
 - a. Click the **Filter data based on assignment status** button .
 - b. Select **Assigned** or **Unassigned** from the list.

Teamcenter displays only those features that are either assigned or unassigned, depending on your selection. Click the **Filter data based on assignment indication** button  to turn off the display.

8. 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:

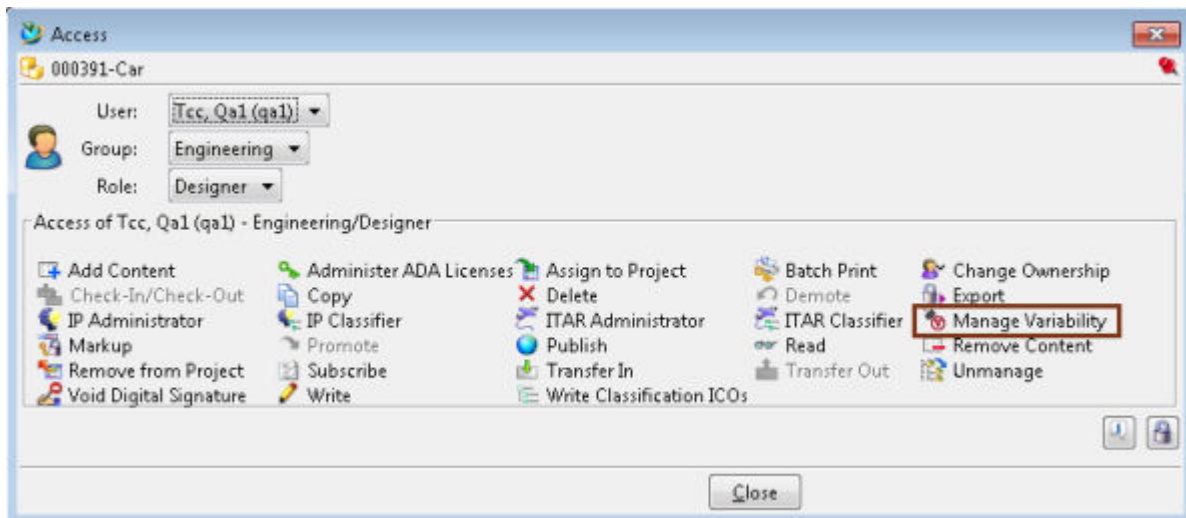
- Installs the solution template to support Product Configurator for Structure Manager.
- Sets the preference to enable the Product Configurator variant mode.

Associate a configurator context with any structure supported by Multi-BOM Management

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.

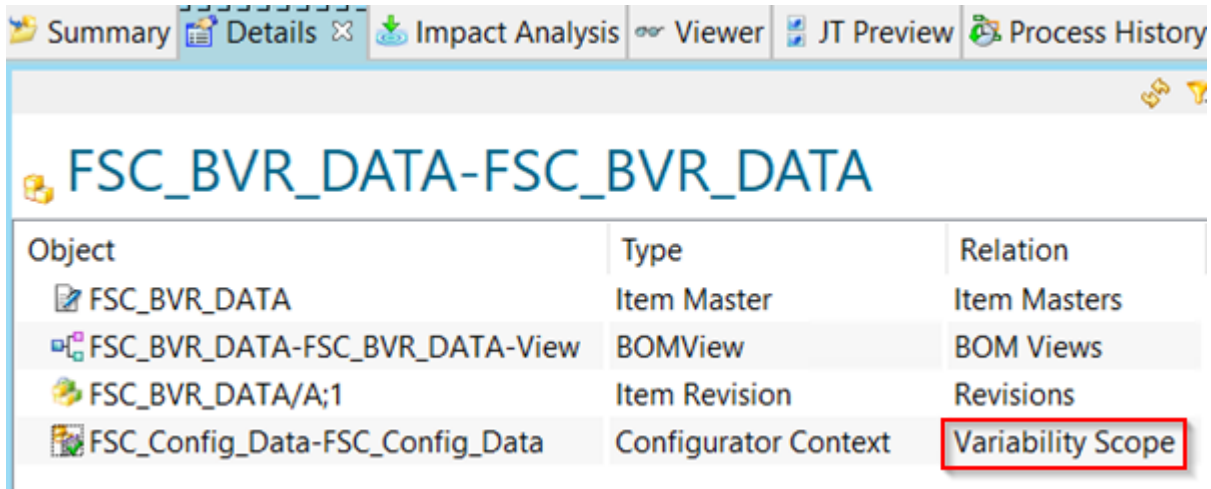
**Note:**

Using a mixture of legacy and product configurator variants can cause data corruption. By default, the system uses the preference **ME_EnableMixVariantModelCheck** to prevent loading structures that use a mixture of these variants. If you are using only one variant, or no workflow results in mixed variants, change the value of **ME_EnableMixVariantModelCheck** to **false**. This value enables the system to open structures without a check.

Associate a configurator context with a structure

1. In My Teamcenter, search for the structure and the configurator context.
2. Right-click the configurator context and click **Copy**.
3. 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**.



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 Multi-BOM Management.

1. In Multi-BOM Management, 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 Multi-BOM Management and open it again from the left navigation pane.

To verify whether the default configurator context is set, open a structure in Multi-BOM Management. The Multi-BOM Management 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 Multi-BOM Management, 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

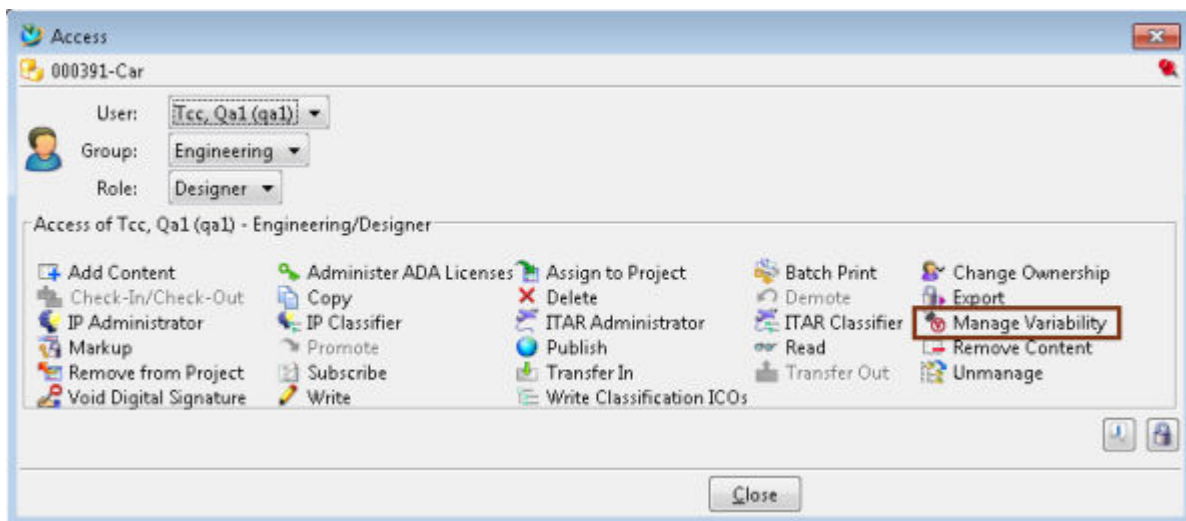
applied to the structure, you must remove the default configurator context. To do so, in Multi-BOM Management, choose **Edit→Unset as Default Configurator Context**.

For the associated configurator context to take effect, you must close Multi-BOM Management 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

1. Open the structure for which you want to author variant conditions in Multi-BOM Management.

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 the BOM line items for which you want to author the variant condition, for example, **Engine**.

Click **Edit the variant condition** .

3. 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.

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.

4. 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 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 | [013016]Engine != 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.

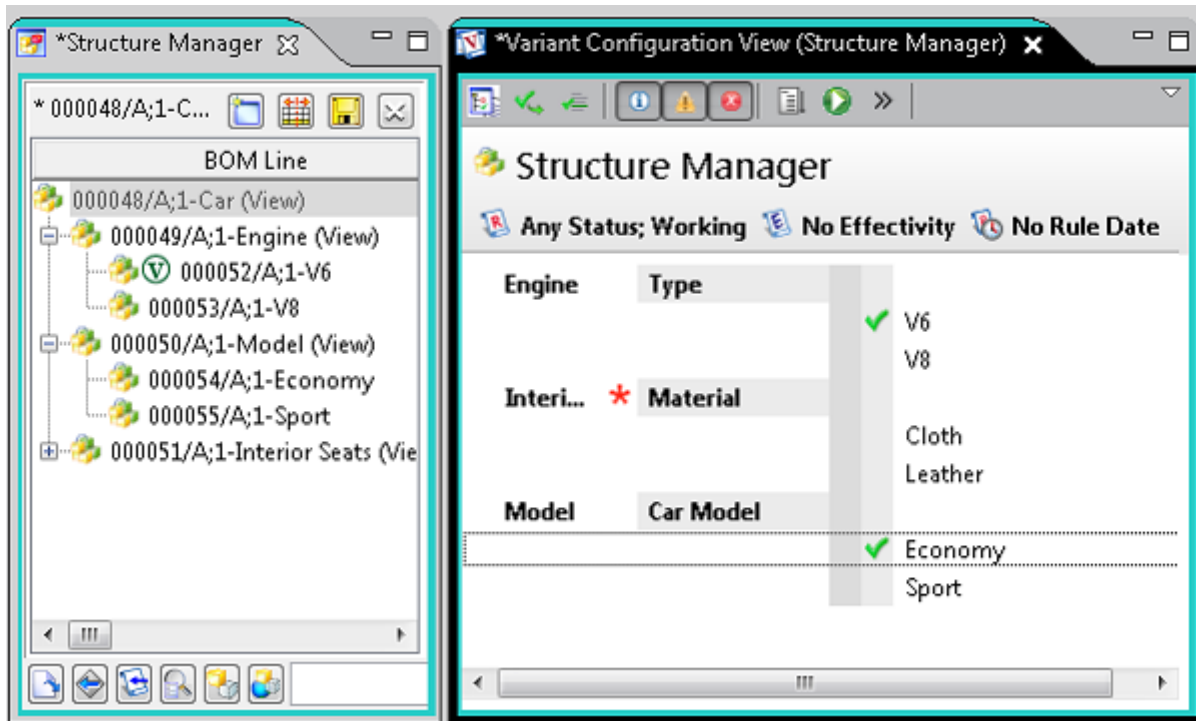
4. Click **Save the current content**  on the main toolbar to set the variant condition.

After you author variant expressions, configure the structure by setting variant rules.

Configure a structure by setting option values

1. Open the structure that you want to configure in Multi-BOM Management.
2. Click **Set option values for selected module**  on the toolbar.

3. 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 Un-configured 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.

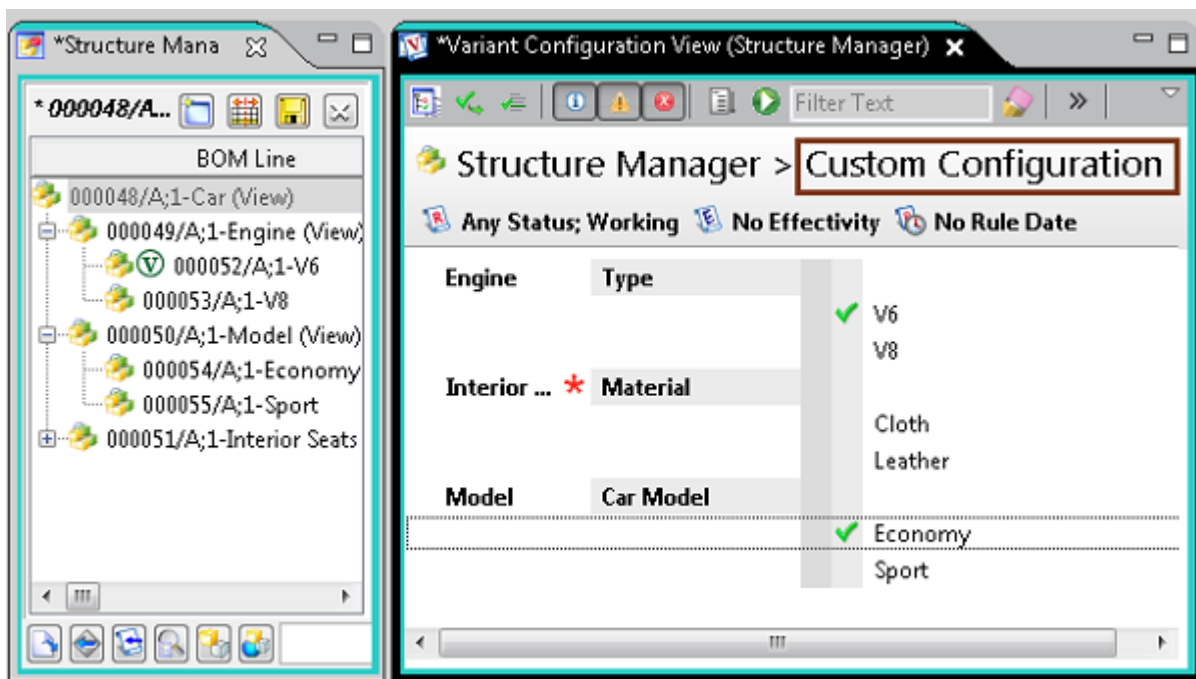
Alternatively, you can select **Add values to existing configuration** to load the configurations in a separate column, preserving the existing selections.

