TEAMCENTER

Engineering BOM Management — Usage

Teamcenter 2412

SIEMENS

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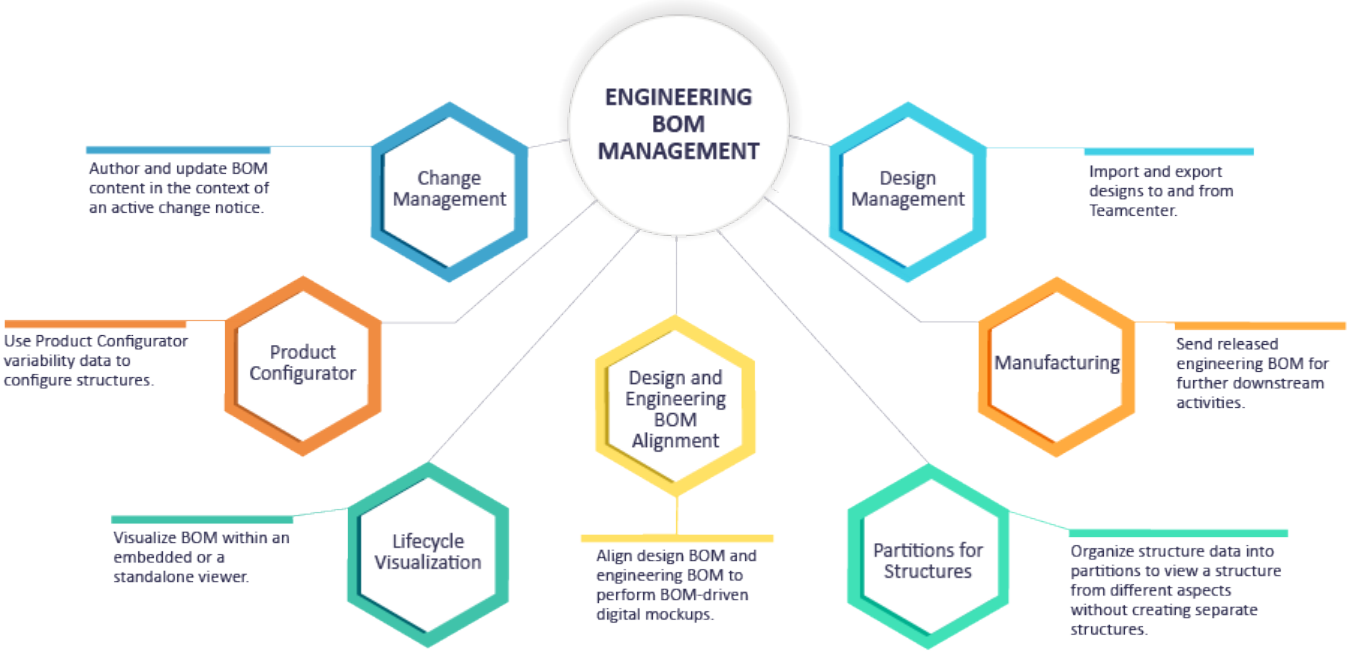
1. About engineering BOM management

Managing the part and design data of a product within a single structure results in a complex BOM, which is difficult to maintain, resulting in rework, delays, and losses. It is more efficient to enable independent evolution of part and design lifecycles. Teamcenter Engineering BOM address this challenge by maintaining the parts and designs as separate structures. Aligning the two structures allows you to perform BOM-driven digital mockups.

You can use several Teamcenter applications that provide additional features to manage the engineering BOM data.



Where do I go from here?

Administrator	See Engineering BOM Management — Deployment and Administration.
Business User	
New user	Familiarize yourself with the engineering BOM **terms** used in Teamcenter. You can also look at the **engineering BOM management business process** and the **task flow** of engineering BOM management.
Set an active change notice	It is recommended that you **set an active change** before you start creating or updating the engineering BOM data.

Verify if the engineering BOM data is created correctly	Review the engineering BOM data to validate if the data is created correctly. You can **compare** the data, **validate the alignment**, and **visualize** structures.
Release engineering BOM data	The engineering BOM **release process** includes validation steps to ensure that the BOM adheres to your business rules before it is released.

2. Engineering BOM management terms

<table>
<tr><th>The term</th><th>Refers to</th></tr>
<tr><td>Design</td><td>The virtual representation of a part. It represents what a part will look like in its floor position. For example,  represents a wheel. Designs are attached to design revisions in Teamcenter.</td></tr>
<tr><td>Part</td><td>This is the primary component of a product. For example, the product CrossKart consists of different parts such as Wheel, Engine, and Chassis. Each part is saved as a part revision in Teamcenter.

A part can be of the following types:

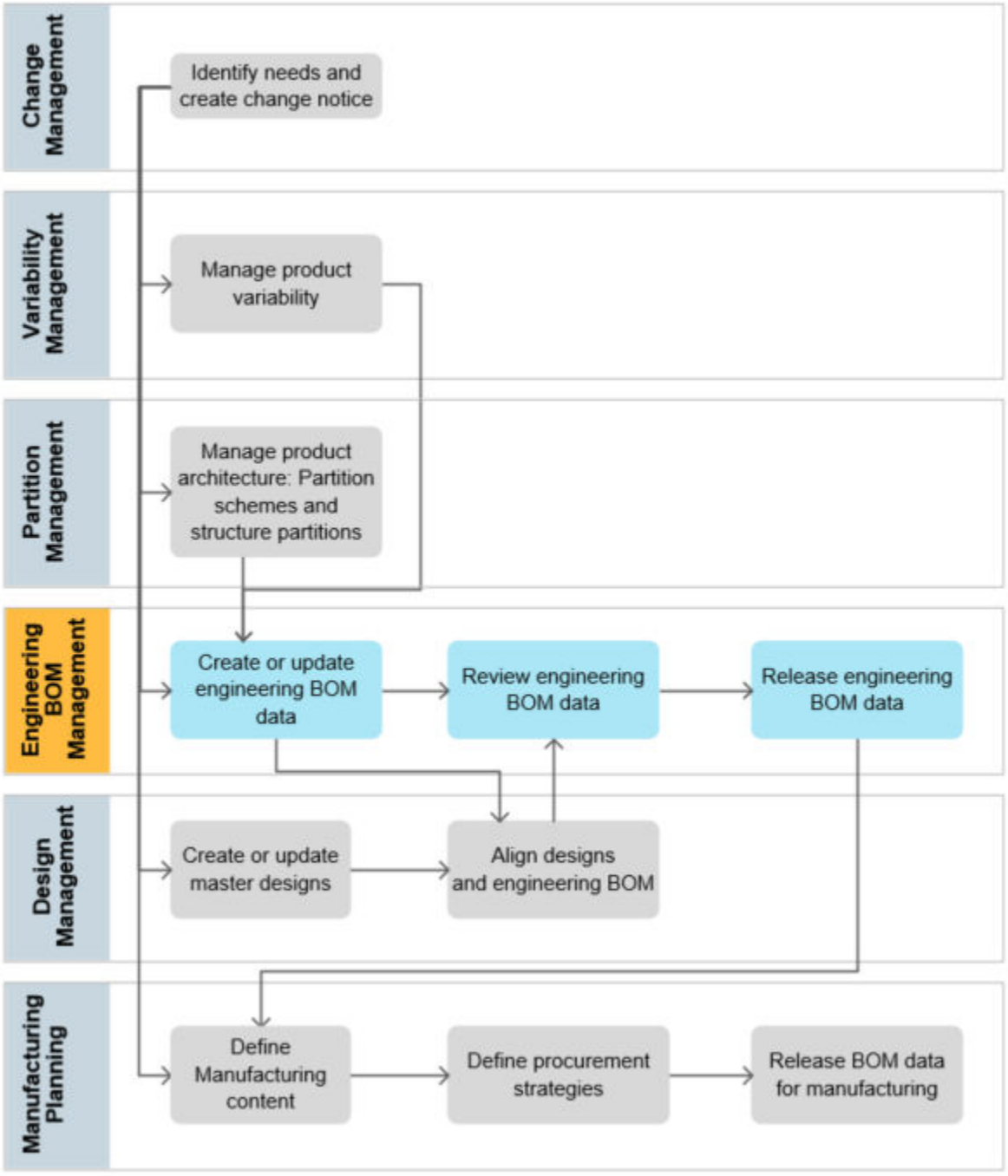
<table>
<tr><th>The type</th><th>Refers to</th></tr>
<tr><td>Component</td><td>A single piece part used in a product. You can add child parts to a component but they neither participate in alignment process nor corresponding manufacturing BOM creation. For example, you can add a spare part as a child component.</td></tr>
<tr><td>Generic part</td><td>A placeholder part that cannot be ordered or procured, or assembled in a product. It has variability associated with it. It is used in a configurable assembly and is replaced with a specific part when a 100% product variant is derived. You can add child parts to a generic part but they neither participate in alignment process nor corresponding manufacturing BOM creation.</td></tr>
<tr><td>Fixed assembly</td><td>An assembly part that has a fixed set of child parts. A fixed part cannot have a variability associated with it.

A fixed assembly can contain other fixed assemblies and components.</td></tr>
<tr><td>Configurable assembly</td><td>An assembly part that has variability associated with its child parts.

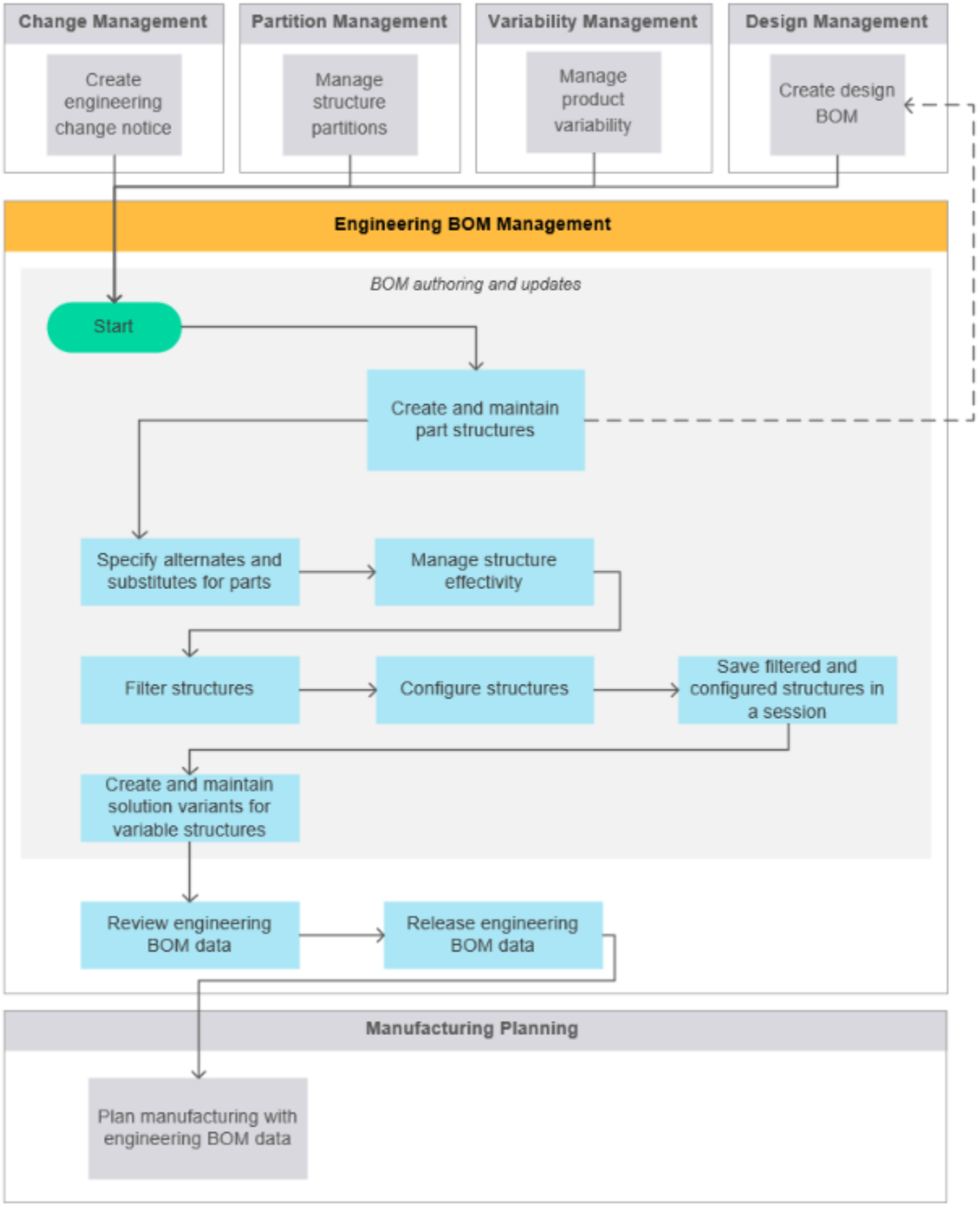
A configurable assembly can contain other configurable assemblies, fixed assemblies, generic parts, and components.</td></tr>
</table>
</td></tr>
<tr><td>Alternate part</td><td>A part that can be used in place of another part in all products.</td></tr>
<tr><td>Substitute part</td><td>A part that can be used in place of an occurrence of another part within a single assembly.</td></tr>
<tr><td>Flexible part</td><td>A part that can be used in a product in various states. Examples include a coil spring, hose pipe, and wire harness.</td></tr>
<tr><td>Bought out part</td><td>A part that is purchased and not manufactured in-house.</td></tr>
</table>

The term	Refers to
Part structure (engineering BOM)	An assembly part that has child parts.
Part occurrence	An instance of a part in a part structure. For example, the wheel assembly contains the part occurrences of *Tire*, *Rim*, and *Valve*.
Partition	A container to logically organize the engineering BOM data.
Design	A virtual representation of a part.
Design structure	A design structure of a product to represent it virtually from a geometrical standpoint. It consists of designs, which contain the design information such as CAD and product manufacturing information (PMI).
Design occurrence	An occurrence of a design in a design structure. A design occurrence contains the position information of a part. For example, the design occurrence of a wheel contains the information related to its placement in *Crosskart*.
Design-part alignment	The alignment between a design and a part. It shows what a part will look like in its floor position.
Design occurrence-part occurrence alignment	The alignment between a design occurrence and a part occurrence. It shows what a part will look like when placed in a product.
Solution variant	A 100% buildable BOM with unique part numbers.

3. Engineering BOM management business process



4. Engineering BOM management task flow in Teamcenter



5. Access the engineering BOM workspace

As a release engineer you can access your engineering BOM data inside a dedicated workspace. To access the **Engineering BOM** workspace, follow these steps.

Procedure

1. Click your profile icon on the session controls.
2. From the **Group** list, select **Engineering**.
3. From the **Role** list, select **Release Engineer**.
4. From the **Workspace** list, select **Engineering BOM**.

6. Work in the context of a change

Set a change context to track BOM updates

You can track updates made to a engineering BOM by setting an engineering change notice as an active change context. The updates can be viewed by accessing the change notice.

To set a change context to track BOM updates:

1. Create a new change notice or a simple change, and select it.

   For more information on creating a change notice, refer to the *Change Management* documentation.

2. Click **More Commands** ••• > **Manage** > **Submit to Workflow**.

3. In the **Submit to Workflow** panel,

   - For a change notice, select the **EBOM Release Process** template, enter a **Name**, and click **Submit**.

   - For a simple change, select the **EBOM Simple Change Workflow** template, enter a **Name**, and click **Submit**.

To set a change context:

- Click **No Active Change** in the global header. and select the required change notice.

The date and unit (end item) effectivity of the change are automatically set on the current revision rule.

Review active or closed changes for a structure

You can track changes (added, modified, replaced, revised, or deleted) to the assemblies using a change request or a change notice. When the ECN or ECR is an Active change, redlines are shown in the structure. To view the closed changes, use the **Show Redlines** command.

1. Search for and open the structure. If the structure has changes, they are indicated by redlining. Expand the assembly to view the details of the change.

   You can also open the structure in the alignment view in which the design structure and its aligned engineering BOM are displayed side-by-side. In this case, enable the **Show Redlines** command.

Deleted parts are indicated by a red strikethrough.

The added parts display in green and are italicized.

For replaced or revised parts, the old and the new values are shown side by side.

2. (Optional) To disable highlighting the changes in the structure, go to **More Commands** ••• > **View** ◎ icon and turn off **Show Redlines**.

   If you are in the alignment view, disable the **Show Redlines** command to stop the changes from being highlighted.

3. Only active changes are shown by default. To view the closed changes, open the design structure or engineering BOM in a separate window and click **More Commands** ••• > **View** ◎ > **Show Redlines**.

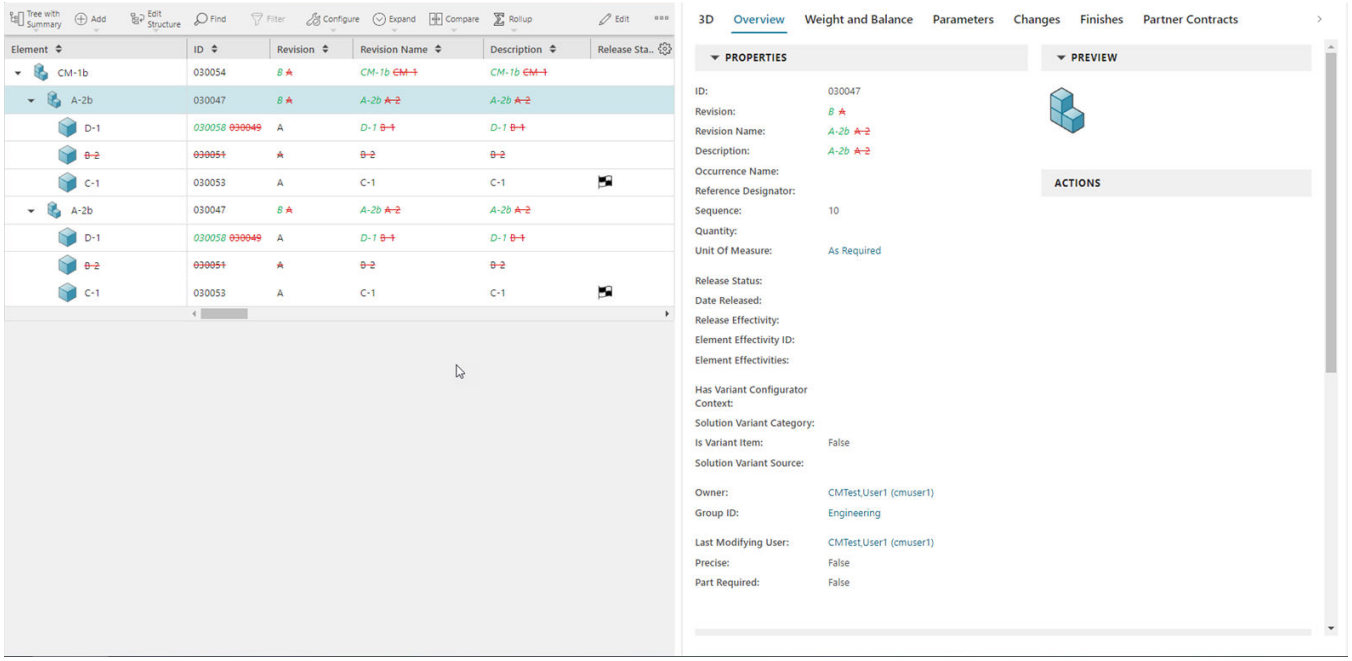
You can return a redline change back to its original impacted version by reverting the BOM modifications.

Track BOM modifications in the change summary

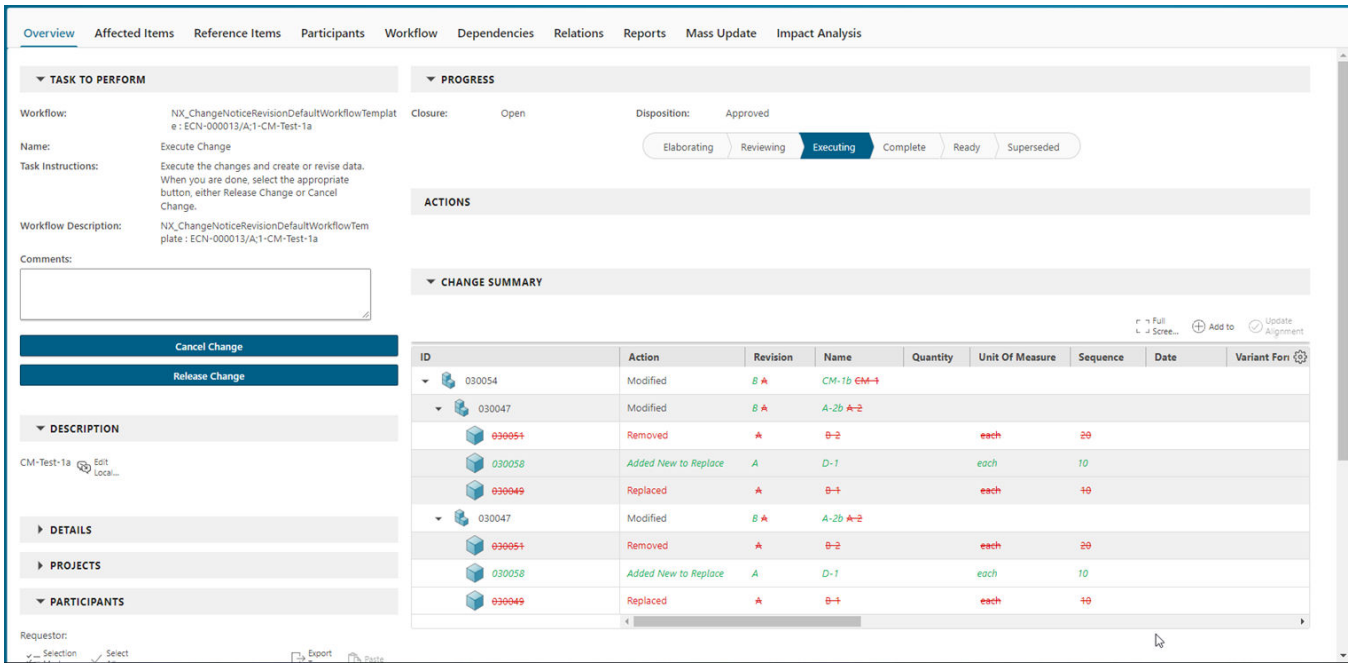
Applying an active change context for BOM revisions automatically tracks the modifications in the change summary.

See **set a change context to track structure updates** for more information.

With the change notice set as an active change, BOM modifications and properties are identified by redlines. For more information on the **Show Redlines** feature, refer to **Review active or closed changes for a structure**.



These modifications, not the full assemblies, are tracked in the change summary of the change notice.



View the authoring change notice and the changes made to the part

1. Open the required structure and select the part.

2. Go to the **Changes** tab. In the **Changes** section, you can see the authoring change notice for the selected part.

3. Go to the **History** tab. All the modifications or revisions made to the selected part with their respective change notices are listed under **Change History**.

Cancel a change notice

Based on a specific product requirement, an engineering change notice is created. The engineering BOM content is authored or updated in the context of the change notice. After authoring or updating the BOM content, the product requirements may get canceled. In such a case, you must also cancel the corresponding change notice before it is released. On canceling the change notice, the updates made to the BOM content also get canceled.

To cancel a change notice:

1. On the **Home** page, click the **Changes** tile, and select the change under which the structure is created or modified.

2. Click **Cancel Change** in the **Overview** tab.

   All the **Solution Items** of the change notice get canceled and their property **Cancelled** is set as *true*.

Canceling the engineering change notice will cancel all its associated solution objects. A canceled revision can never configure. However, you can create a new revision from a canceled revision. You cannot reopen a canceled change and release its content.

If there are sequential changes in ECN2 that have been created based on ECN1, and ECN1 is canceled, ECN2 is not canceled automatically. You can choose to cancel it manually.

When you cancel a change notice which contains a workset or a session having a structure, this cancel change behavior is not supported.

Every cancellation of ECN may not inherit this behavior. For example, cancellation of ECN having workset and subset, which contains the structure.

Release engineering BOM data by validating and releasing the active change

If you created or updated the engineering BOM data, by setting an active change notice, the data can be validated and released together by validating and releasing the active change notice.

Procedure

1. If the change is not yet submitted, **submit the change**.

   You can either use the change notice and the **EBOM Release Process** template or use a simple change and the **EBOM Simple Change Workflow** template.

2. Validate the change notice to perform validation checks on the engineering BOM before its release. This validation is based upon a set of predefined validation rules in the system. Your administrator can also create custom validation rules.

   a. On the **Home** page, click the **Changes** tile, and select the change under which the structure is created or modified.

   b. Click **Validate Change** in the **Overview** tab.

   If the validation fails, the issues are listed in the **Validation** tab under the **Validation Summary** section. Resolve the issues, as needed.

   Once the issues are resolved and the validation is successful, you can release the change.

3. Click **Release Change** to release the change notice.

   While releasing the change, Teamcenter validates the change again to resolve any issues found during the initial validation.

   If no issues found, structure is released. Note that, the workflow (**EBOM Release Process** workflow or the **EBOM Simple Change Workflow**) also releases the BOM view revisions of the *ItemRevisions* that are tracked by the change.

7. Access engineering BOM data within partitions

A BOM architect organizes a large product into smaller, accessible sections called *partitions* and arranges the engineering BOM data logically and hierarchically within the partitions. Partitions can belong to different partition schemes such as functional, physical, or spatial.

When the data is organized within partitions, you can view the data and perform various engineering BOM management tasks from within the partitions.

For information on partition schemes and partitions, see *Structure Partitions — Usage*.

8. Find and navigate structures

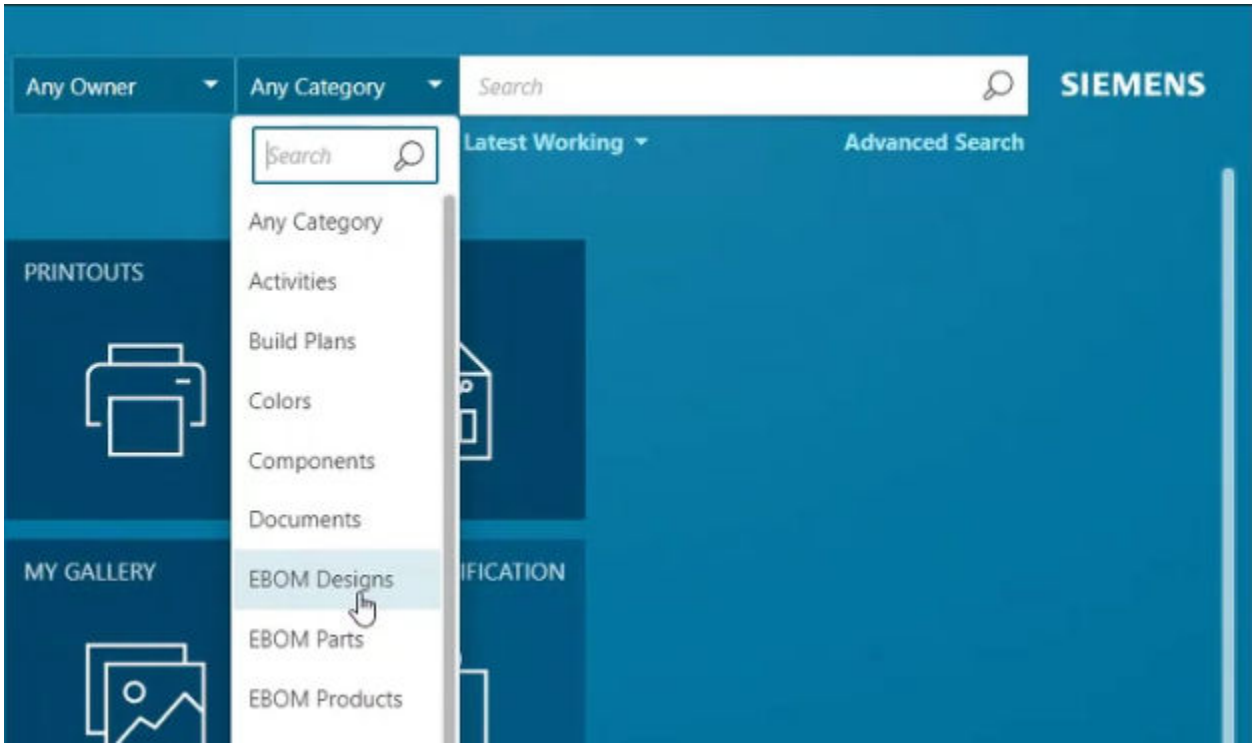
Finding structures and structure elements

You can search for structures or structure components using the following methods:

Global Search	Searches all indexed data in Teamcenter.
Advanced Search	Searches for data by using specific criteria based on predefined queries.
In-context search	Searches for content within an open structure, a working context, or a session that is composed of structures. The structure can be indexed by using either Active Content Structure indexing or Smart Discovery Indexing. It may be non-indexed as well. The non-indexed search requires a Context Management User license. This is used for Quick Find searches.

You can perform a simple search to find an occurrence of an object in an open structure. You can enter any attribute or text associated with the occurrence (for example, a name) and then click **Search** 🔍. Search results span the entire context.

To define context, you can choose **EBOM Parts**, **EBOM Designs**, or **EBOM Products** from the categories list before doing the search.



You can use the same syntax as for full-text searches, including operators such as OR and AND. You can use the **Filter** tab to narrow the results by selecting specific filters and categories.

Find elements within a structure

To narrow your search results to a specific branch in the structure, you can perform a keyword search within the selected subassembly from the **Find** panel.

1. Open a structure from the search results.

2. Click **Find**.

3. In the **Find** panel, enter the search parameters, and click **Search**.

   If file content indexing is deployed in your Teamcenter setup, you can specify dataset filenames as the search parameter. You can also specify a text within a file as the search parameter. For example, consider that the dataset *EngineSpecification.pdf* contains the text **RPM**. If you enter **RPM** as the search parameter, the search result displays elements that have the dataset *EngineSpecification.pdf* as an attachment. The search result also displays elements that have datasets with the text **RPM** in their content.

   Additionally, you can specify the name of a *.prt* file as the search parameter.

4. (Optional) To narrow the results:

a. Select the subassembly to which you want to limit your search.

b. Select the **Find within** check box, enter the search parameters, and click **Search**.

5. Select an element from the search results to view it in the structure.

   If you have **Partitions for Structure** deployed in your Teamcenter setup *and* if you select an element from the search results on the **Find** panel, the element is highlighted in the work area within the partition that contains it.

   However, clicking **Select All** ✓ does not select the corresponding elements in the structure.

Searching structured content if you do not have access to objects

If you find an element in a structure that you do not have read access to, Teamcenter does not show that occurrence and excludes it from the find-in-context results. If the occurrence exists in an assembly to which you *do* have access, Teamcenter shows an **Access Denied** indicator in its place.

> Note:
>
> Access to occurrences is set by your system administrator by using Access Manager. Access controls protect intellectual property and prevent general access to data. To view restricted content that you do not have access to, you can request the owner of the assembly to use project-level security to enable collaboration.

If you do not have access to a revision configured by the revision rule, Teamcenter looks for the last revision you have access to, and configures the access accordingly.

Automatic searching for the last accessible revision is not supported in indexed structures. However, it is supported if Smart Discovery Indexing is used.

Navigate a structure

You can select a structure from the search results and then click **Open** to view the structure.

Navigate to child parts

The assemblies or subassemblies that have child parts are listed with the **Show Children** ▶ button.

Click **Show Children** ▶ to navigate to child parts.

Navigate to a higher level using the breadcrumb trail

Assembly nodes are visible in the breadcrumb trail.

Use the breadcrumb trail to navigate to a higher level (such as parent parts) in a structure.

> Note:
>
> The back button does not take you to the parent parts. It takes you to the previous location visited in Active Workspace. It might also not show the latest structure. You may refresh the structure to view the latest one.

If you use the breadcrumb trail to navigate to a different parent, the first leaf in that structure is displayed, the breadcrumb is updated with the path to that leaf node, and the display is switched back to the hierarchical view.

9. Import and export structures

About importing structures from Excel

In Teamcenter, you can import a structure from a Microsoft Excel spreadsheet. This feature is useful when you need to import data from an external source, for example, from a design contractor who does not have Teamcenter. You can import relatively simple and small structures, such as structure data provided by vendors. Importing from Excel might not be suitable for very large and complicated structures.

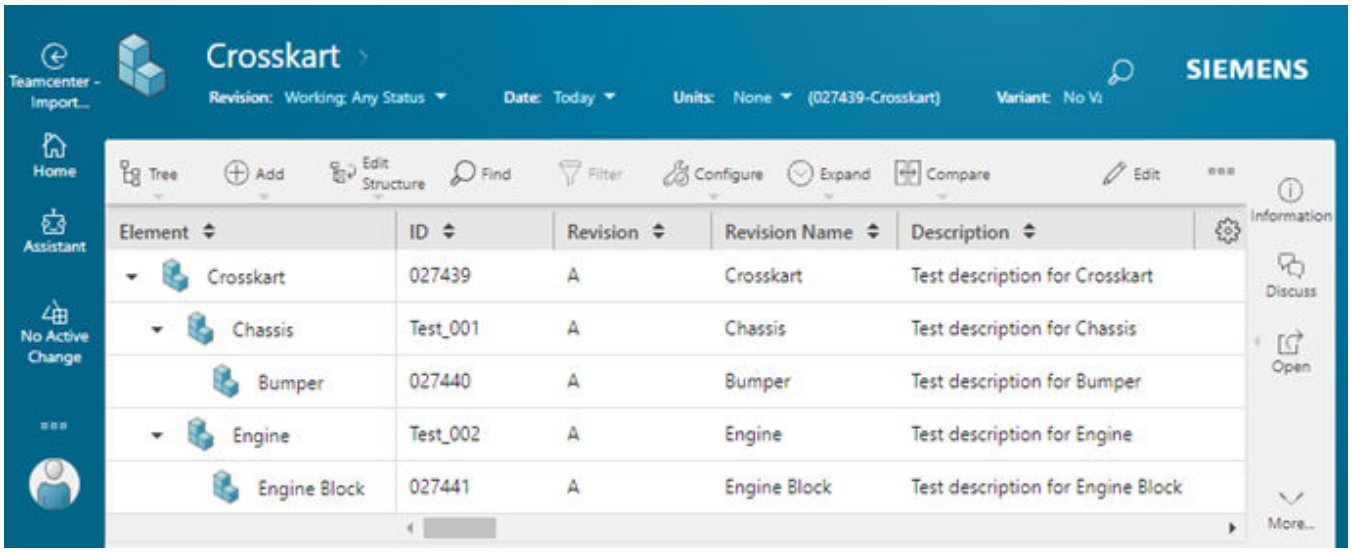
The following scenarios explain how you can **import structures** in Teamcenter.

Scenario 1

You want to create a new *Crosskart* structure with all new components. To do this, you can create an Excel spreadsheet similar to the following and then import it in Teamcenter:

	A	B	C	D	E	F
1			Product Structure			
2	Tc_Level	Tc_ObjectType	Name	ID	Revision	Description
3	0	Item	Crosskart			Test description for Crosskart
4	1	Item	Chassis	Test_001		Test description for Chassis
5	2	Item	Bumper			Test description for Bumper
6	1	Item	Engine	Test_002		Test description for Engine
7	2	Item	Engine Block			Test description for Engine Block
8	<endtag>					

After the import, the following structure is created in Teamcenter:



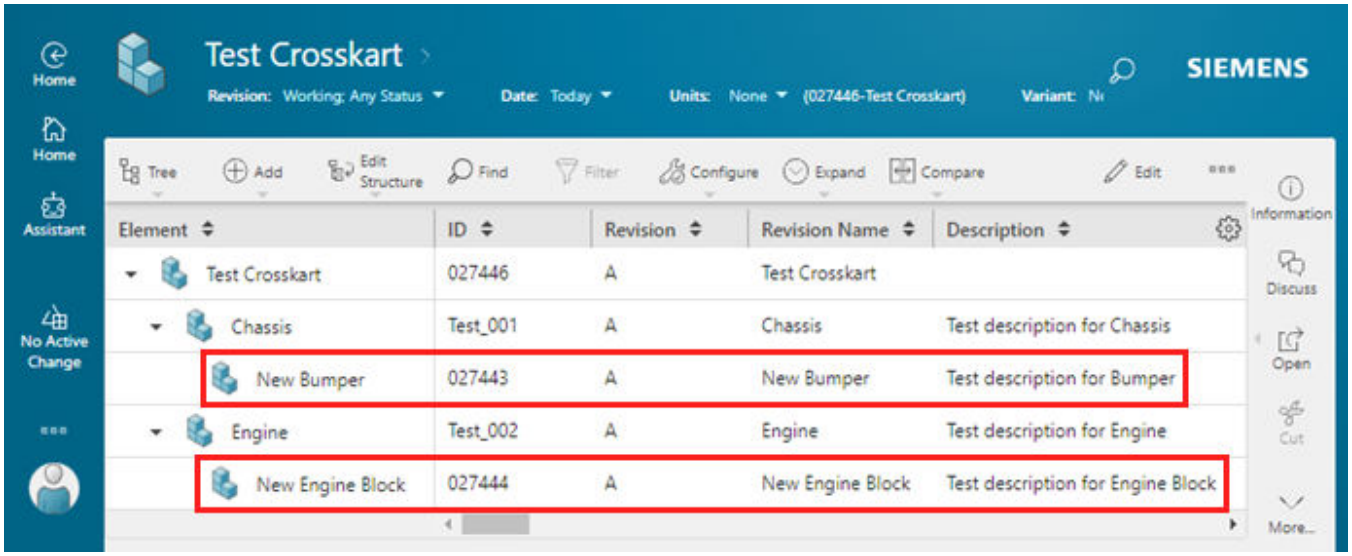
Even if you did not specify an ID for some of the elements in the input spreadsheet, Teamcenter generates the IDs for those elements automatically.

Scenario 2

You want to create a new structure called *Test Crosskart* by reusing some of the existing elements in Teamcenter. Therefore, in the input spreadsheet, you add the name for the new structure and only the names and IDs of the existing subassemblies. Your input spreadsheet appears as follows.

	A	B	C	D	E	F
1	Product Structure					
2	Tc_Level	Tc_ObjectType	Name	ID	Revision	Description
3	0	Item	Test Crosskart			
4	1	Item	Chassis	Test_001		
5	1	Item	Engine	Test_002		
6	<endtag>					

After the import, Teamcenter creates the new *Test Crosskart* by reusing the existing elements from the sub-assemblies. You only need to specify the required properties of the subassemblies and not of the existing elements.



Prepare the Excel file for importing a structure

To import a structure from Excel, you must prepare the Excel file in a specific way. The guidelines for preparing the Excel file are listed here:

- **Mandatory things**
  - The top row must have a title, for example, **Primary Object**.

- The cells in the second row must have the headers **Tc_Level** and **Tc_ObjectType**. The header **Tc_Level** must be in column A and **Tc_ObjectType** must be in column B.
- The properties **Name**, **ID**, and **Revision** are mandatory.
- While you import a structure, the elements that occur multiple times under a single parent in the structure are uniquely identified by certain properties. It is recommended that you use these properties as columns in the input spreadsheet. To get these properties, you may refer to the values in the **AWC_Occ_Unique_Identifier** preference. When you reimport the same structure, make sure that the values for these properties are correctly set. Otherwise, you might not get the expected results.
- You must include **<endtag>** in column A at the end.
- If you do not want to update the part or occurrence properties, leave the corresponding cells in the input spreadsheet blank. Teamcenter ignores blank cells in the input spreadsheet.

- **Import a structure along with reference properties**
  - You can import structures with certain reference properties, such as **Unit of Measure**, **Owner**, and **Group**. You can also import any other reference property with an LOV.
  - After you add the display string of a reference property to the Excel sheet, Teamcenter maps this string to the correct reference object.
- **Import a structure along with vendor-part data**
  - To import vendor-part data, you must specify the secondary objects along with the primary ones. Thus, you must fill in the **Tc_Secondary_ObjectType**, **Tc_Secondary_Relation**, and **Vendor ID** fields.
  - The **Vendor ID** that you specify must exist in the Teamcenter database.
  - **Tc_Secondary_ObjectType** must be the first column in the **Secondary Object** section.
- **Import multiple parts**
  - To import multiple parts, you can add them, excluding any assemblies, to the Excel file. You must specify the **Tc_Level** of each part as zero (0).
  - As Teamcenter ignores occurrence properties, you need not specify them.
  - After you import multiple parts, Teamcenter opens only the first part.
- **Import multiple assemblies**

- To import multiple assemblies, you can add them to the Excel file. You must specify the **Tc_Level** of each top-level part in an assembly as zero (0) and its children as 1 or 2 and so on as per the hierarchy of items.
- Teamcenter considers each top-level part as a new structure.
- After you import multiple assemblies, Teamcenter opens only the first assembly.

- **Import multiple types of secondary objects**
  - You can import multiple types of secondary objects for both an item and an item revision.
  - While importing related objects, you can specify the object type and the relation type.
  - If a related object already exists, Teamcenter relates the primary object to the related object. If a related object does not exist, Teamcenter creates a new related object.
  - If you do not specify any value in the **Tc_Primary_To_Secondary_Relation** column, Teamcenter considers the following values, by default: For vendor-manufacturing related parts, the value is **item-to-rev** and for any other parts that are not related to vendor manufacturing, the value is **rev-to-rev**.

Import a structure from Excel

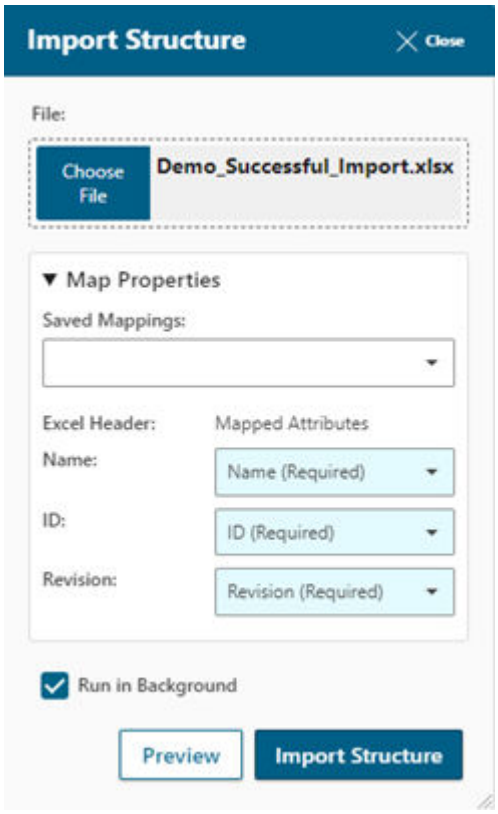
You can import a structure by using an Excel file. The structure can include all reference properties with an LOV, such as unit of measure, owner, and group. You can import structures with the global revision rule and structures using different ID types that use a Multi-Field Key (MFK). You can import vendor-part data, multiple parts and assemblies, and multiple types of secondary objects.

To import a structure from Excel, you must prepare the Excel file in a specific way. See *Prepare the Excel file for importing a structure*.

Procedure

1. Navigate to the folder where you want to import the structure, and choose **More Commands** ••• > **Import/Export** > **Import Structure**.
2. In the **Import Structure** panel, select the Microsoft Excel file from which you want to import the structure by clicking **Choose File**.
3. Map the structure properties between Teamcenter and Excel.
   - Select the required mapping from the **Saved Mappings** list. The list shows the mappings created and saved by the administrator or previous users.

- Alternatively, create a new mapping by entering a name in the **Saved Mappings** field and selecting the **Mapped Attributes** for the **Excel Headers**. Even if an error occurs while importing a structure, the created mapping is saved. You need not select the mapped attributes again for the Excel headers.



- If a mapped attribute is not available for an Excel header:

  a. In the **Mapped Attributes** list for the corresponding Excel header, click **Add New** to create a new attribute.

  b. In **Add Properties**, select appropriate **Subtypes**, if you want to change the default one.

     The reference properties **Unit of Measure**, **Owner**, and **Group**, along with other properties, are listed in the **Add Properties** section.

  c. Filter and select the attribute that you want to map.

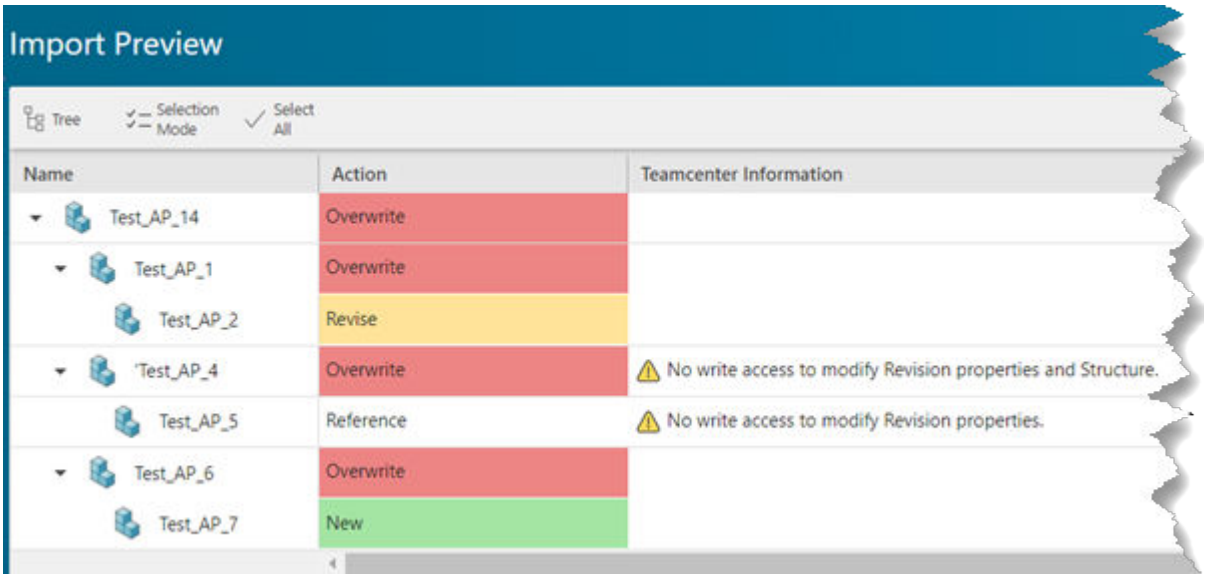
  d. Click **Add**.

  e. In the **Import Structure** panel, choose the newly added attribute.

4. (Optional) If you do not want to run the import process in the background, clear the **Run in Background** check box. The system notifies you about the result of the import process in the **Alerts** panel.

5. (Optional) Click **Preview** to check the structure before import.

   a. The preview shows the structure to be imported along with the **Action** that is performed by default. **Teamcenter Information** shows additional information related to an action.



Action	Description
New	A new item or occurrence is created.
Revise	A new revision of the item or occurrence is created.
Overwrite	The existing revision is overwritten with the updated information.
Reference	The existing revision is used as is. For example, if the revision is released, and some changes are made to the revision in the Excel file without revising the item, the action is set as **Reference**. This indicates that the changes will not be applied.

   b. You can change the action for **Revise** and **Overwrite**. To do so, right click an action and select:

   - **Revise**

     To create a new revision of the occurrence.

   - **Reference**

To reuse the existing revision in Teamcenter as is. The existing revision will not be updated with the latest information in the Excel file.

- **Overwrite**

  To update the existing revision in Teamcenter with the latest information from the source Excel file.

6. Click **Import Structure** to import the structure in Teamcenter.

If there were no errors while importing the structure:

The structure is imported in Teamcenter. When you import multiple elements or assemblies simultaneously, all the top-level elements and assemblies are added to the folder you specified previously. You receive a notification in the **Alerts** panel when the import is complete. Click **Alerts** to open the **Alerts** panel.

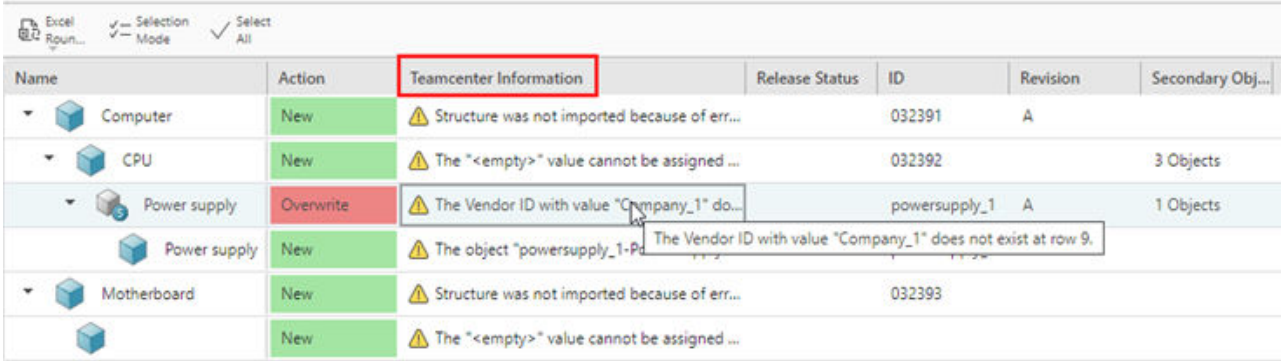
The structure is imported using the global revision rule. The same revision rule is used while opening the structure after import.

You can also import a structure with different ID types that use a multi-field key, that is, when you have two different items with the same ID. You can see the items on the **Import Preview** screen and import them successfully. The import structure functionality searches for and creates items based on the multi-field key.

If there were errors while importing the structure:

You receive an error message stating that the import failed because there were errors while importing the structure. You also receive a notification in the **Alerts** panel, where you can view the error details. Click **Alerts** to open the **Alerts** panel.

In the **Teamcenter Information** section, you can view a list of all potential errors simultaneously. When you hover over an error, you can view detailed information about that error.

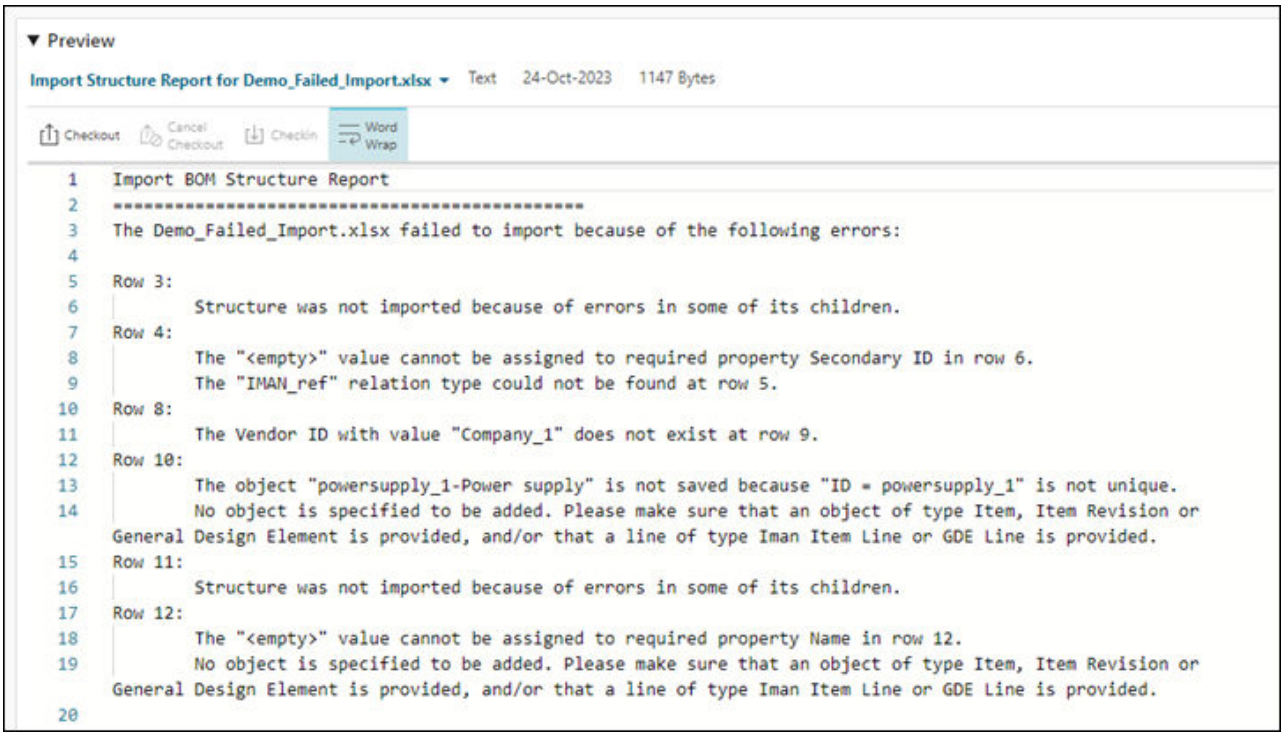


Tip:

At this stage, you need not restart the import process from the beginning. You can make the required corrections in the Excel file and then reupload it by clicking **Choose File** in the **Import Structure** panel. Once this is done, the saved mappings from the previous import are automatically selected and shown in the **Saved Mappings** list. Then, you can click **Import Structure** to proceed with the import.

When you click the link in the **Alerts** panel, you can view the information about the structures that could not be imported and the related objects.

When you click the **Related Objects** link, you receive a detailed report of the errors.



Export and import structures along with partitions

You can export and import structures along with partitions and partition schemes to and from other Teamcenter sites. For the import and export, you can use:

- Briefcase files
- Multi-Site Collaboration
- PLM XML

Export and import structures along with worksets

You can export and import structures along with worksets to and from other Teamcenter sites.

A workset is a context collector for other structures. If your organization has very large structures with a multitude of occurrences, these occurrences can be collated within a workset to do a *what-if* analysis. But when you send the workset to another site by using a Multi-Site environment or a Briefcase, you might not want to export such a large number of occurrences along with the workset. Therefore, while exporting, the **Include entire BOM** option is not enabled by default. Consequently, the TCXML-based Multi-Site functionality works to share workset and related objects but not the product item or item revisions or their content.

Worksets also support site-consolidation activities through the TCXML-based Multi-Site functionality.

To export and import structures along with worksets, you can use:

- Briefcase files
- Multi-Site Collaboration
- PLM XML

Export a structure to NX

You can export a filtered structure and open that in NX. That structure does not contain the parts that are filtered out.

Consider the following points before you export a structure.

- **NX for Active Workspace** must be installed.
- Briefcase Browser must be installed.

Revision rules

Any revision rules applied to the structure are reflected in the exported structure.

Variant rules

- The default variant condition is reflected in the exported structure.
- Any user-applied variant rules are ignored.

Effectivity

- Any effectivity applied as a part of a revision rule is reflected in the exported structure.
- Any user-applied effectivity other than those applied as a part of the revision rules is ignored.

To export a structure to NX:

1. Search for and open the structure that you want to export.
2. Choose **More Commands** ••• > **Import/Export** > **Export NX Assembly**.

   The **Export NX Assembly** command is not available if Briefcase Browser is not installed.
3. In the **Export NX Assembly** panel, choose:

   a. **Export Non-Masters** – To export the object types specified as **Non-Master** in the access control list.

   b. **Export Associated Files** – To export the associated files that are specified in the **AWN0NX_export_exclude_file_types** preference.
4. Click **Export**.

   The export operation runs in the background. When the export is complete, a notification is displayed in the **Alerts** panel.
5. Click the **Alerts** icon to see the notification and download the Briefcase **(.BCZ)** file if required.

> Note:
>
> For additional information about exporting a structure to NX, see the *Teamcenter Integration for NX* guide.

Export a structure to Excel

You can export a structure to Excel. Another user who does not have access to Teamcenter might perform some changes in the Excel. You can then import this Excel back to Teamcenter so that these changes are reflected there.

Procedure

1. Select the structure elements to be exported and click **Excel Round-trip** > **Export to Excel**.

   The **Export to Excel** panel is displayed.

2. (Optional) In the **Settings** section, select any of the following check boxes:

   - **Allow Structure Changes in Excel**: Selecting this option allows external users to modify the structure in Excel.
   - **Include ID as Hyperlink**: The **Object ID** column and the link to the object are exported to Excel. You can click the link and open the object in Teamcenter.
   - **Include Outline Numbers**: The numbers denoting the hierarchy are exported to Excel.

3. From the **Template** list in the **Properties** section, select a template or select **Custom**.

   - If you select a template from the list, you can export the structure elements into a specified template format.

     If a template is not available, contact your administrator.

   - If you select **Custom** from the list, you can select the columns that are exported to the Excel. Do one of the following:

     Select a saved column arrangement.

     Select one or more columns in the **Available Columns** list on the left. Then click > to add the selected column(s) to the **Displayed Columns** list.

     Select one or more columns in the **Displayed Columns** list on the right. Then click < to remove the selected column(s) from the list.

     You can also choose to move a column up or down the list.

4. (Optional) Select the **Run in Background** check box. If you select this option, you receive an alert when the export process is complete.

5. Click **Export**.

The export process begins, and a progress bar indicates that the process is still running.

6. Open the exported Excel and make the required changes to the properties listed, and save the Excel.

> Note:
>
> If no objects match the criteria in the Excel template, a blank Excel sheet appears.

> Caution:
>
> Do not alter these columns in the Excel sheet: **TC_ObjectType**, **TC_ObjectID**, and **ID**. One exception to altering **TC_ObjectType** is creating a new object in the structure.

7. (Optional) To create a new object in the structure:

   a. Open the Excel sheet and insert a new row using the Excel insert feature.

   b. Indicate the object type to be created in the **TC_ObjectType** column, ensuring that the **TC_ObjectID** column is left blank.

   c. (Optional) To adjust the parent or outline level, use the Excel grouping feature.

   d. Save the changes to the Excel file.

Import changes from a previously exported Excel

You can import the changes from a previously exported Excel back to Teamcenter.

Restrictions and limitations

Using the Excel Round-trip functionality, you cannot add or remove structure elements. Additionally, you cannot edit some properties, such as element effectivity and variant formula.

Procedure

1. Click **Excel Round-trip** > **Import Changes**.

   The **Import Changes** panel is displayed.

2. Click **Choose File**, navigate to the Excel file location, and then click **Open**.

3. To ensure that your changes are retained in the event of a conflict, select **Overwrite Conflicts**.

4. Click **Import**.

View where an element is used across assemblies simultaneously

You can view where a structure element is used across all assemblies up to the top level, starting with the immediate parent and navigating one level up at a time. To do this, you go to the **Used in Structures** section and expand one level at a time. However, if you want to view all this data simultaneously, export it to an Excel file.

Similarly, if you want to see where an element in used at the product level across all assemblies simultaneously, you can export this information to an Excel file as well. However, you must have Smart Discovery Indexing installed to generate this data.

1. Search for and select the structure element.

2. Click the **Where Used** tab.

3. Click **Export to Excel** from the following sections depending on the scenario.

Scenario	Action
View where the element is used across all assemblies at all levels.	In the **Used in Structures** section, click **Export to Excel**. Note: If the number of results in the **Used in Structures** section goes beyond the threshold value, the **Export to Excel** button is unavailable. The threshold value is set by your system administrator.
View where the element is used across assemblies only at the product level (works only if you have Smart Discovery Indexing installed).	In the **Top Level** section, click **Export to Excel**.

   The **Export To Excel** panel is displayed with a list of properties available for export.

4. To change the order of the properties, select a property, and in the **Selected Properties** section, click **Move Up** or **Move Down**.

5. To select the properties to be exported, in the **Selected Properties** section, click **Add Properties**.

6. In the **Add Properties** section, clear the check boxes for the properties that you do not want to export. Select the check boxes for the properties that you want to export.

7. Click **Add**.

8. It is recommended to use the **Run in Background** option while exporting the data from the **Used in Structures** section. However, if you do not want to run the export process in the background, clear the **Run in Background** check box.

   While exporting the data from the **Top Level** section, you do not get an option to run the export process in the background.

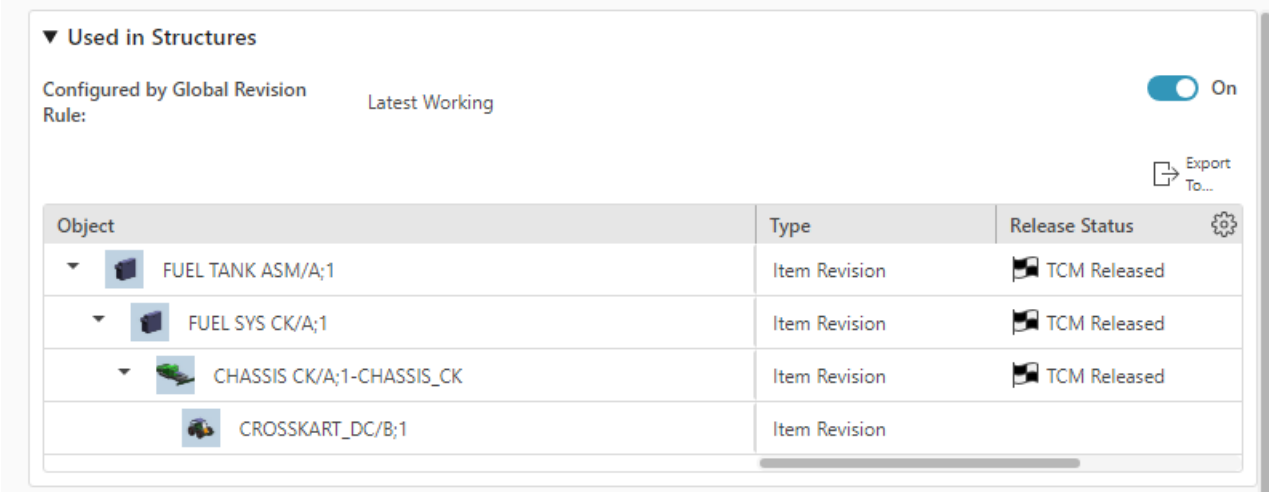
9. Click **Export**.

   If the export process ran in the background, view the notification in the **Alerts** panel and click the link to download the Excel file.

   If the export process did not run in the background, a dialog box is displayed to download the Excel file to your machine.

> Note:
>
> You cannot reimport the exported data back into Teamcenter.

The following graphic shows the sample data in the **Used in Structures** section.



The following graphic shows the sample data in the exported Excel file.

	A	B	C	D	E
1	**Level**	**Object**	**Type**	**Release Status**	**Owner**
2	1	FUEL TANK ASM/A;1	Item Revision	TCM Released	Doe, John
3	2	FUEL SYS CK/A;1	Item Revision	TCM Released	Doe, John
4	3	CHASSIS CK/A;1-CHASSIS_CK	Item Revision	TCM Released	Doe, John
5	4	CROSSKART_DC/B;1	Item Revision		Doe, John
6					

10. Create and maintain structures

About creating structures

You can create a:

- Part structure **automatically** from an existing design structure (design BOM). You can also create a part structure **manually**.
- Design structure **Automatically** from an existing engineering BOM. You can also create a design structure **manually**.
- Part structure or design structure by **duplicating** an existing structure.
- Structure by importing it from **Excel**. You can also **import structures along with their partitions** from other Teamcenter sites.

Generate a part structure (engineering BOM) automatically

You can automatically generate an aligned part structure (engineering BOM) from a design BOM (design structure) that already exists in Teamcenter. The variability scope associated with the design BOM is carried over to the generated part structure.

If the aligned design structure is updated, you must also update the part structure. The alignment data is carried over to the updated structure. If the design structure is released, you must first revise it and then update it. In this case, the alignment data is not carried over to the updated structure.

After generating or updating the aligned part structure, you can validate if the alignment is done correctly. In case of an alignment mismatch, you can realign the parts and designs and the part occurrences and design occurrences manually.

Generate a design structure automatically

You can automatically generate an aligned design structure from a or an engineering BOM that already exists in Teamcenter.

If the aligned engineering BOM is updated, you must also update the design structure. The alignment data is carried over to the updated structure.

After generating or updating the aligned design structure, you can validate if the alignment is done correctly. In case of an alignment mismatch, you can realign the parts and designs and the part occurrences and design occurrences manually.

Create a part structure manually

For a **Configurable Assembly** or **Fixed assembly** part, you create a part structure (engineering BOM) manually by adding child and sibling parts to it. After creating the engineering BOM, you can generate its aligned design BOM.

To manually create a part structure:

1. Open the part and go to the **Content** tab.

2. Click **Add** ⊕ > **Child** to add a new part. You can add an existing part or solution variant from **Search** or **Palette**.

   > Note:
   >
   > You can also reuse revision-controlled parts and assemblies. To do so, ensure that these parts are qualified as engineering Parts by the administrator.

3. If you choose to add a new part, in the **New** tab:

   a. Enter the required information.

   b. Select the **Design Required** check box if you need a corresponding design.

   c. Select the **Automatically Create Design** check box if you want the design to be automatically created and aligned to the part.

      OR

      Click **Add Design** to manually create a design. In the **Add Design** panel, enter the required information, and click **Add**.

      After manually adding a design, if you select the **Automatically Create Design** check box, the manually added design is ignored, and a new design will be automatically created by Teamcenter and aligned to the part.

4. Follow the above steps to build the part structure by adding parts as required. To add parts that are at the same level as the selected part, click **Add** ⊕ > **Sibling**.

   You can include embedded software artifacts in the structure. For example, the part *Tire Pressure Sensor* in the product *Crosskart* can be programmed such that when the air pressure drops below the product's recommended level, the sensor captures this information, and the dashboard indicator lights up.

   Software developers create and maintain the software artifacts using the Embedded Software Management functionality.

Additionally, you can include ECAD parts created and managed in integrated Electronic Design Automation (EDA) applications.

ECAD parts are represented both as designs (in the design BOM) and as parts (in the engineering BOM), hence they are shared between design and part structure.

> Note:
>
> It is recommended that you edit these parts in the integrated EDA application, and not directly in the BOM.

Additionally, you can **carry over** parts from one part structure to another.

To remove a part from the structure, right-click it and select **Remove** ⊖.

If you are not able to remove an aligned occurrence, contact your administrator.

Once you have created a part structure, you must **set maturity levels** for the newly added parts.

Create a design structure manually

You can create a design structure manually by adding child items to it.

Procedure

1. Open the folder in which you want to create a new structure.
2. In the **Overview** tab, click **Add to** ⊕ in the **Contents** section.
3. In the **Add** panel, select the **Type** as **Design**, and:
   - Enter the required information.
   - Select the **Part Required** check box if you need a corresponding part.
   - Select the **Automatically Create Part** check box if you want the part to be automatically created and aligned to the design.

     OR

     Click **Add Part** to create a part or to use an existing part.

     After adding a part, if you select the **Automatically Create Part** check box, the manually added part is ignored, and a new part will be automatically created by Teamcenter and aligned to the design.

- Click **Add**.

4. Open the design that you added, go to the **Content** tab, and click **Add** ⊕ > **Child**.

5. In the **Add Child** panel, enter the required details, and click **Add**.

   Add more children to build the structure. To add children that are at the same level, click **Add** ⊕ > **Sibling**.

   You can drag a design from one place to another to reorder the structure. To remove a design, right-click it and choose **Remove** ⊖.

   If you are not able to remove an aligned occurrence, contact your administrator.

Duplicate a structure

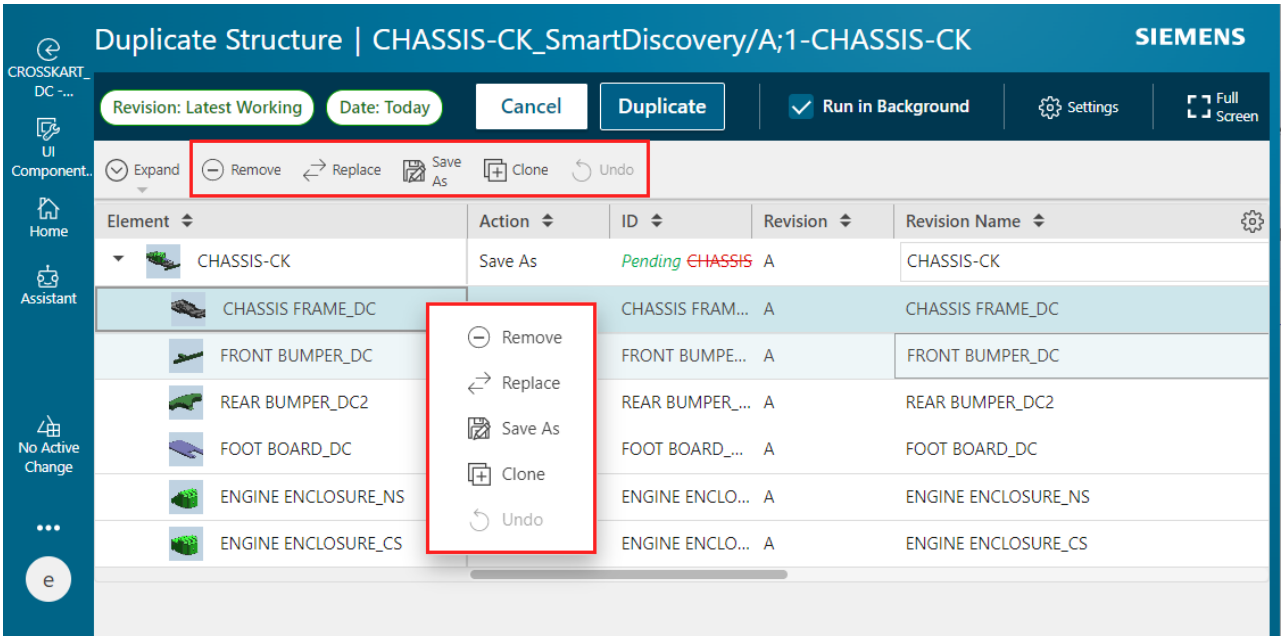
You can create a new structure by duplicating an existing structure. You can also duplicate structures that you do not own. When you duplicate a structure that you do not own, you become the owner of the new structure.

To duplicate a structure:

1. Select the top line or an assembly in the structure that you want to duplicate.

2. Click **Duplicate** ⧉.

3. Right-click each element and select one of the following actions. You can also select these actions from the work area toolbar.



Action	Description
Remove	The element is not included in the new structure.
Replace	The element is replaced with the replacement element that you specified in the **Replace** panel.
Save As	A copy of the element is added to the new structure. You own this new element. If the element is a structure, all its child elements are only referenced in the new structure. These are still owned by the user who created the source structure. You can edit the **Revision Name** and **Description** of the element.
Clone	A copy of the element is added to the new structure. You own this new element. If the element is a structure, copies of its child elements are used in the new structure. You can edit the **Revision Name** and **Description** of each element.

Note:

If any child element is a structure, all its children are also marked with the same action. However, if you change the action of one of its child elements later, the action of the parent element changes accordingly.

If you do not select an action, and the **Action** column is blank, the element is only referenced in the new structure. The element continues to be owned by the user who created the source structure.

4. To undo an action set on an element, select the element, and click **Undo**.

5. (Optional) To define a specific naming pattern for the duplicated elements:

   a. Click **Settings**.

   b. In the **Settings** panel, click **ID Naming Rule** and enter the following details:

ID naming rule	Description
Prefix	The text is prefixed at the start of the existing IDs.
Suffix	The text is appended at the end of the existing IDs.
Replace/With	The text specified in **Replace** is replaced with the text specified in **With**. The text specified in **Replace** must be text that is part of the existing ID, and it is case-sensitive.

   c. Click **Close**.

6. To run the duplicate process in the background or foreground, select or clear the **Run in Background** check box. If you choose to run the duplicate process in the background, you receive a notification in **Alerts** once the structure is duplicated.

7. To create the new part structure, click **Duplicate**.

The alignment data is carried over from the original structure to the new structure. The element effectivity for the new structure is derived from the active change.

Create a new structure from an existing structure

You can create a new structure from an existing structure by saving the existing structure as a new structure.

Procedure

1. Search for a structure.

2. Click **More Commands** > **New** > **Save As**.

3. In the **Save As** panel, enter the required information.

4. If you are creating a part, select the **Copy Design Alignment** check box. If you select this check box, another revision of the existing aligned design is automatically created and aligned with the part. If you do not select this check box, a new revision of the existing aligned design is created at the time of alignment.

If you are creating a design, select the **Copy Part Alignment** check box. If you select this check box, another revision of the existing aligned part is automatically created and aligned with the design. If you do not select this check box, a new revision of the existing aligned part is created at the time of alignment.

5. Click **Save**.

A new structure is created from the existing structure. If the existing structure contains any partitions, the partitions are also carried over to the new structure.

Associate a variability scope with a part structure

The variability data is managed outside of a structure using Product Configurator. To include the variability data within the structure, you associate it with an appropriate variability scope.

1. Search for a part structure of type **Configurable Assembly** and open it.
2. Click **Edit**.
3. In **Variability Scope**, click **Add**.
4. Search for variability scope, select it, and click **Add**.
5. Click **Save**.

Carry over parts from one part structure to another

Engineering parts can be reused in several structures. You can quickly populate a part structure by carrying over parts from another structure.

1. Open the part structure from which you want to carry over the parts.
2. Click the **Split Context**.

   The part structure is split and shown within two views displayed side-by-side.
3. In one view, click **Open in View**.
4. In the **Open in View** panel, add the part structure to which you want to carry over the parts. You can either add the structure from the palette or search for it.
5. Click **Open**.
6. Drag the parts from one part structure to the other in order to carry over the parts.

As the aligned designs are also carried over to the new part structure, you can immediately visualize the carried over parts in the new structure.

Create standalone parts

As each component that makes up a product is identified as a part in Teamcenter, you can create standalone parts as per need and later add these parts to an engineering BOM.

Procedure

1. Open the folder where you want to create a part and click **Add to** ⊕.
2. In the **Add** panel, filter to select **Part**.
3. Enter the required information and click **Add**.

   By default:

   - **Assembly Indicator** is set as **Fixed Assembly**.
   - **Finish Type** is set as **None**.
   - **Part Maturity** is set as **Concept**.

   You can update the part properties later as per your requirement.

Replace a part

You can replace a part with another part.

You can also replace an existing part or a subassembly in an assembly with its copy using the **Save As And Replace** command. If the **Save As And Replace** option is not visible, you may not have the required privileges.

To replace the part or assembly in the structure:

1. Search for the element that you want to replace.
2. Select the occurrence and click **Edit Structure** > **Replace**.
3. In the **Replace** pane, select the replacement and click **Replace**.

   Teamcenter replaces the element and refreshes the display.

Replace a structure component with its copy

A copy is a new item with identical properties but a new ID.

You can copy a part or a subassembly, with or without children, save it with a new name, and replace the existing subassembly in the structure with its copy. If the subassembly is copied with children, the child parts are renamed based on the naming convention specified using the naming rule.

1. Select the structure from which you want to copy the element, and click **Open**.

2. Choose **More Commands** ••• > **New** > **Save As and Replace**.

   The **Save As And Replace** pane is displayed.

3. (Optional) Select the **Clone Children** check box.

   If you choose the **Clone Children** option, the child elements in the assembly are replaced along with the top element.

4. Select **ID Naming Rules** to automatically assign new IDs to the copied elements. The **ID Naming Rules** option is visible only when the **Clone Children** check box is selected.

   - **Prefix**

     The text string provided is added to the start of the existing IDs, and new IDs are assigned.

   - **Suffix**

     The text string provided is added to the end of the existing IDs, and new IDs are assigned.

   - **Replace/With**

     The text string specified in the **Replace** field is replaced with the text string specified in the **With** field in the new IDs.

5. (Optional) Select the **Run in Background** check box.

   > Note:
   >
   > For the save and replace operation to run in background, your system administrator must configure Dispatcher services.

6. If you are replacing a part, select the **Copy Design Alignment** check box. If you select this check box, another revision of the existing aligned design is automatically created and aligned with the part. If you do not select this check box, a new revision of the existing aligned design is created at the time of alignment.

If you are replacing a design, select the **Copy Part Alignment** check box. If you select this check box, another revision of the existing aligned part is automatically created and aligned with the design. If you do not select this check box, a new revision of the existing aligned part is created at the time of alignment.

7. Click **Save As And Replace** at the bottom of the **Save As And Replace** pane.

   Teamcenter replaces the element and refreshes the display.

   If you choose to run the replace operation in the background, a notification is generated once it is complete. Click the notification to view the details of the replacement.

Set the maturity level of a part

The maturity of a part indicates its progression in its development cycle. For example, the maturity of a part can indicate if it is being conceptualized, if its prototype is created, or if it has entered production.

To set the maturity for a part:

1. Select the part for which you want to set the maturity level.
2. Click **Edit** .
3. Set **Part Maturity** in the **Part Properties** section.
4. Click > **Save** .

Insert or remove levels in a structure

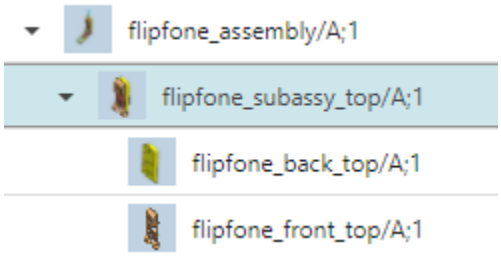
You must have write access to the structure to insert or remove a level. The insert action adds a level between the selected object and its parent object. The remove action removes the selected element's parent object one level above and attaches the element and all its siblings to its current grandparent object two levels above.

Search for the structure you want to edit and click **Open**.

To	Do this	Result
Insert a level	1. Click the element above which you want to insert a level and click **Edit Structure** >**Insert Level** . 2. Fill in the details and click **Insert**.	A new level is added above, as the new parent of the selected element.
Remove a level	1. (Optional) If any child of the level you want to remove has effectivity or variant condition set on it or is suppressed, enable the following options:	The selected element is removed from the structure, and its child elements are attached to what was

To	Do this	Result
	• **Show Excluded by Effectivity** • **Show Excluded by Variants** • **Show Suppressed** 2. Click the element that you want to remove from the assembly and select **Edit Structure** >**Remove Level** .	previously their grandparent elements.

The following example shows how the remove-action works in the three-level assembly in the graphic:



If you are not able to remove an aligned occurrence, contact your administrator.

Revise a structure

You revise a released structure in order to update it.

1. Open the structure that you want to revise.
2. Click **More Commands** ••• > **New** > **Revise** .
3. In the **Revise** panel, enter the required information.

   If the selected structure is a design structure, additionally select the **Keep Existing Part** check box to retain the part that is already aligned with the selected design. The existing part and design alignment will be automatically carried over to the revised structure.

   You can also choose to create a new part or use another existing part by clicking **Add Part**. In this case, the existing part and design alignment will not be carried over to the revised structure. After choosing to create or use another part, if you select the **Keep Existing Part** check box, the new part or the part that you chose is ignored.

   If you see any error while previous alignment is getting removed, contact your administrator.
4. Click **Revise**.

To align the design and part again to fix the mismatched alignments that are indicated as :

a. Switch to the **Tree with Summary** view.

b. Select a design in the design structure.

c. Go to the **Aligned Parts** section in the **Overview** tab, select the required part, and click **Set Primary**.

Discontinue a part

Sometimes a part is unavailable due to logistic issues or raw material shortages. In such cases, you can remove that part for a finite amount of time and reintroduce into the product later.

> Example:
>
> Imagine that you have a released car GPS module which is effective from January 1, 2023 to December 31, 2024. Due to a semiconductor shortage, you want to discontinue the part for 6 months, starting June 1, 2023 until December 31, 2023. After December 31, 2023, you want to reintroduce the part into to the product.

To discontinue a part:

1. Create a change notice with a **release effectivity** range for the duration of the part discontinuation, and **set it as an active change**.

2. Open the engineering BOM and select the released part.

   a. Click **More Commands** ••• > **New** > **Revise** to first revise the part.

   b. Next, in the **Part Properties** section of the **Overview** tab, select the **Discontinued** check box.

   OR

   a. Click **More Commands** ••• > **Manage** > **Submit to Workflow**.

   b. In the **Submit to Workflow** panel, select **Part Discontinue** in the **Template** section.

   c. Click **Submit**.

You can continue this part again by revising it and clearing the **Discontinue** check box.

Update a part

You can update the part information. If the part is an assembly part, you can update its structure by adding, removing, or replacing part. After updating the part structure, you must update its aligned design BOM.