9. 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** .

10. 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.

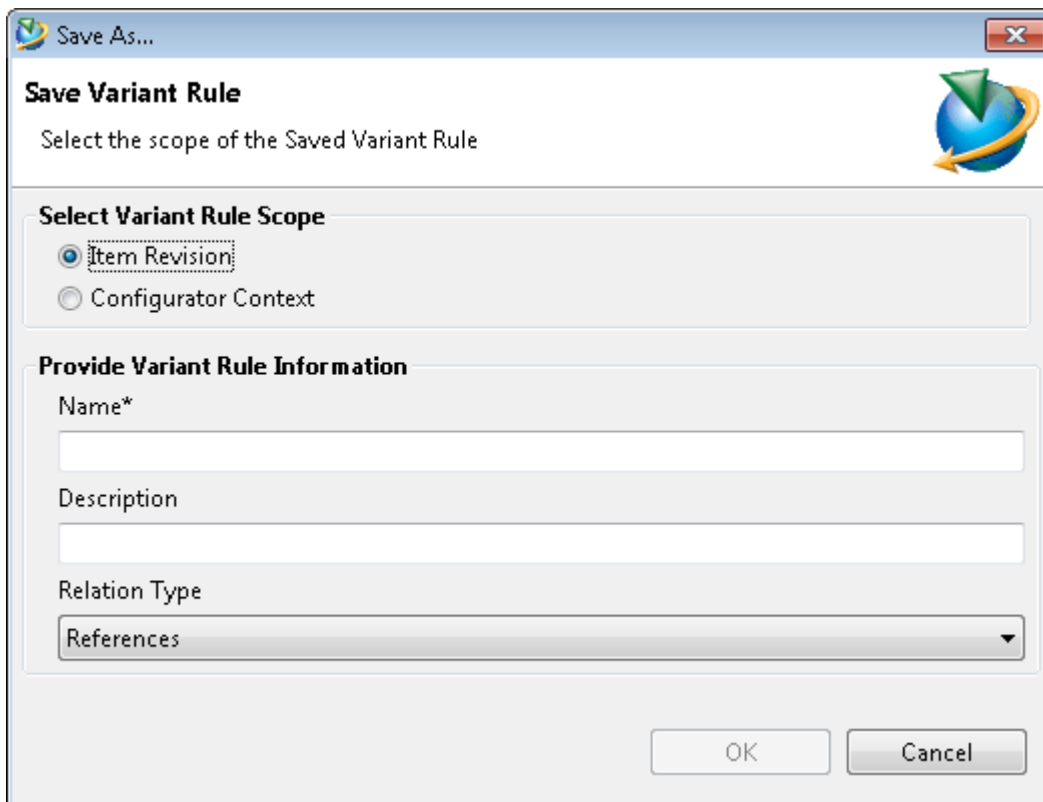


If the **Apply Constraints** button is deselected while applying the configuration, only user selections are applied on the content. However, if the **Apply Constraints** button is selected and the **Allow Validation Rules to Expand** button is deselected, the validation rules are not considered while 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

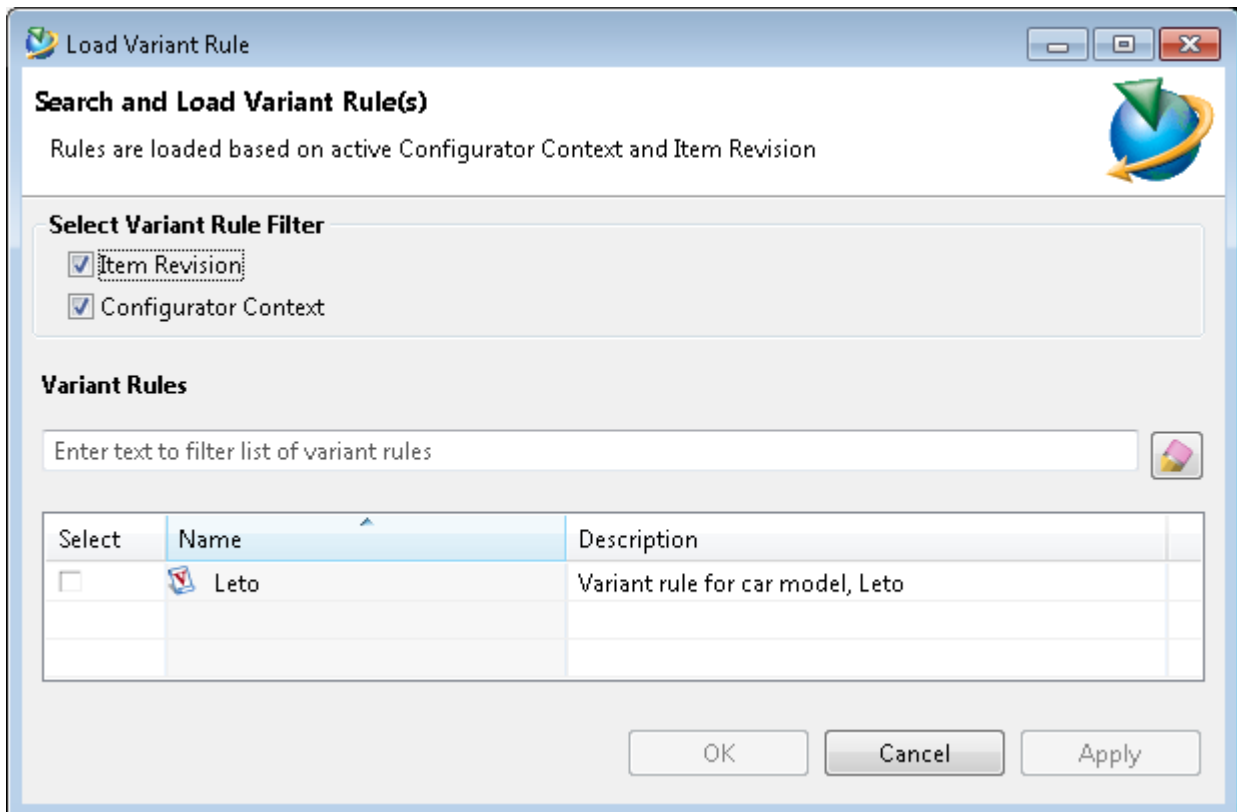
1. Click **Save the current contents**  on the toolbar.
2. In the **Save As** dialog box, enter the required information and click **OK** to create the saved variant rule.



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

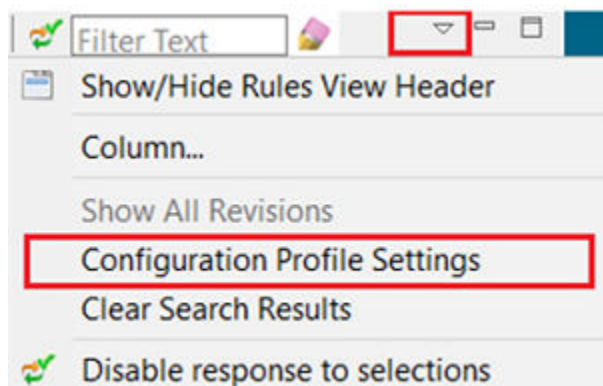
1. Open the structure that you wish to configure in Multi-BOM Management.
2. Click **Open saved variant rules dialog**  on the toolbar.
3. In the **Load Variant Rule** dialog box, select the variant rule filter.



- 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

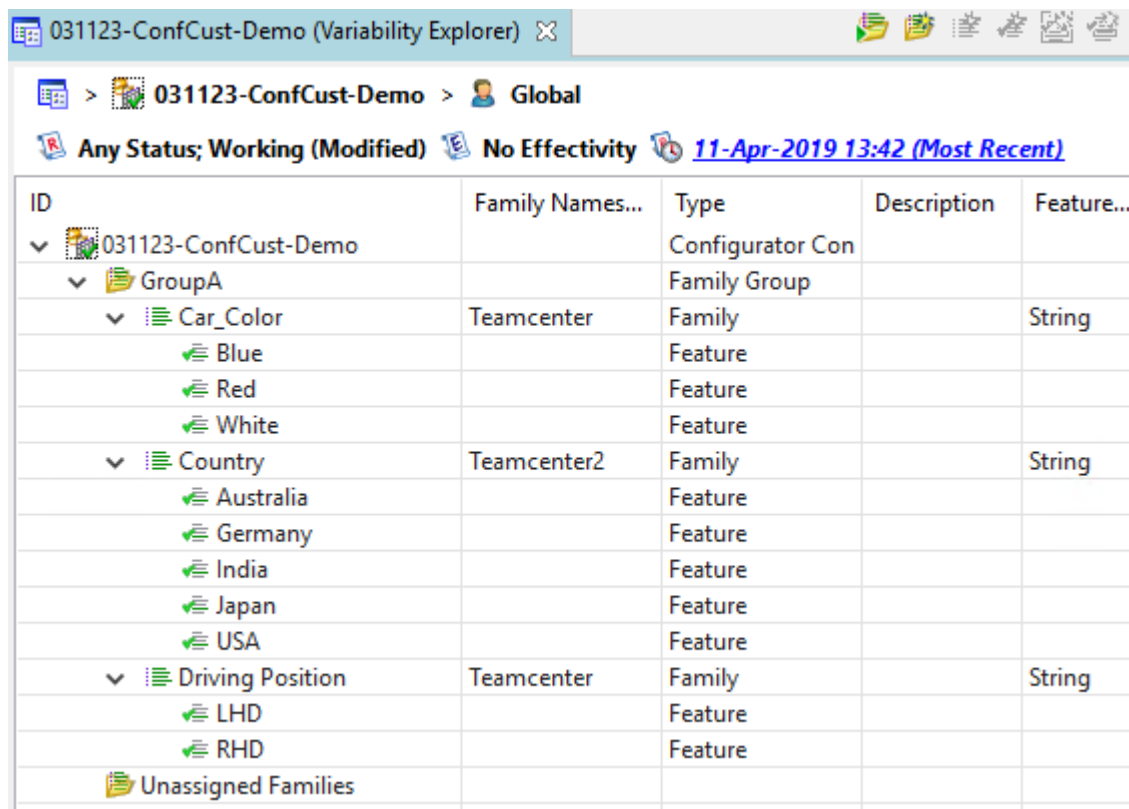
You can configure a structure from the variant expression of one or more BOM lines.

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:



The screenshot shows the '031123-ConfCust-Demo (Variability Explorer)' window. The breadcrumb path is '031123-ConfCust-Demo > Global'. Below the breadcrumb, there are filters: 'Any Status; Working (Modified)', 'No Effectivity', and a date/time stamp '11-Apr-2019 13:42 (Most Recent)'. The main table lists the configuration structure with columns: ID, Family Names..., Type, Description, and Feature....

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:

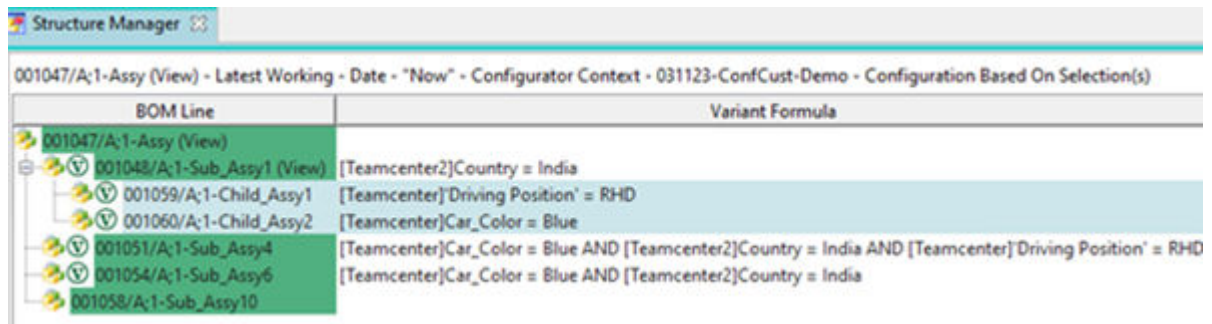
When this action is performed the preference value for **Cfg0DefaultRuleDateForContent** is considered.

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 Multi-Structure Manager, open a structure.
2. Click the **Open Saved Variant Rules Dialog** button on the main toolbar.

- 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**.