To update the part information:

1. Open the part.

2. Click **Edit**.

   In case of parts having a released current or older revisions and no design-part alignments, you can edit following properties without revising the part. If alignment exist, you can unalign first and then edit the properties.

   - **Part Required**
   - **Design Required**
   - **Skip alignment**

3. Update the required information, and click **Save**.

   While updating **Assembly Indicator**, all the four options **Fixed Assembly**, **Configurable Assembly**, **Generic Part**, and **Component** are not always available. The availability of an option depends on certain conditions that are valid.

   You can change **Assembly Indicator** of a part:

From	To	If
Configurable Assembly	**Fixed Assembly**	• Solution variants are not created for the part. • A variability scope is not associated with the part. • Its child parts are not set as **Configurable Assembly** or **Generic Part**. • No revision of the part is released yet.
	Generic Part	• Solution variants are not created for the part.

From	To	If
		• The part does not contain any child parts. • No revision of the part is released yet.
	Component	• Solution variants are not created for the part. • A variability scope is not associated with the part. • The part does not contain any child parts. • No revision of the part is released yet.
Fixed Assembly	**Configurable Assembly**	• Its parent part is set as **Configurable Assembly**. • Alternates and substitutes are not created for the part.
	Generic Part	• The part does not contain any child parts. • Its parent part is set as **Configurable Assembly**. • Alternates and substitutes are not created for the part. • No revision of the part is released yet.
	Component	• The part does not contain any child parts. • No revision of the part is released yet.
Generic Part	**Configurable Assembly**	• Solution variants are not created for the part.
	Fixed Assembly	• Solution variants are not created for the part.

From	To	If
		• A variability scope is not associated with the part. • No revision of the part is released yet.
	Component	• Solution variants are not created for the part. • A variability scope is not associated with the part. • No revision of the part is released yet.
Component	**Configurable Assembly**	• Its parent part is set as **Configurable Assembly**. • Alternates and substitutes are not created for the part.
	Generic Part	• Its parent part is set as **Configurable Assembly**. • Alternates and substitutes are not created for the part.
	Fixed Assembly	Not applicable You can change a component into a fixed assembly.

Classify parts

Classifying parts makes finding and reusing existing parts easier. You classify parts using the **Classification** tab.

Example:

You classify the part *Wheel* as follows:

Property	Value
Fabric Carcass	Radial
If Tyres With Tube	No Tube Allowed

Property	Value
Season	Studded Winter Tyres
Rim Diameter	15 Inches

Later, when you want to use a 15-inch diameter wheel in your product, instead of searching for all the wheels available in the database, you can search for wheels that are 15 inches wide. Based on the other classification properties, you can choose the appropriate wheel for your product.

11. Map engineering BOM with requirements

A part is always created or added inside the structure due to a requirement. A requirement, as well as a part, can evolve over time. When either the requirement or the part changes, there might be an impact on some other requirement or a part.

> Example:
>
> A ball bearing was designed for a load requirement of 100 kg, but now the load requirement has changed to support 200 kg. This results in a change to the part design of the bearing, and it can also impact other parts, such as the suspension spring.

Therefore, it is important to have a mapping between the part and its corresponding requirements for impact analysis and quick navigation. You can create this mapping using trace links.

> Example:
>
> The part tire is used in the Crosskart, and it has a tire requirement for a radial type of tire, independent of the tire location.

You can create the trace link between the part tire and the requirement of the radial tire, making a revision to revision trace link.

After creation, you can also view the existing trace links.

12. Specify alternates and substitutes for parts

About global alternates and substitutes

Parts are the different components that make up a product. In certain cases, one part can be interchanged with another part. There are two types of interchangeable parts, namely, global alternates (also known as alternates) and substitute components (also known as substitutes).

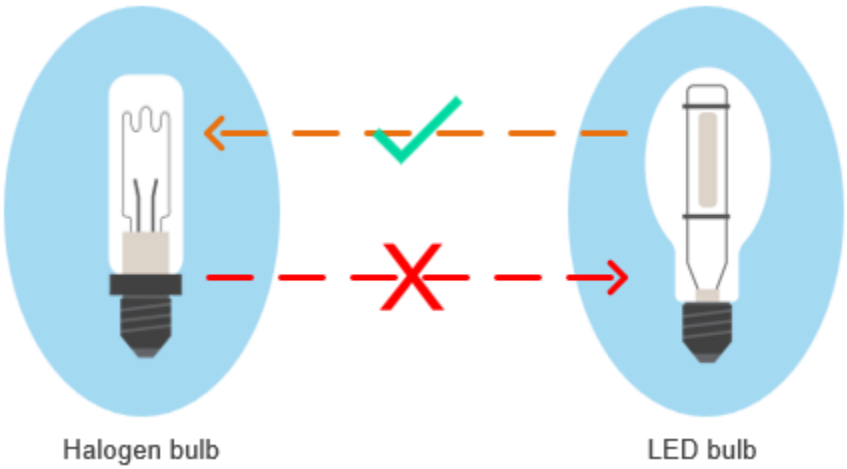
Alternates

An alternate is a part that can be interchanged with another part in all circumstances, irrespective of where the other part is used in a product structure. Alternates are not specific to a variant or a product. You use alternates to specify that a part is interchangeable in any assembly.

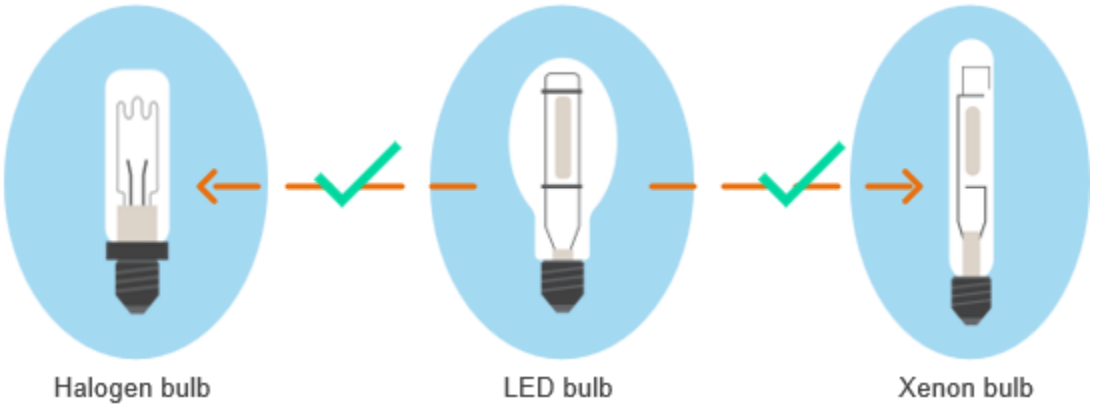
> Example:
>
> Consider a Halogen bulb that is used in several assemblies across products. You can specify an LED bulb as an alternate for the Halogen bulb. This means that in all assemblies and products, in place of the Halogen bulb, the LED bulb can be used.

Note the following important points about alternates:

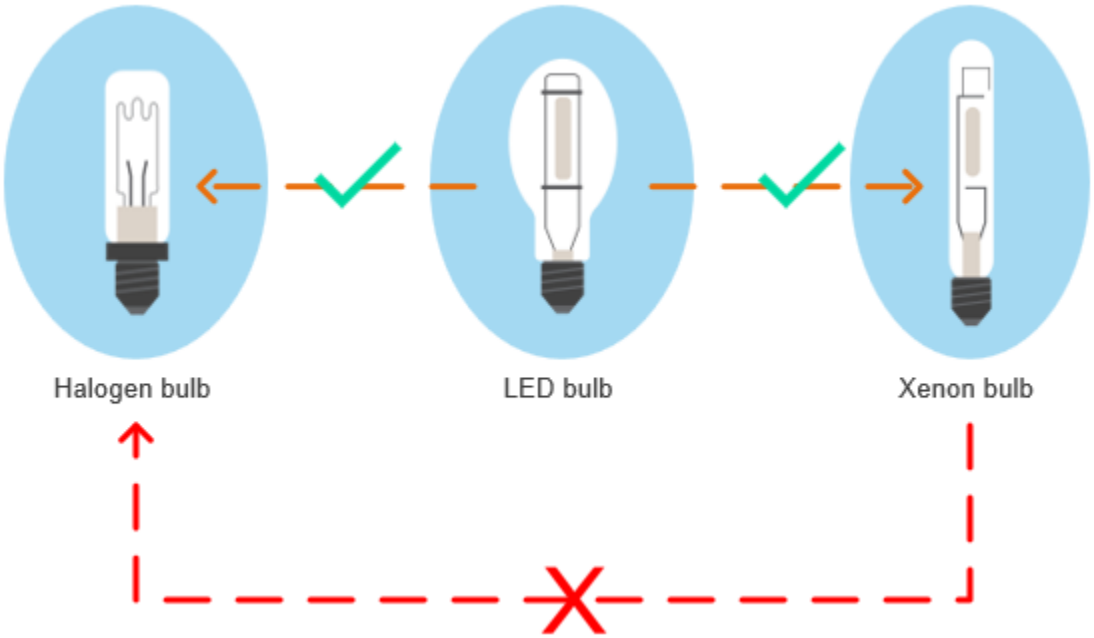
- If you reuse a part in some other assembly, the alternates of the part are carried over.
- Parts and their alternates are related in one way only. For example, the LED bulb is an alternate of the Halogen bulb. However, the Halogen bulb is not an alternate of the LED bulb.



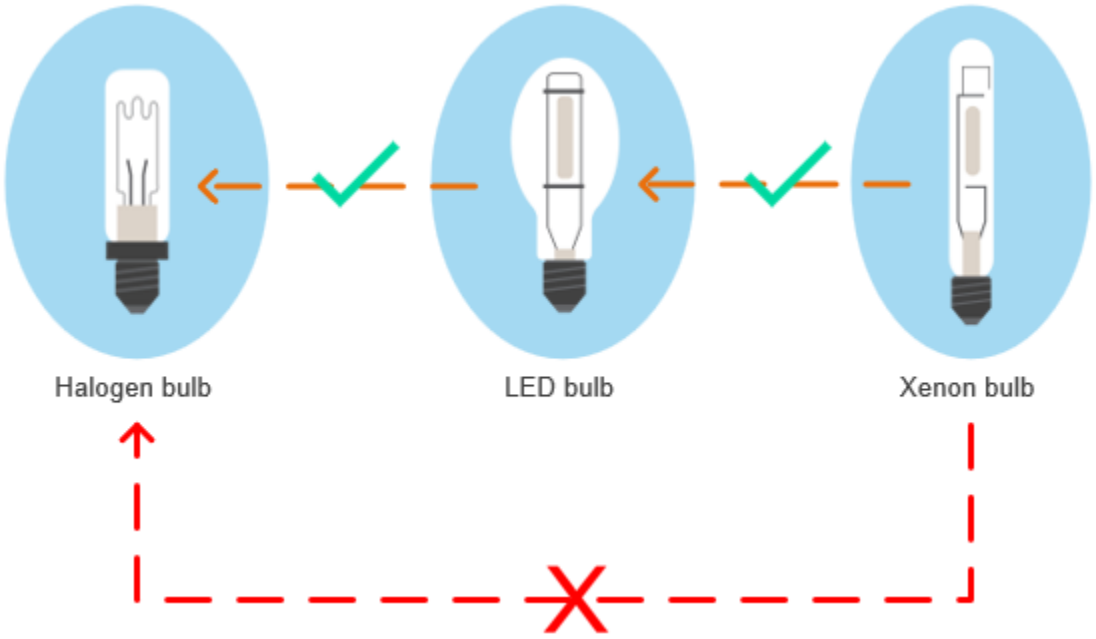
- One part can be an alternate of multiple other parts. For example, the LED bulb is an alternate of the Halogen bulb and of the Xenon bulb.



- Alternate relationships are not shared. For example, the Xenon bulb is not an alternate of the Halogen bulb, even though the LED bulb is an alternate of both bulbs.



- Alternate relationships are not chained. For example, the LED bulb is an alternate of the Halogen bulb. And the Xenon bulb is an alternate of the LED bulb. However, the Xenon bulb is not an alternate of the Halogen bulb.



Substitutes

Substitutes are parts that can be interchanged only with a particular occurrence of a component within a single assembly. You define a substitute for a single occurrence in an assembly and not for an item. You use substitutes to specify that a part is interchangeable only in a specific assembly.

> Example:
>
> Consider that Crosskart has a lighting assembly that uses the Halogen bulb, by default. You set the Xenon bulb as a substitute for the Halogen bulb within the lighting assembly. A substitute can be used in place of another part but only in a specific assembly. So, you cannot use the Xenon bulb in place of the Halogen bulb in another assembly.

Note the following important points about substitutes:

- You define a substitute for a single occurrence in an assembly and not for an item.
- You can add multiple substitutes for an occurrence of a part.
- You can replace a part in an assembly with a substitute.
- All substitutes of one occurrence share the same occurrence attributes. The occurrence attributes can be a find number, quantity, and notes.

Set global alternates for a part

An *alternate part* is a part that can be used in place of another part in any product.

You can set an alternate for only those parts that have **Assembly Indicator** set as **Fixed Assembly** or **Component**.

To set global alternates:

1. Select the part for which you want to set a global alternate.
2. Click the **Overview** tab.

   The alternates available for a part are listed under the **Global Alternates** section.

Add an alternate

1. In the **Global Alternates** section, click **Add Alternate** ⊕.
2. In the **Add Alternate** panel, click one of the following tabs:

Tab	Description
New	On this tab, you can add a new occurrence.
Palette	On this tab, you can paste an occurrence from the clipboard or select one from your **Favorites** or **Recent** list.
Search	On this tab, you can search for an occurrence to add.

3. In the **Add Alternate** panel, select the part that you want to add as a global alternate. You can select multiple parts.
4. Click **Add**.

   The selected parts are added to the **Global Alternates** list.

Remove an alternate

1. From the **Global Alternates** list, select the alternate that you want to remove. You can select multiple alternates.
2. Click **Remove** ⊖.

   The selected parts are removed from the **Global Alternates** list.

Set substitutes for a part in a structure

A *substitute part* is a part that can be used in place of another part in a specific product configuration. A substitute part can be added in the context of an engineering BOM.

You can set a substitute for only those parts that have **Assembly Indicator** set as **Fixed Assembly** or **Component**.

To set substitutes:

1. Select the part for which you want to set a substitute.
2. Click the **Overview** tab.

   The substitutes available for a part are listed under the **Substitutes** section.

Add a substitute

1. In the **Substitutes** section, click **Add Substitute** ⊕.
2. In the **Add Substitute** panel, click one of the following tabs:

Tab	Description
New	On this tab, you can add a new occurrence.
Palette	On this tab, you can paste an occurrence from the clipboard or select one from your **Favorites** or **Recent** list.
Search	On this tab, you can search for an occurrence to add.

3. In the **Add Substitute** panel, select the part that you want to add as a substitute. You can select multiple parts.
4. Click **Add**.

   The selected parts are added to the **Substitutes** list.

Remove a substitute

1. From the **Substitutes** list, select the substitute that you want to remove. You can select multiple substitutes.
2. Click **Remove** ⊖.

   The selected parts are removed from the **Substitutes** list.

Replace an element with a substitute

1. From the **Substitutes** list, select the substitute that you want to use in place of an element.
2. Click **Use** ⇄.

In the structure, the element is replaced with the selected part. The element that is replaced in the structure is added to the **Substitutes** list.

13. Manage structure effectivity

About structure effectivity

A product structure goes through many changes during the evolution of its product definition. Using structure effectivity, you can capture how the product structure has evolved over a period.

An effectivity can be of the following types:

Element effectivity	It denotes from which date or for which unit (and end item) an element is effective.
Release effectivity	It denotes from which date or for which unit (and end item) an element revision is effective. It is necessary to have a release status associated with an element to author release effectivity on it.

Release effectivity helps in configuring different revisions of the same element, wherein with the help of element effectivity you can decide if to show the element itself or not inside the structure.

For example, in an engine cooling block, revision *A* has 5 cooling fins and in revision *B* it is changed to 6, now to decide which revision to use, release effectivity is used. Now suppose we decide to use another engine block itself which is liquid-cooled, to decide between the air-cooled or liquid-cooled engine block element effectivity is used.

An effectivity can be expressed as a date range or a range of units or both. When you edit the effectivity range for one occurrence, the change is applied to all occurrences.

If an element does not have an associated effectivity object, it is assumed to be always effective. It is not constrained by any effectivity.

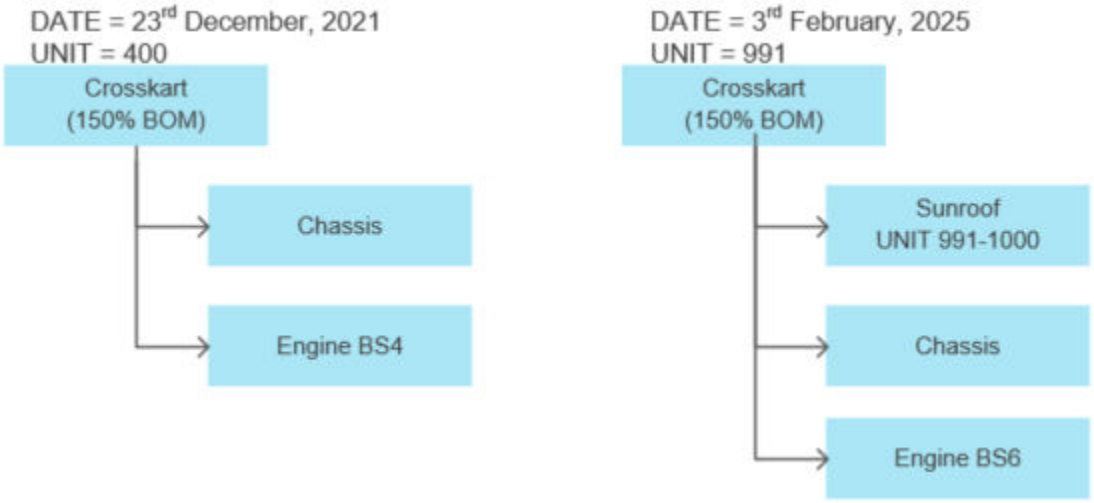
Effectivity can be used for the following purposes:

You can use **group effectivity** to combine multiple end items and range of units for each end item or multiple date ranges to configure multiple occurrences at the same time which have different effectivities on them.

- To reflect changes to the structure over time when new parts replace old ones.

  For example, due to an engineering change, from 1st January 2025 onwards, Engine BS6 must be used instead of Engine BS4. For this, you specify date effectivity on both the engines.

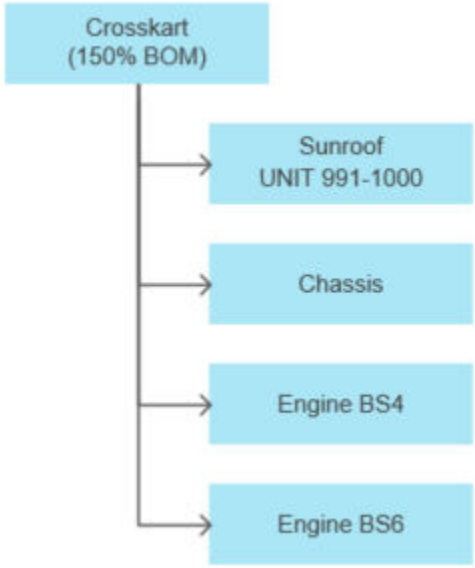
  When you configure Crosskart on 23rd December 2021, Engine BS4 is used. However, when you configure Crosskart on 3rd February 2025, Engine BS6 is used.



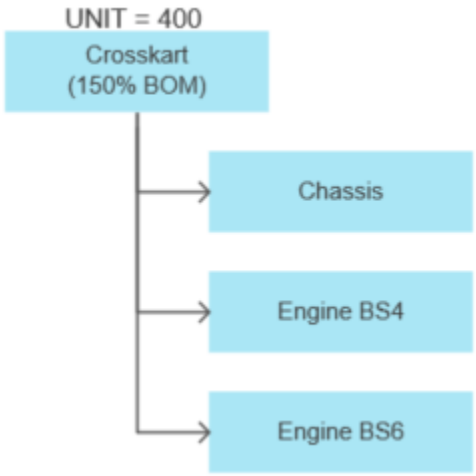
- To state the content of a unit or range of units as a means of managing the variability of the product.

  For example, consider that your company manufactures a product, Crosskart. As per the company's business requirement, a total of 1000 units of Crosskart must be manufactured.

  However, 10 customers want Crosskart with Sunroof. Due to such special customer requests, there is a slight deviation from the standard configuration of the product. It is inconvenient to maintain unique identifiers for several such small deviations. But with occurrence effectivity, it is easier to accommodate such deviations as the existing structure can be modified to accommodate the changes.



  If you specify a unit between 1 and 990, or a range of units between 1 and 990, Sunroof is not included in the configured structure. If you specify a value between 991 and 1000, Sunroof is included.



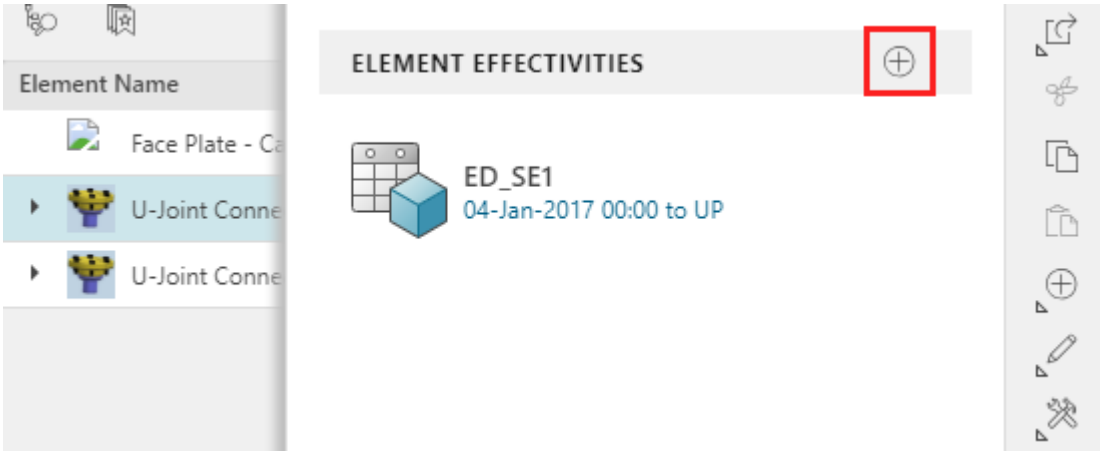
Add or modify an element effectivity

You can **create** an element effectivity using a range of dates, a unit number or a range of units. You can also **update** an existing element effectivity.

Add an element effectivity

1. Select one or more elements and click **Add** ⊕ > **Element Effectivity**.

2. In the **Element Effectivity** panel, click **Add Effectivities** ⊕.



3. You can add multiple effectivities to the selected element.

> Note:
>
> Add a new effectivity or locate existing effectivities from the **Search** tab.

To author a new date effectivity:

a. In the **New** tab, select **Date**.

b. (Optional) Select the **Share** check box to create a shared effectivity.

The **Name** field is displayed only for shared effectivities, so that users can search for the effectivity by name.

c. Select the **Start** date from the calendar.

d. Select the **End** date from the calendar. If applicable, you can select **UP (all future dates)** or **SO (stock out)**.

e. (Optional) Click **Replace** to add a new **End Item**, or search for an existing **End Item**.

f. (Optional) Select the **Protect** check box if you do not want the effectivity to be edited.

g. Click **Add** to create the effectivity.

The element effectivity is applied to the selected element. If the applied **Revision Rule** or **Date** effectivity is not applicable to this element, then it is excluded from the structure. Select the **Show Excluded By Effectivity** toggle to show this element.

> Note:
>
> You cannot author multiple date ranges inside a single date effectivity on a single occurrence.

OR

To author a new unit effectivity:

a. In the **New** tab, select **Unit**.

b. (Optional) Select the **Share** check box to create a shared effectivity.

The **Name** field is displayed only for shared effectivities, so that users can search for the effectivity by name.

c. Specify the desired unit or a range of units in the **Unit** field.

d. Click **Replace** to add a new **End Item**, or search for an existing **End Item**.

e. (Optional) Select the **Protect** check box if you do not want the effectivity to be edited

f. Click **Add** to create the effectivity.

The element effectivity is applied to the selected element. If the applied **Revision Rule** or **Unit** effectivity is not applicable to this element, then it is excluded from the structure. Select the **Show Excluded By Effectivity** toggle to show this element.

> Note:
>
> You cannot edit multiple date ranges inside a single date effectivity on a single occurrence.

Edit or remove an element effectivity

- To update an element effectivity, select it and click **Edit**.
- To remove an element effectivity, select it and click **Remove**.

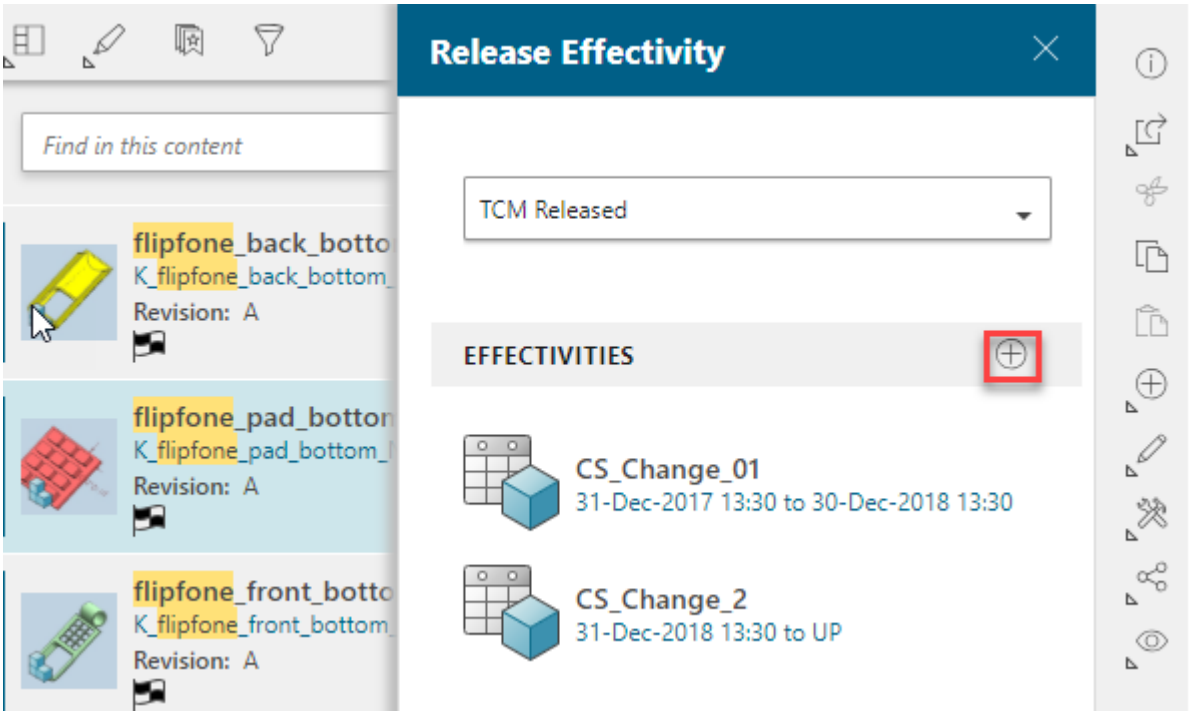
After the element effectivity is updated for an element, if the applied **Revision Rule** or *effectivity criteria* is not applicable to this element, then it is excluded from the structure. Select the **Show Excluded By Effectivity** toggle to show this element.

Add or modify release effectivity

You can **create** a release effectivity using a range of dates, a unit number or a range of units. You can also **update** existing release effectivity.

Add release effectivity

1. **Set an active change notice to track an engineering BOM**.
2. Select the element (having some release status associated with it) from the structure and click **Add** > **Release Effectivity**.
3. You can also search the element (having some release status associated with it) and click **Manage** > **Release Effectivity**.
4. In the **Release Effectivity** panel, select the appropriate release status.
5. In the **Release Effectivity** panel, click **Add Effectivities**.



6. Add a new effectivity or from the **Search** tab locate existing effectivities. You can add multiple effectivities to the selected element.

   To specify the dates for release effectivity:

   a. In the **New** tab, select **Date**.

   b. Select the **Share** check box to create a shared effectivity. Specify the effectivity **Name**.

      The **Name** field is displayed only for shared effectivities. You can search for the effectivity by name.

   c. Select the **Start** date from the calendar.

   d. Select the **End** date from the calendar. If applicable, you can select **UP (all future dates)** or **SO (stock out)**.

   e. (Optional) Click the **Replace** ⇄ icon to add a new **End Item** or search for an existing **End Item**.

   f. Select the **Protect** check box if you do not want the effectivity to be edited

   g. Click **Add** to create the effectivity.

      After release effectivity is added, the occurrence is configured based on the current revision rules.

OR

To specify units for release effectivity:

a. In the **New** tab, select **Unit**.

b. Select the **Share** check box to create a shared effectivity. Specify the effectivity **Name**.

   The **Name** field is displayed only for shared effectivities. You can search for the effectivity by name.

c. Specify the desired unit or a range of units in the **Unit** field.

d. Click the **Replace** icon to add a new **End Item** or search for an existing **End Item**.

e. Select the **Protect** check box if you do not want the effectivity to be edited

f. Click **Add** to create the effectivity.

   After the release effectivity is added, the element is configured based on the current revision rules.

Edit or remove the release effectivity

To update the newly added release effectivity, select it and click **Edit**.

To remove the release effectivity, select it and click **Remove**.

After release effectivity is updated, the part revision is configured based on the current revision rules.

Configure structure using group effectivity

A group effectivity is a combination of multiple end items and range of units for each end item or multiple date ranges. When you want to configure multiple occurrences at the same time which have different effectivities on them, you can configure using group effectivity.

To enable the creation of group effectivities, the administrator must set the **Fnd0EnableMultiUnitConfiguration** global constant to **true** at each site with the Business Modeler IDE.

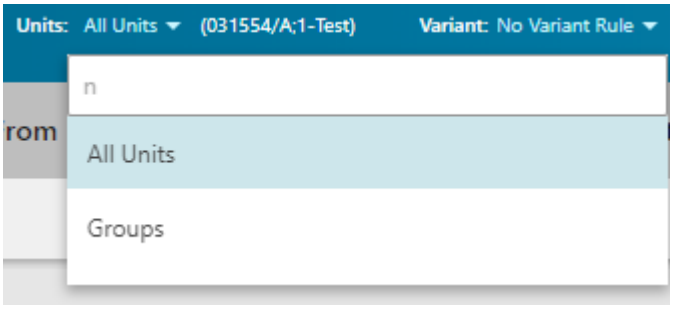
Group effectivity is used to configure product structure occurrences of an assembly by:

- Specifying multiple end items
- Specifying the unit effectivity ranges for each of those end items

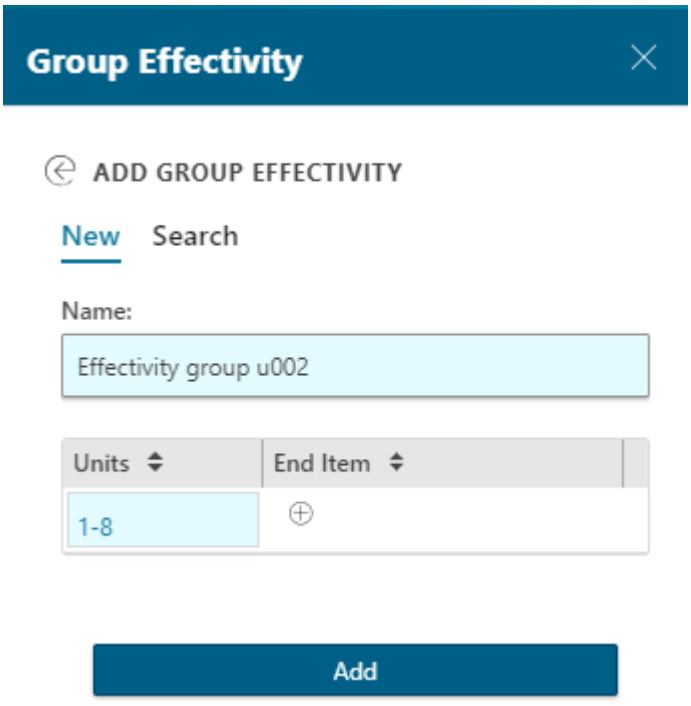
- Specifying multiple date ranges

Configure a structure using a group of unit effectivities and end items

1. Search and open the structure that you want to configure with group effectivity.
2. Select the structure and click **Units** > **Groups**.



3. In the **Group Effectivity** pane, click the **Add Group Effectivity** ⊕ icon.
4. Click **New**.



5. Specify the effectivity **Name**.
6. Specify the desired unit or a range of units in the **Unit** field.

7. In the **End Item** field, click **Add** ⊕ to add a new **End Item** or search for an existing **End Item**.

   Once the unit and end item information is entered, a new row is added to the table.

8. Add more units and unique end items as required.

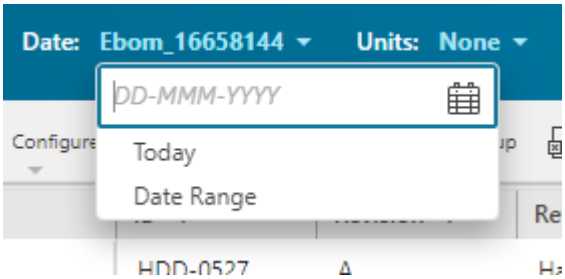
9. Click **Add**.

   A group effectivity is created and applied to the currently displayed structure. As the effectivity criteria set in the header, and in the revision rule are in sync, you may lose any earlier **configuration done using the revision rule**.

Configure a structure using a range of date effectivities containing an end item

1. Search for and open the structure that you want to configure with date range effectivity.

2. Select the structure and click **Date** > **Date Range**.



3. In the **Date Range Effectivity** panel, click **New**.

4. In the **Name** box, specify a name for the date range effectivity.

5. In the **Start** box, specify a start date for the date range effectivity.

6. In the **End** box, choose one of the following values:

   - **Date**
   - **UP - All Future Dates**
   - **SO - Stock Out**

7. In the **End Item** field, click **Add** ⊕.

8. Select an end item from the **Palette** tab or search for and select an end item from the **Search** tab.

9. Click **Add**.

10. Click **Apply**.

Edit or remove group effectivity of units and end items

1. Select the structure which is configured with group effectivity and click **Units** > **Groups**.
2. In the **Group Effectivity** pane, select the effectivity that you want to edit or remove.

   The **Remove Group Effectivity** and **Edit** icons are displayed.

   a. To remove the group effectivity, click the **Remove Group Effectivity** icon to remove the effectivity.

   b. To modify the group effectivity, click **Edit** and then change the properties you want to edit.
3. Click **Save**.

Edit or remove range of dates

1. Select the structure which is configured with group effectivity and click **Date** > **Date Range**.
2. In the **Date Range Effectivity** pane, select the date range from the **Search** tab.
3. To edit the date range, click **Edit** and modify the dates and click **Apply**.
4. To remove the applied date range, select **Today** from the header.

14. Filter structures (Smart Discovery)

About filtering structures

You **filter a structure** so that you can work with a specific product definition, which is comparatively smaller in size than the entire structure.

You can filter structures if your Teamcenter setup has the Context Management User and Smart Discovery licenses.. Additionally, you can filter only those structures that are indexed using Smart Discovery Indexing. Such structures can be identified by the *Indexed* indicator  . Hovering over the indicator shows the start time of the last successful index update indicating whether the modified structure is available for filter.

The different ways to filter a product structure are as follows:

- **Filter by spatial proximity and volume**

  Filter a structure by locating parts that are at a certain proximity from a specific part. You can also filter a structure by locating parts that are inside or outside a certain spatial zone. The spatial zone is represented by a bounding box. You can also choose to locate parts that are on the edges of the bounding box.

- **Filter by period**

  Filter a structure by selecting a date range. You can select the date range when the structure was created or modified.

- **Filter by properties**

  Filter a structure by specifying certain properties such as *owner*, *type*, and *occurrence notes*.

  You cannot find an element within a structure by specifying occurrence properties. You can do so by specifying item revision properties. However, you can filter a structure by specifying both occurrence properties and item revision properties.

- **Filter by partitions**

  Filter a structure by selecting partitions.

Filter a structure

You filter a structure so that you can work with a specific product definition, which is smaller in size than the entire structure.

Restrictions and limitations

You can filter structures if your Teamcenter setup has the Context Management User and Smart Discovery licenses.. Additionally, you can filter only those structures that are indexed using Smart Discovery Indexing. Such structures can be identified by the *Indexed* indicator. Hovering over the indicator shows the start time of the last successful index update indicating whether the modified structure is available for filter.

Procedure

1. Search for a structure, and click **Open** to open it.

2. Click **Filter**.

3. In the **Filter** panel, click **Settings**, enable or disable the following options, and click **Apply**:

   - **Auto-update filters**: By default, this option is enabled, and the structure is filtered in real-time as you apply each filter. When this option is disabled, you select all filters first and then apply them on the structure.

   - **Filter/Append Elements with Children**: By default, this option is enabled, and the children of the structure element selected as a filter are automatically added to the filter criteria. When this option is disabled, the children are not added to the filter criteria.

4. In the work area, right-click a structure element, and choose the filters.

   If the administrator has not configured the advanced search options, you can use the following filters:

   - **Filter Selected Elements with children** to narrow down the structure by including the selected elements along with the children. The elements and the children are added to the filter criteria using the **AND** operator.

     This filter option is displayed when the **Filter/Append Elements with Children** setting is enabled.

   - **Filter Selected Elements** to narrow down the structure by including only the selected elements and not their children. The selected elements are added to the filter criteria using the **AND** operator.

   - **Append Selected Elements with children** to broaden the filtered structure by including the selected elements along with the children. The elements and the children are added to the filter criteria using the **OR** operator.

     This filter option is displayed when the **Filter/Append Elements with Children** setting is enabled. Additionally, this option is displayed only when after you first apply another filter.

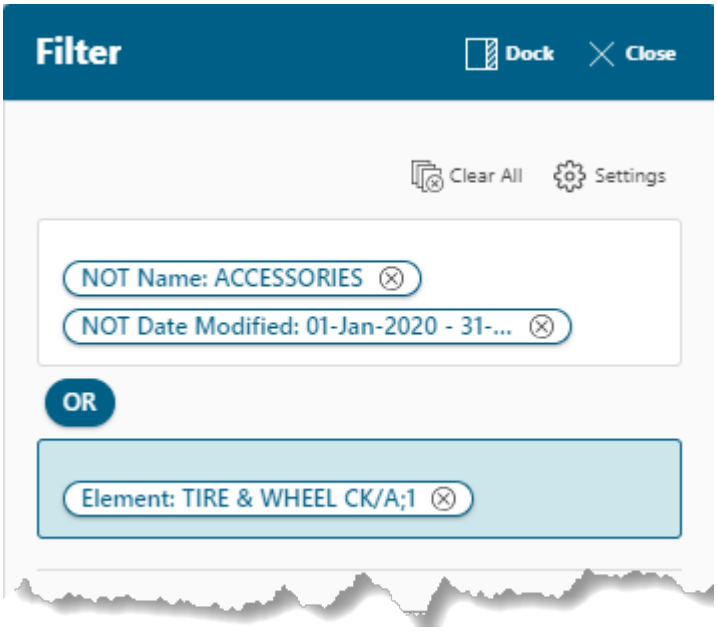
- **Append Selected Elements** to broaden the filtered structure by including only the selected elements and not their children. The selected elements are added to the filter criteria using the **OR** operator.

  This filter option is displayed when the **Filter/Append Elements with Children** setting is disabled. Additionally, this option is displayed only when after you first apply another filter.