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:



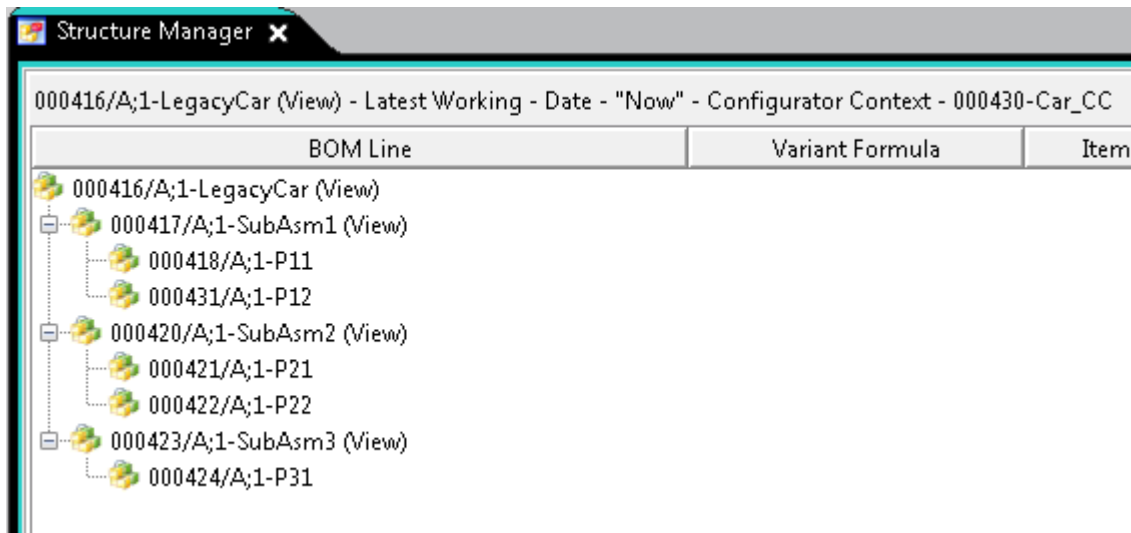
2. Create the **Engine_CC** configurator context with the group, family, and features as follows:

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			

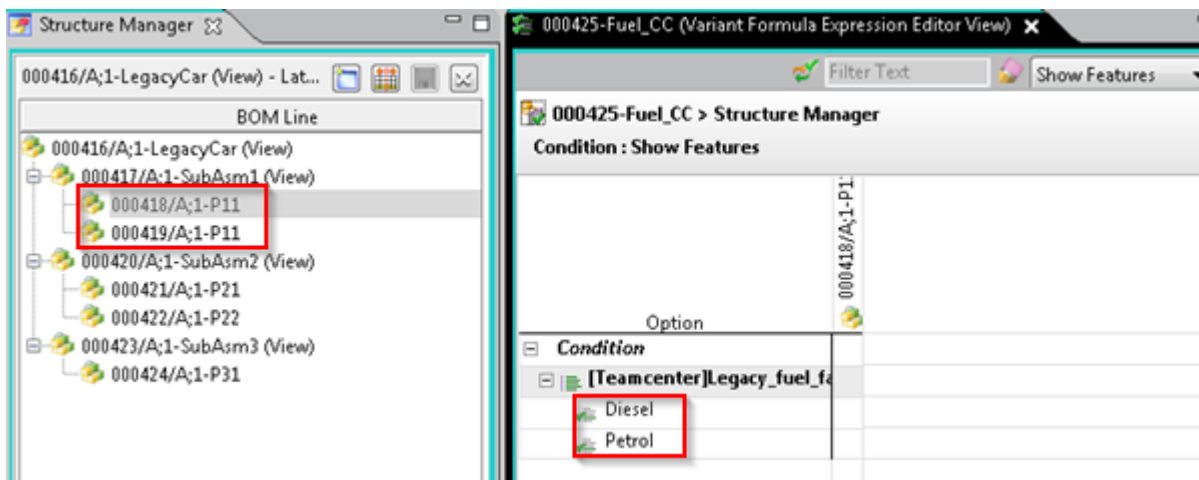
3. Create the **Car_CC** configurator context with the group, family, and features as follows:

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				

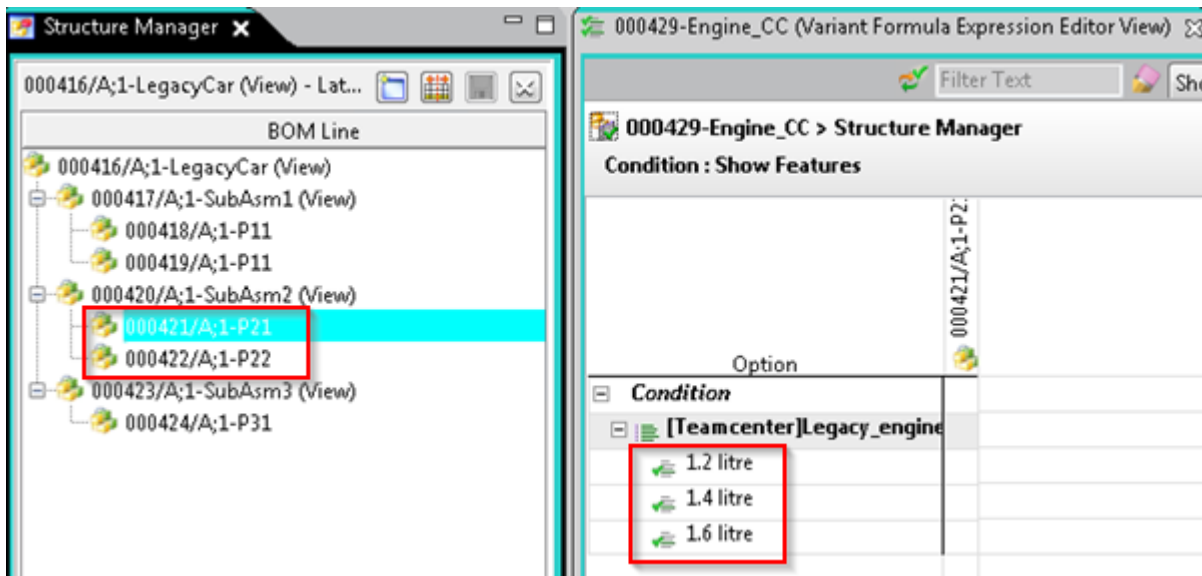
4. In Structure Manager, create the following structure.



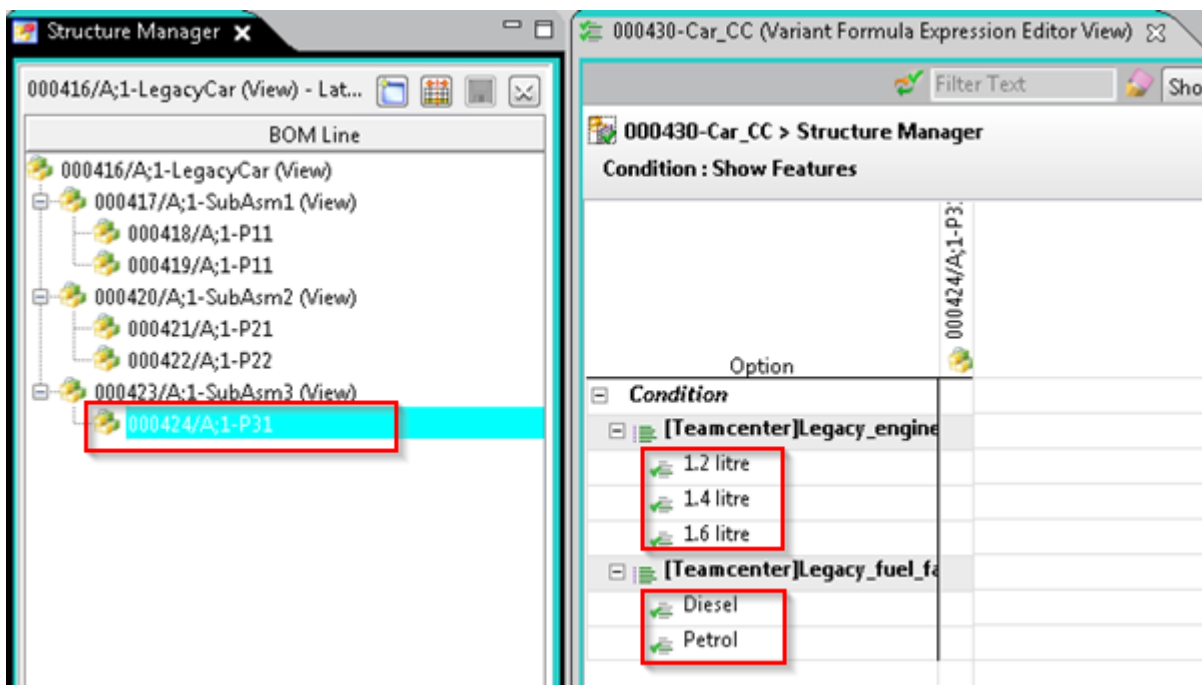
- Associate **Car_CC** to the root structure, **Fuel_CC** to **SubAsm1**, and **Engine_CC** to **SubAsm2**.
- Double-click the **Variant Formula** column for the **P11** and **P12** BOM lines. The **Variant Formula Expression Editor** view displays **Diesel** and **Petrol** features defined in the **Fuel_CC** 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.



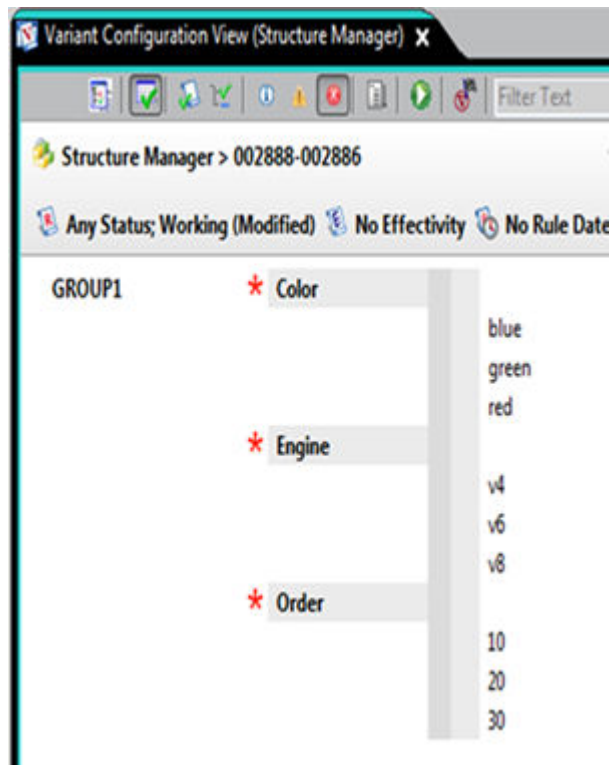
8. Double-click the **Variant Formula** column for the **P31** BOM line. The **Variant Formula Expression Editor** view displays **1.2 litre**, **1.4 litre**, and **1.6 litre** features defined in the **Engine_CC** configurator context and **Diesel** and **Petrol** features defined in the **Fuel_CC** configurator context.



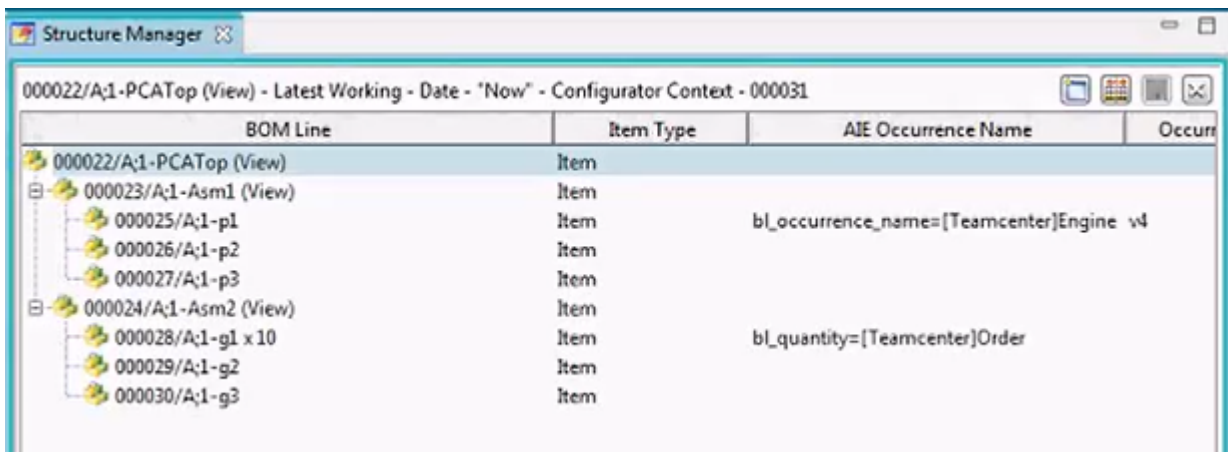
Set the configurator feature to BOM line properties and create a solution variant

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.

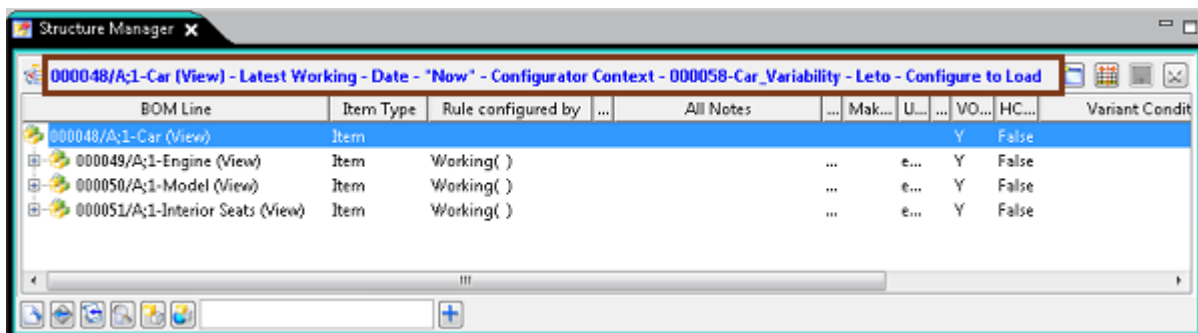
These values are not populated on generic variant assemblies.

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 Multi-BOM Management, choose **View→Enable Variant Configure To Load**.
2. Send the structure to Multi-BOM Management.
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

Multi-BOM Management 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.

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.

1. Search for the structure in My Teamcenter, and click **Open**. Select it, right-click and select **Send To→Multi-BOM Manager**.
2. To open the **Variant Configuration** view, in the **View Menu**  on the view toolbar, select **Configure Variants**.
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 next to the selected feature.

4. 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.

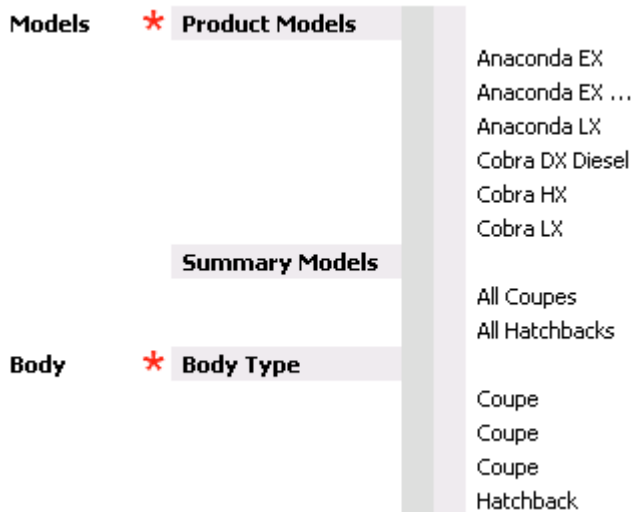
- Invalid product configuration .

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.

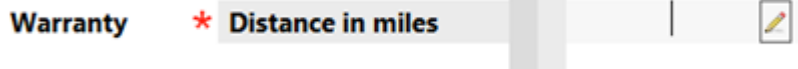
- Click the cell to select the variant condition you want to use to define the configuration:
 - Click one time to display a green check mark  to include the variant condition when defining the configuration.
 - Click two times to display a red circle backslash  to exclude the variant condition when 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**.

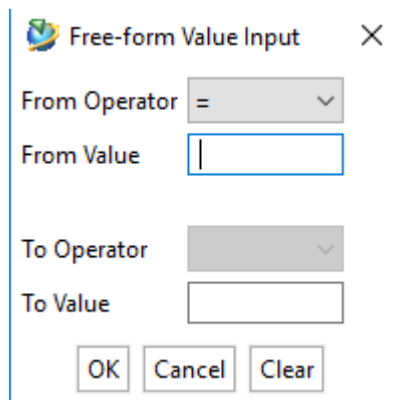
Multiple variant conditions are connected using a logical **AND** operation in the variant expression that defines the configuration.

6. 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.
7. If the feature is a free-form text, perform the following steps:

- 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.

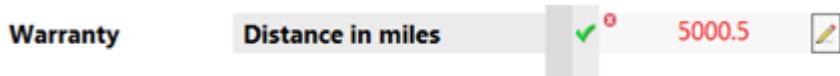


The dialog box titled 'Free-form Value Input' contains the following fields:

- From Operator:** A dropdown menu showing '='.
- From Value:** A text input field with a cursor.
- To Operator:** A dropdown menu.
- To Value:** A text input field.
- Buttons:** OK, Cancel, and Clear.

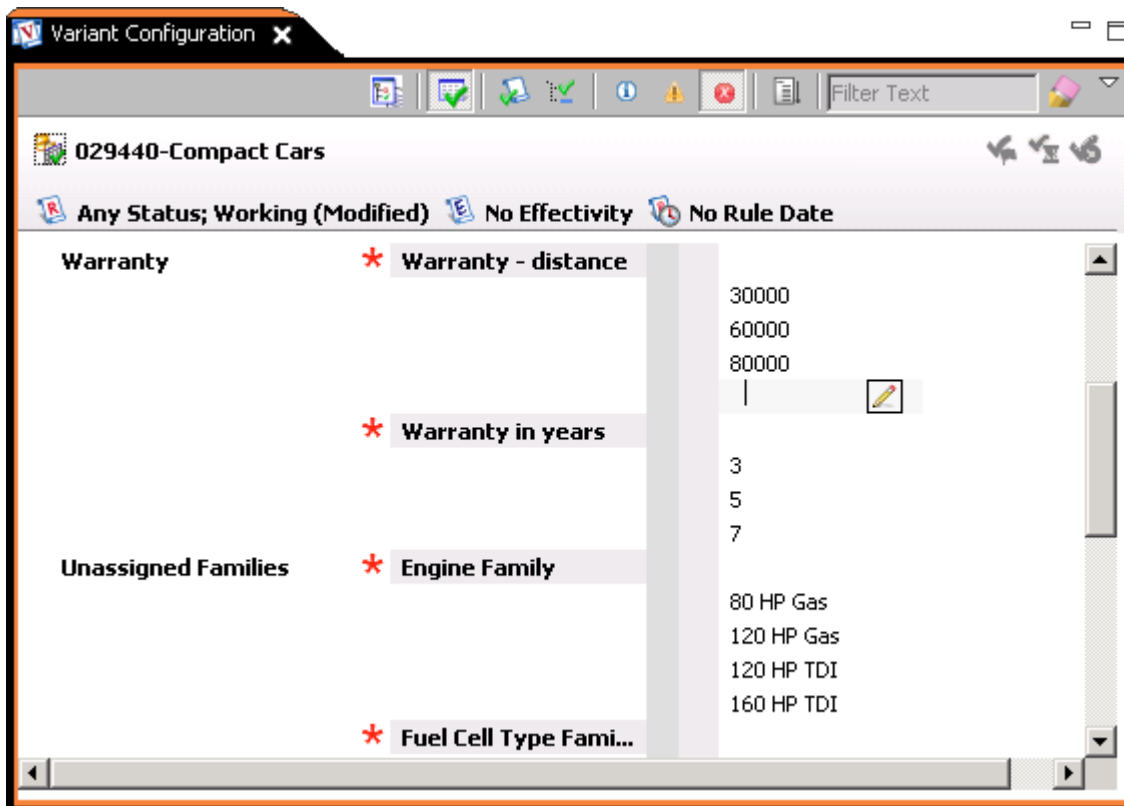
- d. Click **OK**.

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.



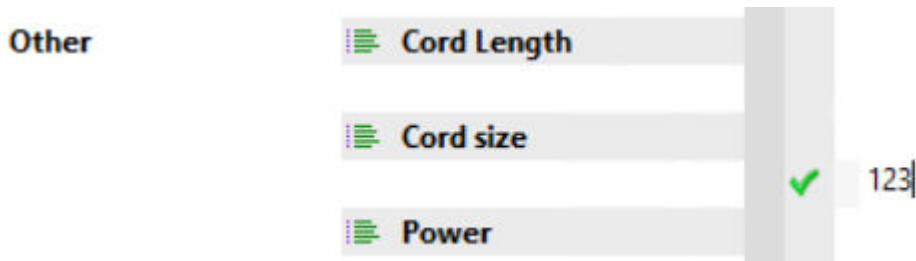
8. Use the above procedure to specify values for free-form non-string, numerical, or date type families.

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.

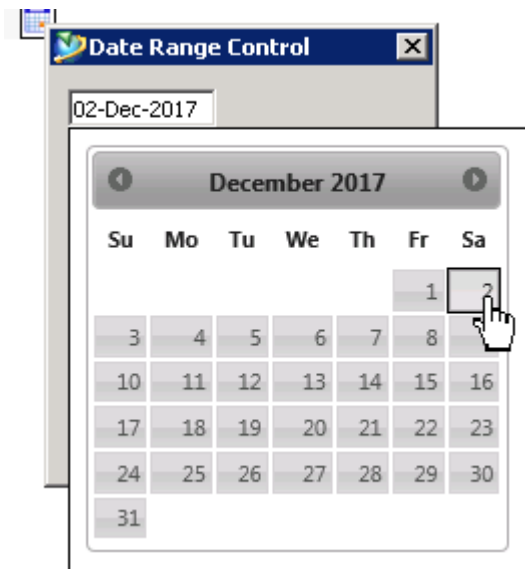
9. If a family is defined as free-form string, perform the following steps:
 - a. Click to the right of the corresponding cell under the free-form string family.
 - b. Enter values directly in the cell.



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.
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.

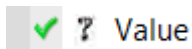
Configure with guided variant configuration (active validation)

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→Multi-BOM Manager**.
2. To open the **Variant Configuration** view, in the **View Menu**  on the view toolbar, select **Configure Variants**.
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 rollout, 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.

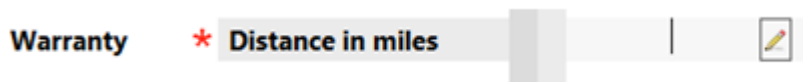
5. Click the cell to select the variant condition you want to use to define the configuration.
 - Click one time to display a green check mark  to include the variant condition when defining the configuration.
 - Click two times to display a blank cell to indicate the variant condition is not used when 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**.

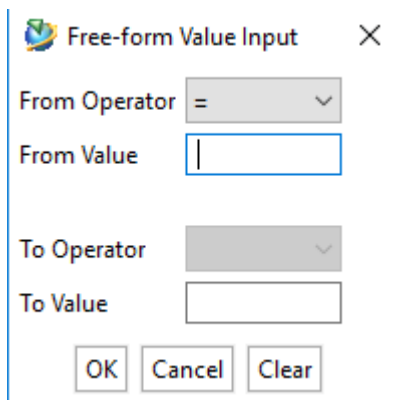
Multiple variant conditions are connected using a logical **AND** operation in the variant expression that defines the configuration.

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.

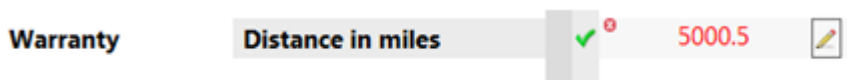


- b. Click  to type the values.
 - c. In the **Free-form Value Input** dialog box, type the values to set the variant condition.



- 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

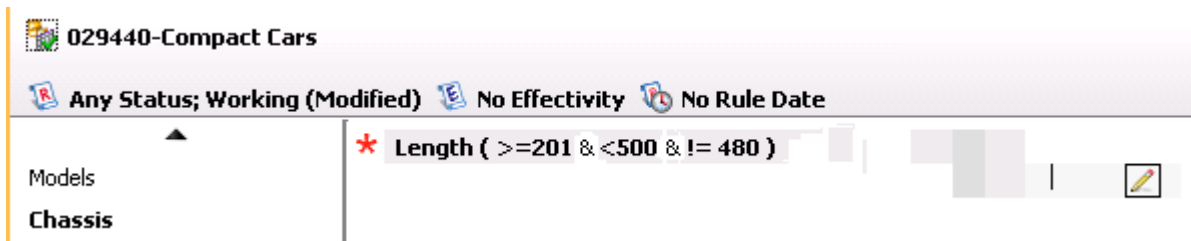
Cord size

Power

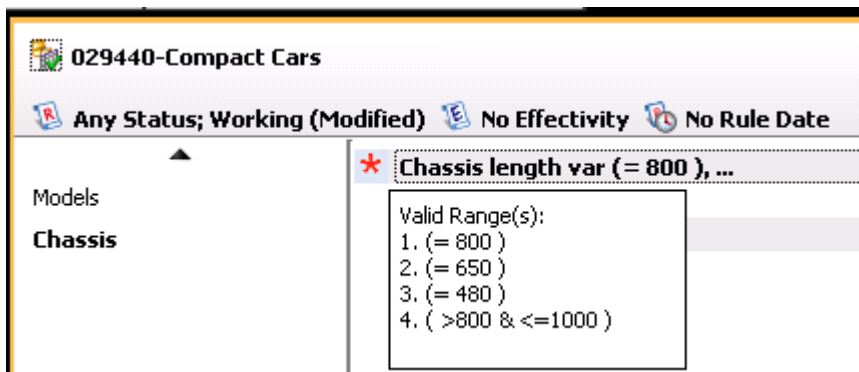


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8. During guided validation mode, for enumerated and free-form non-string families, the system displays allowable ranges by considering all of the configurator rules.



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.
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.