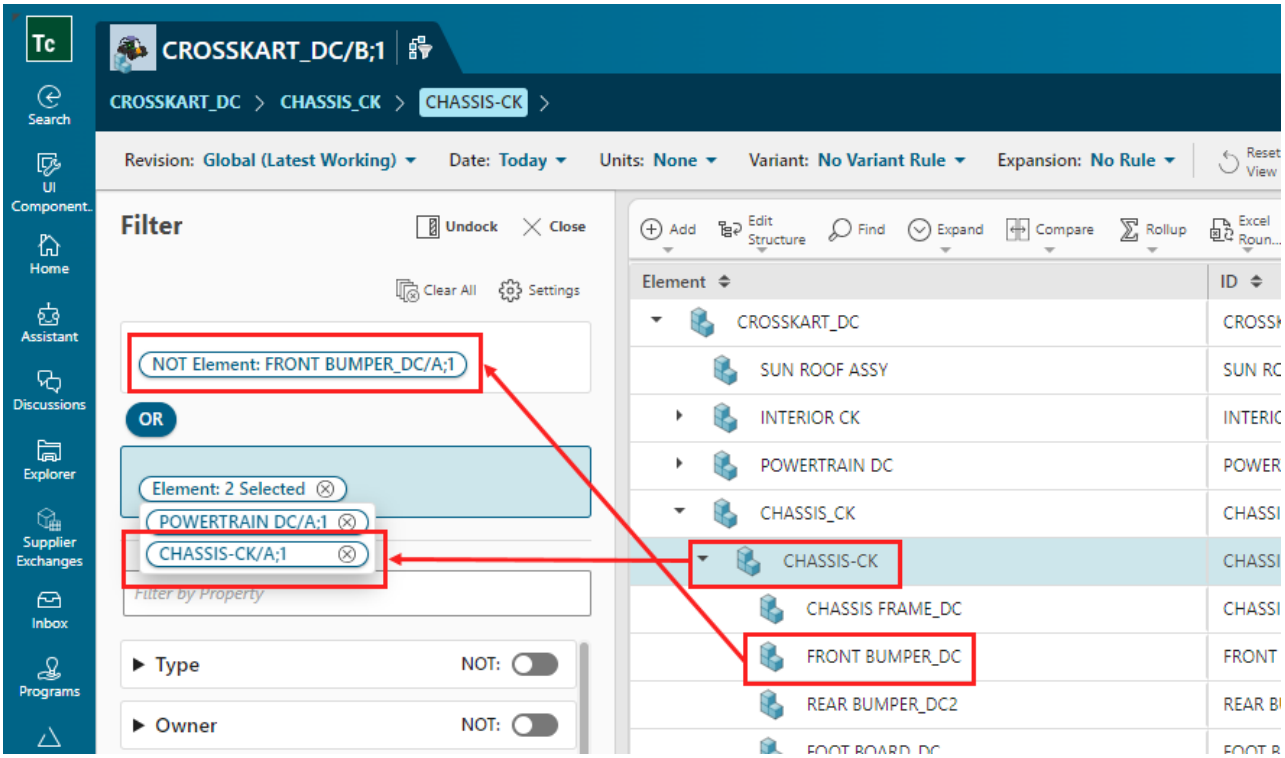
- **Exclude Selected Elements** to narrow down the structure by excluding the selected elements along with the children. The elements and children are added to the filter criteria using the **NOT** operator. For example, if you want to exclude an assembly and its children parts, select that assembly and click **Exclude Selected Elements**.

The filters are applied in groups. If the advanced search options are not configured, a maximum of three groups with the **OR** operator can be created and you can use the same filter expression in NX.

The filters applied using the **OR** operator are always placed last in the filter criteria.



Sometimes, when you append selected elements with children, a filter applied using the **OR** operator overrides a filter applied using the **NOT** operator. For example, if you want to exclude **FRONT_BUMPER_DC** from the structure but want to append its parent **CHASSIS-CK** with children, **FRONT_BUMPER_DC** is automatically included in the structure.



If the administrator has configured the advanced search options, you can use the following filters:

- **Filter Selected Elements with children** to narrow down the structure by including the selected elements along with the children. The elements and the children are added to the filter criteria using the **AND** operator.

  This filter option is displayed when the **Filter/Append Elements with Children** setting is enabled.

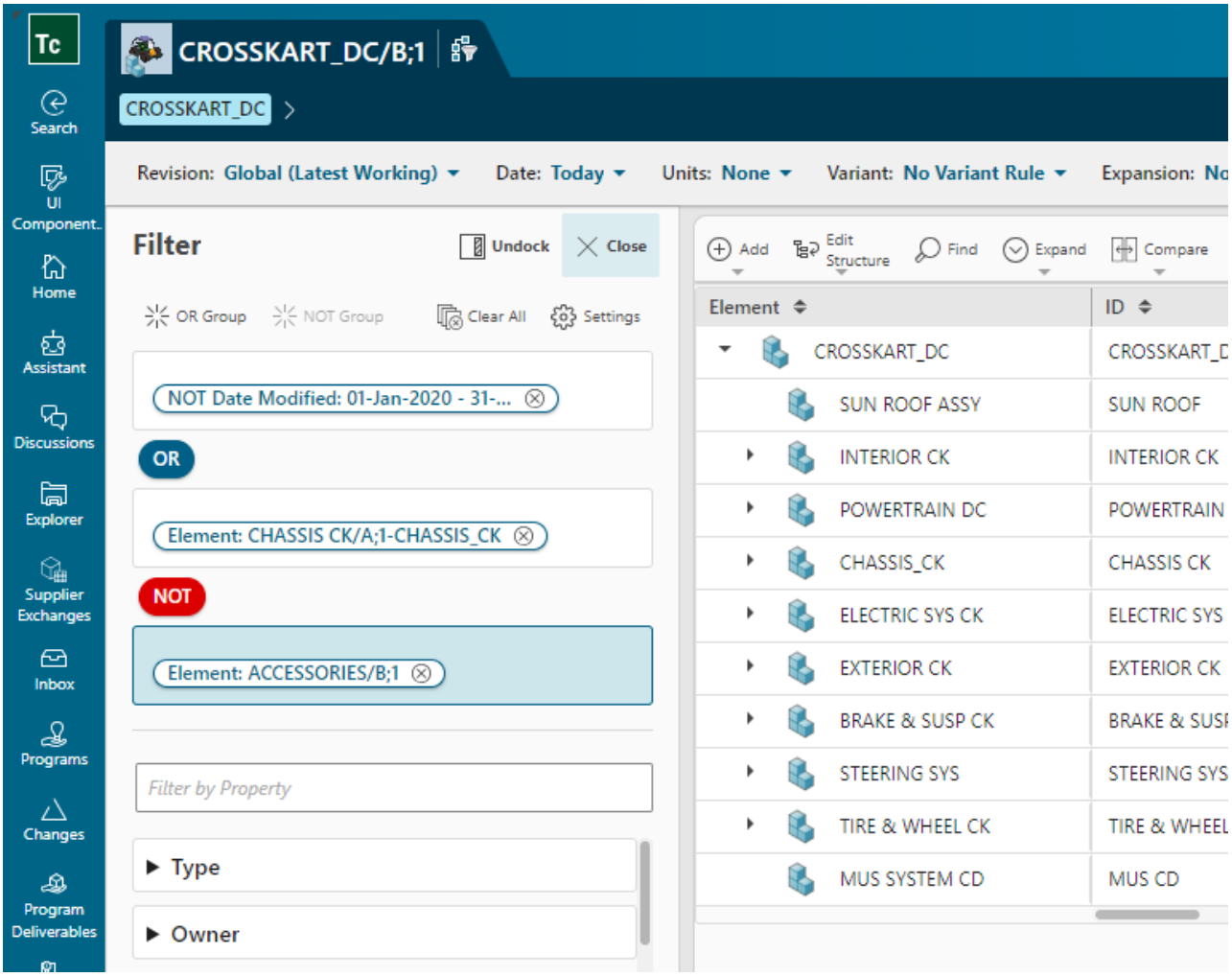
- **Filter Selected Elements** to narrow down the structure by including only the selected elements and not their children. The selected elements are added to the filter criteria using the **AND** operator.

- **Exclude Selected Elements** to narrow down the structure by excluding the selected elements along with the children. The elements and children are added to the filter criteria using the **NOT** operator. For example, if you want to exclude an assembly and its children parts, select that assembly and click **Exclude Selected Elements**.

If the advanced search options are configured, the **OR Group** and **NOT Group** buttons are available in the **Filter** panel. You can use these buttons to create the filter expression which is a combination of the **OR** and **NOT** groups. You can create multiple **OR** groups in the expression but only one **NOT** group can exist in the filter expression.

When the filter expression is a combination of **OR** groups and a **NOT** group, the filter shows all results from the **OR** groups by excluding the result from the **NOT** group. For example, suppose

that you want to filter the structure that was not created between 1 January 2020 through 31 December 2020, contains **CHASSIS_CK**, and does not contain **ACCESSORIES**. In such a case, you can use the filters shown in the following image.



5. In the **Filter** panel, apply additional filters, as required:

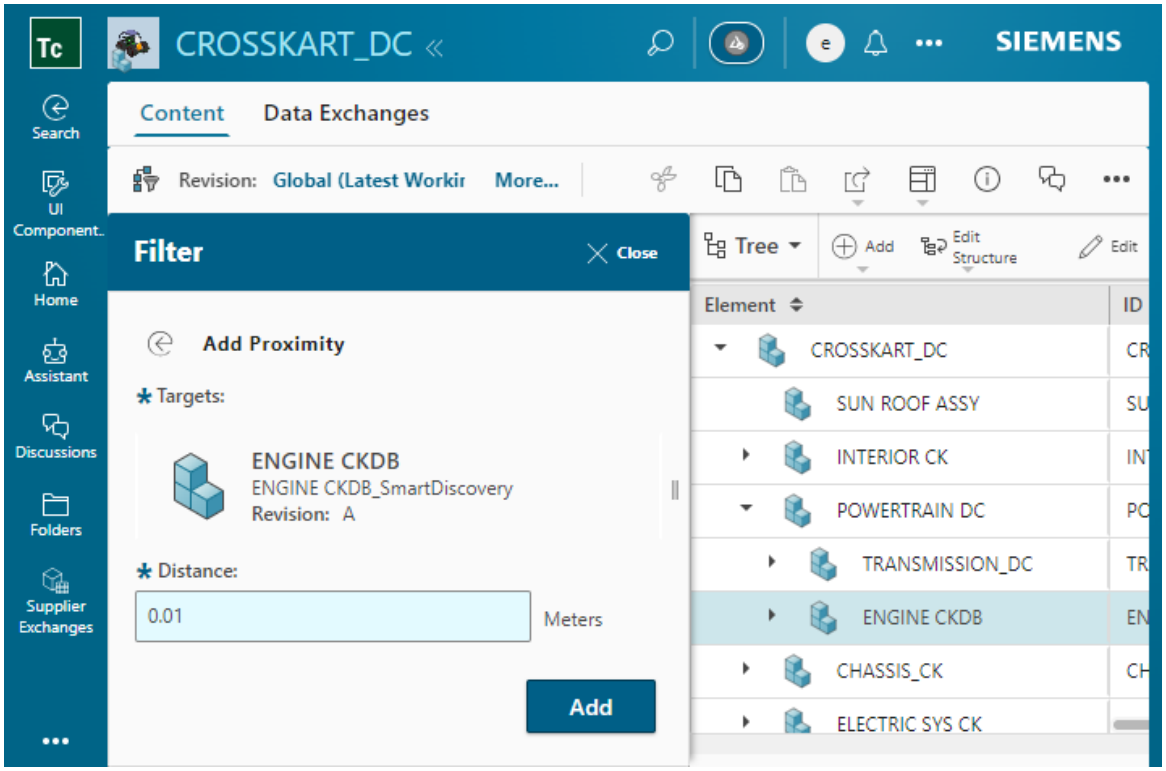
To filter by spatial proximity:

You require the Smart Discovery license to filter by proximity.

a. From the work area, select a structure element to locate other structure elements that are at a certain proximity from it.

b. In the **Filter** panel, select **Proximity** from the **Spatial** section.

c. Enter the proximity in **Distance** and click **Add**.

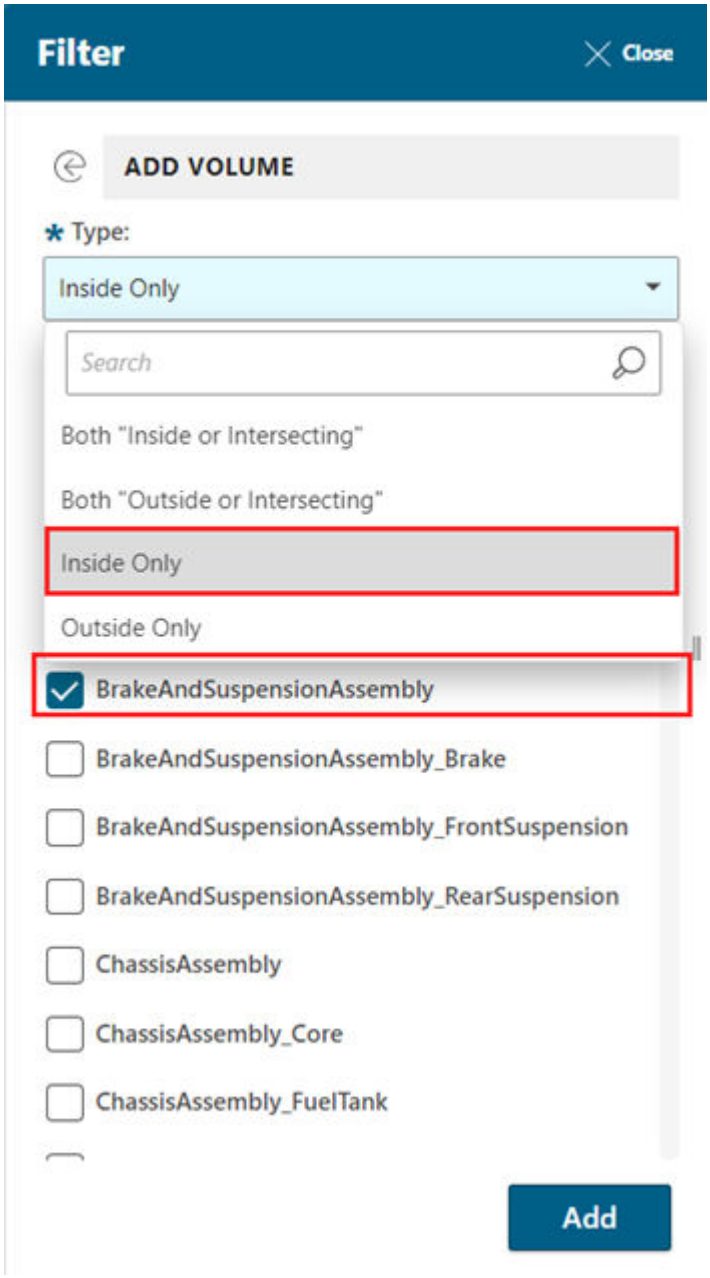


To filter by spatial volume:

You require the Smart Discovery license to filter by volume.

a. In the **Filter** panel, select **Volume** from the **Spatial** section.

b. Select the volume for which you want to perform the search. For example, you can choose to locate parts that are inside the brake and suspension assembly.



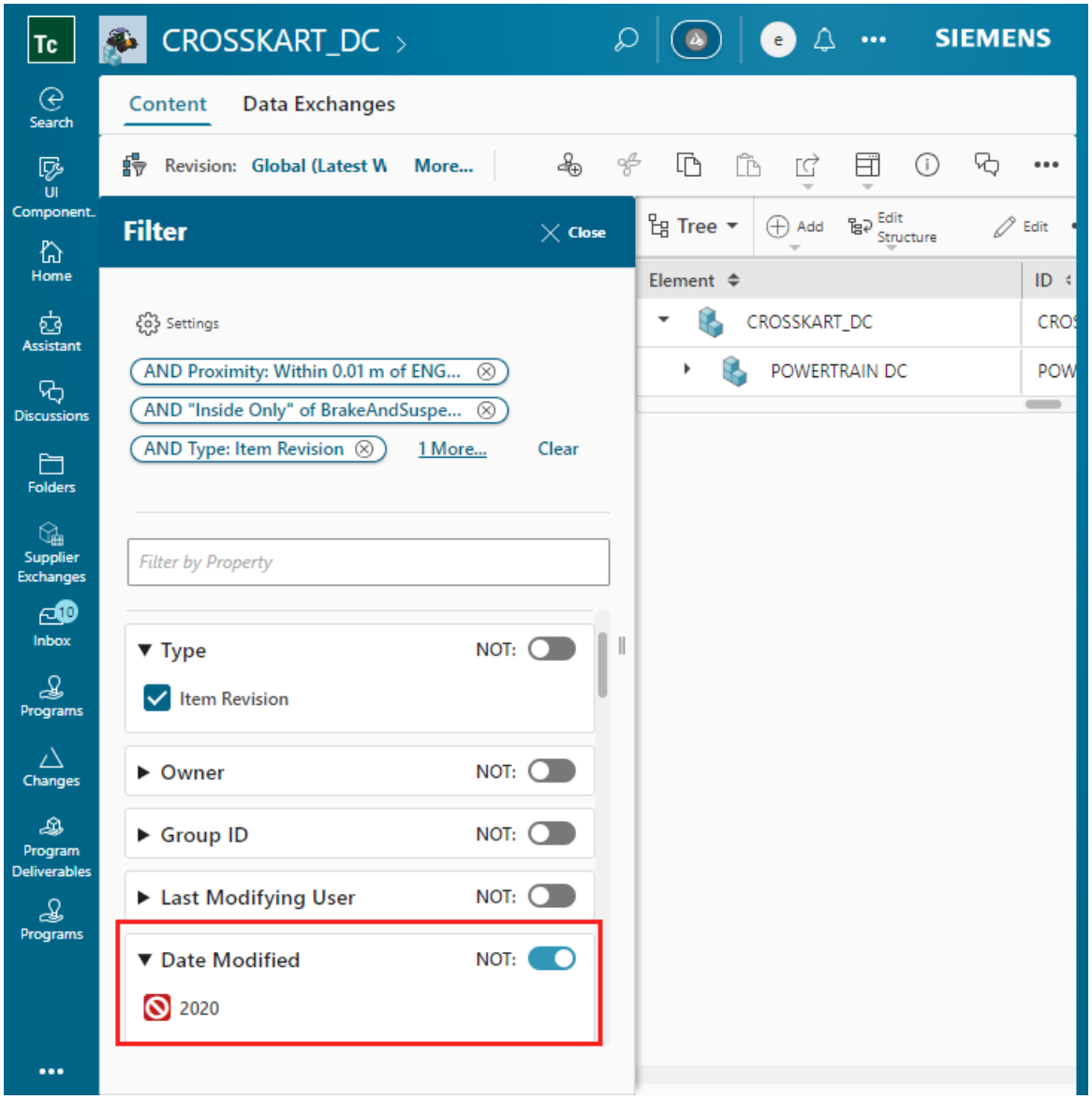
c. Click **Add**.

To filter the structure by properties:

> Note:
>
> The top element in a structure or BOM is not considered for the **Find** or **Filter** actions. Therefore, the properties of the top element are not available while you perform these actions.

a. Select the attributes, such as **ID**, **Occurrence Type**, and **Date Modified**, by which you want to further filter the structure In the **Filter** panel. For example, include all elements that are of the type, **Item Revision**.

To exclude a property as a filter, select the property and enable the **NOT** option. For example, to exclude all elements that were not modified in 2020, select **2020** and enable the **NOT** option in the **Date Modified** section.

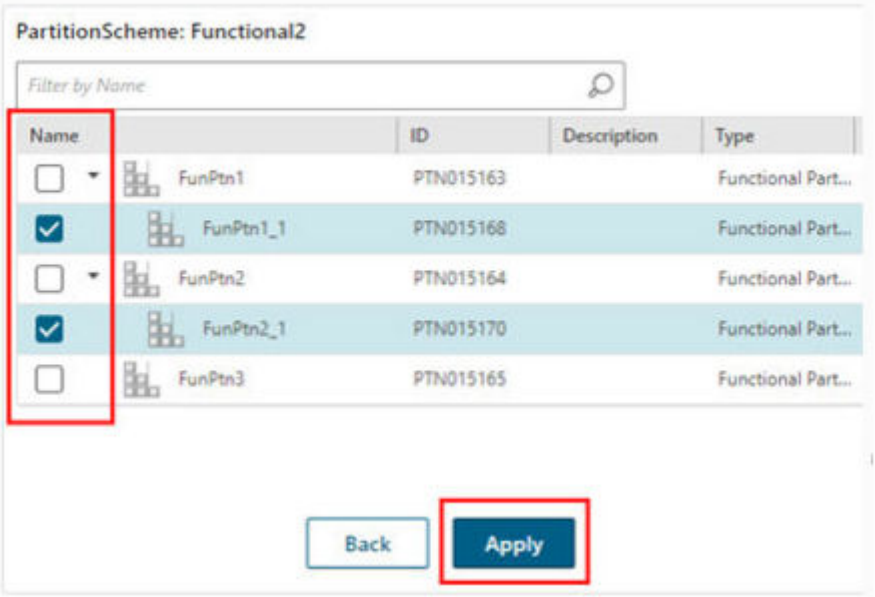


To filter by partitions:

You require the Smart Discovery license to apply a proximity filter.

a. In the **Filter** panel, select a partition scheme.

b. Select the partitions that contain the required structure elements and click **Apply**.



If a selection partition, in turn, has child partitions, the elements of the child partitions are also considered.

As you select different filters in the **Filter** panel, an expression is built at the top.

To remove any filter from the expression, click ⊗ next to it.

To remove all filters, click **Clear All**.

6. If you disabled auto-update, click **Filter** to filter the structure.

> Note:
>
> Filtering by spatial proximity and volume supports one-to-one, one-to-many, and many-to-one alignments.

To view all the structure elements including the ones that are not displayed due to the applied filters, click **Configure** and apply the **Show Excluded by Filtering** option.

You can save the filtered structure in a *workset* or *session* for easy retrieval.

Reset a filtered structure

Reset removes all filters and sets the configuration criteria to its default settings. To reset a structure:

1. Search for the structure.

2. Click **Open** to open the structure.

3. Select **Configure** > **Reset View** to remove the filters applied to the structure.

15. Configure structures

About configuring structures

To view a specific configuration of the structures, you can configure a structure using:

- **Selection**
- **Proximity**
- **Effectivities**
- **A closure rule for expansion**
- **Revision rules**
- **Variant rules**
- **A custom configuration**

Configure a structure by selection

You can configure a structure based on the Product Configurator-authored variants used in a structure element. This method of configuring a structure is called *configure by selection*. Based on the variability of the selected elements, other elements are configured in or out of the structure, which enables you to validate all possible and valid variant combinations according to your product configurator-authored variant definitions.

Restrictions and limitations

You can configure a structure by selection only if the structure is indexed by using Smart Discovery Indexing and your Teamcenter setup has the Context Management User license.

Procedure

1. Search for a product structure on which variability is set by using Product Configurator variants.
2. Open the structure.
3. Locate a structure element on which variability is set. You cannot configure the structure by selecting its root element.
4. Click **Configure** > **Configure by selection**.

Configure a structure by proximity

You can configure a structure based on the legacy classic variants used in a structure element. This method of configuring a structure is called *configure by proximity*. Based on the variability of the selected elements, other elements are configured in or out of the structure.

Restrictions and limitations

You can configure a structure by proximity only if the structure is indexed by using Smart Discovery Indexing and your Teamcenter setup has the Context Management User license.

Procedure

1. Search for a structure on which variability is set by using legacy variants.
2. Click **Open** to open the structure.
3. Click **Filter**.
4. Select a structure element from the work area. You cannot configure the structure by selecting its root element.
5. In the **Filter** panel, click **Proximity**.
6. Enter the proximity in **Distance** and click **Add**.
7. Click **Configure** > **Configure by proximity**.

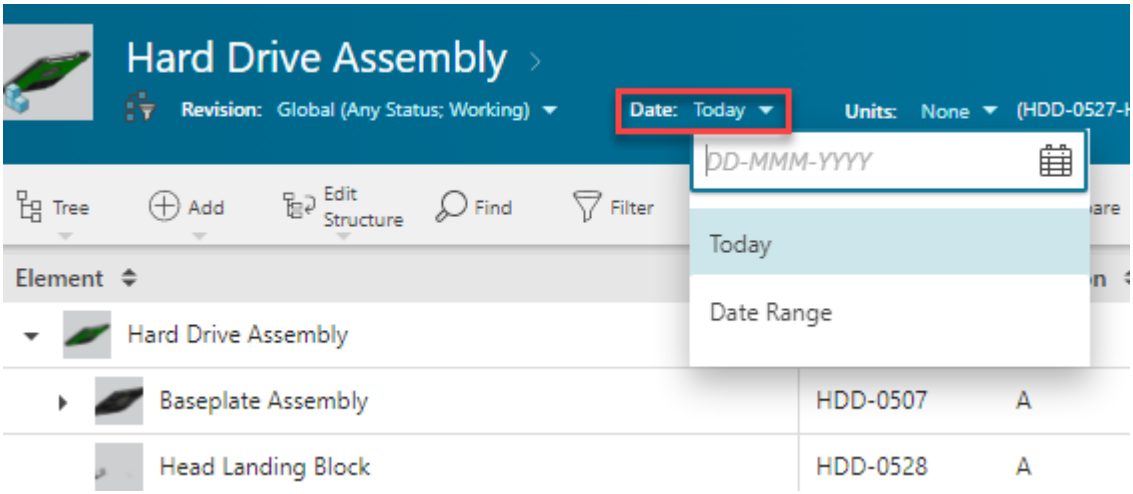
Configure a structure by effectivity

You can configure a structure by **date** as well as by **unit** effectivity.

To configure by date effectivity:

1. Search for and open the product to be configured.
2. Select **Date** in the header. Alternatively, select **Configure** > **Configuration** to display the **Configuration** panel.

   In the **Date** section, you can select **Today** or a specific date from the calendar. You can also add a range of dates.



To add a new range of dates:

a. Select **Date Range**.

b. In the **Date Range Effectivity** panel, you can add a new range of dates or locate the existing date effectivities from the **Search** tab.

c. To author a new range of dates inside the **New** tab:

   A. Give a suitable name to the new date range.

   B. Select the **Start** date from the calendar.

   C. Select the **End** date from the calendar. If applicable, you can select **UP** (all future dates) or **SO** (stock out).

   D. Click **Apply**.

(Optional) To add an end item:

1. In the **Configuration** panel, click the element displayed in the **End Item** section. By default, the top-level element is displayed in this section.

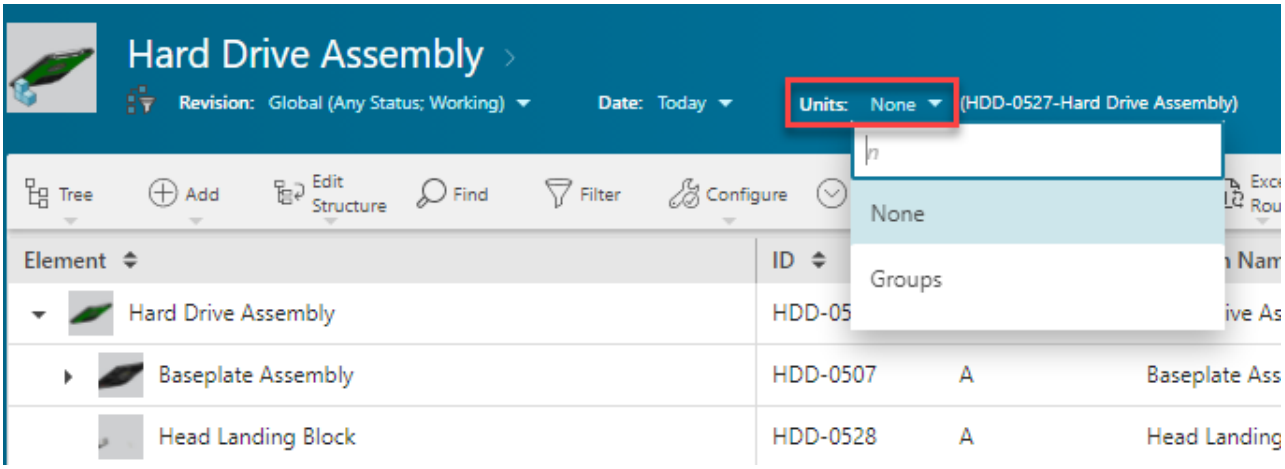
2. Search for an end item and select it or choose an end item from the **Palette** tab.

   The end item that you selected is displayed in the **End Item** section on the **Configuration** panel.

To configure by unit effectivity:

1. Search for and open the product to be configured.

2. Select **Unit** in the header.



You can enter a specific integer or select the following options in unit effectivity:

None	To display all the elements without effectivity.
Groups	To **author new group effectivity** and apply it.

Configure a structure with a closure rule for expansion

A closure rule holds subsidiary rules that define the objects of interest in a given structure. The rules determine if an object is included in a given structure based on their types, classes, and the relationship between them.

Typically, a Teamcenter administrator creates and adds closure rules.

For more information about closure rules, see *Managing closure rules* in *PLM XML/TC XML Export Import Administration* in the Teamcenter documentation.

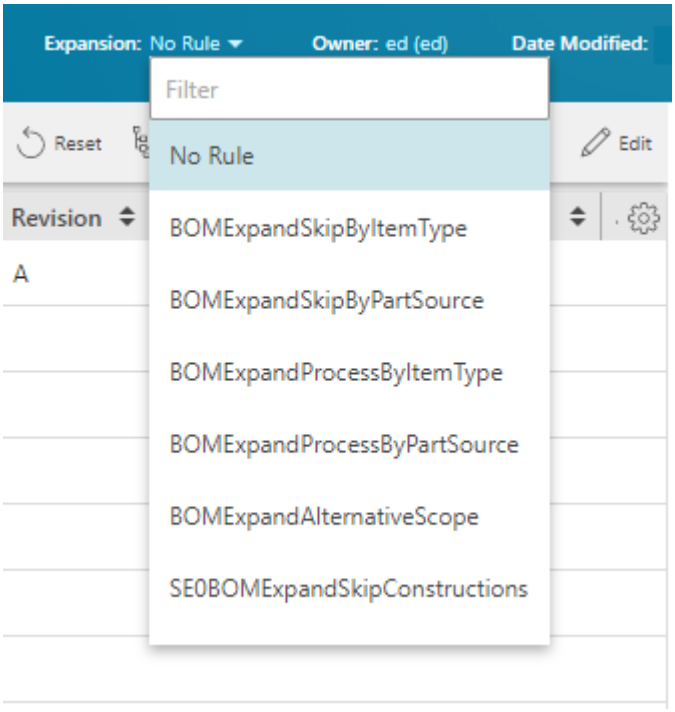
In Teamcenter:

- You can configure a non-indexed structure with a closure rule to apply an expansion or filtering logic to the structure.
- You cannot create or edit closure rules.
- You can use only static closure rules listed in the **ClosureRulesForBomExpansion** preference.

To configure a structure by using a closure rule:

1. Search for and open the structure (only non-indexed structures) to be configured.

2. To apply a closure rule, select the rule from the **Expansion** list in the header.



Teamcenter refreshes and displays the configured content based on the applied closure rule.

Configure a structure with revision rules

Understanding revision rules

You can create and apply revision rules that select the appropriate revision of parts and assemblies in a product structure. A revision rule:

- Selects the working revisions and (optionally) specifies the owning user or group.
- Selects revisions by status (according to status precedence) or the latest revision with any based on the using release date.
- Optionally specifies the effectivity against which the revisions are configured. Effectivity may be specified by date or by unit number.
- Selects revisions in a specified override folder.
- Selects the latest revisions according to the revision ID in the following order: alphanumeric, numeric, or creation date. This selection does not depend on whether the revisions are in the working or released state.

You define each of these criteria with a revision rule entry. A revision rule may contain any number of rule entries, each of which attempts to select a revision according to the specified criteria, for example, the status that the revision should have or the user or group that owns the revision.

Teamcenter evaluates rule entries in the order of precedence until a revision is successfully configured. You can include some entries more than once to define the order of precedence. You can modify the order of the rule entries to change the precedence Teamcenter uses when evaluating the revision rule. Certain rule entries can also be grouped so that they are evaluated with equal precedence.

Viewing and updating a revision rule

You can configure a structure with a revision rule. You can also view or update revision rule clauses in the context of a structure.

The following revision rule clauses are supported for viewing and updating in Active Workspace:

Revision	Description
Date	Loads item revision with a specific date.
End item	Configures a structure by effectivity with respect to a product, system, or module. For example, you can configure the structure of unit number **110** in product **X400**, where **X400** is the end item.
Latest	Loads item revisions regardless of whether they are released or not.
Override	Overrides all item revisions available in an override folder. The revision rule is not evaluated for these item revisions.
Precise	Loads item revisions in a precise product structure.
Status	Loads item revisions that are released with a specific status.
Unit Number	Loads item revisions with a unit number as specified by the user. It is used in combination with the status rule entry with unit number effectivity. Typically, a unit number is a property of the end product or a major module of a product. As Teamcenter may manage many units, you typically qualify a unit number entry with an end item entry.
Working	Loads the working item revision that does not have a release status.

The **Branch** clause is not supported in Active Workspace, while the **Nested Effectivity** clause is read only.

Updating a revision rule

You can view and modify the revision rule clauses, but you cannot save the modified rule as a new revision rule. It is saved as a modified version of the existing revision rule.

The modified revision rule is available only to the user who modified it.

For one user session, you can have multiple modified versions of the revision rule. However, once you log off, only the modified versions applied to the product are saved. Other versions are not saved.

The modifications do not impact the original revision rule.

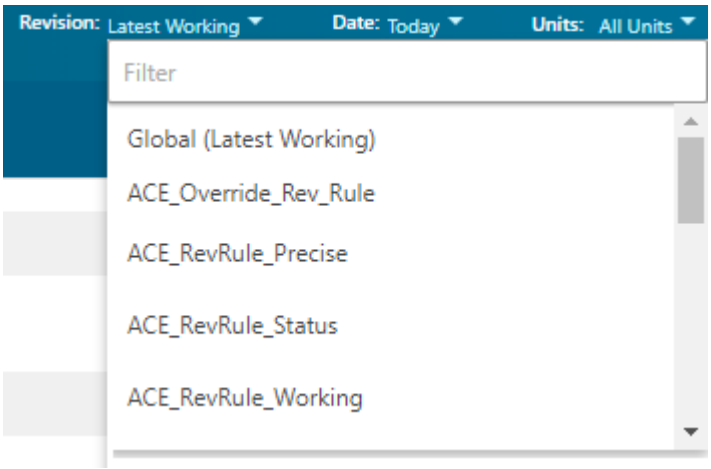
If the nested effectivity clause is applied on the original revision rule, it can be viewed and used in the modified revision rule, but it cannot be updated.

Configure structures with a revision rule

To configure a structure by an existing revision rule:

1. Search for and open the product to be configured.

2. To apply a revision rule, select the rule from the **Revision** list in the header.



   Teamcenter refreshes and displays the configured content based on the new configuration.

Alternatively, you can perform the following steps to apply a revision rule using the **Configuration** panel.

1. Search for and open the product to be configured.

2. Click **Configure** and then select **Configuration** to display the **Configuration** panel.

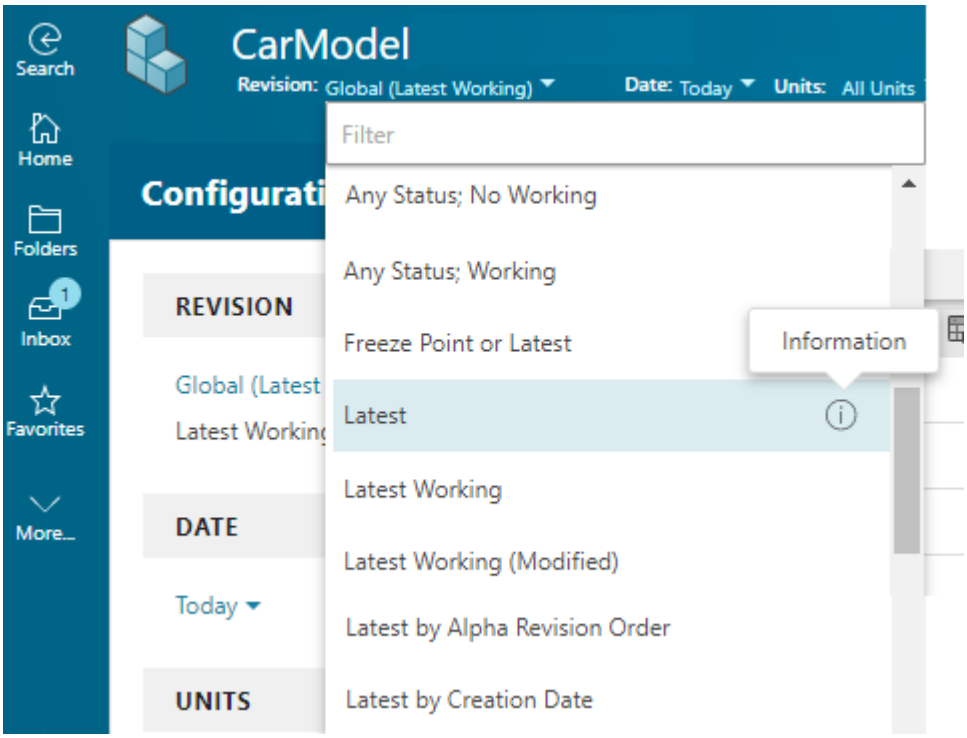
3. Select the rule from the list in the **REVISION** section in the **Configuration** panel.

   Teamcenter refreshes and displays the configured content based on the new configuration. As the effectivity criteria set in revision rule, and in the header are in sync, you may lose any earlier configuration done using the **effectivity group configuration**.

Configure a structure with a modified revision rule

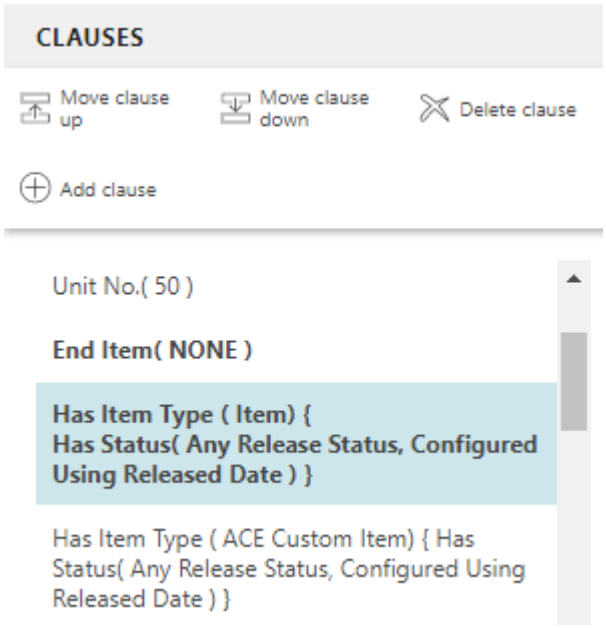
To modify a revision rule:

1. To create a modified revision rule, in the revision rule list, go to the rule that you want to modify and click **Information**.



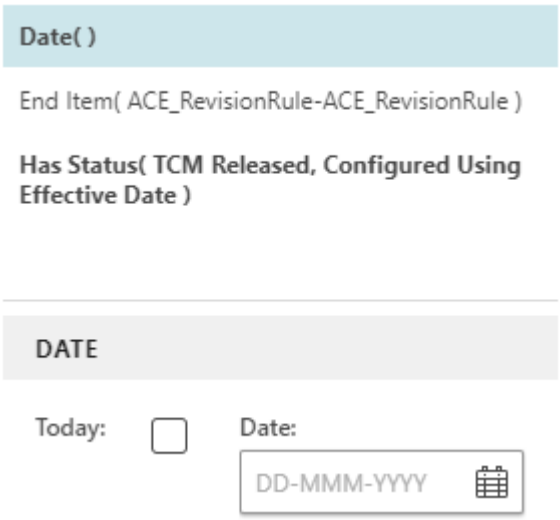
   The revision rule details are displayed with all the clauses.

2. To modify the rule, you can add a new clause, delete a clause, or change the order of precedence by moving a clause up or down.