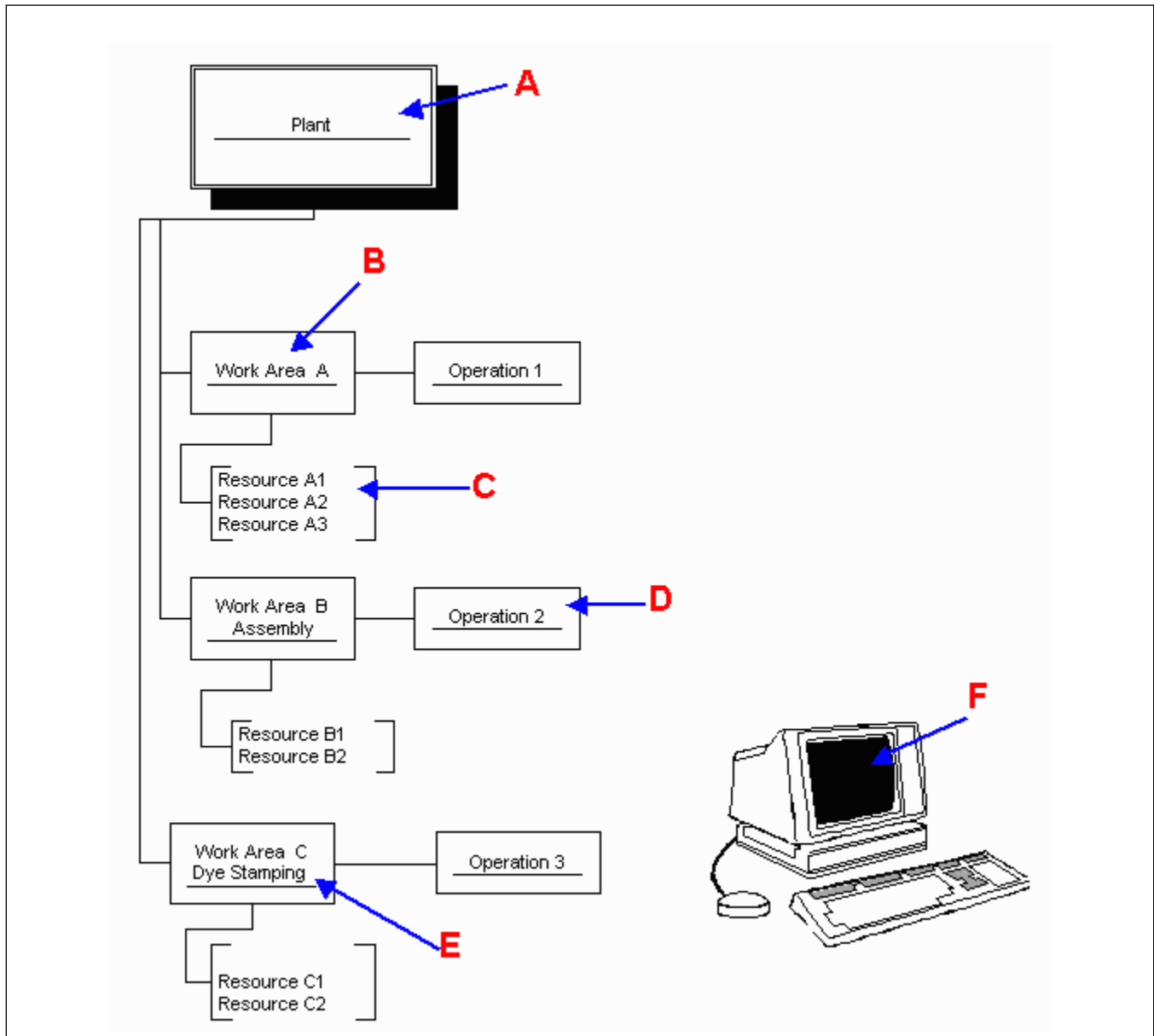
9. Managing bills of equipment

Creating plant structures

About plant structures

A *plant structure* is a hierarchy of work areas, as illustrated in the *Sample plant structure*. The work areas describe the locations existing in a plant in which manufacturing operations are performed. The hierarchy of the work areas can be very different from one plant to another.

Sample plant structure



Plant architecture example

- A** The plant structure can represent the entire plant.
- B** The plant structure can also represent work areas, sections, line cells, or stations within the plant.
- C** Each work area can include resources that are permanently positioned at the work area.
- D** Individual process operations used to manufacture a product are assigned to the work areas in which they are performed.

- E Each work area is typically configured with standard equipment but also can be specially configured with any equipment necessary to execute a specific operation.
- F If special resources are needed, create work instructions that explain how to configure the work area to meet an operation's special needs. If appropriate, create a workflow process to release the work instructions.

For example, if a process operation requires tools that are not already at the assigned work area (such as those that are part of work area C), work instructions are generated to identify which tools need to be available and installed when the process operation is executed.

Note:

You cannot create a plant in a plant structure. The plant structure represents the plant itself.

Plant layout tools such as FactoryCAD are generally used to populate the work area structure within your plant. Using a plant layout tool lets you create detailed designs of each work area.

Create a new work area structure

The physical layout of equipment in each work area and the relative locations of these areas throughout the plant are the scope of the work area structure definitions. Standard equipment is organized hierarchically into work areas depending on their location on the shop floor.

1. Open a plant structure in a structure view.
2. Choose **File→New→Work Area**, or click **Create Work Area** .
3. In the **New Work Area** dialog box, select one of the work area types from the list.

For more information on creating additional work area types, see *BMIDE for Data Model Design*.

4. Click **Next**.
5. Enter the ID number to be assigned to this new work area. If this new work area is a revision of an existing one, type the ID of the existing work area. You can assign a unique revision number in the **Revision** field.

To let the system automatically assign a unique ID, click **Assign**.

6. Type a name for the new work area. Make it unique so you can search the database using this term.
7. Select **Show as new root** to specify that the newly created work area is opened as a root object. It is not pasted to the selected work area. If you do not select this option, the new work area is pasted as a child of the selected work area.

If the **Show as new root** option is selected but unavailable, Teamcenter does not allow you to create a new object under the selected object, for example, if you try to create a work area under a process.

8. Type a work area description.

At this point, you have all the information required to create a new process.

9. (Optional) Select a unit of measure from the **Unit of Measure** list.
10. (Optional) Click **Next** to add optional information, such as filling out the work area item's forms, or checking the work area item out of the database.
11. (Optional) Click **Define Options** to specify the following:
 - Select **Use item identifier as default display** or **Use revision identifier as default display** if you created an alternate identifier for the item and want to use it as the default display object.
 - Select **Check Out Workarea Revision on Create** to check the newly created work area out of the database immediately upon creation.
12. Click **Finish** to create the new work area.
13. Click **Close** to close the **New Work Area** dialog box.

Open an existing work area structure

Do one of the following:

- Open a work area revision in Multi-BOM Management using the **Open Work Area** dialog box.
- Find the work area revision item in My Teamcenter. Using the mouse, drag it to the **Multi-BOM Management** button in the navigation pane; or use the shortcut menu and choose **Send To** to send it to the Multi-BOM Management application.
- Open a process revision in Multi-BOM Management. The work area most recently assigned as a target by the process is opened by default.

The process revision most recently assigned as a target item by this opens by default if the **MSE_load_related_product_process_plant** preference is set to **true**.

Sequence the work area flow

The work area sequence represents the line of work areas a product passes through during the manufacturing process. As you develop your work area structure, you may need to modify the sequence of the individual work areas in your plant. Set both parallel and linear sequences as necessary using the

PERT view. While this sequence is independent of any process flow, it does impose constraints on the process flow through the plant.

Managing tool design packages

Creating a tool design package

In a manufacturing environment, tool design is often outsourced to other companies. These companies work with native NX to design custom tooling. You can create a tool design package in Multi-BOM Management that contains information from NX, Teamcenter, and Process Simulate required for tool design. The information is imported into NX at the tool design supplier. Tool design is performed in the context of a station in the plant. The tool design package can include:

- Consumed parts
- Work area data
- In-process assemblies coming from a previous stations
- Consumed welds
- Assigned datums
- Weld projections (coming from Process Simulate)
- Datum direction and type (defined in the context of the BOP)
- Resources
- Welds consumed by a particular resource

Occurrences can also be suppressed so that they do not appear in the package or during an export.

After completion, the tool designer sends the completed tool back to the manufacturer where it is imported into Teamcenter from NX.

In Teamcenter, a tool design package is a kind of study. When you create such a study, you must consider whether you want to use a shared study or a simulation study.

Suppressing objects in a tool design package

You can hide lines in a structure that are not relevant to the tool design package that you create. These suppressed lines are then not included in the exported tool design package.

Before you suppress a line in a tool design package, you must make the root line in the study the context for the change.

Export a tool design package

1. Select the tool design study and choose **File→Tools→Export→To PLM XML**.
2. In the **Export Directory** box, select the directory in which to place the PLM XML file. Click **Browse** to locate the directory.
3. In the **PLM XML Export** dialog box, select the **ToolDesignPackageExport** transfer mode from the list.

This transfer mode exports the contents of the tool design package, including the in-context forms that are processed to modify the BOM line transforms of the welds. The content includes the XML file along with part files in subdirectories.

4. (Optional) Click **Select Languages** to display the **Language Selection** dialog box for the languages configured at your site.
5. (Optional) Select **Open PLM XML File** to view the file when the export operation is complete.
6. (Optional) Select the **Perform Export In Background** check box to perform an asynchronous export.
7. Click **OK** to export the objects in the **Object List** list and close the dialog box.

When the export completes, a dialog box is displayed.

If the export was successful, click **Yes** in the dialog box to view the log file for the export.

If there were errors during the export, the dialog box lists the errors. Click **Yes** to view information on the errors that occurred.

Body in white integrated workflow

1. Design engineers design the product in NX. This is done in the Teamcenter Integration for NX environment, meaning they pull files from the Teamcenter database and save them back interactively. Only design engineers can modify the assembly that includes part and JT files.
2. Body in white (BIW) manufacturing engineers run Teamcenter rich client. They open the engineering BOM (EBOM) using a revision rule that lets them see the approved (released) content. They create a body BOM skeleton with precise revisions. They assign only the sheet metal parts from the design BOM. Any multiple lines for the same part in the EBOM (for example, for different variants) are distilled to a single line in the body BOM. The body BOM is modifiable only by the body-in-white engineers.

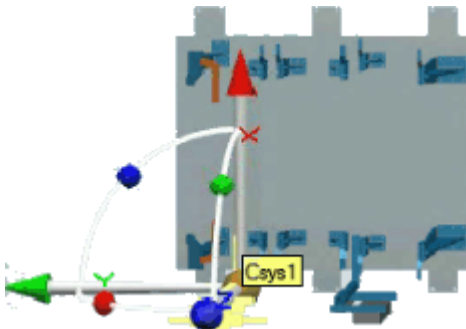
3. BIW engineers in NX add welds and datum points to the body BOM assembly. Because all the revisions are precise, the body BOM has exact revisions of everything from the EBOM.
4. BIW engineers import a plant structure with JTs to Teamcenter.
5. BIW engineers create a process structure. Generally each process represents a workstation in a factory. The process references the in-process assembly (the state of the product to date), the parts to be welded, and the plant structure's workstation. All of it can be seen in the assembly viewer. BIW engineers add child operations representing weld guns. Weld guns and the welds to be created by the gun are attached to the operation as resources and as consumed lines, respectively.
6. BIW engineers create a **Tool Design Package** study and copy the process containing the workstation, IPA, consumed objects, guns, and welds into it that they want to send to Process Simulate.
7. In Process Simulate, BIW engineers analyze the welds and modify the approach angles on them. The results are exported back to Teamcenter.
8. The user suppresses some of the lines under the process in the study that do not need to be sent to the tool supplier, including some of the product and work station contents. In the assembly viewer, the user sees the location of the parts, workstation, and weld guns in the process structure. Teamcenter does not display the weld angles graphically.
9. BIW engineers use PLM XML export to export the tool design study to a directory on a local disk. The engineers specify the **ToolDesignPackageExport** transfer mode specifically designed to export the desired content, including the in context forms that are specially processed to modify the BOM line transforms of the welds. This content includes the XML file along with part files in subdirectories.
10. BIW engineers zip the export directory that contains the XML and associated files and sends the compressed file to the supplier.
11. The supplier unzips the NX assembly and uses the **nx_import_tool_design_package** utility to load the data into an NX installation running in native mode. The supplier sees an assembly structure that resembles the original structure but is not the same. Manufacturing features are opened as parts and additional coordinate system objects are added to represent the projected position (the orientation) of the locations created in Process Simulate. The supplier designs the tool in the product assembly's coordinate system producing part files on a local disk.
12. The supplier moves the weld gun to each weld and aligns it to the weld angle to visually ensure that the gun does not collide with the tool in each weld position.
13. The supplier zips up the part files and sends them back to the BIW engineer.
14. BIW engineers, running Teamcenter Integration for NX, import the tool assembly sent by the supplier to the Teamcenter database.

15. In the Teamcenter rich client, BIW engineers load the process structure and attaches the tool assembly to the process. By using the same transform as the IPA, it is located correctly in the assembly viewer relative to the rest of the objects in the study.
16. The process is sent to Process Simulate for validation of the tool design against the robot tool paths.