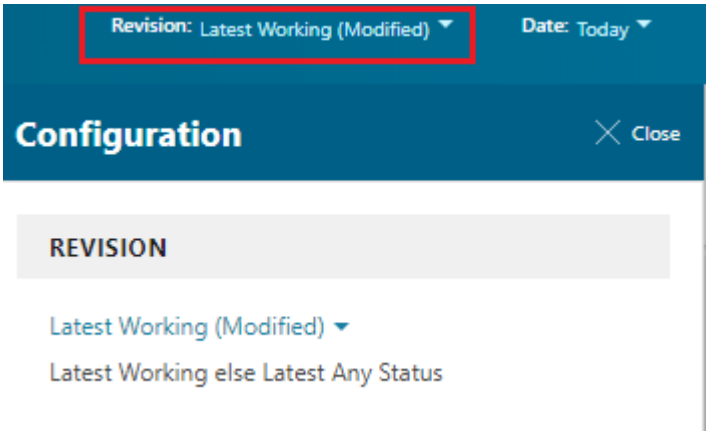
3. To edit a clause, select the clause.

   The editable attributes for the clause are displayed. For example, if the **Date** clause is selected, the date-related fields are displayed.

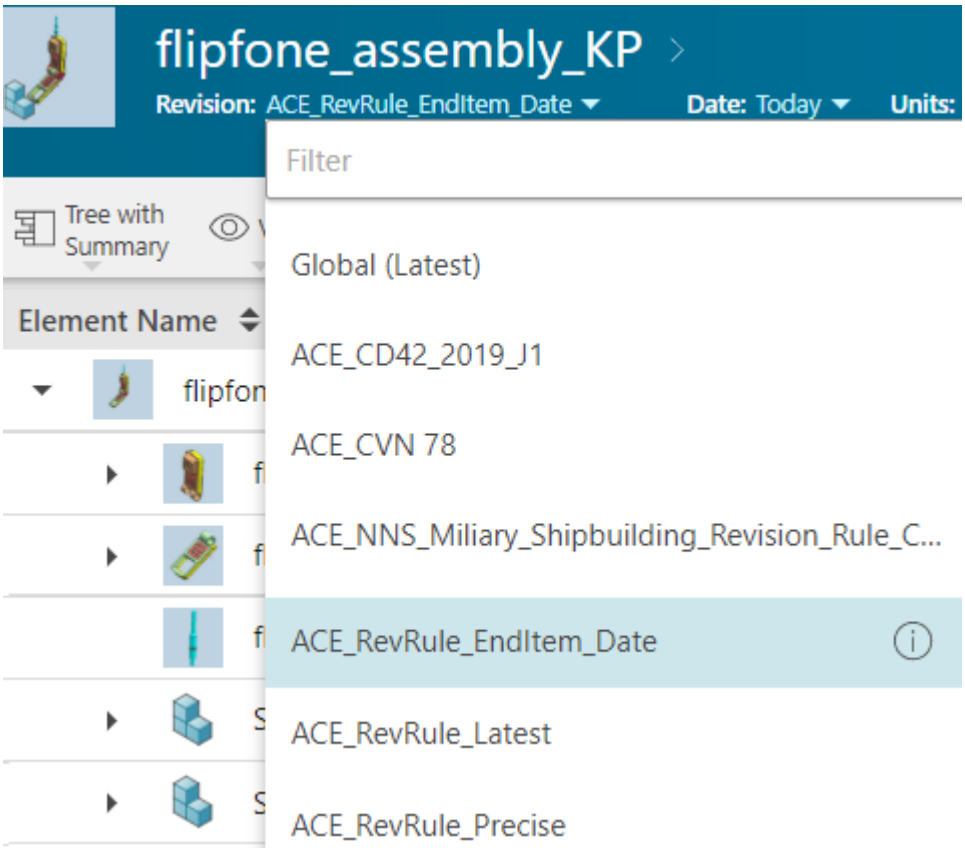


4. To apply the modified revision rule, click **Modify and Configure**.

   Teamcenter refreshes and displays the content configured by the modified revision rule. The **Revision** in the header area shows the modified revision rule.



5. Alternatively, you can modify the revision rule clauses and update the **Date** and **Unit** values from the configuration panel header. To modify the revision rule clauses, select the revision rule you want to update from the list.



The modified rule is available to you only if you modified the rule.

As the effectivity criteria set in the revision rule and in the header are synchronized, you might lose any configuration done earlier using the **effectivity group configuration**.

Configure a structure with a revision rule that contains an override clause

You can configure a product structure by using a revision rule with an override clause for various tasks, such as marking the structure as precise, checking temporary changes, performing what-if analyses, and analyzing changes to the structures based on business requirements.

Procedure

1. Identify the folder that is used as an override folder in the revision rule.

   If you cannot, contact your administrator.

2. Search for and copy the required items to the folder.

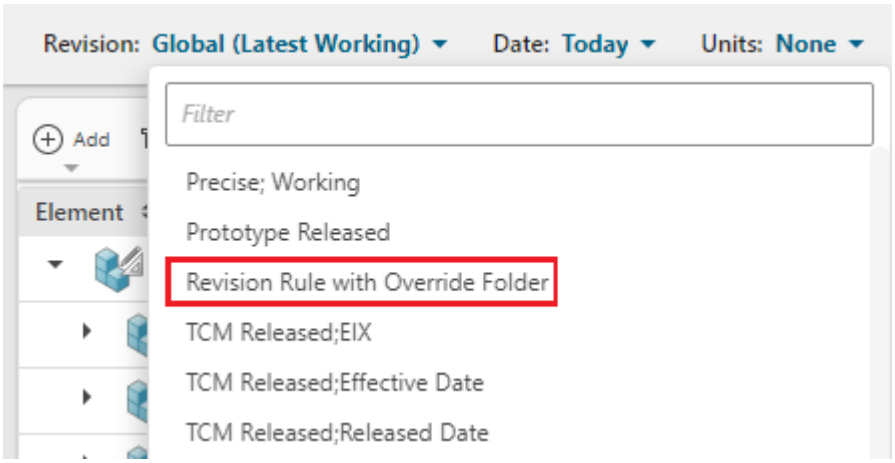
   For example, copy item revisions.

3. Additionally for collaborative product engineering BOM, search for and copy the required part usages to the folder.

4. Search for and open the product to be configured.

5. To apply the revision rule with an override clause, select the rule from the **Revision** list.

   The following screenshot shows an example of a revision rule that the administrator has created with an override clause.



   Teamcenter refreshes and displays the configured content using the selected revision rule.

Configure a structure with variant rules

Configuring structures with variant rules

Manufacturers often want to develop a range of products based on the same generic platform, offering their customers choice, but at the least engineering cost. One approach is to create a single generic product structure that can be configured for each variant of the product offered.

Using Teamcenter, you can define options and the corresponding allowed values and attach them to an item, typically the top-level item in the structure. For example, you can define a Gearbox option with the allowed values of Manual and Automatic. You then attach a logical expression, referred to as a variant condition, to any occurrences of the components that are configurable, for example, the automatic and manual gearboxes. The expression refers to the defined options and can be as complex as necessary.

You choose the desired option values for a configuration and set them in a variant rule. Teamcenter evaluates the variant conditions on the occurrences in the structure against the set option values, and components are configured accordingly. Unconfigured components can be hidden.

A designer can preset the option values in the variant rule. The preset value may be a default option or a derived default option.

- **Default option**

  A default value is a value that you preset for an option. For example, the option **aerial** may have a default value set to **standard**.

- **Derived default option**

  A derived default is a value that is set to a value that depends on a condition. For example, the option **radio** may have a value **stereo** if **car type = GLX**.

For more information about default and derived default options, see the *Working with option defaults* in *Structure Management on Rich Client — Usage*.

Designers can define combinations of option values that are not allowed using the variant rule checks. A variant rule check consists of a condition (for example, **engine = 1200 AND gearbox = automatic**) and an error message (for example, **Incompatible engine and gearbox**). An error message containing the condition and message is displayed if the rule check fails when you configure a structure with the variant rule.

You can view existing variant rules and variant configuration data. Additionally, you can change the configuration data and save the updated rule as a new variant rule. You can apply any existing or updated variant rule configuration to your structure.

To view or update saved variant rules, ensure that the **PSEVariantsMode** preference is set to **legacy**.

Configure a structure with a variant rule

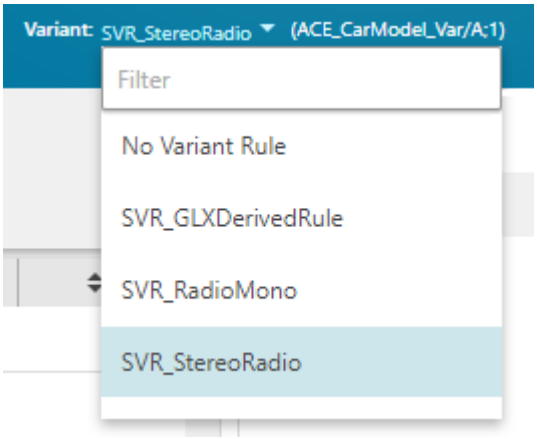
In Teamcenter, you can configure a structure with a variant rule. You can view the existing variant rules and variant configuration data. You can also change the configuration data and save the updated rule as a new variant rule. If you have **Partitions for Structure** deployed in your Teamcenter setup, you can set variability on partitions, so that you see only those partitions that are relevant to your configuration.

> Example:
>
> In a structure where no variant rule or no partition scheme is specified, you choose the variant *Sedan* and then choose the partition scheme *Physical*. Now, you see only the partitions that are relevant to this configuration. Specifically, with the variability applied on the partitions, the partitions *Truck* and *Hatchback* are not displayed in the configured structure.

To configure a structure by using a saved variant rule:

1. Search for and open the product to be configured.

2. To apply a variant rule, select the rule from the **Variant** list in the header.

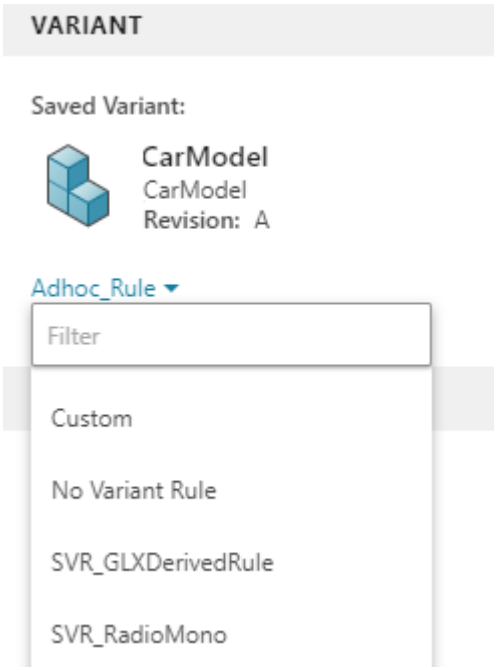


   Teamcenter refreshes and displays the configured content based on the new configuration.

Alternatively, you can perform the following steps to apply a variant rule using the **Configuration** panel.

1. Click **Configure** and then select **Configuration** to display the **Configuration** panel.

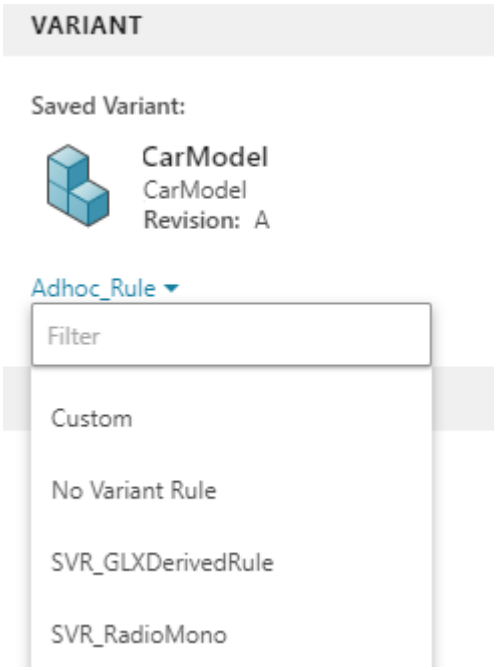
2. To apply a variant rule, select the rule from the list in the **VARIANT** section in the **Configuration** panel.



Teamcenter refreshes and displays the configured content based on the new configuration.

View variant rule details

1. Search for and open the structure to be configured.
2. Click **Configure** and then select **Configuration** to display the **Configuration** panel.
3. In the **Variant** section, select the rule you want to view.

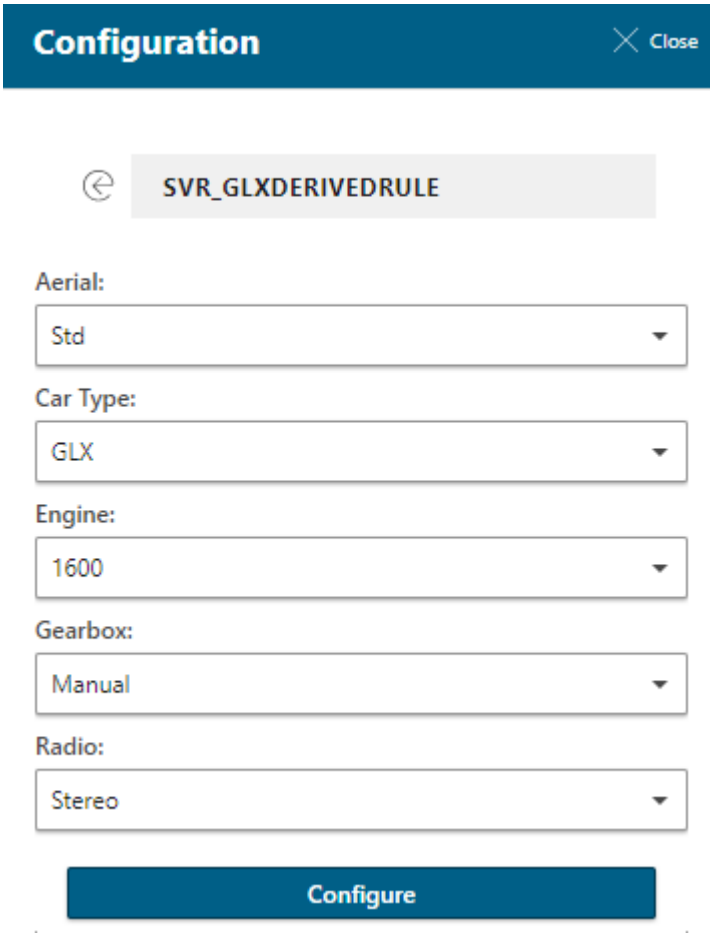


Teamcenter refreshes and displays the configured content based on the new configuration.

4. To view the details of the applied variant rule, select **Custom** from the variant rule list.

   The **Configuration** panel shows the options and values defined in the variant rule.

   For the options in the variant rule that do not have a defined value, the default values and derived default values are shown.



5. Change a default value and click the **Configure** button to view the derived default values for the selected default value.

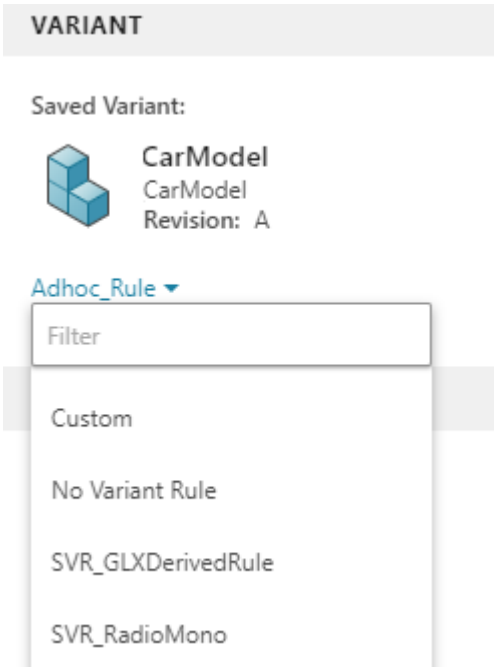
> Note:
>
> Unless the **Configure** button is clicked, the derived default value is not updated even after the default value is changed.
>
> Similarly, the rule checks for the variant rule are executed only after the **Configure** button is clicked.

Update a variant rule

Only users with the requisite access privileges can modify a variant rule. To modify a saved variant rule:

1. Click **Configure** and then select **Configuration** to display the **Configuration** panel.

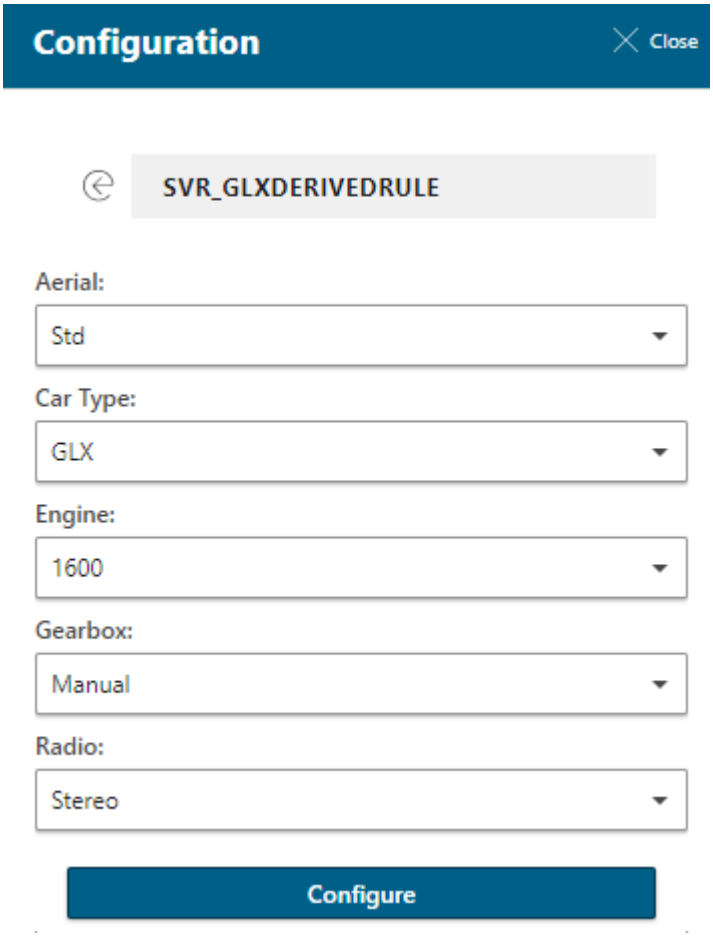
2. Select the variant rule you want to modify from the list in the **Variant** section in the **Configuration** panel.



3. To update the variant rule, select **Custom** from the list.

   The **Configuration** panel shows the options and values defined in the variant rule.

   For the options in the variant rule that do not have a defined value, the default values and derived default values are shown.



4. Make the changes to the option values as required and click the **Save** icon.

   The variant rule is saved with the updates. You can use it to configure structures.

Save a modified variant rule as new

1. After updating a variant rule, to save it as a new rule, click the **Save As** icon.

2. Enter a **Name** and **Description** and click the **Save** button.

3. To attach this variant rule to the current structure or the configurator context, select the appropriate option.

A new variant rule is created that you can use to configure structures.

Associate a variability scope to a structure

To associate a variability scope to a structure:

1. Search for the required structure element such as item, part, or product design, and open it.

   Alternatively, from the item revision, part revision, or design revision, navigate to the respective item, part, or product design using the **Relations** tab.

2. In the **Overview** tab, click **Edit** > **Start Edit**.

3. In the **Variability Scope** section, click **Add**.

4. Select the required configurator context using **Search** or **Palette** and click **Add**.

5. Click **Edit** > **Save Edits**.

Create variant conditions for a part

To add a variant condition to a part:

1. Search for the product structure that contains the part for which you want to add a variant condition.

2. Associate a configurator context with the product structure, if this is not already done.

3. Select the product design and click **Open**.

4. Select the relevant part and click the **Variant Conditions** tab.

5. Click **Show All Families** to view all options.

6. To expand each option family, click **Show Children**.

7. Click **Edit**.

8. Click a cell in the grid next to a variant option to set the variant condition for the part:

   - Click once to display a check mark to include the variant option as a variant condition.
   - Click twice to display a circle backslash to exclude the variant option as a variant condition.
   - Click three times to display a blank cell to indicate that the variant option is not used as a variant condition.

9. Click **Save Edits** to update the variant conditions.

Multiple variant conditions are connected using a logical **AND** operation to create the final variant condition.

Perform a solve using a modular configuration

Why use a modular configuration?

The configurator administrator or a designated user creates *configurator modules*.

As a BOM engineer, you can use configurator modules to configure the product. They help to minimize engineering and production costs. They are self-contained, plug-compatible units that can be *reused*.

Manufactured goods are often designed and assembled from configurator modules. For example, consider a company that produces a range of refrigerators and freezers in different sizes and colors. The door assemblies are developed in a department that designs a modular door suitable for use in any refrigerator or freezer. They design a generic door assembly that has all possible components for any use—a sheet steel outer door and two internal covers, one for a freezer and one for a refrigerator.

You can then configure the door assembly for a particular use in a refrigerator or freezer by setting various parameters or variant conditions that describe it, for example, **door width**, **door height**, **application** (refrigerator or freezer), and **color** (white or stainless steel). This intelligent door assembly is called a *configurator module*.

The door configurator module is completely self-contained and can be reused in any product by setting its modular configuration. The modular configuration settings only control the features and components contained in the door configurator module itself and make no reference to features in higher- or lower-level configurator modules.

Solve the modular configuration

As a BOM engineer, you can perform a solve using the configurator module.

Procedure

1. Search and open the modular configuration.
2. Click **Details** > **Variant Configuration**.
3. Choose one of the following modes:

   - In the **Guided** mode, only valid features are displayed.

     This mode allows you to navigate only valid selections and configurations. If no configuration is applied, a model opens in guided mode, and the system guides you to select a valid group of features in which to configure a product. Every time a selection is made, the system reevaluates the rules and refreshes the list of features.

     Guided mode supports both complete and partial configurations.

- In the **Manual** mode, all available features, including variants that are not valid in the current context, are displayed.

  In this mode, you can look at the entire variability, choose a variety of features, and assess if those selections are valid based on the configurator rules. You can validate your selections and save your configuration. If there are any conflicting constraints, the system reports violations as error messages and specifies the conflicting selections.

While radio buttons are displayed for making selections in **Guided** mode, check boxes are displayed for **Manual** mode.

4. To **filter configurator data by revision rule, effectivity, and rule date**, and rule date, click ⚙ to view the **Settings** panel and change them as appropriate.

5. Set the validation mode.

   a. Click ⚙ to view the **Settings** panel.

   b. In the **Filter Criteria** section, choose the product hierarchy depth.

      The default value is **1** and the maximum is **5**.

      > Note:
      >
      > By default, five levels of structures are supported. However, this example provides procedures to configure only three levels of structures.

   c. In the **VALIDATION MODE** section, **choose a mode from the drop-down list**.

      - **Order** (default profile)

        This mode is intended for a user who wants to quickly arrive at a 100% BOM. You can use a 100% BOM to create a prototype, perform simulations, compute the price, calculate the weight of the product, or visualize the structure.

      - **Overlay**

        This mode does not expect you to specify the complete configuration. It is intended for developing a new product or making changes to an existing product.

6. To configure the modular configuration, make the appropriate selections in the **Variant Configuration** view.

7. Select a product model with which you would like to work.

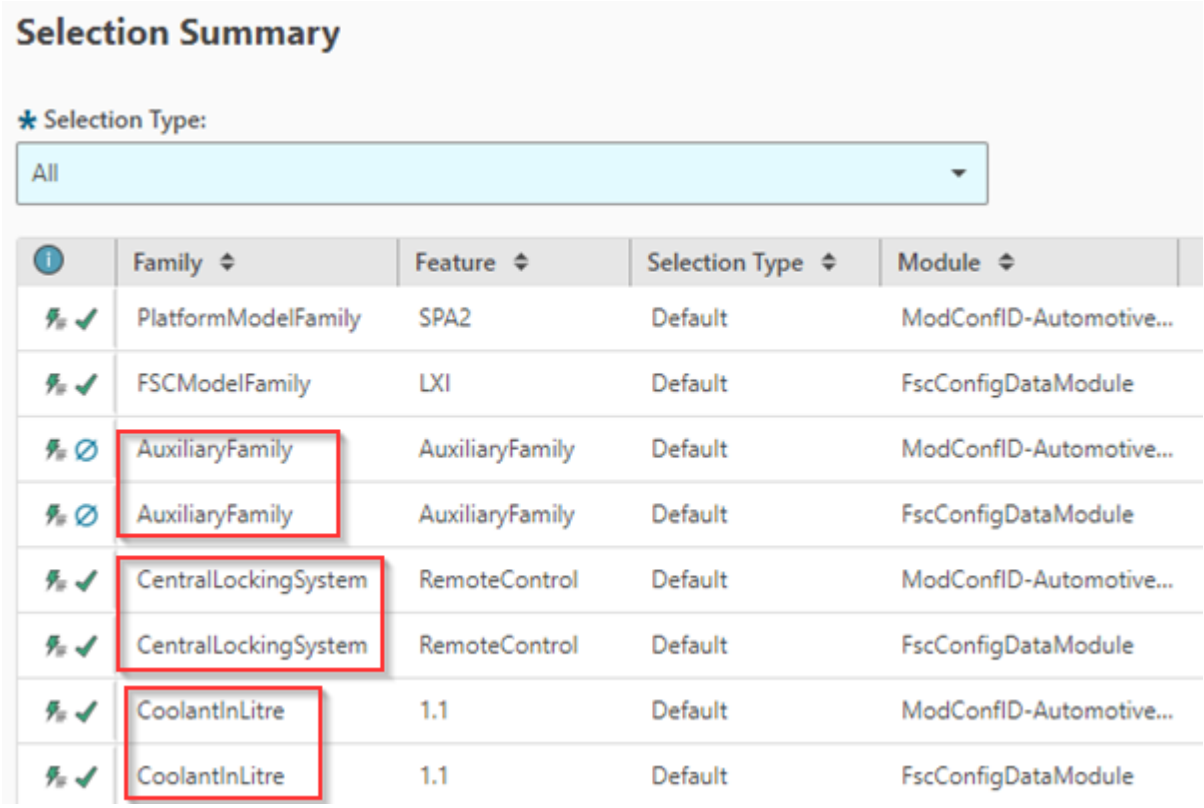
8. Select each group from the list in the left panel and make the necessary feature selections in the work area.

9. (Optional) To find the required selections, in the **Variant Configuration** view, choose **More Commands** > **Next Required** or **Previous Required** as appropriate.

10. (Optional) To find user and system selections, in the **Variant Configuration** view, click **Full Screen**, choose **Selection Summary**. and select **All** from the **Selection Type** list.

    When the product hierarchy depth is greater than **1**, the **Selection Summary** panel shows an additional column, **Module**. This column displays where the selection has been made, that is, the module, family, feature, and type of selection.

    The **Selection Summary** panel sometimes displays the same feature in two rows. This happens when either the user or the system (based on constraints) has made a selection on a feature that exists both in the parent module as well as the child module. You can see the name of the parent and the child module for that repeated feature in the **Module** column for that feature.



11. Make all the required selections.

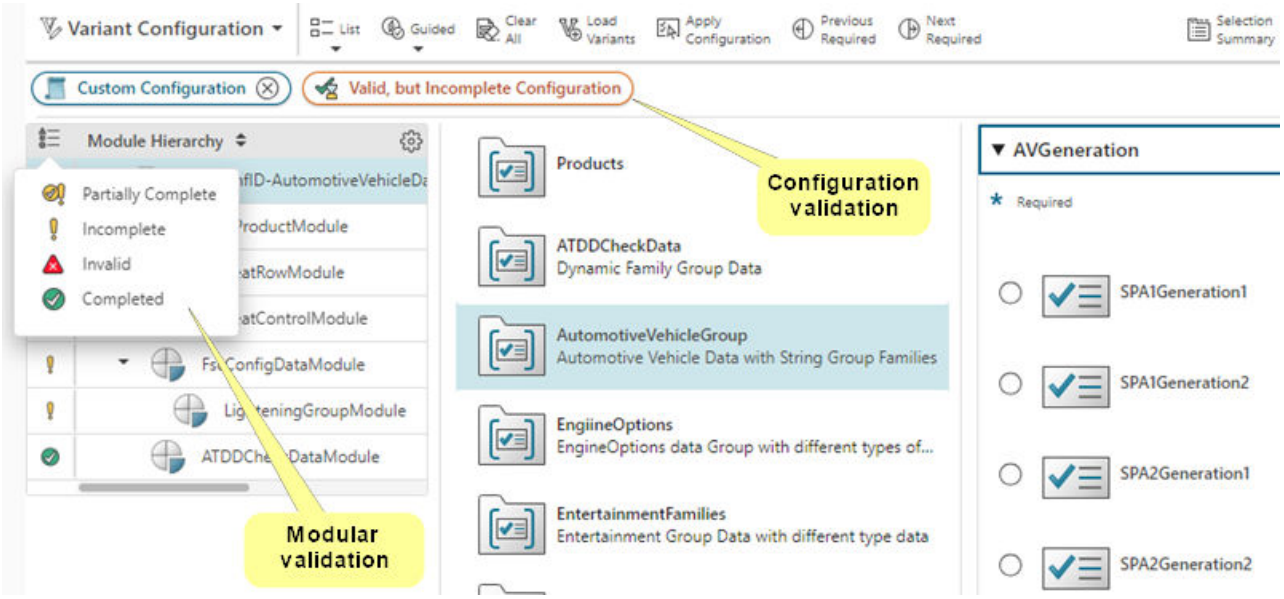
    You can make selections at the root level and child level modules (configurator context levels).

    In the **Guided** mode, the validation happens for each of your selections, and its configuration completeness is displayed automatically.

If you are in the **Manual** mode, when you click **Expand** or **Validate**, the current selections in the UI are validated or expanded, respectively.

With modular configuration, along with configuration completeness, a module completeness check is also done.

The configuration completeness is standard for all product structures, irrespective of the modular configuration.



The completeness indicator at the top of the view displays one of three states: **Valid and Complete**, **Valid and Incomplete**, and **Invalid**.

- **Valid and Complete** (applicable for both guided mode and manual mode)

  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 execute an order entry in the order system. When a configuration is valid and complete, you can 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 indicator, you should not typically perform the above action. 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** (applicable for both guided mode and manual mode)

In guided mode, you can select **Next Required** or **Previous Required** to navigate to the next or the previous family or the feature that requires a value to be assigned to complete the configuration.

In the case of modular configuration, **Next Required** or **Previous Required** takes you to the next module after reaching the last incomplete family of the last group.

- **Invalid** (applicable for manual mode only)

  It means that the input criteria is invalid based on the configurator rules set in the current configurator context.

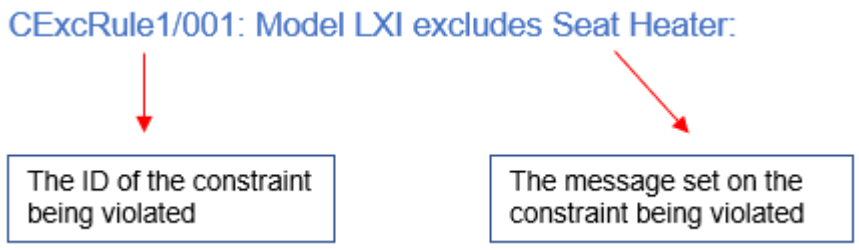
The modular validation indicates the following states:

State	Description
Partially Complete	The selections for the parent are complete, but the selections for some of the children are not.
Incomplete	Some required families do not have complete selections.
Invalid	Some violations have occurred due to some constraints.
Completed	All the required selections are complete for the module, and they do not have any conflicts with constraints.

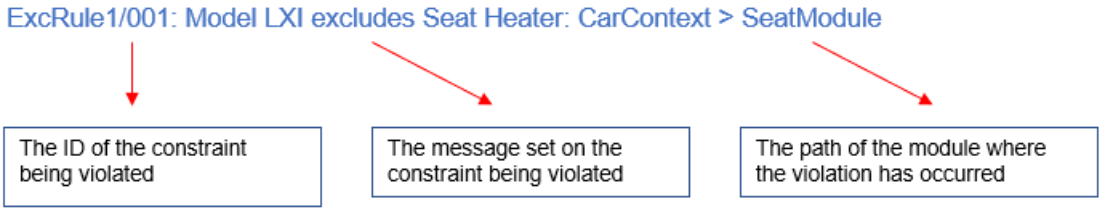
12. In the **Manual** mode, when you click on **Expand** or **Validate**, you might enter into an invalid state because of some constraint being violated. In such cases the system reports violations.

    The following are some examples of violation messages in the **Manual** mode:

    Example of violation message without modular configuration:



    Example of violation message with modular configuration:



Note:

Violation indicators are available at the child level also.

13. Record your selections by clicking the **Save** button.

    If you have not loaded a variant rule or a variant condition, the system prompts you to save the selections as a new variant rule or variant condition. In such cases, specify the name in the **Save** dialog box and select one of the following options:

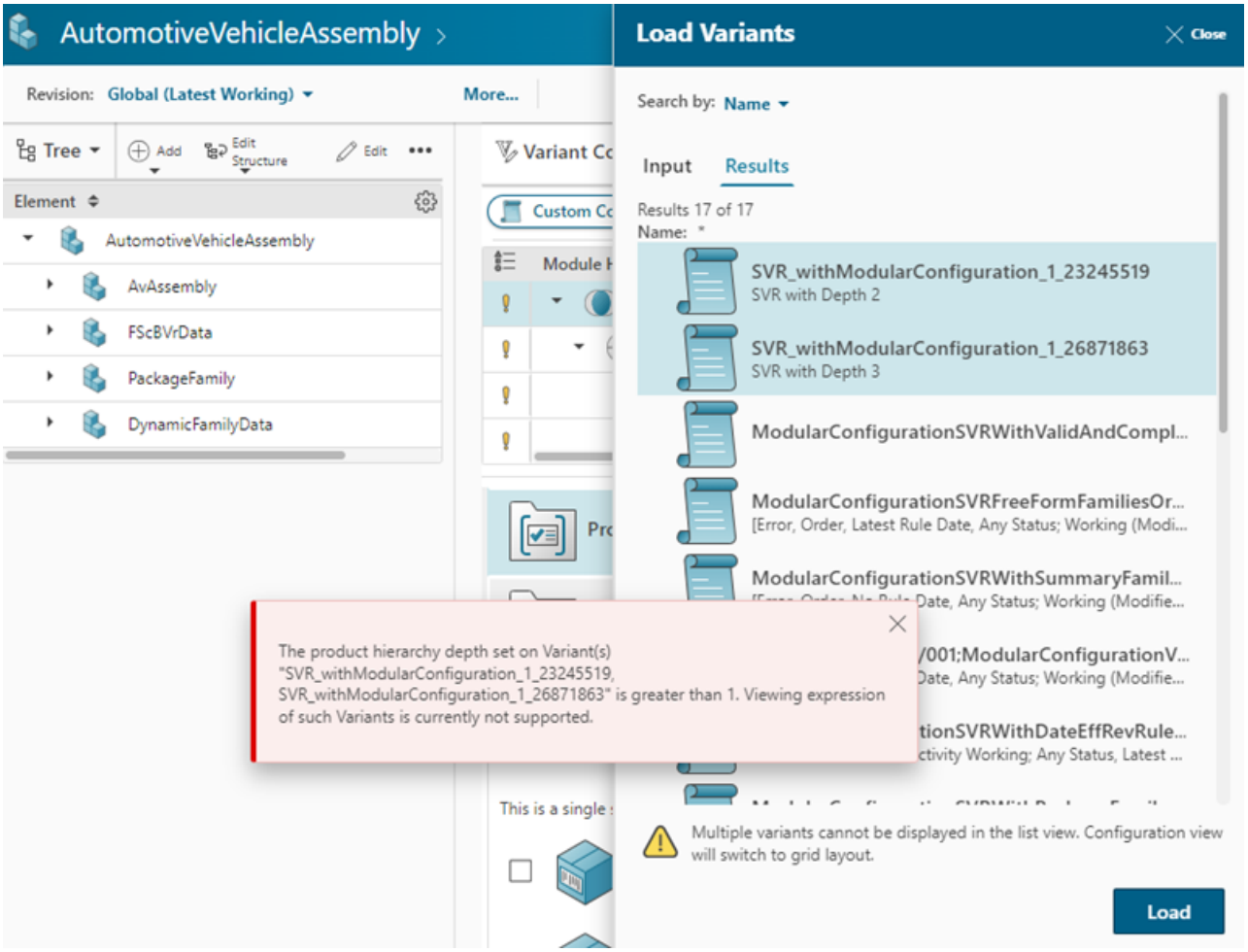
    - **Current Structure Revision** to save the variant rule or the variant condition to the current structure.
    - **Configurator Context** to save the variant rule or the variant condition to the configurator context. This saved variant rule or variant condition is available in all structures to which the configurator context is attached.

14. To load a variant rule or variant condition, choose **More Commands** > **Load Variants**.

    Currently, when you load multiple variants using the **Load Variant** dialog, the system switches to the variant configuration's **Grid Mode**.

    With a modular configuration:

    - If the selected variants have a product hierarchy depth greater than **1**, the system does not switch to **Grid Mode** and an error message is displayed. This is currently not supported.
    - Any variant with a depth greater than **1** can be viewed only in the variant configuration's **List** view.
    - If the selected variants have a mix of depth greater than **1** and depth as **1**, the system switches to the variant configuration's **Grid Mode**. It then displays only the variants with a depth of **1**. The rest of the variants with a depth greater than **1** are skipped with a warning message.



15. Save selections after loading a variant rule or variant condition.

    - Click the **Save** button to save the changes to the existing variant rule or variant condition; OR
    - Click the **Save As** button to save the changes to a new variant rule or variant condition.

16. To apply the selected variant configuration to the current content and to refresh the content in the product, choose **More Commands** > **Apply Configuration**.

Perform a solve using a custom configuration

Set the validation mode

To update the validation mode for the current session:

1. Find and open the product to be configured and choose **Details** > **Variant Configuration**.
2. Click ⚙ to view the **Settings** panel.

3. In the **VALIDATION MODE** section of the **Settings** panel, choose a mode from the drop-down list.

   - **Order** (default profile)

     This mode is intended for a user who wants to quickly arrive at a 100% BOM. You can use a 100% BOM to create a prototype, perform simulations, compute the price, calculate the weight of the product, or visualize the structure.

   - **Overlay**

     This mode does not expect you to specify the complete configuration. It is intended for developing a new product or making changes to an existing product.

   The validation severity, expansion severity, and selection behavior settings are updated based on the selected mode. These settings are defined by your administrator and are therefore, unavailable and read-only.

4. Click **Apply**.

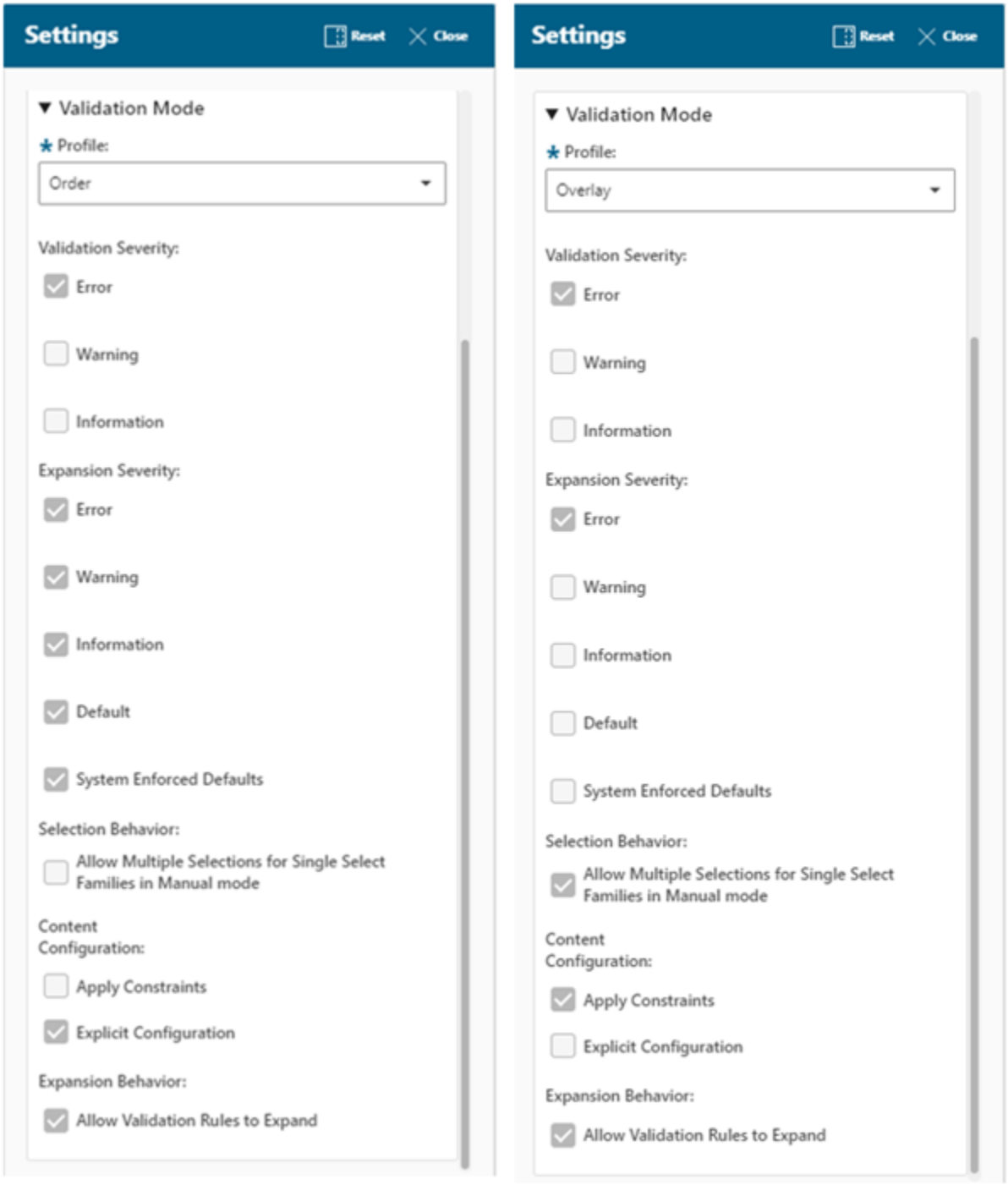
   All user selections are retained, but the system selections and violations are cleared.

   > Tip:
   >
   > Once you change tabs or otherwise start a new session, the validation mode settings will return to the defaults. A **saved variant** stores this setting information, however, so loading the appropriate SVR is a quick way to return to your desired settings.

The individual settings that make up each mode definition are defined by your administrator and are read-only. If you change from one mode to the other, the settings change to reflect the selected mode.

When applied, all user selections are retained, but the system selections and violations are cleared.

Choosing the validation mode sets the severity for reporting and expansion in order to control how the solver behaves and how violations are reported. When a mode is selected, the definition of that mode is shown, including its validation severity, expansion severity, and its selection behavior. These settings determine how strictly you want to evaluate the constraints in the system.



- The **Validation Severity** applies when the configuration is validated and is always higher than the expansion severity.
- The **Expansion Severity** is relevant when an order is expanded by clicking **Apply System Selections**, and the user wants to communicate the severity level to the solver.

- (Not applicable for **Order** mode by default.) The **Selection Behavior** consists of a check box which determines whether multiple selections for a single select family will be considered valid or not (in manual mode, where single select families are represented with check boxes for each feature).

  Note:

  The **Selection Behavior** setting is ignored in guided mode.

- (Not applicable for **Order** mode by default.) The **Apply Constraints** check box, if selected, determines if all constraints should be considered while applying the variant expression on the content. If deselected, only user selections are applied.

- (Not applicable for **Overlay** mode by default.) The **Explicit Configuration** check box, if selected, returns only BOM lines where the features have been explicitly selected in **Order** mode. This leads to a configuration that is 100% or less. Conversely, if the **Overlay** mode is selected, the **Explicit Configuration** check box is not selected by default. This leads to a configuration that is more than 100%, for example, a 120% BOM. This happens unless a complete configuration is specified that results in a 100% BOM.

  For more information, see **Example of solve behavior using explicit configuration**.

- The **Allow Validation Rules to Expand** check box, if selected, determines if validation rules should participate during criteria expansion. If deselected, only violations, if present, are reported. The system selection, based on validation rules, does not occur in the expanded criteria.

  By default, this check box is selected.

Example:

When the validation severity is set to **Error** (as it is for both **Order** and **Overlay** modes), the configuration is considered invalid only when the **Error** severity rules are in conflict. When there are conflicts between **Warning** and **Information** constraints, the configuration is considered valid.

Filter configurator data by revision rule, effectivity, and rule date

You can filter configurator data by **revision rule**, **effectivity**, and **rule date**. To do so:

1. Find and open the product to be configured and choose **Details** > **Variant Configuration**.

   Note:

   If your configuration analyst has not associated a configurator context with the product, **Variant Configuration** is not displayed.

2. Click **Settings** ⚙ to view the **Settings** panel.

3. Filter configurator data by revision rule.

   Content changes can be managed by revising product data. Changes that may necessitate a new revision include addition or removal of components, relationships to other products or assemblies, and changes to properties. You can then apply a revision rule to view the correct revisions of the product data.

   Similarly, you can apply revision rules to configure the families and features for a particular configuration. The revision rule (as well as effectivity and rule date) in the **Settings** panel of **Variant Configuration** *only* applies to the configurator families and features. For example, a feature may have a specific rule date, and the **Settings** panel will control whether or not that feature is available for selection in a configuration.

   > Note:
   >
   > The revision rule and effectivity for configuration is separate and independent of the revision rule and effectivity for product data. Rule date is unique to configuration.

   You cannot view multiple configurations at the same time; if you want to see another configuration, you must apply a different revision rule.

   Revision rules are predefined by your system administrator, and you select a rule from the list of available rules.

   To override the default revision rule for the current session:

   a. In the **FILTER CRITERIA** section of the **Settings** panel, click the current revision and select a revision rule from the resulting **Revision Rule** list.

      > Note:
      >
      > An invalid revision rule is a rule that contains a clause that is not valid for a particular type of object. While both valid and invalid revision rules appear in this list, the system will not let you apply an invalid revision rule.

   b. Click **Apply**.

      The system refreshes the displayed content to show only content configured in by the selected revision rule.

4. Filter configurator data by effectivity.

   You can configure configurator data with effectivity. When you apply the effectivity, the features are configured according to the unit range or the date range you specify. The system then shows the features that are in effect for the specified date, unit number or range.

You can edit the **Cfg0DefaultEffectivity** user preference to set the default effectivity. While editing this preference, you can specify date ranges or units.

Examples:

- *Date Range*: *YYYY-MM-dd..YYYY-MM-dd* (Example: **2023-11-08..2023-11-30** or **2023-11-30..UP**)
- *Today*: The present date. (Example: If **Today** is **2023-11-08**, it is displayed in the user interface as **2023-11-08..2023-11-09**)

For more information about setting this preference, see the description of this preference.

For information about retrieving a list of preferences, see Where can I get a list of preferences? in *Teamcenter Administration*.

Only the valid features are displayed in the structure views when you set the default effectivity.

> Note:
>
> Your administrator configures the effectivity scheme used by your business by setting the **PCA_effectivity_shown_columns** preference. This preference can be set to show **Effectivity Date**, **Unit**, or **Both**.
>
> You must ensure that the values specified for both **Cfg0DefaultEffectivity** and **PCA_effectivity_shown_columns** preferences are in sync. For example, if you set the default value as date range, then the effectivity shown column preference should also be set to date. Otherwise, the system displays a warning and the default value is set.

If your site supports date and unit effectivity, both selections are displayed in the **Settings** panel.

To override the default or change the existing dates:

a. In the **FILTER CRITERIA** section of the **Settings** panel, click **All Dates** or the displayed date under **Effectivity**.

b. Use the calendar to select the desired start date.

   To set a date range, use the calendar to select the desired end date.

   Using the pull-down menu, you can select **UP** (any date after the one specified) or **SO** (stock out), rather than a specific date.

c. Click **Set**.

d. To reconfigure the content to match the new date, click **Apply**.

5. Filter configurator data by rule date.

BOM engineers who develop new products typically prefer to use the **Latest** rule date. That is because the configurator engineer is continuously improving configurator rules or adding new ones, and, therefore, the BOM engineer wants to validate the product against the **Latest** rule date.

Order engineers need to validate the variant rules or variant criteria against the rules that were valid at the time of the order. If the order is already in production, they might not want to apply the **Latest** rule date. In such cases, **Date** that is set on the order is used to validate variant rules or variant criteria.

The **Cfg0DefaultRuleDateForContent** user preference specifies the default rule date mode value for the configurator views. By default, it is set to **Latest**.

For information about retrieving a list of preferences, see Where can I get a list of preferences? in *Teamcenter Administration*.

a. Select a rule date as appropriate and click **Set**.

Rule date	Description
Date	Sets the rule date selected from the widget.
Latest	Sets the rule date as the current time on the clock.
System Default	Sets the rule date as the system default.
No Rule Date	Sets the rule date as null.

b. To apply the settings, click **Apply**.

Configure variants in guided mode

1. Find and open the product to be configured and choose **Details** > **Variant Configuration**.

   The system displays a list of available product lines, product models, and groups. If the product has a variant configuration defined, the selections in the configuration are shown with the variability in the context.

   > Note:
   >
   > Your administrator can deploy the system with the **Cfg0PrimaryBusinessRelevantAttribute** global constant that allows you to use either **Name** or **ID** as the primary business-relevant attribute. When the system is configured with the global constant that points to **Name** as a primary business property, all Product Configurator views display **Name** instead of **ID** in the corresponding areas.

2. Select the **Guided** mode. This is the default mode.

   In this mode, only valid features are displayed.

Guided mode allows you to navigate only valid selections and configurations. If no configuration is applied, a model opens in guided mode, and the system guides you to select a valid group of features in which to configure a product. Every time a selection is made, the system reevaluates the rules and refreshes the list of features.

Guided mode supports both complete and partial configurations.

While radio buttons are displayed for making selections in **Guided** mode, check boxes are displayed for **Manual** mode.

> Note:
>
> If you have an invalid configuration, the system does not allow you to switch from manual to guided mode.

3. To begin creating a customized variant configuration, do one of the following:

   - Select the product line containing the product model with which you would like to work.

     The model families in the selected product line are selected by the system.

   - Select a product model with which you would like to work.

     The system automatically selects the product line containing the selected product model.

     When you make some selection changes and revert them, the system continues to display the **Save** icon.

> Note:
>
> Product lines are only listed if they are defined in the configurator model.

4. After you have selected the appropriate product model in the work area, select each group from the list in the left panel and make the necessary feature selections in the work area.

   - If there are more than fifteen features in a family, the **Filter** box displays to help locate the appropriate feature. The text filter is not case-sensitive and is based on the family and feature properties shown (**Name** and **Description**, for example).

> Example:
>
> You type **mfv** into the **Filter** box.
>
> - The filtered list shows the families containing **mfv** in the family name, along with all the features in that family.

- The filtered list shows the features containing **mfv** in the feature name, along with its parent family.

- An ◉ option button displays when a single-select feature is selected. Click the feature again to deselect.
- In multiselect and Boolean families, you can cycle between three states:
  - ☑ indicates include.
  - ∅ indicates exclude.
  - ☐ indicates unselected.

5. Select one feature in a single-select family or one or more features in a multiselect family.

   The completeness indicator at the top displays one of three states: **Valid and Complete**, **Valid and Incomplete**, and **Invalid**.

   - **Valid and Complete** (applicable for both guided mode and manual mode)

     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 execute an order entry in the order system.

     On the contrary, if you do not see this completeness indicator, you should not typically perform the above action. 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** (applicable for both guided mode and manual mode)

     In guided mode, you can select the **Next Required** or the **Previous Required** option to navigate to the next or the previous family or feature that requires a value to be assigned to complete the configuration.

   - **Invalid** (applicable for manual mode only)

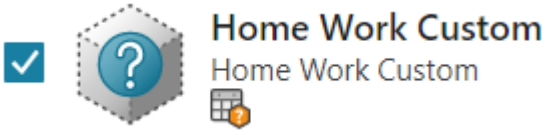
     It means that the input criteria is invalid based on the configurator rules set in the current configurator context.

   It may also refresh features displayed for other families as it applies the relevant rules by hiding invalid features. If none of the features in a family is still valid, the family itself is hidden.

Default features are selected by the system if they do not already have a value and designated with the indicator. Constraints are applied, validating the expression and adding any additional expression terms.

6. Select a family or feature that has a specified revision rule, effectivity, or rule date. Apply a different revision rule, effectivity, or rule date. This becomes an unconfigured family or feature.

   Such families and features are displayed with a different icon and have a question mark and an indicator that shows it as *configured out*. In such cases, the system switches to the manual mode. To proceed in guided mode, you can clear your selection of the unconfigured family or feature and select another family or feature. The system switches to the guided mode and you can continue to configure the structure.



   - If a family is unconfigured and you select a feature within it, then both the family and feature are shown as unconfigured.

   - If you deselect an unconfigured feature or family and navigate to a different group, both the family and feature are not displayed by the system. Similarly, if you deselect an unconfigured feature or family, save it, and reopen it, neither the family nor the feature are displayed by the system.

   You can optionally save the content with an unconfigured family or feature as an SVR.

7. An optional feature family contains product configurations where users are not required to select a feature for the family. For example, you may have a family with features for optional equipment.

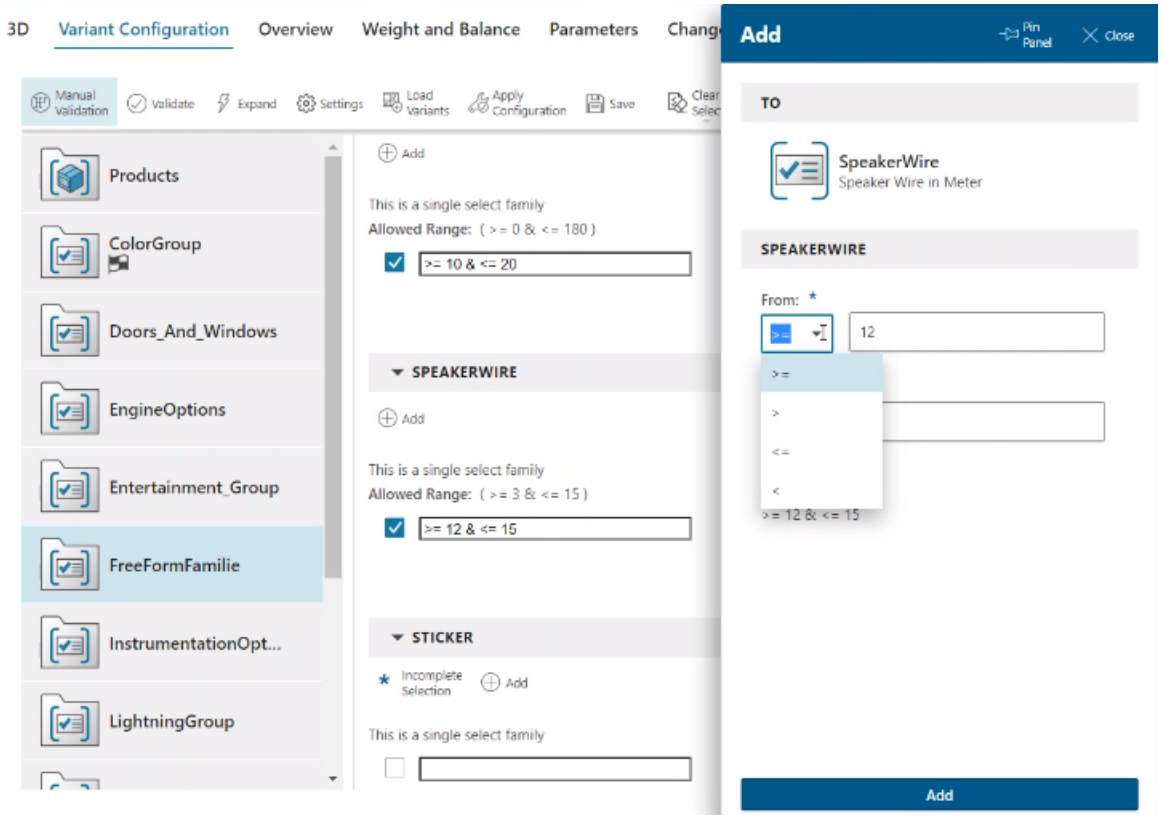
   If optional feature families are defined in a product model, an additional option is displayed in the family section header. Click if you want *none* of the optional family features to appear in the structure.

8. Typically, features are predefined for each family, but free-form families allow you to enter a value for a feature at any time. If a family is specified as free-form, you can enter numbers, strings, or dates, depending on the data type defined.

   Select an assembly that contains free-form families in the **Variant Conditions** tab, and click the **Add Feature** option. You can use operators such as **>=**, **>**, **<=**, and **<**. If you select **<=** or **<** in the **From** field, the **To** field is disabled.

   If you have a **SpeakerWire** free form family in your configuration context, then you can enter the free form value as a discreet value or a range in the text box or use the **Add** panel to author the range. According to the range or the discreet value you specified, the configuration context displays

only the correct BOM lines. For combining the values, you can use the AND (**&**) operator. The OR (**|**) operator is not supported.



When you apply the configuration to the structure, the system filters the structure to show only the items that meet the condition for the feature.

9. As you make selections for the custom configuration, click **Selection Summary** to open the panel. You can select one of the following options from the **Selection Type** list:

   - **User** to see only user selections.
   - **All** to see all selections, including user and system.
   - **Incomplete Families** to see families from which you have not made any selections yet.

10. At any time, click **Clear All** to clear all user and system selections as well as any reported violations across all groups.

    This provides a blank configuration from which to start.

11. (Optional) Save the custom configuration.

12. Click **Apply Configuration** to apply the selected variant configuration to the current content and to refresh the content in the product.

Configure variants in manual mode

You can view all the product lines and product models in a configurator context. Product lines are sometimes referred to as *series* and provide a high-level organization of product models.

1. Find and open the product to be configured and choose **Details** > **Variant Configuration**.

   The system displays a list of available product lines, product models, and groups. If the product has a variant configuration defined, the selections in the configuration show with the variability in the context.

   > Note:
   >
   > Your administrator can deploy the system with the **Cfg0PrimaryBusinessRelevantAttribute** global constant that allows you to use either **Name** or **ID** as the primary business-relevant attribute. When the system is configured with the global constant that points to **Name** as a primary business property, all Product Configurator views display **Name** instead of **ID** in the corresponding areas.

2. Switch to **Manual** mode by selecting **Guided** > **Manual**.

   You are now in manual mode.

   - You see all available features, including features that are not valid in the current context.
   - Summary models are listed below the models in a particular product group and act as a dependency chain to other places in the model. For example, one particular car model requires gasoline, while another requires diesel. Choosing one of these fuel categories triggers changes in other parts of the model, such as the engine itself, the need for spark plugs, the need for a fuel receptacle, and so on.
   - You can look at entire variability, choose variety of features, and assess if those selections are valid based on the configurator rules. You can validate your selections and save your configuration. If there are any conflicting constraints, the system reports violations as error messages and specifies the conflicting selections.
   - Single select groups are designated as such to show the intent of the groups. However, when you select a feature, other features in the same family remain displayed, allowing you to select additional features.
   - Configurator rules and defaults are *not* automatically applied. You must manually apply configurations by clicking  .

- Automatic selection, filtering, and indications of invalid selections are *not* automatically provided. You must manually validate ⊘ and apply system selections ⚡.

> Note:
>
> If you have an invalid configuration, the system does not allow you to switch from manual to guided mode.

3. Select the appropriate model and the summary model.

   When you make some selection changes and revert them, the system continues to display the **Save** icon.

4. Select the desired group to see the features.

   You can only view one group at a time.

   - If there are more than fifteen features in a group, the **Filter** box displays to help locate the appropriate feature. The text filter is not case-sensitive and is based on both the family and the feature names.

     > Example:
     >
     > You type **mfv** into the **Filter** box.
     >
     > - The filtered list shows the families containing **mfv** in the family name, along with all the features in that family.
     > - The filtered list shows the features containing **mfv** in the feature name, along with its parent family.

   - Because manual mode allows multiple selections for single select families, you can cycle between three states:
     - ☑ indicates include.
     - ⊘ indicates exclude.
     - ☐ indicates unselected.

     You can cycle between these same three states in multiselect and Boolean families as well.

5. Select the appropriate features for this custom variant configuration.

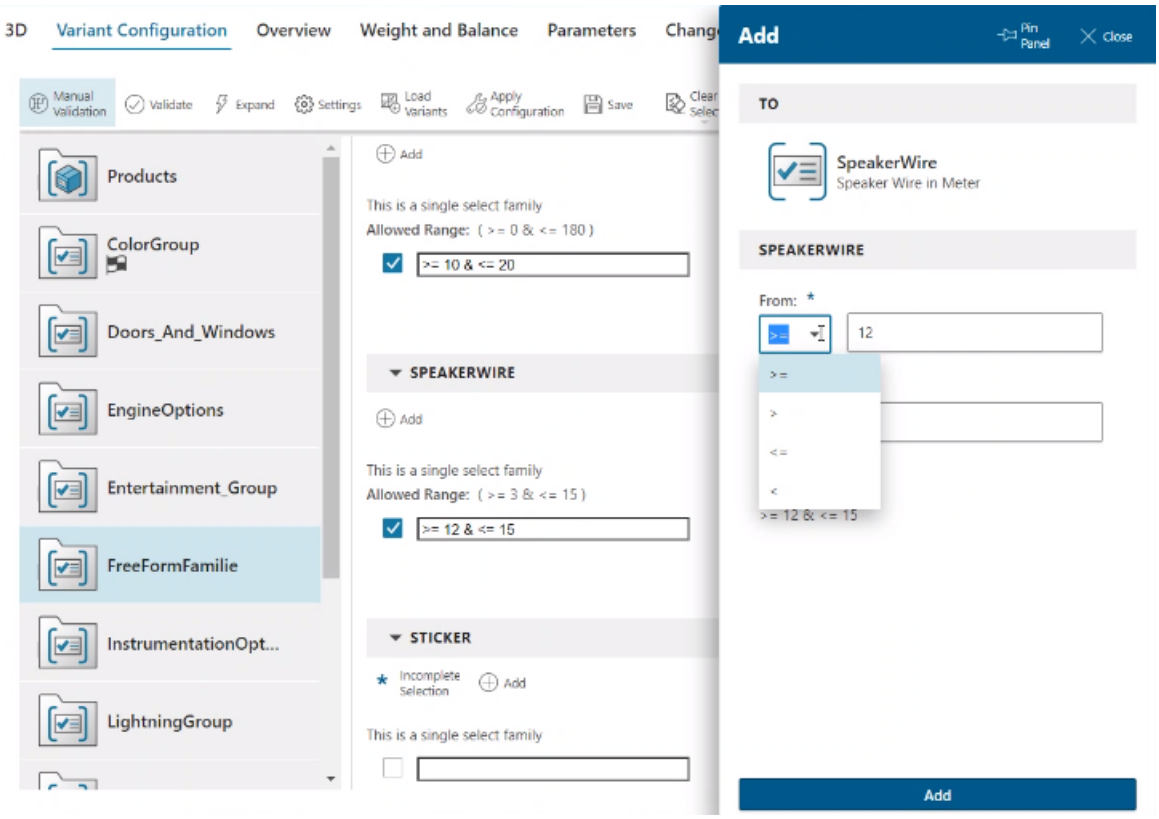
6. An optional feature family contains product configurations where users are not required to select a feature for the family. For example, you may have a family with features for optional equipment.

If optional feature families are defined in a product model, two options display in the family section header. Click ☑ to allow *any* of the optional family features to appear in the structure. Click ⊘ if you want *none* of the optional family features to appear in the structure.

7. Typically, features are predefined for each family, but free-form families allow you to enter a value for a feature at any time. If a family is specified as free-form, you can enter numbers, strings, or dates, depending on the data type defined.

   Select an assembly that contains free-form families in the **Variant Conditions** tab, and click the **Add Feature** option. You can use operators such as **>=**, **>**, **<=**, and **<**. If you select **<=** or **<** in the **From** field, the **To** field is disabled.

   If you have a **SpeakerWire** free form family in your configuration context, then you can enter the free form value as a discreet value or a range in the text box or use the **Add** panel to author the range. According to the range or the discreet value you specified, the configuration context displays only the correct BOM lines. For combining the values, you can use the AND (**&**) operator. The OR (**|**) operator is not supported.



   When you apply the configuration to the structure, the system filters the structure to show only the items that meet the condition for the feature.

8. At any time, click **Validate** to validate the configuration.

   Each violation is identified using the ⚠ error indicator.

> Note:
>
> The type of violation assigned to a feature or feature group is based on the severity assigned by your configuration analyst. You cannot change the severity level in the current Active Workspace release. The severity is currently set to *error* by default.

Hover over the indicator icon next to a feature to view the reason for the violation.

9. As you make selections for the custom configuration, click **Selection Summary** to open the panel. You can select one of the following options from the **Selection Type** list:

   - **User** to see only user selections.
   - **All** to see all selections, including user and system.
   - **Incomplete Families** to see families from which you have not made any selections yet.

10. At any time, click **Expand** to apply system selections.

    The system makes selections based on configurator rules or constraints and displays the  indicator to designate the system selections.

    The completeness indicator at the top displays one of three states: **Valid and Complete**, **Valid and Incomplete**, and **Invalid**.

    - **Valid and Complete** (applicable for both guided mode and manual mode)

      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 execute an order entry in the order system.

      On the contrary, if you do not see this completeness indicator, you should not typically perform the above action. 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** (applicable for both guided mode and manual mode)

      In guided mode, you can select the **Next Required** or the **Previous Required** option to navigate to the next or the previous family or feature that requires a value to be assigned to complete the configuration.

    - **Invalid** (applicable for manual mode only)

It means that the input criteria is invalid based on the configurator rules set in the current configurator context.

11. At any time, click **Clear Selections** > **Clear System Selections** to clear any system selections that may have been previously calculated, while preserving your user selections.

    Alternatively, click **Clear Selections** > **Clear All** to clear all user and system selections, as well as any reported violations across all groups.

12. (Optional) **Save the custom configuration**.

13. Click **Apply Configuration** to apply the selected variant configuration to the current content.

> Note:
>
> If you save the current context (for example, the subset definition or workset), the variant configuration displays in the list of saved variants.

Configure by saved variant or variant criteria

Variants allow you to select and apply feature families (for example, color) and allow features of those families (for example, red and blue) to configure a part or assembly.

To configure a particular variant of a product, apply the appropriate variant (a group of families and features such as **color = red**, **material = cotton**) or variant criteria (a revisable version of a saved variant). These items are predefined by the configuration analyst and are stored in Teamcenter for users to retrieve later.

To configure content by a saved variant or variant criteria (VC):

1. Find and open the product to be configured and choose **Details** > **Variant Configuration**.

> Note:
>
> If your configuration analyst has not associated a configurator context with the product, **Variant Configuration** is not displayed.

2. To open the SVR or VC, click **Load Variants**  .

3. Search for the appropriate configuration by typing the name (or part of the name) of the SVR or VC to be loaded.

   The available SVRs and VCs is obtained from the configurator context associated with the product or from the product itself. Only SVRs and VCs directly associated with the product can be loaded. A variant that is created for a product is not available for other products, even if the products share a configurator context.

The SVRs and VCs matching the search criteria are listed.

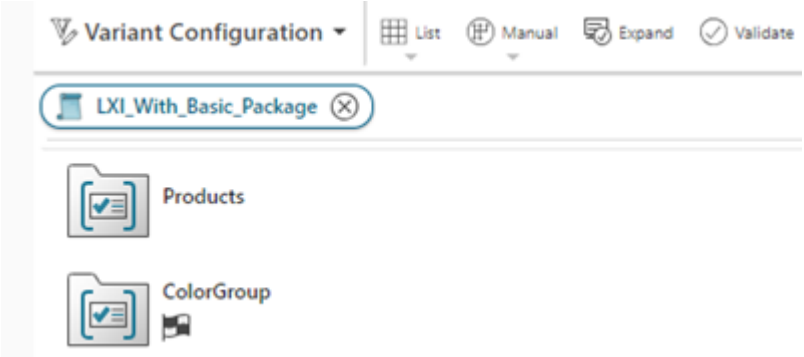
4. Select an SVR or VC and click **Load**. The system loads the selected configuration.

> Note:
>
> In this example, a single variant configuration is applied. Multiple variants can be applied to *4G structures* from the **Variant** section of the **Configuration** panel. Access the **Configuration** panel by clicking **Configure**.

- If no variant is applied to the structure, the model opens in guided mode.
- If a configuration is applied, the model displays in manual mode.

5. Remove the variant rule or variant condition applied to the structure.

Example:



Example of solve behavior using explicit configuration

The following is an example of solve behavior for **Order** and **Overlay** modes. In the **Order** mode, the **Explicit Configuration** check box is selected by default and in **Overlay** mode, it is deselected by default.

Teamcenter allows you to choose a solve behavior that influences which BOM lines get configured in or out. When you perform a solve using the **Order** mode, it results in a configuration that is 100% or less. Conversely, if you choose the **Overlay** mode, the solve results in a configuration that is more than 100%, for example, 120% BOM. However, if a complete configuration is specified in this mode, it results in a 100% BOM.

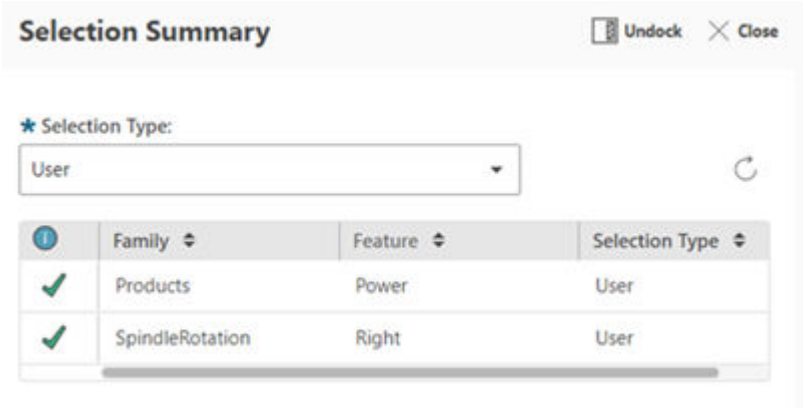
Procedure

1. Open the hand drill assembly. Let us assume that the assembly has the following unconfigured content data.

Element	ID	Variant Formula
Handdrill_Assembly_Configurator	PWRTOOLS-1-100	
Drill machine housing	3-001-000065	Models = PX AND SpindleRotation = 'Left and Right'
Drill machine housing (no direction sli...	3-001-000068	Products = Power AND SpindleRotation = Right
Drill chuck (open/close with tool)	3-001-000021	SpindleRotation = Right
BATTERY 18V	PWRTOOLS-1-101	Voltage = 18V
BATTERY 12V	PWRTOOLS-1-102	Voltage = 12V
MOTOR WITH GB	PWRTOOLS-1-103	
ELECTRICAL WIRING	PWRTOOLS-1-104	Products = Hammer AND Products = Impact AND Products = Power AND Products = Screw
LED WorkLight	LED WorkLight	WorkLightType = LED
WorkLight	WorkLight	WorkLight = true
Universal Torque Controller	Universal Torque Controller	

2. Select the **Power Drills** feature from the **Products** family and the **Right Turning Spindle** feature from the **Function POWERTOOL** family.

   Choose **Selection Summary** to ensure that the following selections have been made.



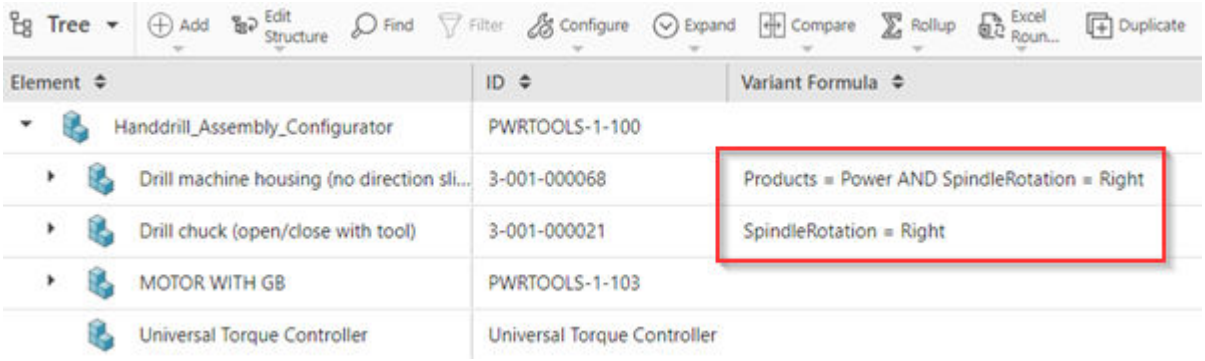
3. Switch to **Order** mode.

   a. Click **Settings** and select **Order** mode.

      Verify that the **Explicit Configuration** check box is selected by default in this mode.

   b. Click **Apply Configuration**.

      The result of the **Order** solve is as follows:



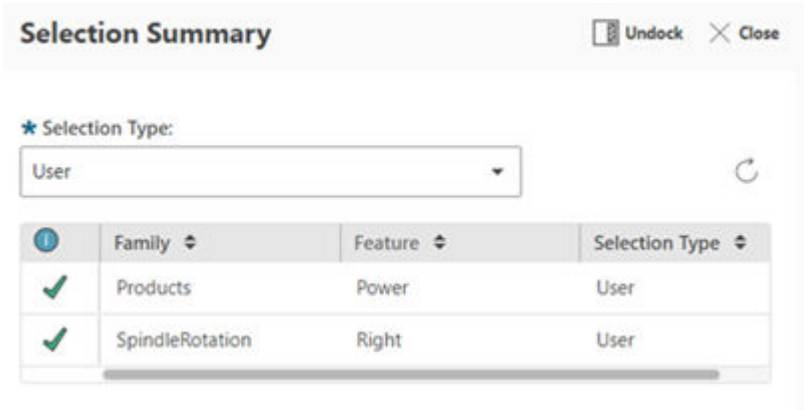
In **Order** mode, the **Explicit Configuration** check box is selected by default. Assuming that there are no default rules to make system selections, this solve returns only features that have been explicitly selected by users such as **Power**

4. Switch to **Overlay** mode.

   a. Click **Settings** and select **Overlay** mode.

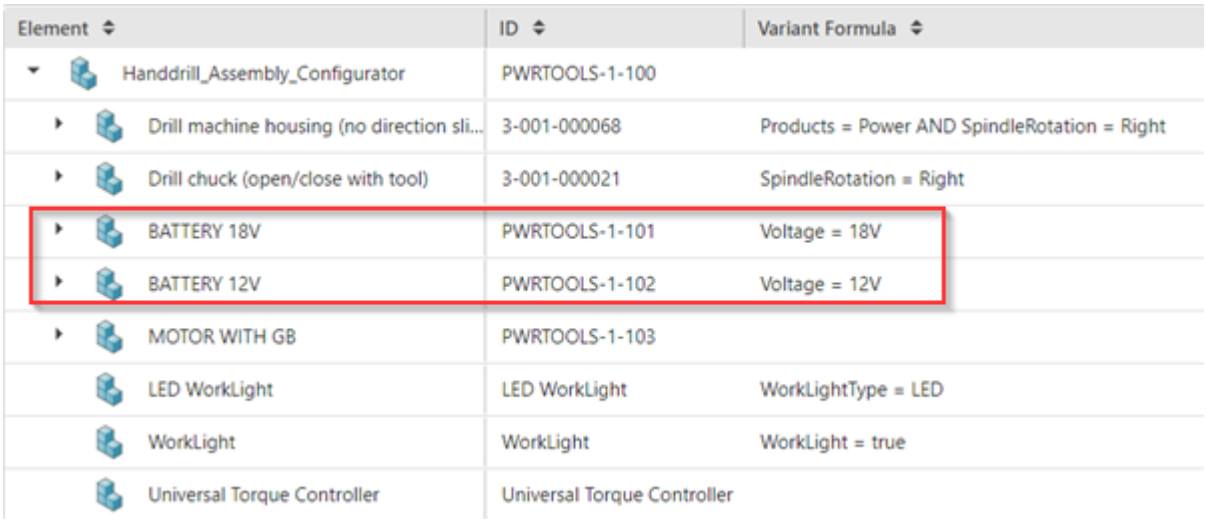
      Verify that the **Explicit Configuration** is *not* selected by default in this mode and click **Apply** in the **Settings** panel.

   b. Choose **Selection Summary** to ensure that the following selections have been made.



   c. Click **Apply Configuration**.

      The result of the **Overlay** solve is as follows:



Element	ID	Variant Formula
Handdrill_Assembly_Configurator	PWRTOOLS-1-100	
Drill machine housing (no direction sli...	3-001-000068	Products = Power AND SpindleRotation = Right
Drill chuck (open/close with tool)	3-001-000021	SpindleRotation = Right
BATTERY 18V	PWRTOOLS-1-101	Voltage = 18V
BATTERY 12V	PWRTOOLS-1-102	Voltage = 12V
MOTOR WITH GB	PWRTOOLS-1-103	
LED WorkLight	LED WorkLight	WorkLightType = LED
WorkLight	WorkLight	WorkLight = true
Universal Torque Controller	Universal Torque Controller	

In **Overlay** mode, the **Explicit Configuration** is not selected by default. Assuming that there are no default rules to make system selections, this solve returns features that have not been explicitly selected by users such as **BATTERY 18V** and **BATTERY 12V**.

Solve behavior for matrix constraints when configurator contexts have a negative bias

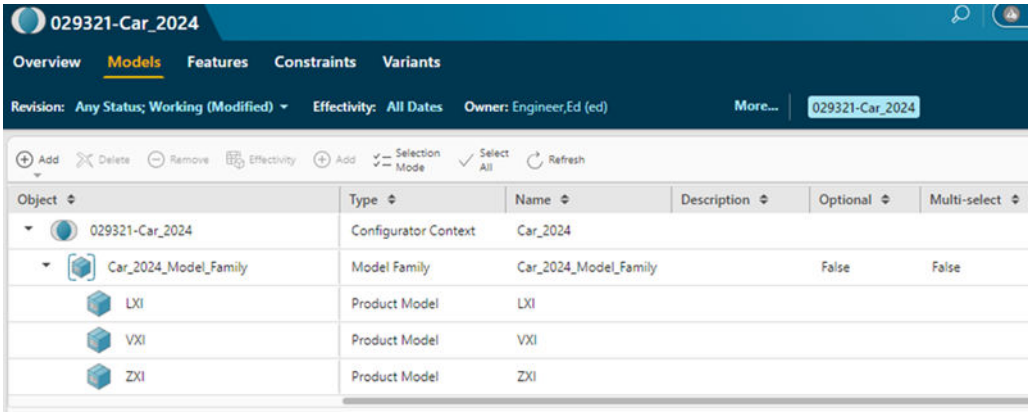
When you create a configurator context with a negative bias, the system automatically creates availability rules for the features included in the condition of the matrix constraint.

The system automatically creates an availability rule for all the features included in the condition of the matrix constraint for configurator contexts with negative bias. However, the system creates availability rules only for the features included in the condition of the matrix constraint. The features that are not included in the condition of the matrix constraint are ignored.