Confirm product parts are in proper tool position

When you perform a design review, you can visually identify consumed product parts in their absolute coordinate system (CSYS) tool position. This lets you confirm that they are properly located when a supplier returns them. The **Use Reference Frame Position** command moves parts to their assigned CSYS.

1. Open a plant bill of process (BOP) and the **Graphics** view.
2. In the plant BOP, select a process station and choose **File→New→Station Reference Frame**.
3. In the **New Reference Frame** dialog box, in the **Item Information** group, type a name for the frame and click **Assign** to create an ID and revision name.
4. In the station work area, select a tool design, and next to the **Use position of** text box, click .
5. Click **Finish** to view the absolute **CSYS** location of the tool design in the **Graphics** view.



Note:

You cannot copy and paste station reference frames to other process stations. They must be manually created for each station.

6. With the plant BOP process station selected, in the plant BOP toolbar, click **Use Reference Frame Position** .

A message reports that consumed objects will be temporarily moved relative to the reference frame.

7. (Optional) To avoid this message in the future, select the **Don't show this message again** ☒ check box.
8. Click **OK**.

The frame and CSYS are turned on and consumed parts move to the absolute frame position. If you created any dynamic process assemblies (DIPAs), or create DIPAs in the future, they also move to the absolute frame position.

10. Managing and tracking changes

Understanding change

Multi-BOM Management provides several tools for managing and verifying changes to your product structures.

- The **Change Tracker** view displays all changes that took place in a range defined by either unit or date effectivity. These changes can be based on incremental change, on revision effectivity, or on both. Once the change tracker lists the changes, you can mark them to indicate that they have received attention or propagate the changes to a target structure. The view can also be used to find out where and how the item revisions in a change notice affect a particular structure.
- Incremental change management is the process of controlling changes and providing an audit history of a product's definition and configuration.

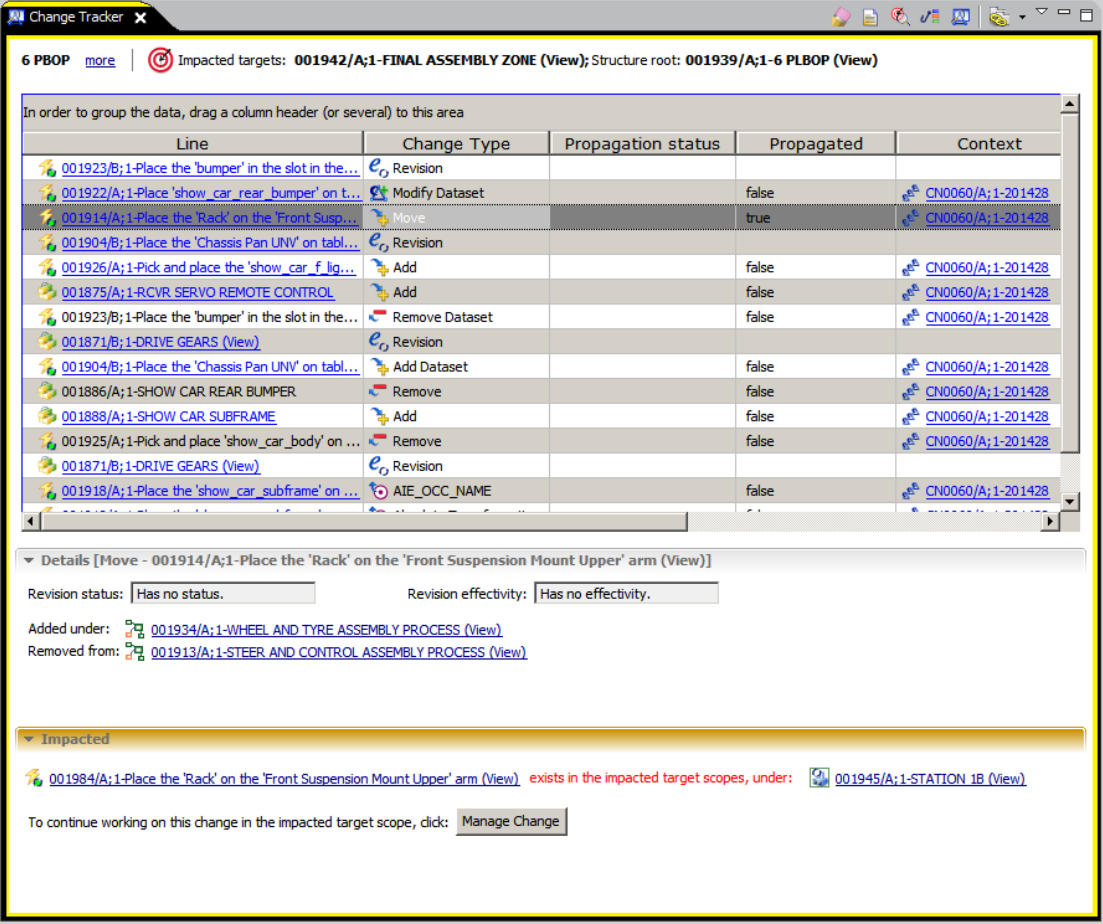
Caution:

Incremental change is an advanced change management tool. If you are planning to use Incremental change, please consult with a Siemens Digital Industries Software representative before deployment.

Using the change tracker

Tracking and propagating changes to a structure

As the manufacturing planning cycle progresses, one of the challenges the manufacturing engineer experiences is keeping up-to-date with changes in the product. Parts may be revised, added, removed, and BOM line properties may be changed. You can easily discern which changes are made to a product structure using the **Change Tracker** view.



This view displays all the changes that took place in a range defined by either unit or date effectivity. These changes can be based on incremental change or on revision effectivity (or both). Once the **Change Tracker** view lists the changes, you can work through the changes, marking them to indicate that they have received attention or propagating the changes to a target structure.

Note:

- The change tracker does not search for changes that have an end date or expiration unit within the specified range.
- If both unit and date effectivity are specified in the revision rule, only unit search is supported. You cannot search for a combination of these.
- You can also use the change tracker to review change notice details. For more information, see *Review a change notice*.

For each change resulting from an added part or changed properties, the change tracker can provide you with suggestions on where to propagate the changes in a target structure. The change tracker finds the candidate source lines based on three mechanisms.

- Consumed siblings

Teamcenter checks if any of the siblings of the added line exist in the target structure. If they do, it offers the sibling's parent as a possible target to receive the change.

- Existing logical assignment designator

Teamcenter checks if a line in the target structure has the same logical designator.

- Line already exists in target structure

Teamcenter checks if the added or modified line already exists in the target structure.

You can use the change tracker to find changes between any two structures. You can propagate changes between a product BOP and a plant BOP.

The following prerequisites are necessary to run the change tracker.

- The structure's revision rule has to have either unit or date effectivity specified.
- **Show Unconfigured Changes** 🚧 must be turned off.
- To propagate to an impacted structure, incremental change must be turned on in the impacted structure.

Run the change tracker to track structure changes

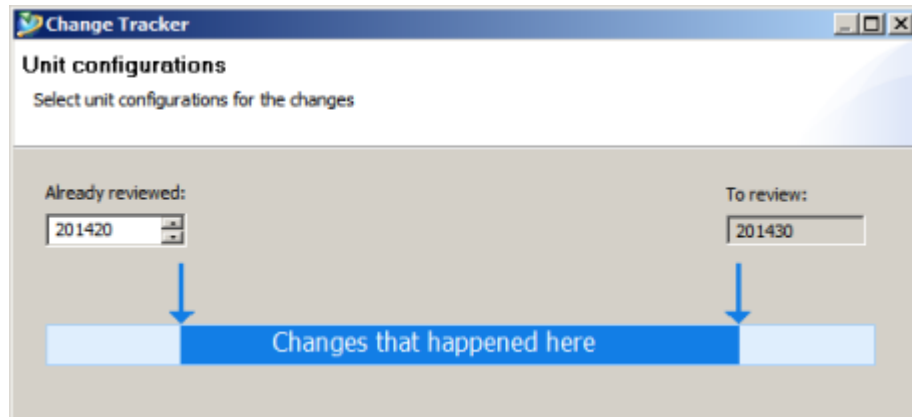
You can track changes to structures using the change tracker.

Note:

You can also review change notice details using the change tracker.

1. Select the line for which you want to track structure changes and choose **Tools→Change Tracker**.
2. If it is not already selected, in the **Change Tracker** dialog box, select **Search by effectivity**.
3. To search for incremental status changes to the structure, and use effectivity to configure the associated changes, select the **Incremental change** ☒ and/or **Revision effectivity** ☒ check boxes and click **Next**.

If you selected the revision effectivity check box, Teamcenter displays the **Change Tracker** dialog box with the current unit configuration set in the **To Review** box.



4. If you selected the revision effectivity check box, specify the unit or the date from which you want to begin comparing and click **Next**.

Whether the change tracker sets the range according to date or unit is dependent on the type of effectivity you set on the structure. If you selected the incremental change check box, a list of status search filters is displayed.

5. If you selected the incremental change check box, select one or more statuses to filter your search to include only structural changes with those statuses, and click **Next**.
6. Select the types of change mechanism that you want to use to check for changes and click **Next**.
7. (Optional) Select the owning users whose changes you want to reflect in the comparison. This filters the results down to the changes of the selected owner.

You can filter for revision effectivity and incremental change independently.

8. (Optional) Further filter the comparison results based on status by clicking  and selecting the status.

You can filter for revision effectivity and incremental change independently.

9. Click **Finish**.

Teamcenter displays the **Change Tracker** view with all the changes listed.

Change Tracker X

6 PBOP [more](#) | Impacted targets: 001939/A;1-6 PLBOP (View); Structure root: 001939/A;1-6 PLBOP

Change Type	Line	Change Type	Propagation status
Add			
	001875/A;1-RCVR SERVO REMOTE CONTROL	Add	
	001908/A;1-Pick and place 'Power pack case' ...	Add	
	001888/A;1-SHOW CAR SUBFRAME	Add	
	001926/A;1-Pick and place the 'show_car_f li...	Add	
GCS CP			
	001911/A;1-Place 'Reducer Gears' in the case...	GCS CP	
Move			
	001910/A;1-Place 'Drive Gears' in the case (Vi...	Move	
Remove			
	001909/A;1-Place 'Motor' in the case (View)	Remove	
	001925/A;1-Pick and place 'show_car_body' ...	Remove	
	001886/A;1-SHOW CAR REAR BUMPER	Remove	
Revision			
	001871/B;1-DRIVE GEARS (View)	Revision	
	001871/B;1-DRIVE GEARS (View) x 2	Revision	

Tip:

Parent, the last column in the **Change Tracker** view, displays the parent of each line. Change the order of columns to review this information.

Line	Change Type	Parent
001931/A;1-newOp	Add	001916/A;1-p1 (View)
001937/B;1-p6 (View)	Revision	partition1
001937/B;1-p6 (View)	Find No.	partition1

If a change is applicable to the configured structure and took place within the range specified, it is listed in the **Change Tracker** view. You can click each line in the top part of the view to display additional information about the change in the **Details** section below it. The **Details** section lists:

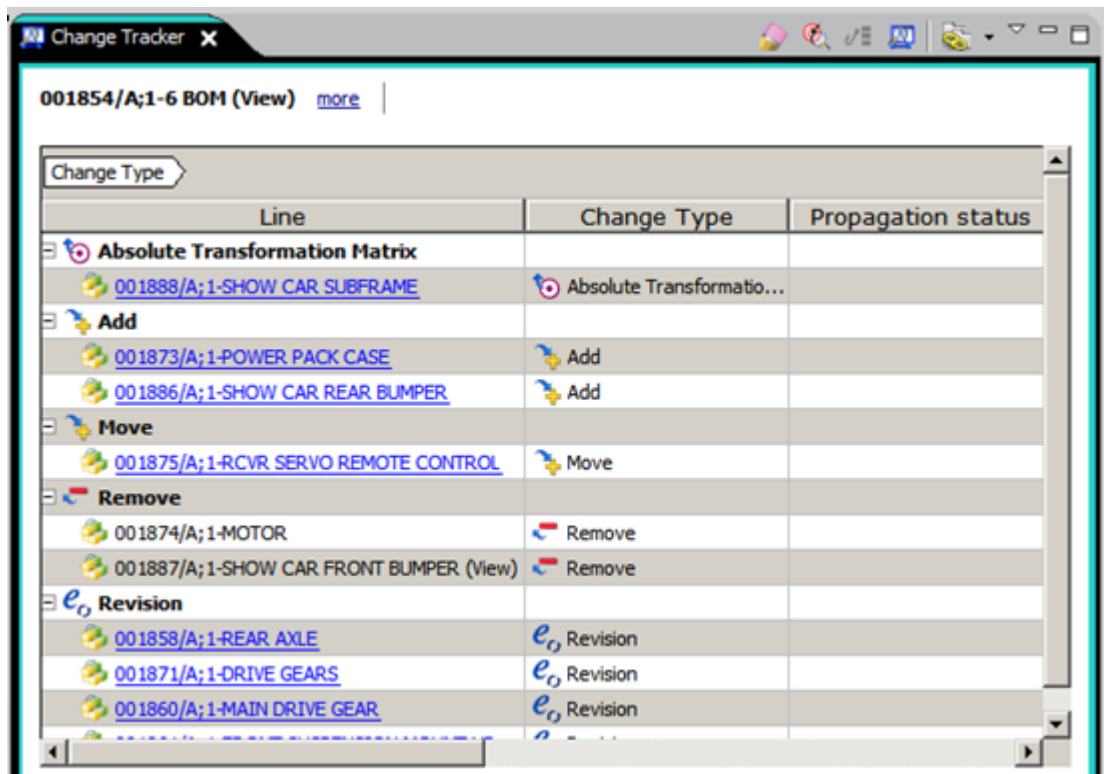
- For an addition, the line under which the change was added.
- For a deletion, the line from which the line was removed.
- For a moved line, the line from which the moved line was removed and the line under which the moved line is pasted.
- The revision status of each selected change.

- The revision effectivity of each change.
- For lines with changed attributes, the value in place at the lower limit of the effectivity range of the search and the new value.
- For lines with changed datasets, the dataset at the lower limit of the effectivity range of the search and the new dataset.

10. (Optional) Group results by one or more columns.

- Drag one or more column headers to the area above the table.

Teamcenter reorganizes the table to display the data grouped in the order of the column headers in the list.

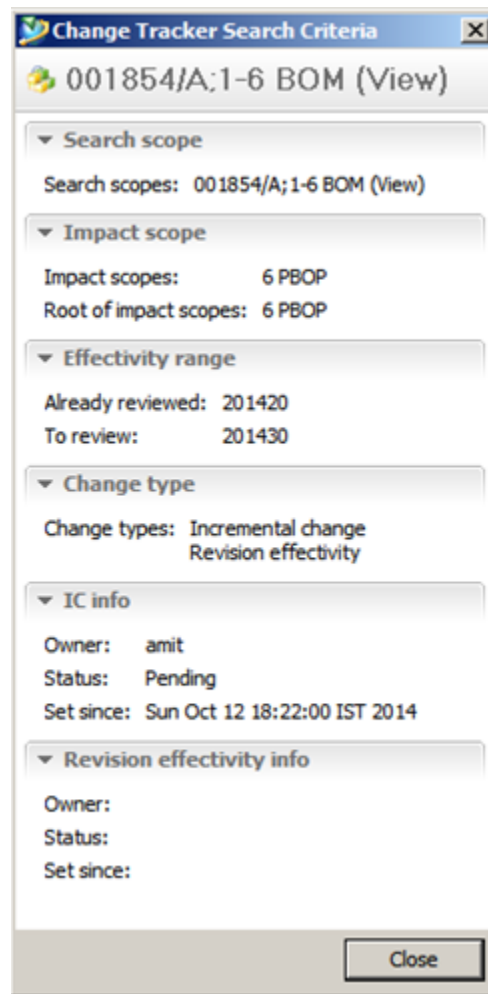


- Ungroup the table by right-clicking the column headers in the list at the top of the table and choosing **Ungroup by**.

View change tracker settings

- At the top of the **Change Tracker** view, beside the name of the tracked structure, click **more**.

Teamcenter displays the **Change Tracker Search Criteria** dialog box. This dialog box displays all the settings and configuration information in place when you ran the search.



Incorporate changes into a target structure

To find out whether the selected change has been incorporated into a consuming structure (a target scope), use the **Impacted** section of the **Change Tracker** view. For each change in the view, the **Impacted** section lists:

- Lines in the target scope impacted by the change.
- Potential lines in the target scope to which a change might be applied.

Note:

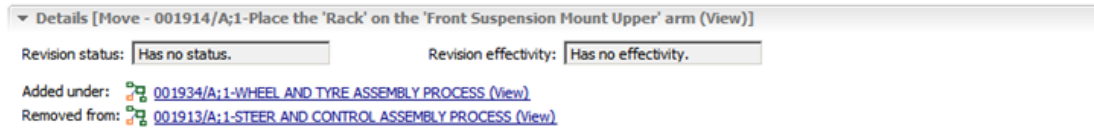
Incremental change must be active in the target structure before you can propagate changes.

1. Select the scope in the impacted structure and click .

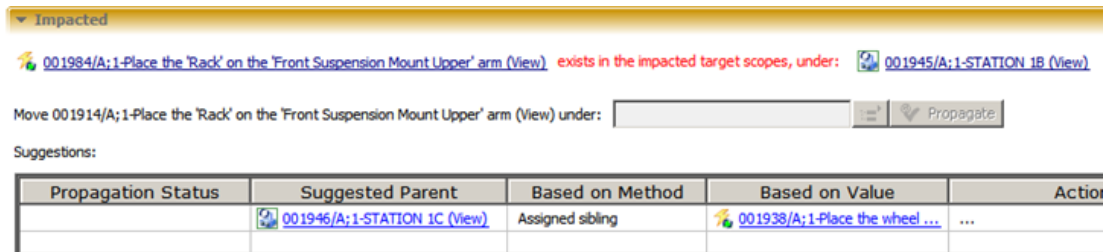
The impacted structure is the target structure to which you want to propagate the changes found by the change tracker.

2. Select a change in the top part of the **Change Tracker** view.

Teamcenter displays details about the change in the **Details** section of the view. For example, if you select a move change, the **Details** pane displays the parent line before the move and after it.



The **Impacted** section displays whether the changed line exists in the target structure.



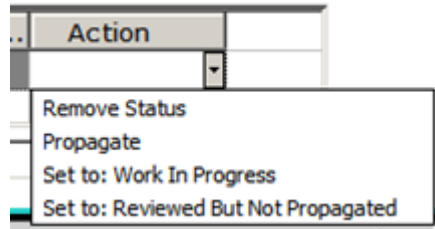
The **Impacted** pane varies according to whether a change is due to an added line, a removed line, or a change in properties.

3. Do one of the following:
 - Add the line to the target structure.
 - Remove the line from the target structure.
 - Propagate property changes to the target structure.

You cannot propagate revision effectivity changes.

Remove a line from an impacted structure

1. Select the deleted line in the top part of the **Change Tracker** view.
2. Do one of the following in the **Action** column:
 - Select **Propagate** to remove the line from the impacted structure.



The **Propagation Status** columns are updated with the 🚧 symbol.

- Select **Work in Progress**.

The **Propagation Status** columns are updated with the T symbol.

- Select **Reviewed But Not Propagated**.

The **Propagation Status** columns are updated with the ✓ symbol.

The **Propagation Status** column can contain more than one action symbol. For example, if you add the same line multiple times in the target structure, you can mark one change as **Reviewed But Not Propagated** and the other as **Work in Progress**.

Propagate property changes to an impacted structure

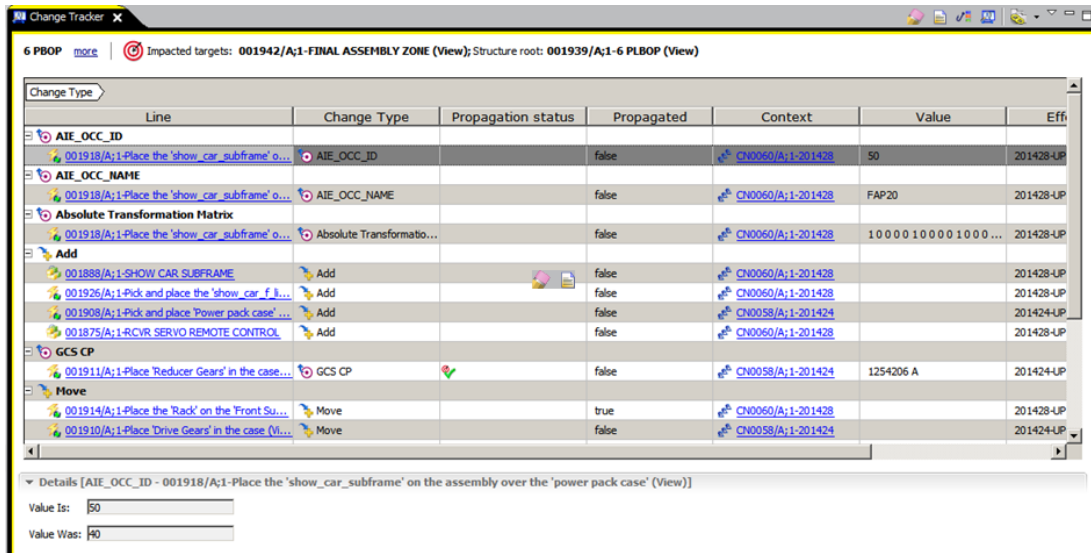
When running the change tracker, you can select a change resulting from property changes in a line and propagate these changes to a target structure using the **Impacted** section of the **Change Tracker** view.

Note:

Incremental change must be active in the target structure before you can propagate changes.

1. Select a property change in the top part of the **Change Tracker** view.

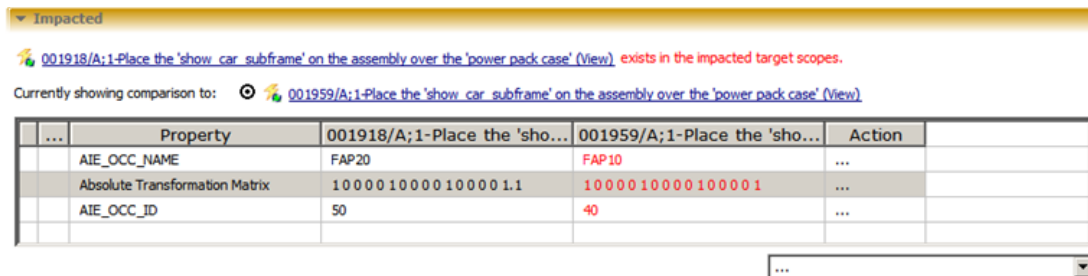
Teamcenter displays details about the changed properties in the **Details** section of the view.



- Click **Compare to target** in the **Impacted** section.

The **Impacted** section displays the target line that does not yet contain the changes. If the source line exists multiple times in the target structure, each target structure is listed here.

Teamcenter displays the affected properties and their values in columns. Any differences in property values are shown in red. In the following example, the source line exists twice in the target structure. Using the buttons, you can switch the comparison of the source line to each of the target lines.



- In the **Action** column, select the desired action. Alternatively, if you want to apply the same action to all the lines with the changed properties, click the ... list below the table and select the appropriate action.

Tip:

If there are multiple impacted lines in the target structure with the same item ID, your administrator can set the preference **MECTImpactedLinesSearchProperties** to narrow the list. By default, the property **bl_item_id** exists in the preference but other properties (for example, the value **bl_plmxml_abs_xform**) can be added to further narrow the list.

Compare changes in attachments

You cannot propagate changes to attachments, nor can you set a propagation status.

1. Select a change that represents a changed attachment. These are listed as **Modify Dataset**.

Change Tracker

more | Impacted targets: 002662/A;1-Area 51 (View); Structure root: 000798/A;1-Plant BOF

Line	Change Type	Propagation status	Value
005598/A;1-PBOP ...	MEUILocation	✓	185, 113, 103, ...
005742/A;1-e	MEUILocation		0, 0, 84, 43
005738/A;1-b	MEUILocation	✓	119, 241, 84, 43
005744/A;1-g	MEUILocation		0, 88, 84, 43
Modify Dataset			
005586/A;1-PBOP ...	Modify Dataset		Accountab
005584/A;1-PBOP ...	Modify Dataset		Accountab
Move			
005697/A;1-Move ...	Move	✓	
000907/A;1-B	Move	✓	
005500/A;1-PBOP ...	Move	✗	

Details [Modify Dataset - 005586/A;1-PBOP P3 (View)]

Is: [Accountability Check Report](#) 15-Oct-2014 15:43

Was: [Accountability Check Report](#) 15-Oct-2014 15:41

Impacted

[005586/A;1-PBOP P3 \(View\)](#) exists in the impacted target scopes.

Targets found: ☐ [005606/A;1-PBOP P3 \(View\)](#)

Show Attachments

Teamcenter displays the name of the attachments before the change and after the change in the **Details** pane.

2. (Optional) Click **Show Attachments** to view the **Attachments** view for the impacted structure.

3. Click each attachment to view its state before and after the change.
 - To paste added attachments to the impacted line:
 - a. Right-click the changed line and choose **Open With→Attachments**.
 - b. Copy the attachment.
 - c. Paste the attachment to the impacted line in its **Attachments** view.
 - To remove attachments from the impacted line, click **Show Attachments** and remove the attachment from the impacted line.
 - To compare the two attachments, open both.

Note:

You can open only attachments for which the supporting software is installed on your system and for which Teamcenter is configured to open the file type. For example, if you do not have Microsoft Office installed, you cannot open a .pptx attachment.

Create a revision details report

You can select multiple groups of revision changes in the change tracker and then generate an Excel report. The report compares each revision change from the earliest to the latest groups.

1. Run the change tracker.
2. In the **Change Tracker** view, select one or more lines in the results list.
3. Click **Create Revision Details Report** .
4. In the **Create Revision Details Report** dialog box, specify a file name or location or accept the defaults, select the **Open Report File** ☒ check box, and click **OK**.
5. Review the Excel report.