Procedure

1. Create a **Car_2024** configurator context with a negative bias.

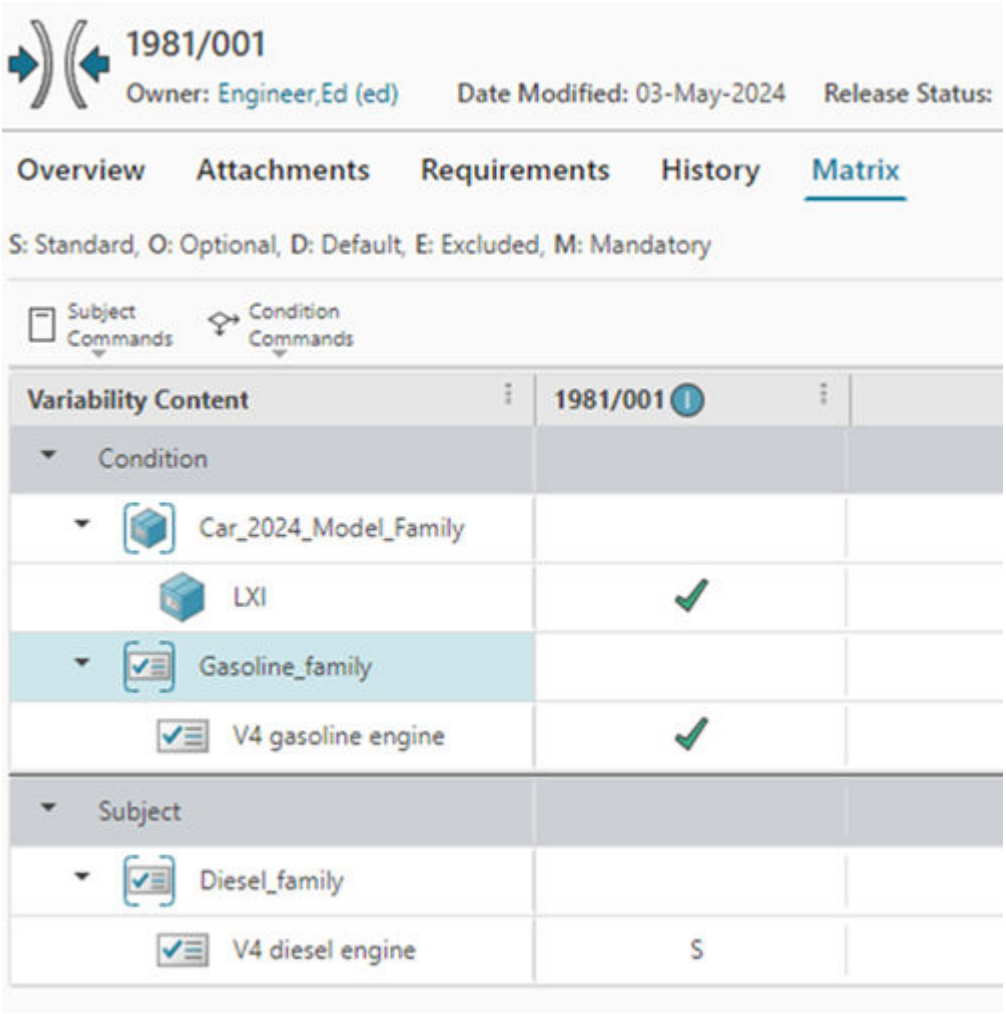
2. Create a model family and product models as follows:



3. Create a group, family, and features as follows:

Object	Type	Name	Feature Da...	Optional	Free-form	Multi-select
029637-Car_2024	Configurator Context	Car_2024				
Engine group	Group	Engine group				
Diesel engine family	Family	Diesel engine family	String	False	False	False
R3 diesel engine	Feature	R3 diesel engine				
R4 diesel engine	Feature	R4 diesel engine				
R5 diesel engine	Feature	R5 diesel engine				
Gasoline engine family	Family	Gasoline engine family	String	False	False	False
V4 gasoline engine	Feature	V4 gasoline engine				
V6 gasoline engine	Feature	V6 gasoline engine				
V8 gasoline engine	Feature	V8 gasoline engine				
Unassigned Families						

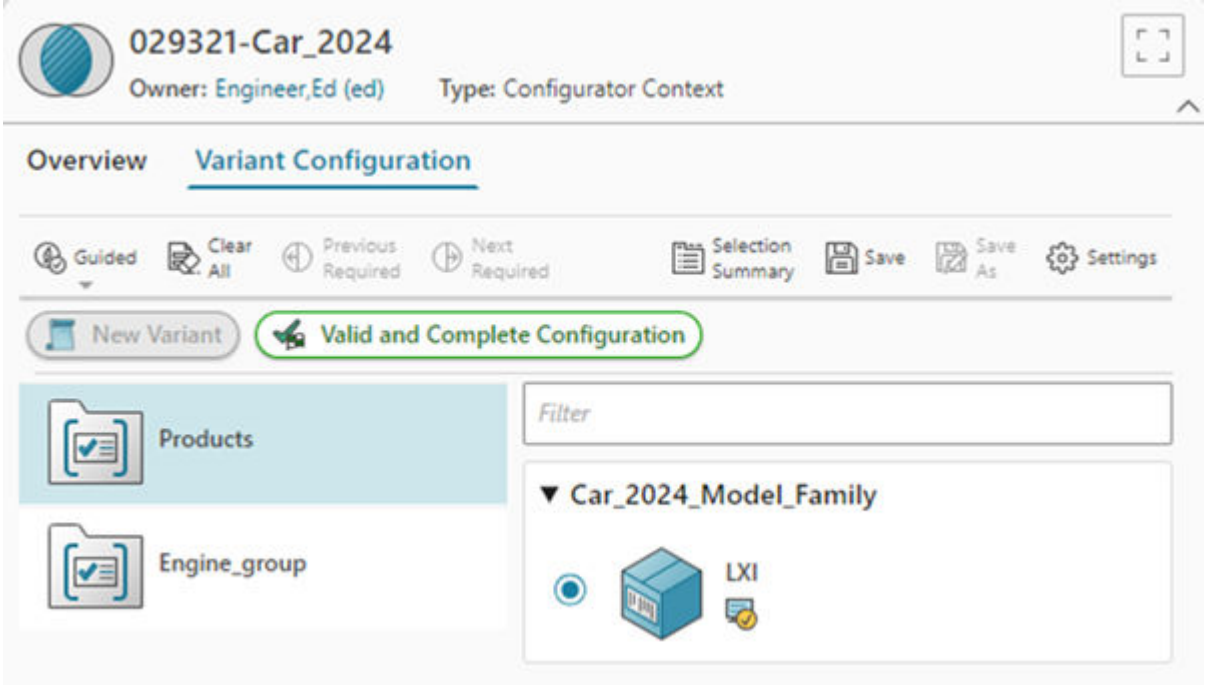
4. Create a matrix constraint and select condition and subject as follows:



5. Open the **Variant Configuration** view.

   The system automatically creates an availability rule for all the features included in the condition of the matrix constraint for configurator contexts with negative bias.

   > Note:
   >
   > The system automatically creates availability rules only for the features included in the condition of the matrix constraint. The features that are not included in the condition of the matrix constraint are ignored.



Solve behavior for default rules

When you create default rules, the **Cfg0DefaultRuleSortSequence** site preference defines the default rule properties for computing the rank of default rules.

Default rules help improve usability because they help users form a complete configuration of a product. A default rule tries to anticipate common configuration settings that meet most of the users' preferences.

Default rules that are in conflict with the user input or constraint rules with a higher severity are automatically skipped when expanding the configuration. Teamcenter automatically resolves all conflicts that involve default rules by determining the optimum set of default rules to be suppressed based on their affiliation with the input configuration and their ranking based on sequence number. Default rules with a higher sequence number are evaluated later and therefore have a lower ranking. Those with the same sequence number have the same ranking.

For more information, see About default rules in *Product Configurator on Rich Client — Usage*.

The **Cfg0DefaultRuleSortSequence** site preference infers the rank of the default rules. The default value of this preference is **Cfg0DefaultRule:cfg0Sequence:ASC**. It means that the default rank of the default rule is determined from the sequence property of the default rule.

As a site administrator, you can append or change the value of the **Cfg0DefaultRuleSortSequence** site preference to customize the rank of the default rule. Examples are as follows.

If the system administrator sets the value as:

Cfg0DefaultRule:object_name:ASC

Cfg0DefaultRule:cfg0Sequence:ASC

Then, the alphabetical order of the object name takes priority for the default rules. If the object names are same, then the sequence is considered next for prioritizing rules.

If the system administrator sets the value as:

Cfg0DefaultRule:cfg0Sequence:ASC

Cfg0DefaultRule:object_name:ASC

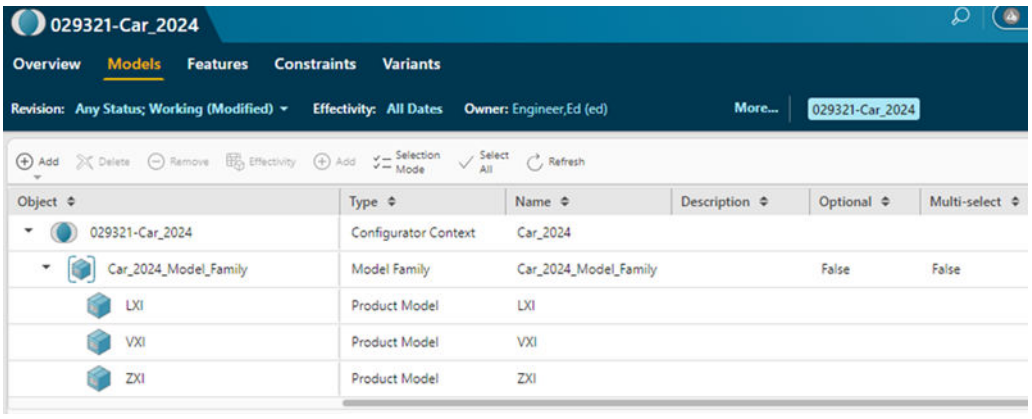
Then, the sequence number takes precedence. If the sequence numbers are the same, the alphabetical order of the object name is considered next for prioritizing rules.

> Note:
>
> If your site has default rules with custom properties it is possible to define a mixture of custom and default properties in the **Cfg0DefaultRuleSortSequence** site preference.
>
> When ranking two default rules **DR1** and **DR2** based on custom properties that are defined for the business object type of **DR1**, but not for the business object type of **DR2**, then **DR2** is ranked as if its property value is the empty string (for string properties), **0** (for integer properties), or **0.0** (for floating point properties).

Procedure

1. Create a **Car_2024** configurator context with a positive or negative bias.

2. Create a model family and product models as follows:



3. Create a group, family, and features as follows:

Object	Type	Name	Feature Da...	Optional	Free-form	Multi-select
029637-Car_2024	Configurator Context	Car_2024				
Engine group	Group	Engine group				
Diesel engine family	Family	Diesel engine family	String	False	False	False
R3 diesel engine	Feature	R3 diesel engine				
R4 diesel engine	Feature	R4 diesel engine				
R5 diesel engine	Feature	R5 diesel engine				
Gasoline engine family	Family	Gasoline engine family	String	False	False	False
V4 gasoline engine	Feature	V4 gasoline engine				
V6 gasoline engine	Feature	V6 gasoline engine				
V8 gasoline engine	Feature	V8 gasoline engine				
Unassigned Families						

4. Verify the value of the **Cfg0DefaultRuleSortSequence** site preference. The default value of this preference is **cfg0Sequence:ASC**. This means that only sequence numbers are considered for default rules and the lower sequence takes priority.

   Override this preference by setting the value as **Cfg0DefaultRule:object_name:ASC**.

5. Create availability rules as follows in the **Grid Editor**.

   Availability rules are required only if you create a configurator context with a negative bias.

Variability Content	1964/001 Availability Rule	1973/001 Availability Rule	1974/001 Availability Rule
Subject			
Diesel engine family			
R3 diesel engine			✓
Gasoline engine family			
V4 gasoline engine		✓	
V6 gasoline engine	✓		
Condition			
Car_2024_Model_Family			
LXI	✓	✓	✓

6. Create default rules as follows in the **Grid Editor**.

Variability Content	1976/001 Default Rule	1977/001 Default Rule
Subject		
Gasoline engine family		
V4 gasoline engine	✓	
V6 gasoline engine		✓
Condition		
Car_2024_Model_Family		
LXI	✓	✓

7. Click **Settings** > **Arrange**. In **Available** columns, search for **object_name**, select the **Name** column, and move it to **Displayed Columns**. Ensure that this is next to the **Sequence Number**. Click **Save and Arrange**.

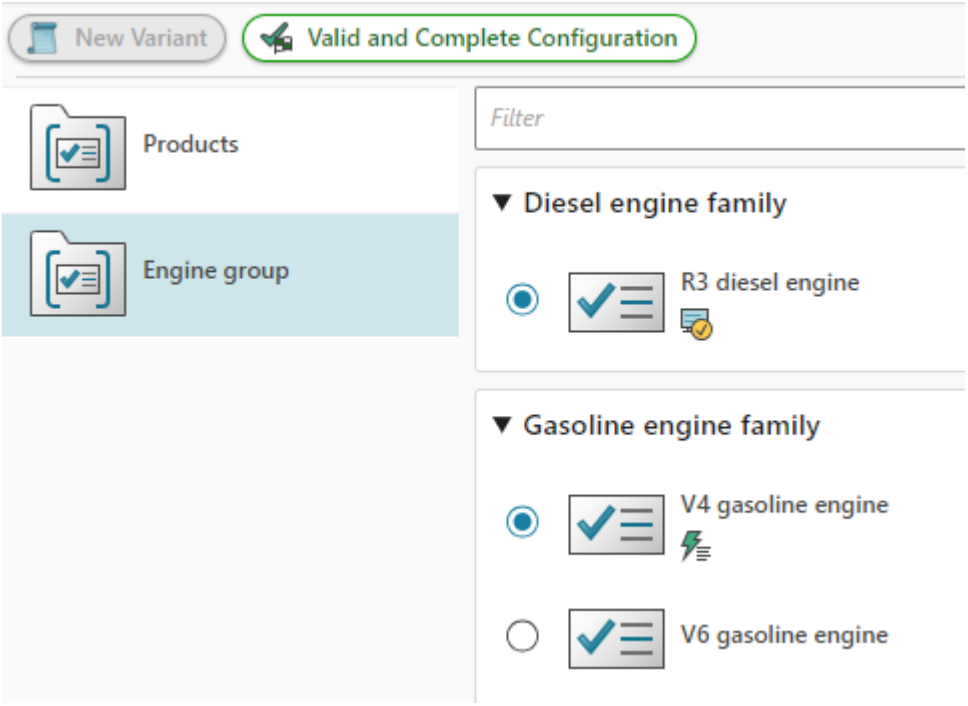
   object_name is the internal name for the **Name** column.

8. Edit the default rules to specify the **V4 gasoline engine** and **V6 gasoline engine names** as **V4_gasoline** and **V6_gasoline**, respectively.

Severity	Name	Subject	Condition
Error	1964	'Gasoline engine family' = 'V6 gasoline engine'	Car_2024_Model_Family = LXI
Error	1973	'Gasoline engine family' = 'V4 gasoline engine'	Car_2024_Model_Family = LXI
Error	1974	'Diesel engine family' = 'R3 diesel engine'	Car_2024_Model_Family = LXI
	V4_gasoline	'Gasoline engine family' = 'V4 gasoline engine'	Car_2024_Model_Family = LXI
	V6_gasoline	'Gasoline engine family' = 'V6 gasoline engine'	Car_2024_Model_Family = LXI

9. Open the **Variants** tab and click **Variant Configuration**. It shows a valid and complete configuration.

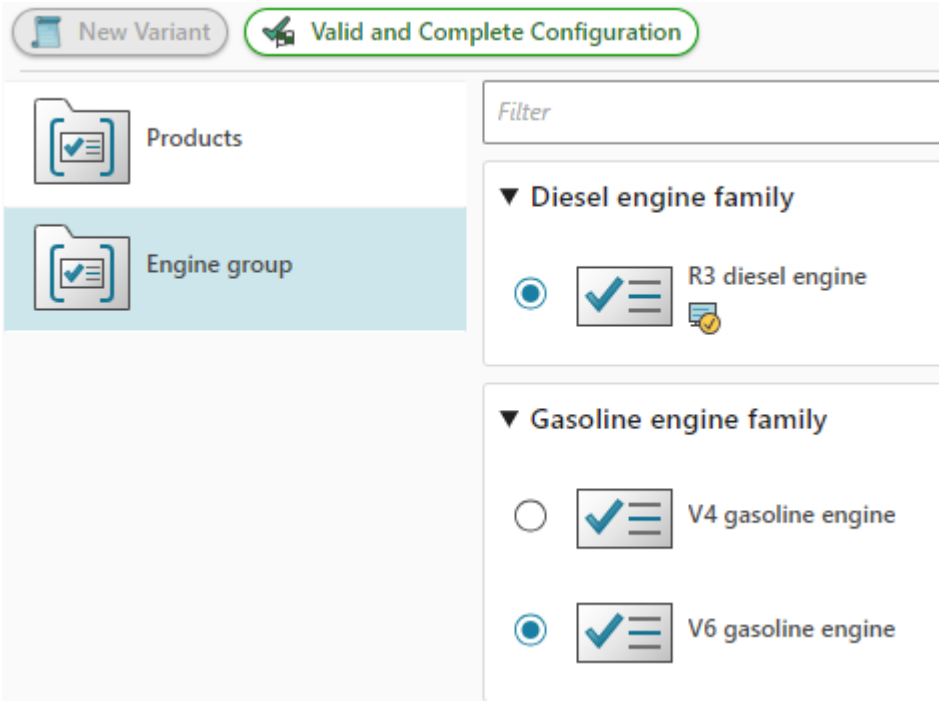
10. Navigate to the Engine group.



The **R3 diesel engine** is a system selection because of an availability rule. The **V4 gasoline engine** is the default selection. This is because the default rule name was **V4_gasoline** for **V4 gasoline engine** and **V6_gasoline** for **V6 gasoline engine**. The alphabetical order of the default rule name takes priority for the default rules since you have overridden the **Cfg0DefaultRuleSortSequence** site preference and set the value to **Cfg0DefaultRule:object_name:ASC**.

11. Edit the names of the default rules to specify **y_gasoline** and **x_gasoline** for **V4 gasoline engine** and **V6 gasoline engine**, respectively.

12. In the **Variant Configuration** view, navigate to the Engine group.



The **V6 gasoline engine** is the default selection now. This is because the default rule name was **y_gasoline** for **V4 gasoline engine** and **x_gasoline** for **V6 gasoline engine**. The alphabetical order of the default rule name takes priority for the default rules since you have overridden the **Cfg0DefaultRuleSortSequence** site preference and set the value to **Cfg0DefaultRule:object_name:ASC**.

13. Override the **Cfg0DefaultRuleSortSequence** site preference and set the value as follows:

    Cfg0DefaultRule:object_name:ASC

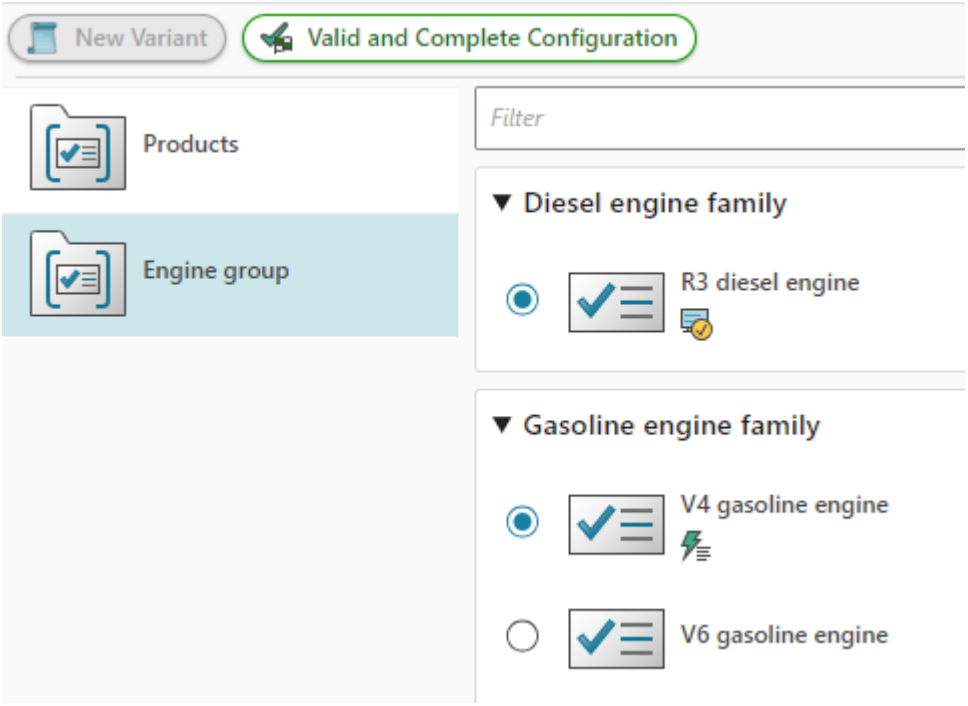
    Cfg0DefaultRule:cfg0Sequence:ASC

14. Edit the names of both the default rules and specify **gasoline** as the value.

15. Edit the **Sequence Number** property of the default rule and specify **10** as the value for **V6 gasoline engine**. The sequence number of **V4 gasoline engine** remains unchanged as **0**.

16. Save your changes.

17. In the **Variant Configuration** view, navigate to the **Engine** group.



The **V4 gasoline engine** is selected. This is because the names (**gasoline**) are the same for both the default rules. However, the sequence number was **0** for **V4 gasoline engine** and **10** for **V6 gasoline engine**. The system, based on the preference value, first considers the names of the default rules and since they are the same, it considers the sequence number next to prioritize the rules. In this case, the lower sequence number is prioritized.

Filter features by intent while authoring variant conditions

You can filter out features by specific intent while authoring variant conditions. For example, if you are authoring a bill of materials (BOM), you can focus on features with technical intent. Conversely, if you are looking at a bill of process (BOP), you can focus on features with marketing intent.

The configurator administrator defines a business purpose or intent such as manufacturing, marketing, or technical to categorize groups, families, features, and constraints. For more information, see *Define business intents for configurator objects*.

Procedure

1. Find and open the product or item revision to be configured.

2. Select one or more BOM lines, click the **Variant Conditions** tab, choose **Table Settings** ⚙ > **Arrange**, add **Intents** from **Available Columns** to **Displayed Columns**, and close the **Arrange** panel.

3. To filter the variability data by intents, click the vertical ellipsis on the **Intents** column header, select the appropriate filter, for example, **Contains**, and type *technical*, *manufacturing*, or *marketing*.

Author variant formula in the grid

You can author variant formula by selecting features from the grid. This is the recommended method.

You can also **author variant formula by typing the formula in the text editor**. This is recommended only for complex formula or combinations that cannot be selected on the grid.

Procedure

1. Find and open the product for which you want to author variant formula.
2. Select the BOM lines for which you want to apply variant conditions and click the **Variant Conditions** tab.

   The BOM lines you selected are displayed as columns at the top. You can hover over the column header to view the complete name of the BOM line.
3. (Optional) Enable **Variant Formula** column in your work area, if it is not available.

   This column displays the variant formula for each BOM line and you can edit this in the grid.

   a. In your work area, click **Settings**.

   b. Click **Arrange** and search for the **Variant Formula** column.

   c. Select the **Variant Formula** column and click **Move up** to bring it to the top of the **Arrange** panel.
4. Click **Start Edit** on the top of the grid
5. Make the required selections in the grid.
6. Click **Save Edits**.

Author variant formula in the editor

You can author variant formula by typing the formula in the text editor. This is recommended only for complex formula or combinations that cannot be selected on the grid.

You can also **author variant formula by selecting features from the grid**. This is the recommended method.

In the **Variant Formula Editor**, you can author complex variant conditions that cannot be authored in the grid. This view is used by expert users who want to write the expression directly in the editor. When you save such a variant condition, it is not available in the grid.

Procedure

1. Find and open the product for which you want to author variant formula.

2. Select the BOM lines for which you want to apply variant conditions and click the **Variant Conditions** tab.

   The BOM lines you selected are displayed as columns at the top. You can hover over the column header to view the complete name of the BOM line.

3. (Optional) Enable **Variant Formula** column in your work area, if it is not available.

   This column displays the variant formula for each BOM line and you can edit this in the grid.

   a. In your work area, click **Settings**.

   b. Click **Arrange** and search for the **Variant Formula** column.

   c. Select the **Variant Formula** column and click **Move up** to bring it to the top of the **Arrange** panel.

4. Select one of the BOM lines, click on the top of the column, and click **Show Variant Formula Editor**.

   Even if you select multiple BOM lines in the **Variant Conditions** view, you can edit only one BOM line at a time.

5. To edit the variant condition, in the **VARIANT FORMULA EDITOR**, click **Start Edit**.

6. Click inside the box to start creating your formula.

   The **Intellisense** autocompletion feature is turned on by default. When it is turned on, you can get suggestions by pressing either Ctrl + space bar or space bar and then make a selection. After making the selection, press the space bar again to get the appropriate logical operators. Continue to create a complete formula and click **Validate Syntax** to validate the syntax of the formula you have created manually.

   Example: `ExteriorColor = NeptuneBlue`

   When the autocompletion feature is turned on, the system honors the name or the ID as the primary business attribute depending on how the attribute is set at your site by your administrator. This means that if name is set as the primary attribute, you must type the name in the formula editor and not the ID to complete the formula. Additionally, the administrator at your site can set the visibility of option families and the display of family namespace. By default, option families are visible and family namespace is not displayed. In such cases, you can type the option families in the formula editor, but not the family namespace to complete the formula. The system honors

the configurations set by the administrator and makes suggestions based on these configurations. Consult the administrator at your site for more information.

When you type the suggestions, the system performs validations for each suggestion when the feature is turned on. However, when the feature is turned off, the system does not perform any validation.

When the autocompletion feature is turned off, you must author the formula using the internal Teamcenter formula format. Example: `(([FSC_Config_Data]ExteriorColor = NeptuneBlue))` where **FSC_Config_Data** is the namespace, **ExteriorColor** is the family and **NeptuneBlue** is the feature.

You can also use custom formula in the formula editor. By default, custom formula is not enabled. Consult your administrator to enable it.

7. Make the required changes to the variant formula for the selected BOM line.

   The formula displayed in the **Variant Formula** column is the display formula whereas it is an internal formula for the editor. The server converts the internal formula to the display formula.

   Examples where the logical operators are different:

Variant Formula column	Formula in editor
Engine = V4 OR Engine =V8	**(Engine = V4 | Engine =V8)**
Music Player = Radio AND Music Player = CD Player	**(Music Player = Radio & Music Player = CD Player)**

8. Click **Save Edits**.

   The system validates the expression syntax only after you save the changes.

   If you specify a wrong formula in the editor and click **Save Edits**, the system displays a syntax error or invalid error as appropriate.

   You cannot save the changes if they are invalid.

9. (Optional) To validate the expression against the constraints associated with the configurator context, after saving multiple changes, click **Validate All** on the top of the grid.

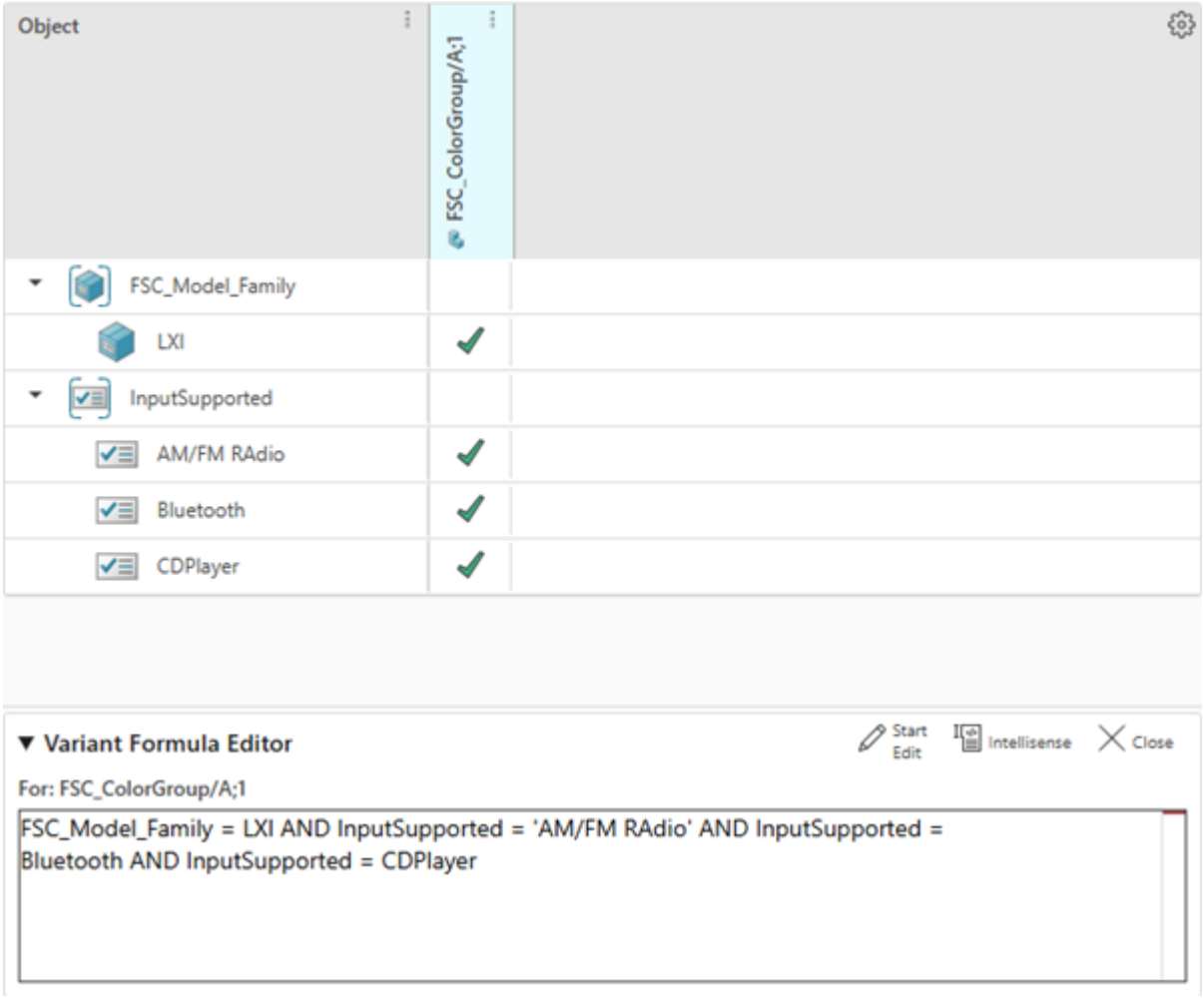
Examples

The following are some examples of the differences when selections are made for single select and multiselect families.

1. Open a structure. select a BOM line, and make selections in the **Variant Conditions** tab as follows. Additionally, select the BOM line, click on the top of the column, and click **Show Variant Formula Editor**.

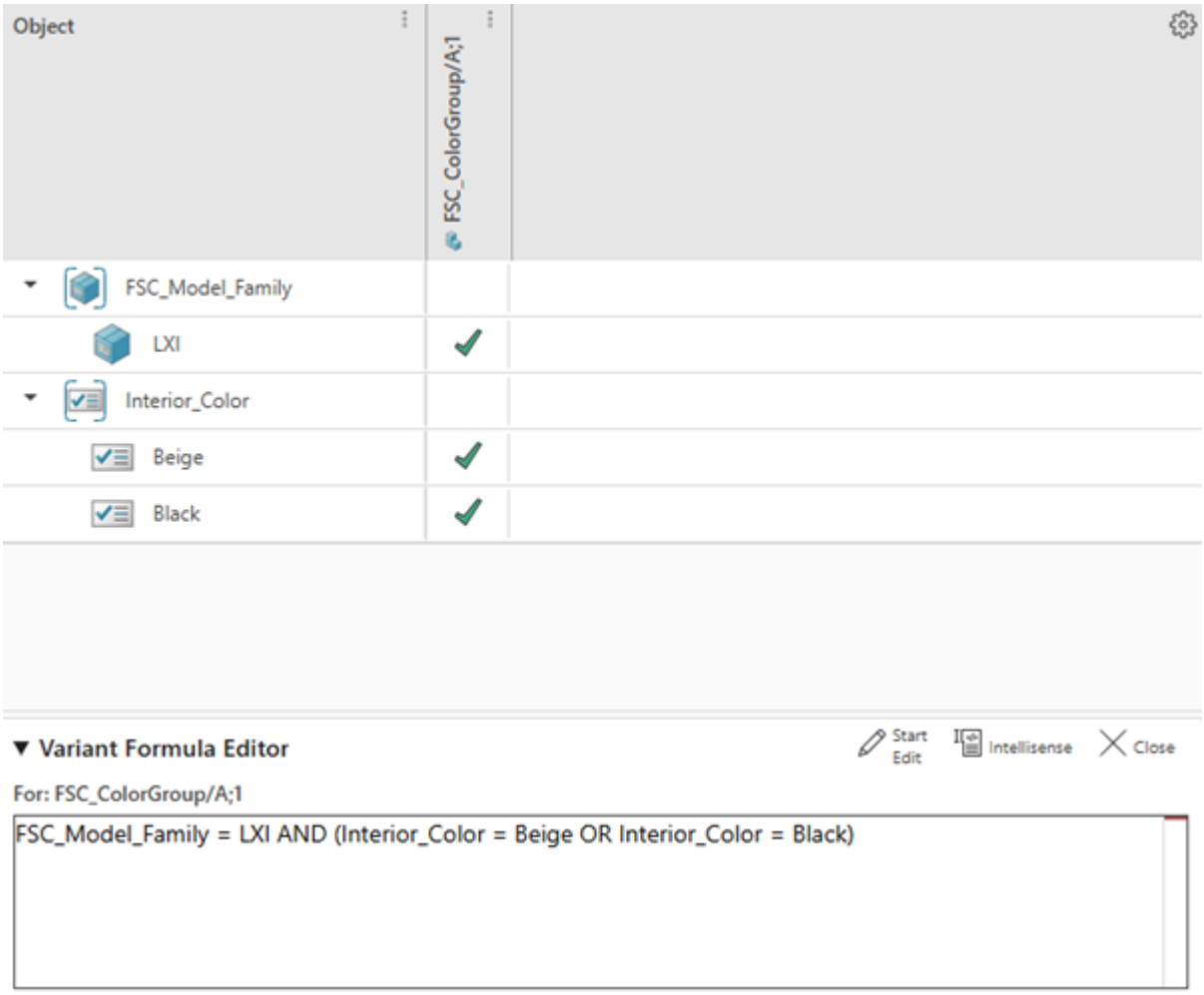
2. In a multiselect family, feature selections are connected using **AND**.

   Example:



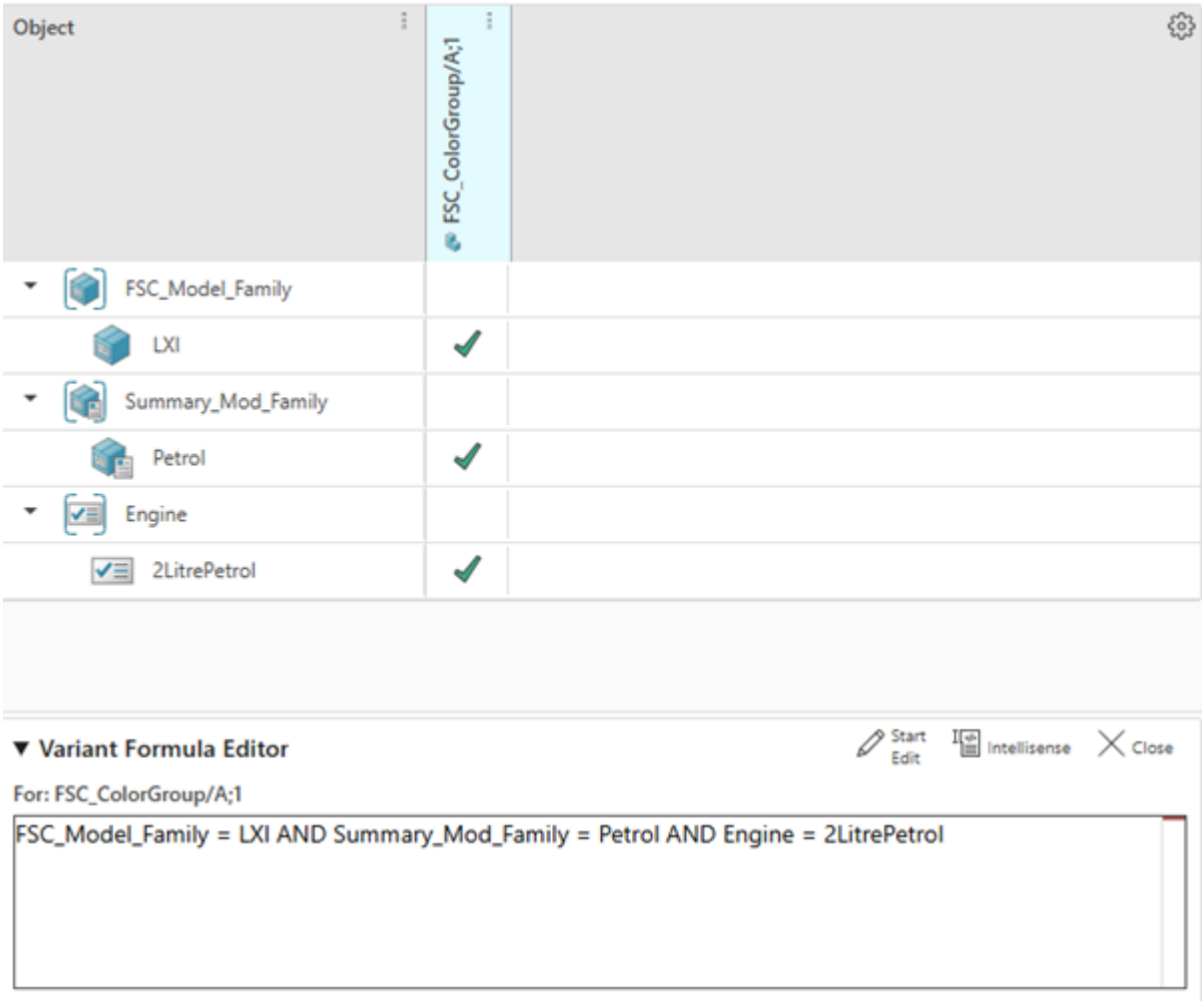
3. In a single select family, feature selections are connected using **OR**.

   Example:



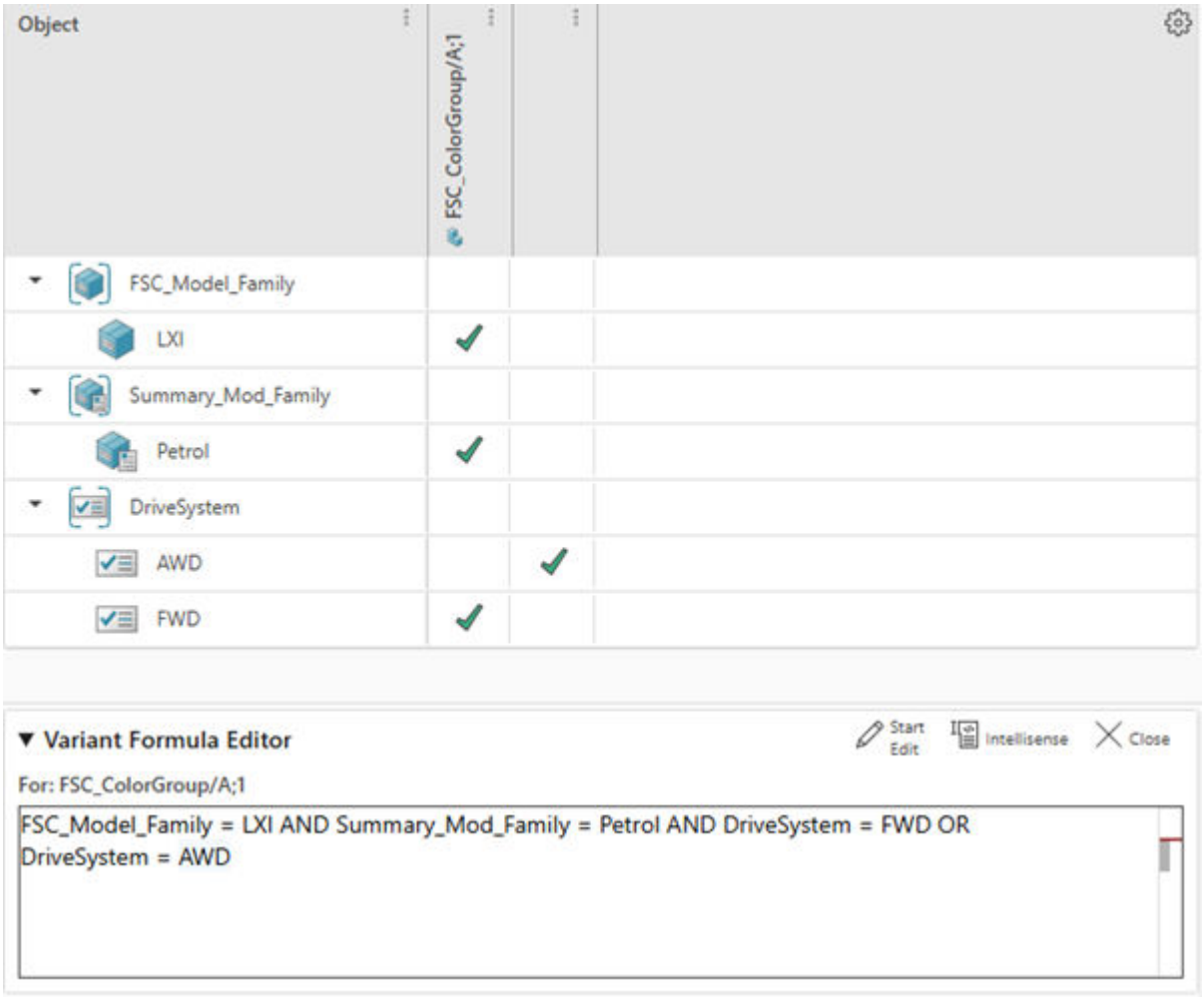
4. Feature selections from different families are connected using **AND** in the same column.