Effectivity Range - Already							
Effectivity Range - To Review							
Change Types		Revision effectivity					
Revision Effectivity Info							
Owner							
Status							
Set Since							
		Modified Property				Additional	
Revised Lin	Find No	Change Type	Is	Was	Changed Lin	Find No	CustomProp1
000800:A line1	10	Revision	b	a			line1CustomProp1Value
000800:A line1	10	Revision status	TCM_Released	TCM_Released			line1CustomProp1Value
000800:A line1	10	Revision effectivity	5(000029)	5(000			line1CustomProp1Value
000800:A line1	10	Revision Description	new desc	old desc			line1CustomProp1Value
000800:A line1	10	Add	000801;a child1				
000800:A line1	10	Remove		000802;a child2			
000800:A line1	10	Variant Condition	color=red	color=blue	000806;a child7	30	child7CustomProp1Value
000800:A line1	10	Variant Condition	color=blue	color=red	000806;a child7	30	child7CustomProp1Value
000800:A line1	10	Revision	b	a			line1CustomProp1Value
000800:A line1	10	Revision status	TCM_Released	TCM_Released			line1CustomProp1Value
000800:A line1	10	Revision effectivity	5(000029)	5(000			line1CustomProp1Value
000800:A line1	10	Revision Description	new desc	old desc			line1CustomProp1Value
000800:A line1	10	Add	000801;a child1				
000800:A line1	10	Remove		000802;a child2			

Note:

You can customize the report layout and elements using **MECTRev** preferences.

Revision details report preferences

Revision details report output is controlled by the preferences below.

Change Tracker Revision Details Report									
Date	2015-03-02								
Time	4:58:54 PM								
User	guthrie								
Structure Name	000370/A;1-Plant BOP (View)								
Revision Rule									
- Effective Date	Date(Today)								
- End Item									
- Effective Unit									
Variant Rule	music = bose AND music = sirius;								
Search Criteria									
- Search Scopes	000625/C;2-p4 (View);								
- Effectivity Range - Already	Date(21-Jan-2015 00:00)								
- Effectivity Range - To Revis	Date(Today)								
- Change Types	Revision								
- Owner									
- Statuses									
- Set Since	Date(31-Dec-1969 19:00)								
Revised Line				Modified Property		Changed Line	Additional Properties		
BOM Line	No.	All Notes	Type	Is	Was	BOM Line	No.	All Notes	Find No.
000625/C;2-p4 (View)	50	Usage_PartNum ber: part number 1	Revision	C	A			000625/C;2-p4 (View)	50
000625/C;2-p4 (View)	50	Usage_PartNum ber: part number 1	Release Status	MES Work in Progress	MES Released			000625/C;2-p4 (View)	50
000625/C;2-p4 (View)	50	Usage_PartNum ber: part number 1	Revision (Effectivity	01-Mar-2015 00:00 to UP (NONE)	01-Jan-2015 00:00 to UP (NONE)			000625/C;2-p4 (View)	50
000625/C;2-p4 (View)	50	Usage_PartNum ber: part number 1	Find No.	12	10	000627/A;1-op2 (View)	12	Ignore Partial Match: true	000627/A;1-op2 (View)
000625/C;2-p4 (View)	50	Usage_PartNum ber: part number 1	Variant Conditions	music = radio/cd		000627/A;1-op2 (View)	12	Ignore Partial Match: true	000627/A;1-op2 (View)

Preference Name

Values in this example



MECTRevEffectivityAdditional Properties

bl_indented_title

bl_sequence_no



MECTRevEffectivityChildLineCompareProperties

bl_sequence_no

bl_variant_condition



MECTRevEffectivityLineIdentificationProperties

bl_sequence_no

bl_all_notes

Managing incremental changes

Managing incremental changes

Incremental change management is the process of controlling changes and providing an audit history of a definition and 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.

The following actions constitute a reason for creating a change in manufacturing:

- Adding and removing existing processes and operations from parent processes.

- Replacing a process or operation with another process or operation.
- Adding, removing, or replacing relationships between a top-level process and a target product, process, and plant with other product and plant objects.
- Adding, removing, or replacing items from the setup structure at the operation level. This includes consumed items, work areas, and resources.
- Adding, removing, or replacing objects that are attached to a process or an operation such as datasets, forms, and other items.
- Adding, removing, or replacing objects in an activity folder with other objects such as other activities, tools, and programs.

A single change can add or remove multiple objects from an item or item revision. A single object can be added to an item or item revision with different effectivities by several changes and removed with different effectivities by several other change objects.

You can also create a baseline item revision by configuring all the incremental changes.

Note:

- Precedence relations between operations in a manufacturing process are not supported within Multi-BOM Management.
- You can create incremental change (IC) information about occurrence groups and their content (children). However, configuring the view to show or hide configured changes does not work for this information. Only incremental change information that is common with the base view (in the item structure) is filtered.

Show or hide incremental change management

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.

You can specify whether incremental change is applied per structure or per application using the **MEIncrementalChangeMode** preference. If set to **structure**, incremental change is relevant only for the selected structure and for the secondary views connected to the selected structure. In this mode, each structure can use its own incremental change.

Turn off incremental change tracking

- Click the  button in the toolbar.

Teamcenter removes the header information from the view and stops tracking edits.

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.

Setting up incremental change

Before using incremental change, you must complete several setup procedures, including creating the necessary change types, providing users with access, defining releases statuses, and writing revisions rules.

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 **Show Unconfigured Changes** from the view menu to toggle between showing all lines or only those set by the current revision rule.

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 active incremental change in the structure view header.

You can also view the active incremental change in the **Configuration Information** dialog box by clicking .

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 activities, components, attachments, created/deleted data, and predecessors that are tracked against this incremental change.

Note:

A replacement is shown as an override.

- **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

To view all the incremental changes associated with a structure, select a line in the structure and choose **Open with → Incremental Change**. For each line, this view 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.

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 structure view header.
2. Select the structure line corresponding to the *item revision* under which you want to create the attachment.
3. Choose **Open with→Attachments**.
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** view.

Track changes to an attachment

To track changes (edits) made to an attachment, select the attachment (dataset or form) and choose **Tools→Incremental Change→Edit Attachment**.

Teamcenter also tracks edits if you double-click the dataset or form. With a dataset, the change is tracked when you open the form to edit; with a form, the change is tracked only when you click **OK** or **Apply**. Teamcenter tracks the changes by creating a copy of the dataset or form.

The **Attachments** pane displays the appropriate version of the attachment according to the configured incremental change against which the edits were tracked.

Note:

You can view the original, unchanged attachment in My Teamcenter.

If you open an attachment, check it out, and then close it, the checkout lock is not retained. The checkout is retained only if you save the attachment at least once before closing it.

Track the creation or deletion of an attachment

You can track the creation of a dataset or form against an incremental change, so that the attachment itself has an effectivity that is derived from the effectivity of the incremental change; this is in addition to the effectivity applied by the incremental change that attaches the attachment to an item revision. This feature may be useful if the attachment is attached to more than one item revision.

- To track the creation of an attachment, select the attachment in the **Attachments** pane and choose **Tools→Incremental Change→Create on Object**.
- To track the deletion of an attachment, select the attachment in the **Attachments** pane and choose **Tools→Incremental Change→Delete on Object**.

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 structure view header. 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

You can remove individual incremental changes one of two ways, from the **Incremental Change** view 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** view, 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** view.

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.

Working with incremental change baselines

Create an incremental change baseline item revision

Changes to a process plan can be managed by making incremental changes, which are tied to incremental change objects. This enables you to track and configure the changes without forcing you to create a new revision. After making several sets of incremental changes, you may want to roll up the changes made into a new baseline revision. The baseline item revision allows you to create a new revision of an item by capturing all the changes made using incremental change objects until the configuration date or unit number. The baseline item revision can be created at any stage.

1. Select an item revision and choose **Tools→Incremental Change→Incremental Change Baseline**.

Teamcenter displays the **Baseline** dialog box.

2. Type a name and a description. Teamcenter displays the selected item revision and revision ID by default. These boxes cannot be edited.
3. Click **OK**.

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.

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 are 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**.

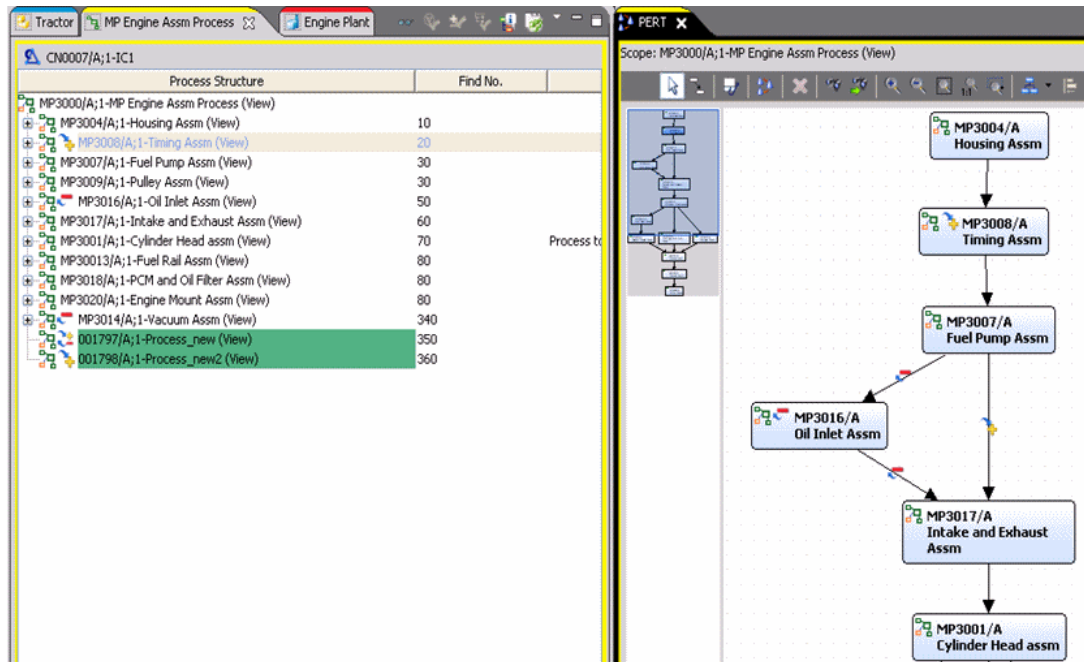
Teamcenter displays a confirmation message if the import is successfully completed. It imports only changes to the structure, as captured in the exported PLM XML file.

Working with incremental changes and predecessors

About incremental changes and predecessors

A *predecessor* represents a sequential relationship between two processes, operations, or activities; the predecessor must complete before the second process, operation, or activity. You can use this relationship to track changes to the sequence of operations in a process or to activities in an operation. For example, you can use it to define a flow of operations or processes to be effective from a certain date or unit number. If you use a change object to add a predecessor, the change effectivity is attached to the predecessor and the predecessor becomes effective as of that change.

The following figure shows how Manufacturing Process Management displays the predecessors of a process or operation. If a + sign appears on the symbol, the predecessor was added with an incremental change; if a – sign appears on the symbol, the predecessor was removed with an incremental change.



Incremental changes on predecessors

Add an incremental change on a predecessor

1. Open the **PERT** view.
2. Create a new flow between (sequence) between the related processes or operations.

Remove an incremental change from a sequence

If you remove or delete a predecessor, it remains displayed in the **PERT** view but is marked for deletion when the relevant change becomes effective.

To remove an incremental change from a sequence, do the following:

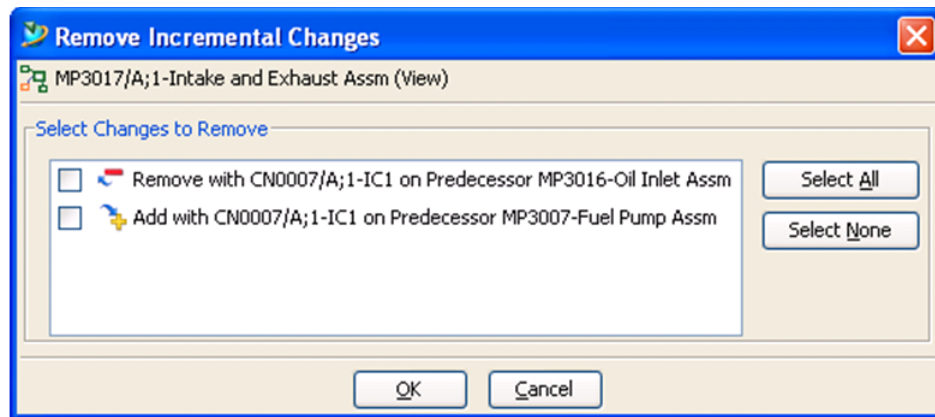
1. Open the **PERT** view on a process.
2. Select the sequence line and click **Delete** from the PERT toolbar.

Roll back incremental changes on the sequence

1. Open the **PERT** view on the process.
2. Select the target node of the sequence on which you want to remove incremental changes.

3. Choose **Tools**→**Incremental Change**→**Remove Changes**.

Teamcenter displays the **Remove Incremental Changes** dialog box.



4. Select the desired change and click **OK**.

Teamcenter removes the selected changes.