   Example:



5. For split columns, the expression generated by feature selections across columns are connected using **OR**.

   Example:



Save changes in a configuration

You can save changes in your existing variant or save your custom configuration as a new variant rule. Alternatively, you can save them as a variant criteria. This depends on how the administrator configures your Teamcenter environment.

When an SVR or VC is saved, the user and system selections are saved, along with everything in the **Settings** panel, including the validation severity, expansion severity, and selection behavior settings, as well as the filter criteria information (revision rule, effectivity, and rule date).

In earlier versions, the system only saved the user selections when saving an SVR. If you load an SVR that was saved in a previous version, it loads the saved user selections but keeps the current settings in the **Settings** panel.

To save changes in your configuration,

1. To open the **Save** panel, choose **More Commands** ••• > **Save** .

2. Enter a name.

3. (Optional) Type a description.

4. Select one of the following options in **Attach to**:

   - **Current Structure Revision** to save your changes to the structure you have opened. These changes are available only for the specific structure.

   - **Configurator Context** to save your changes to the configurator context. These changes are available to all the structures to which this configurator context is associated.

   The default selection for this option is determined by how the administrator configures your Teamcenter environment. By default, it is **Configurator Context**.

5. Click **Save**.

16. Save filtered and configured structures within a workset

About worksets

A workset is your personal working context. You can save your product definition in a workset. It is a container that holds one or more structures together. These structures can be the different views of the same structure or two entirely different structures. You can perform all BOM operations for a structure within a workset even when a partition scheme is applied to the structure.

You can create and use worksets only if your Teamcenter setup has the Smart Discovery license.

Create a workset

A workset is your personal working context in which you can save your product definition. You can create a workset to bring separate structures together. A workset can be created for all structures, including those on which a partition scheme is applied.

Procedure

1. Open the structure that has variability data created using Product Configurator.

   You cannot create a workset for a structure that has variability data defined using classic variants.

2. Select **Add** ⊕ > **Workset** .

3. In the **Add Workset** panel, do the following:

   a. In the **Type** list, select either **Workset** or **Workset Custom** depending on whether you want to create a workset or a custom workset.

   b. In the **ID** box, enter an ID for the new workset.

   c. In the **Revision** box, enter a revision for the new workset.

   d. In the **Name** box, enter a name for the new workset.

   e. (Optional) In the **Description** box, enter a description for the new workset.

   f. (Optional) Click **Add Project** to assign a project to the new workset.

4. Click **Add**.

A workset is created for your structure.

Update a workset

When you change the filter parameters of a configuration in a workset, the updates you made to the workset and the structures within it are saved automatically. You can also update a structure (within the workset) for which a partition scheme is applied. However, the tree structure does not reflect the change. Therefore, you must perform a recalculation. Subsequently, the partition scheme displays the configured BOM lines under a partition, and this is based on the applied configuration settings and filter criteria.

Procedure

1. Search for a workset using the global search or **Quick Access**.
2. Click **Open** to open the workset.

   The workset is always loaded with static data.
3. To update the workset with the latest applied filters and configurations, select the workset and then click **Replay**. All modified structures within the workset are updated.

   OR

   To update just a structure within the workset, select the structure and then click **Replay**.
4. Select a product within a workset and then click **Filter** or select **Configure** > **Configuration** to apply filters or configurations to the workset.
5. Select the workset and click **Replay** to update it.

Save a workset as a new workset

When you change the filtering aspects of a configuration in a workset, the updates you made to the workset and the structures within it are saved automatically. When you save a workset as a new workset, the name of the workset is changed, but its configurations are retained. You can also save a structure (within the workset) for which a partition scheme is applied as a new structure.

Procedure

1. Search for a workset using the global search or **Quick Access**.
2. Click **Open** to open the workset.

3. Select a product within a workset and then click **Filter** or select **Configure** > **Configuration** to modify the filters or the configurations applied on the workset.

4. Click the workset and then select **More Commands** > **New** > **Save As**.

5. In the **Save As** panel, enter a name for the new workset.

6. (Optional) In the **Description** box, enter a description for the new workset.

7. (Optional) Click **Add Project** to assign a project to the new workset.

8. Click **Save**.

Revise a workset

When you change the filter parameters of a configuration in a workset, the updates you made to the workset and the structures within it are saved automatically. When you update or revise a workset, the revision of the workset is changed, but its configurations are retained. You can also revise a structure (within the workset) for which a partition scheme is applied.

Procedure

1. Search for a workset using the global search or **Quick Access**.

2. Click **Open** to open the workset.

   The workset is always loaded with static data.

3. To update the workset with the latest applied filters and configurations, select the workset and then click **Replay**. All modified structures within the workset are updated.

   OR

   To update just a structure within the workset, select the structure and then click **Replay**.

4. Select a product within a workset and then click **Filter** or select **Configure** > **Configuration** to modify the filters or the configurations applied on the workset.

5. Click the workset and then select **More Commands** > **New** > **Revise**.

6. On the **Revise** panel, do the following:

   a. In the **Revision** box, enter a revision for the workset.

   b. In the **Name** box, enter a name for the workset.

c. (Optional) Enter a description for the workset in the **Description** box.

d. (Optional) Click **Add Project** ⊕ to assign a project to the new workset.

e. Click **Revise**.

Find elements within a workset

You can find elements across the different product structures (indexed using Smart Discovery Indexing) saved within a workset.

Procedure

1. Open a workset from the search results.
2. Click **Find** 🔍.
3. In the **Find** panel, enter the search keywords and click **Search** 🔍.

   The search result displays elements that match the search keywords. These elements can belong to the different structures within the workset.

   You can also search within a specific structure. However, this structure must be indexed using Smart Discovery Indexing. To search within a structure in the workset:

   - Select the structure and click **Find** 🔍.
   - In the **Find** panel, select the **Find within <Product Name>** check box, enter the search keywords, and click **Search** 🔍.

     You can also find an element in a single structure (within the workset) for which a partition scheme is applied.

Create a snapshot of a workset

You can create a snapshot of all worksets, irrespective of whether a partition scheme applied to the structures within the worksets.

Snapshots capture the 3D data associated with your product. When you load the product in the 3D viewer and take a snapshot, you capture the current 3D view, including camera, visibility, selection, view port (pan, zoom, and rotate modes), orientation, sections, measurements, queries, and markups. You also capture the configuration and filtering criteria.

When working with worksets, you can capture snapshots of a workset to preserve the working context and save it for later use.

Working with Product Configurator data in a workset

A workset is a container that holds two or more structures together. Therefore, to view configuration information, select the relevant structure within the workset.

You can perform Product Configurator-related tasks, such as authoring variant conditions and loading a Saved Variant Rule (SVR), from within the workset and from the structures included in the workset. Classic variants are not supported in a workset.

Modifying the data in a workset

After you open a workset, it is always loaded with static data. You can modify the data in a workset, for example, you can add a structure element, remove an element, and edit the properties of an element. When you do this, you must replay the workset or a structure within the workset for the changes to take effect.

When you insert an element in a structure within a workset, the element is immediately displayed in the tree structure. However, when you reopen the workset or refresh the browser page, the element is not displayed. Now, when you replay the workset or a structure within the workset, the element might be displayed in the tree structure based on the applied filter criteria.

When you delete an element from a structure within a workset, the element is removed from the tree structure.

When you edit the properties of an element or edit a variant condition or author occurrence effectivity, the updates are immediately done. However, to display the changes, you must replay the workset or the structure within the workset. Now, when you reopen the workset or refresh the browser page, the updates are maintained even though the changed property does not satisfy the filtering or configuration criteria.

Export and import structures along with worksets

You can export and import structures along with worksets to and from other Teamcenter sites.

A workset is a context collector for other structures. If your organization has very large structures with a multitude of occurrences, these occurrences can be collated within a workset to do a *what-if* analysis. But when you send the workset to another site by using a Multi-Site environment or a Briefcase, you might not want to export such a large number of occurrences along with the workset. Therefore, while exporting, the **Include entire BOM** option is not enabled by default. Consequently, the TCXML-based Multi-Site functionality works to share workset and related objects but not the product item or item revisions or their content.

Worksets also support site-consolidation activities through the TCXML-based Multi-Site functionality.

To export and import structures along with worksets, you can use:

- Briefcase files
- Multi-Site Collaboration
- PLM XML

17. Save filtered and configured structures within a session

About sessions

To easily retrieve a structure that you are currently working with, you save it within a *session*. You can further apply filters to the structure or configure it to derive a smaller structure that is more relevant to you. The session retains the filters and configurations applied to the structure.

When you open a session, you view the structure as it was previously saved retaining its applied filtering and configuration criteria. Depending on how your application administrator has configured the system, the session displays:

- Static data already stored in the session.

  OR

- Dynamic data where the stored data is re-evaluated against the current data and the latest data is loaded.

You can override the value of this preference by creating a new instance of the preference at a higher-precedence location.

You can make **changes** to the session by applying new filters and configuration, and can also **save it as a new session**. Additionally, you can capture a snapshot of the product within the session to include the 3D measurement data applied on the structure. You can also **share a session** with other users.

Depending on how structures are indexed, you can perform the following tasks:

Scenarios		Tasks
Structures are indexed using Smart Discovery Indexing.	Structures are filtered.	Create a session. Visualize large structures and capture snapshots.
	Structures are not filtered.	Create a session. Visualize large structures and capture snapshots.

Create a session

You can create a session for a regular structure and also for a structure within a workset with a partition scheme applied. You can save this session and share it with other applications.

To create a session:

1. Search for and **Open** the desired structure.
2. Filter the structure as per your requirement.
3. Click **New** > **Session**.
4. In the **Session** panel, specify the access level for other users:
   a. Select the **Allow others to view** check box to provide *read* access to other users. Clear the check box to deny read access.
   b. Select the **Allow others to edit** check box to provide *write* access to other users. Clear the check box to deny write access.

   > Note:
   >
   > The **Allow others to edit** check box is displayed only when the **Allow others to view** check box is selected.

5. Click **Create** to create the session.

Search for a session

You can search for a session based on the properties associated with the top-structure node in that session. To quickly search for a session, you can further filter sessions by their properties such as **Name**, **ID**, and **Type**.

1. Search for sessions by performing a global search.

   You can search with a keyword or the wildcards characters ***** or **?**.

   The **Filters** panel is displayed.

2. In the **Filter** search box under the **Type** list, select the **Session** check box.

   The session that you are searching for should be displayed in the panel to the right of the **Filters** panel.

You can further refine your search by applying more filters, such as **ID Contained in**, **Name Contained in**, and **Type Contained in** and many other filters.

Save a session as a new session

1. Search for a session.
2. Click **Open** to open the session.
3. Click **Filter** or select **Configure** > **Configuration** to modify the filters or the configurations applied on the session.
4. Click the session and then select **Session** > **Save As**.
5. In the **Save As Session** panel, enter the required details and click **Save**.

View and update a session

1. Search for a session.
2. Click **Open** to open the session. Your site administrator sets whether to load a session with the static data stored in the session or with the latest data.

   Sometimes, when a session is opened, you get a message asking you to choose to restore the session. Due to some issues, such as getting logged out while making updates to a session, results in this message. Click **Restore** if you want to autorecover the updates that you earlier made to the session. If you do not want to restore, you can ignore the displayed message, and continue with your updates to the session.

   Session information that gets restored includes snapshots, quick measurements, part orientation, queries, sections, and workspace settings such as floor options and material.
3. To view the latest filters and configurations applied on the structure within the session, click **Replay**.

   If you opened the structure in another window and edited it, the updates are not reflected in the session when you replay it. You must refresh the browser window to reload the changes in the session.
4. Click **Filter** or select **Configure** > **Configuration** to modify the filters or the configurations applied on the session.
5. Click **Save Session**.

   If the session is opened by another user at the same time and the other user made some changes to the session, you can choose to overwrite the session or save the session as a new one. You can overwrite the session only if your administrator has allowed overwriting of the session.

If another user removes some structure elements from the session, you receive a message with the list of the structure elements that are no longer available in the session.

6. To save a session as a new one:

   - Click **Session** > **Save As**.
   - In the **Save As Session** panel, enter the required details and click **Save**.

7. To undo the updates to the session, click **Session** > **Reset View**.

   On resetting, the session goes back to its previously saved state.

Configure a session

Sessions are used to save the filtering and configuration criteria applied to a structure. When you open a session, you view the structure as it was previously saved retaining its applied filtering and configuration criteria.

When a new session is created for a structure, objects in the structure are displayed based on the configurations applied prior to creating the session. The status of the following **Show...** sets a preference. The value of the preference is not saved when the session is saved.

- Show Excluded by Effectivity
- Show Excluded by Variants
- Show Suppressed

You can use these **Show...** toggles in the **Configuration Settings** menu to control the display of the structure elements. You can apply any filters on the configured structures as required. The configuration is retained with the filters applied.

When the session is saved, the applied configuration (variant, effectivity, filtering, etc.) is also saved. However, the status of the **Show...** commands is not saved.

Show or hide occurrences excluded by effectivity

When a structure is loaded, all objects including those which are not effective for the specified revision rule are displayed by default. However, you can choose to display only those occurrences that are effective for a specified date, unit, range of dates, or unit numbers.

To show or hide the occurrences that are excluded by the currently applied effectivity, in the work area toolbar, click **Configuration Settings** > **Show Excluded By Effectivity**.

Show or hide occurrences excluded by variant

When a structure is loaded, all occurrences including those occurrences which are not configured by the variant are displayed by default. However, a user can choose to hide or show the that are not configured.

To show or hide the occurrences that are excluded by the variant configuration, in the work area toolbar, click **Configuration Settings** > **Show Excluded By Variants**.

Show suppressed occurrences

Occurrences in a structure can be hidden by setting the suppress property to *True*. When a structure is loaded, all occurrences including the suppressed occurrences are displayed by default.

To show or hide the suppressed occurrences, in the work area toolbar, click **Configuration Settings** > **Show Suppressed**.

Share a session with other users

You can share a session with other users. As a prerequisite, the system administrator must set the **Has Class(Fnd0AppSession)** Access Manager rule. To share the session, you must be the creator of the session. After you share the session, other users can view or edit the session that is shared by you.

Make a session shareable while saving the session

1. Search for and open the structure.
2. Configure the structure as required.
3. Click **More Commands** ••• > **New** > **Create Session**.
4. In the **Create Session** pane, specify the access level for other users:
   a. Select the **Allow others to view** check box to grant *read* access to other users. Clear the check box to deny read access.
   b. Select the **Allow others to edit** check box to grant *write* access to other users. Clear the check box to deny write access.

   > Note:
   >
   > The **Allow others to edit** check box is displayed only when **Allow others to view** check box is selected.

5. To create the session, click **Create**.

Initiate a workflow to share a session

When you share a session, you must inform the person you have shared the session with. You can communicate using any method such as emailing the session URL. You can also use a workflow to share sessions and assign tasks to other users.

1. Search for and select the session that you want to share.
2. Click **More Commands** ••• > **Manage** > **Submit to Workflow**.

   The **Submit to Workflow** panel with a list of workflow templates is displayed.
3. Select the **Session Collaboration Workflow** template.
4. Enter a description for the workflow participants, and select the appropriate workflow template.

   A default workflow is defined for sharing the session. It is automatically selected as the workflow template.
5. Click **Assignments** to assign users and resource pools to the workflow.

   > Note:
   >
   > You must have selected the **Allow Others to View** check box while creating a session in order for the assigned user to receive an email about the shared session.
6. Click **Submit**.

Release a session

To set a *release* maturity on a session:

1. Search for the session you want to release.
2. Click **Open** to open the session.
3. Click **More Commands** ••• > **Manage** > **Submit to Workflow**.

   The **Submit to Workflow** panel with a list of workflow templates is displayed.
4. Select the **Session Release Workflow** template.
5. Enter the required details and click **Submit**.

Find an element within a session

You may want to search for a structure element within a session. Searching for an element is not limited to the filtered structure displayed in the session. The element is searched for across the unfiltered structure.

1. Open a session.
2. Click **Find** .
3. Enter the search keyword.
4. (Optional) To narrow your search, select **Find within** to find the element within a certain assembly.

Capture a snapshot of a session

You can capture a snapshot of a session.

Snapshots capture the 3D data associated with your product. When you load the product in the 3D viewer and take a snapshot, you capture the current 3D view, including camera, visibility, selection, view port (pan, zoom, and rotate modes), orientation, sections, measurements, queries, and markups. You also capture the configuration and filtering criteria.

You can capture a snapshot of the current view of an assembly as an in-session snapshot. In-session snapshots are contained within the session. You cannot share these snapshots independently with other users.

View a session in other applications

To easily retrieve a structure that you are currently working with, you save it within a *session*. The session also retains any filters and configurations applied to the structure. You can view a saved session and update the structure in applications such as Teamcenter lifecycle visualization, NX, or CATIA.

When you make changes to a session, and then open the unsaved session in other applications such as Lifecycle Visualization, NX, or CATIA, the changes must be saved or discarded before opening the structure in the other application. You can save or discard the unsaved changes.

1. Search for a session that you want to view.
2. Click **Open** to open the session.
3. To work with the 3D data associated with the structure, open the session in Teamcenter lifecycle visualization by clicking **Open** > **Open in Visualization**.

Before opening the session in Teamcenter lifecycle visualization, you must first replay and save the session in Active Workspace.

4. To make design modifications to the engineering BOM structure, open the session in CATIA or NX by clicking **Open** > **Open in CATIA** or **Open in NX**. The aligned design BOM is opened in the selected application.

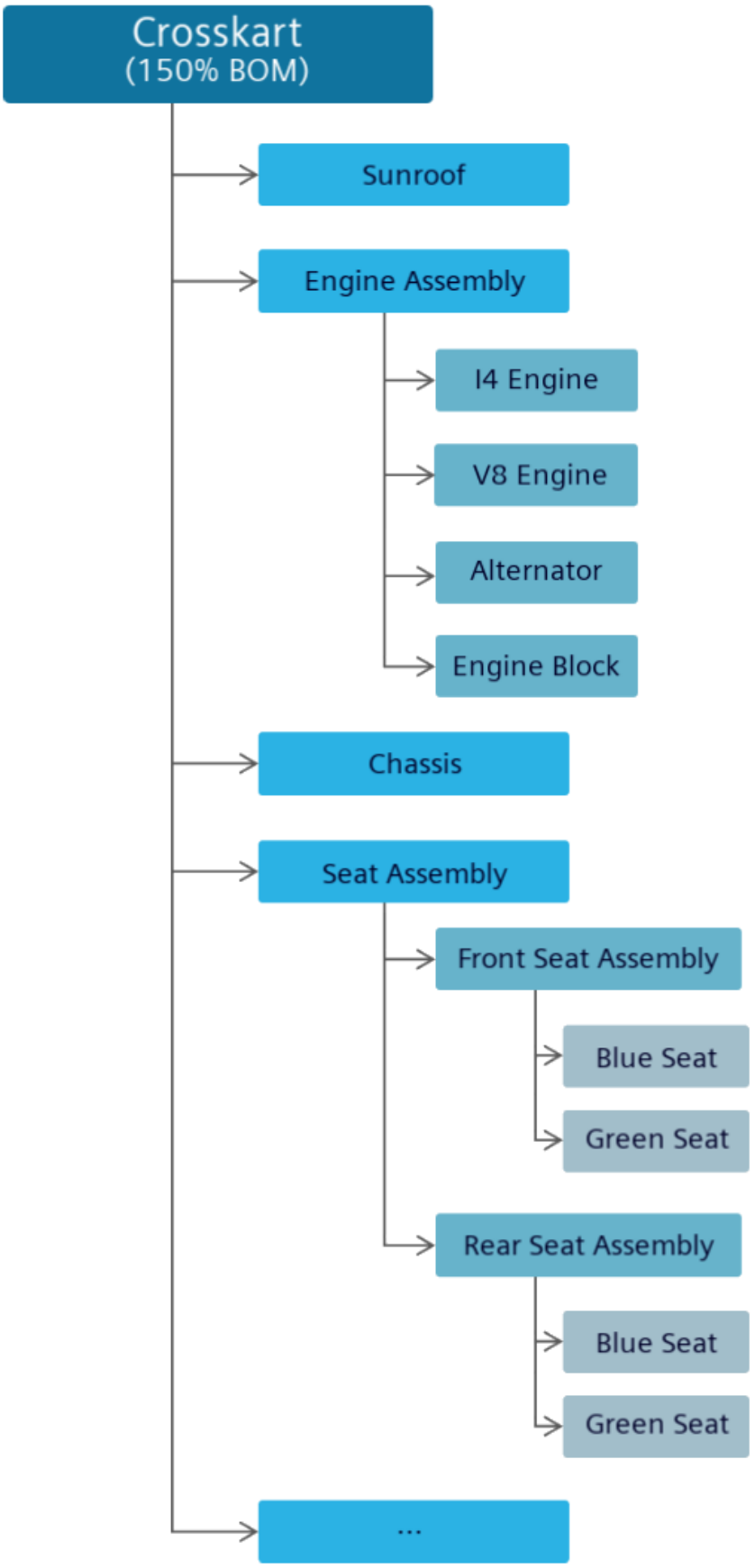
18. Create and maintain solution variants

About solution variants

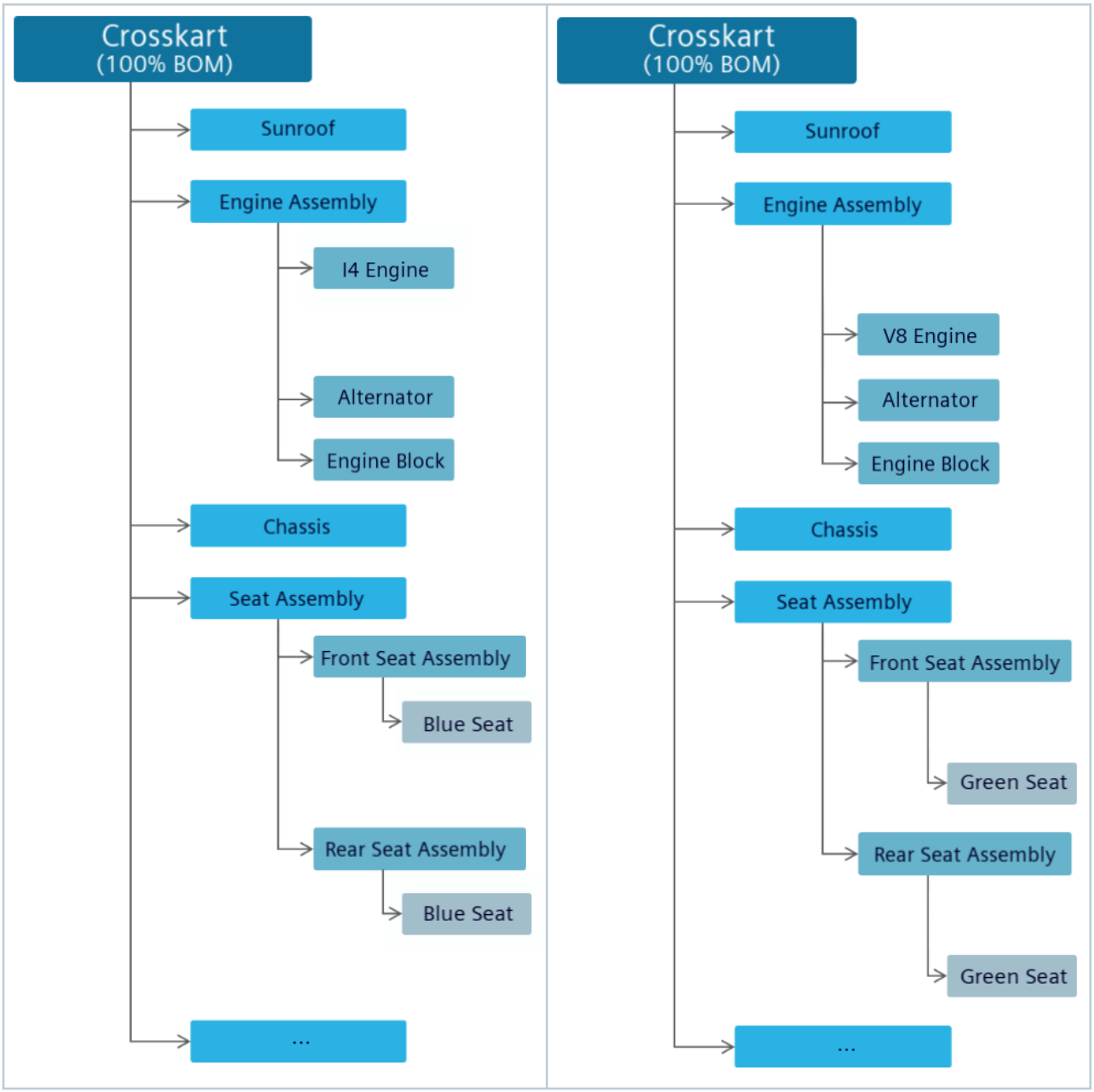
For effective product definition and management, a range of product variants are managed as a single variable structure (150% BOM) by using a configurator instead of managing them as discrete product variants. You can configure this variable structure to generate a 100% variant by applying a valid variant configuration to **create** a *solution variant*. The solution variant has a unique item ID, and it is linked to the source structure.

Multiple solution variants can be created for each valid variant configuration of the 150% variable structure. Teamcenter ensures the uniqueness of each solution variant by comparing the content with a list of existing solution variants before creating a new one. As the solution variants are linked to the source variable structure, the solution variants can be updated to easily incorporate the changes made to the source structure.

Example — Consider a product, *Crosskart*, that has two variants, *Base* and *Deluxe*. Both these variants are managed within a single variable structure.



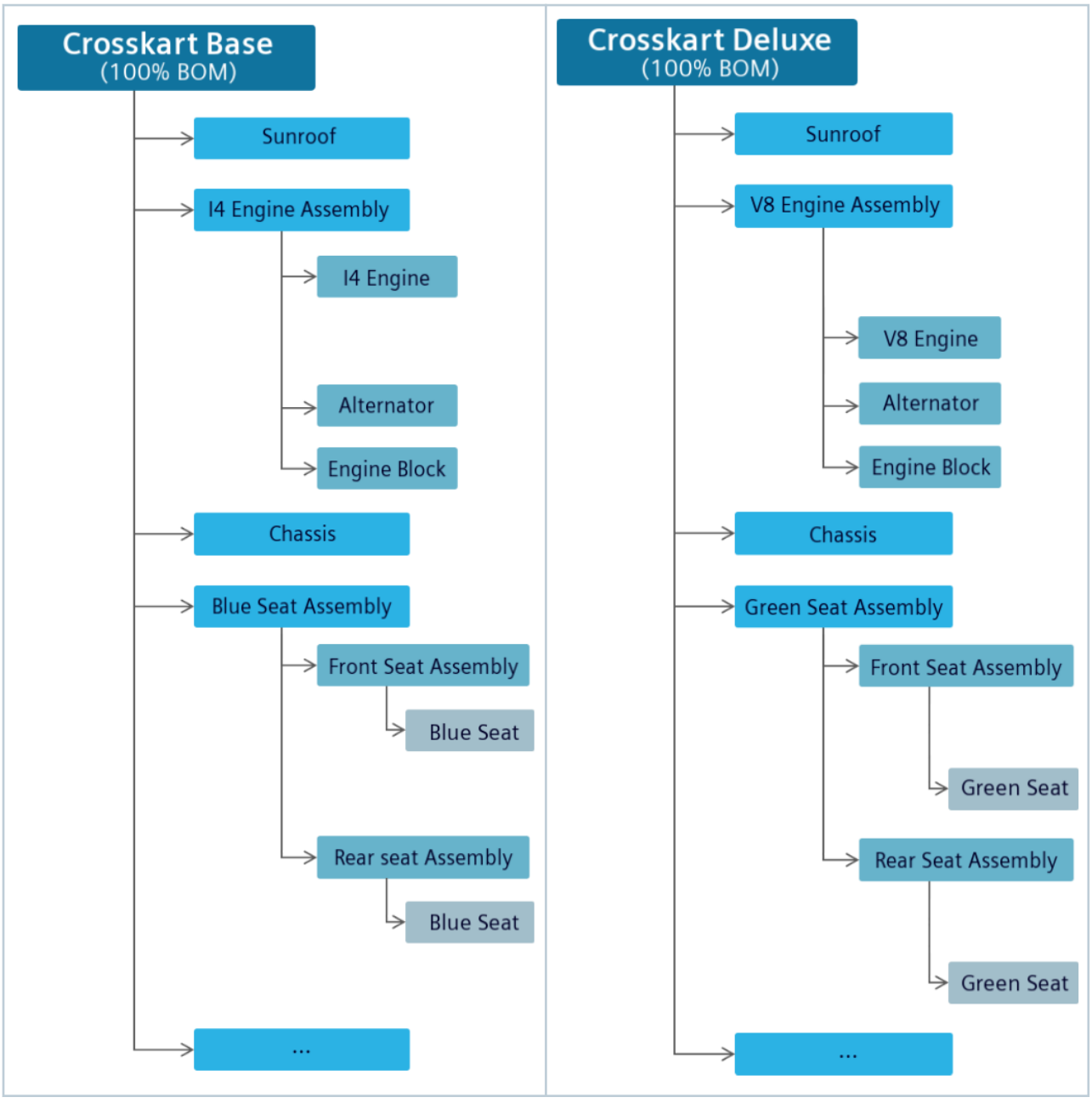
To derive the base and deluxe variants, you apply a valid configuration. This is based on the variant rules already set in Product Configurator for *Crosskart*. As per these rules, *I4 Engine* and *Blue Seat* must be used in the base variant, while *V8 Engine* and *Green Seat* must be used in the deluxe variant.



In these distinct base and deluxe variants, the crosskart, engine assembly, and seat assembly are not uniquely identified even though they contain different parts. Therefore, to identify and represent them statically, you create their solution variants.

When you select *Crosskart*, *Engine Assembly*, and *Seat Assembly* to create their solution variants for the base variant, three separate solution variants are created. Each solution variant has a unique identifier. They are identified as *Crosskart Base*, *I4 Engine Assembly*, and *Blue Seat Assembly*. Similarly, three

solution variants can be created for the deluxe variant, namely, *Crosskart Deluxe*, *V8 Engine Assembly*, and *Green Seat Assembly*.



The source structure, *Crosskart*, is maintained as a separate entity and is linked to each solution variant. It can continue to evolve. If you update the source structure, you must update its solution variants. When you update the source structure to correspondingly update its solution variants, solution variants that were previously created are reused. A new solution variant is created for a new part only if you choose to create a new solution variant for that part.

As solution variants are not just created at the product level but can also be created at the assembly level, this allows the reuse of variable parts. For example, consider that you want to reuse the engine

assembly in another product, *Buggy*. According to the variant rules defined in the configurator, an I4 engine is used in the standard variant of Buggy. When you create a solution variant of the engine assembly for the standard variant, instead of creating a new solution variant, the one (*I4 Engine Assembly*) that was already created for *Crosskart Base* is reused. This way Teamcenter ensures that each solution variant is unique by comparing it with a list of existing solution variants before creating a new one. These solution variants, generated at the product or assembly level, can be used in downstream processes.

Create solution variants for multiple variants of a product

A solution variant is a 100% valid structure that is derived from a 150% configurable structure. You can create solution variants for more than one (valid and complete) variant of a product at the same time. You can also create solution variants in bulk for a structure element as long as the solution variant category for the element is set to *Reuse*.

1. **Set an active change notice** that has the appropriate effectivity.

2. Open an engineering BOM that has **Assembly Indicator** set as **Configurable Assembly**.

3. Select the topmost line of the structure and set a variability scope, if not already set:

   a. In the **Details** section, click **Edit**.

   b. In **Variability Scope**, click ⊕ to search and add a configurator context.

   c. Click **Save**.

   Additionally, you can set a variability scope to any part that is set as **Configurable Assembly** or **Generic Part**.

4. Enable or disable **Show Excluded by Effectivity** and **Show Suppressed** from **Configure**, as required.

5. Go to the **Solution Variants** tab. If you do not see the **Solution Variants** tab, contact your system administrator.

   The **Solution Variants** section lists all the variants of the product and the assemblies within it. You can add new product variants, if needed, in the **Variants** section:

   a. Click **Add** to add a new product variant.

   b. Click **Edit** to add appropriate variability content:

      - Click one time to display a green check mark ✓ to include the option in the variant rule.

      - Click two times to display a circle backslash ⊘ to exclude the option from the variant rule.

- Click three times to display a blank cell to indicate that the option is not used in the variant rule.

Click **Save Edits**.

Click **Validate All** to check if the new variant is valid and complete.

The newly created product variant is added in the **Solution Variants** section. To create solution variants:

a. Select all the valid and complete variants for which **Solution Variant** is set as **Pending**, and click **Create**.

b. In the message dialog box, you can choose to create the solution variant in the background or foreground by selecting or clearing the **Run in Background** check box. Click **Yes** to create the solution variant.

If you chose to create the solution variant in the foreground, the solution variant is created and displayed in the **Solution Variant** column.

If you chose to create it in the background, go to **Alerts** to open the solution variant.

In the **Variant Rules** section on the **Solution Variants** tab, new variant rules are created to match the newly created solution variants. Additionally, you can view the features, for example, seat material, seat control, and seat switches for the variant rules.

You can select across the tables in the **Variant Rules** and **Solution Variants** sections. For example, you can select a column (variant rule) from the table in the **Variant Rules** section and the corresponding row (variant rule) is selected from the table in the **Solution Variants** section and the other way round.

After a solution variant is created, the absolute occurrence properties (**Position Designator**, **ID in Context**, and **Usage Address**) along with the absolute occurrence data properties for a part within the solution variant are carried forward.

6. Finally, release the active change. To do so, click **Changes**, select the change, and click **Release Change**.

Create solution variants for a single variant of a product

You create a solution variant for a specific variant of a product, which has variability.

To create a solution variant:

1. Set an active change notice that has the appropriate effectivity.

2. Open an engineering BOM that has **Assembly Indicator** set as **Configurable Assembly**.

3. Select the topmost line of the structure and set a variability scope, if not already set:

   a. In the **Details** section, click **Edit**.

   b. In **Variability Scope**, click to search and add a configurator context.

   c. Click **Save**.

   Additionally, you can set a variability scope to any part that is set as **Configurable Assembly** or **Generic Part**.

4. Configure the structure by selecting an existing saved variant rule from **Variant**.

   OR

   Click **Details** > **Variant Configuration** to apply a valid and complete configuration.

5. Enable or disable **Show Excluded by Effectivity** and **Show Suppressed** from **Configure**, as required.

6. Click **Create Solution Variant**. If you do not see the **Create Solution Variant** command, contact your system administrator.

   Teamcenter compares the content of the displayed structure with solution variants already available in the database.

   - If a matching solution variant is found, a message is displayed, asking if you want to open it.
   - If a matching solution variant is not found, the **Preview Solution Variant** page is displayed.

7. In **Preview Solution Variant**, **Solution Variant Structure** is displayed as **Pending** for the parts that are set as **Configurable Assembly** or **Generic Part**, indicating that solution variants will be created for these.

   Click **Create**.

   In the message dialog box, you can choose to create the solution variant in the background or foreground by selecting or clearing the **Run in Background** check box. Click **Create** to create the solution variant.

   If you choose to create the solution variant in the foreground, the solution variant is created and displayed on the user interface. If you choose to create it in the background, go to **Alerts** to open the solution variant.

The **Assembly Indicator** of a solution variant is changed to **Fixed Assembly** from **Configurable Assembly** and to **Component** from **Generic Part**.

To verify if the solution variant is created:

1. Open the structure for which you created the solution variant.

2. Go to the **Solution Variants** to view the solution variant The **Solution Variants** sections also shows the solution variants that were created for the other revisions of the selected structure.

Finally, release the active change. To do so, click **Changes** ⚠, select the change, and click **Release Change**.

After a solution variant is created for a structure that has a partition scheme applied, the Functional scheme and the partitions within it are created. However, for this to happen, the partitions must be member-owned partitions.

After a solution variant is created, the absolute occurrence properties (**Position Designator**, **ID in Context**, and **Usage Address**) along with the absolute occurrence data properties for a part within the solution variant are carried forward.

Update solution variants of a product

When a product structure is updated, you must also update the corresponding solution variants.

After creating solution variants, if the design structure is updated, first update the aligned engineering BOM. Next, update the solution variants that were created for the engineering BOM.

To update the solution variants:

1. (Optional) **Set an active change notice** that has the appropriate effectivity.

2. Open the updated structure.

   Warning:

   Do not change the state of the **Show Excluded by Effectivity** and **Show Suppressed** toggles. The state of these toggles must be the same while creating and updating the solution variant.

3. Go to the **Solution Variants** tab.

   The **Solution Variants** section lists all the solution variants that were previously created.

4. Select the solution variants that you want to update and click **Update**.

If you do not select any solution variants, all solution variants are updated.

In the message dialog box, you can choose to update the solution variants in the background or foreground by selecting or clearing the **Run in Background** check box. Click **Yes** to create the solution variant.

If you choose to update the solution variants in the foreground, the solution variant is updated and the value of the **Source Modified** column is changed to **False**.

If you choose to update the solution variants in the background, go to **Alerts** to open the solution variant.

All the solution variants that are impacted due to the changes in the source structure are updated. If a solution variant is already released, it is first revised and then updated.

When you update a solution variant in the context of an active change, the updates are reflected in the change summary.

After the solution variant is updated, the absolute occurrence properties for a part within the solution variant are carried forward. The absolute occurrence properties (**Position Designator**, **ID in Context**, and **Usage Address**) are also transferred if your administrator has configured them to be carried forward.

5. To verify if a solution variant is updated correctly, open it from the **Solution Variants** column.

6. If you have set an active change notice, release the active change.

   To do so, click **Changes**, select the change, and click **Release Change**.

Update solution variants of a product through a workflow

When a structure is updated, you must also update the corresponding solution variants.

Scenarios	How to update solution variants
Source design BOM is updated.	Perform an automated or guided update to update the corresponding engineering BOM. If the solution variant is not updated during the automated update, first check the BOM generation report located in the **Newstuff** > **BOM Generation** folder for any errors. Next, manually fix any error. Finally, **start the workflow** to update the solution variant for the engineering BOM.
Source engineering BOM is updated.	Send the engineering BOM through a **workflow to update the corresponding solution variant**.

To update the solution variants through a workflow:

1. **Set an active change** that has the appropriate effectivity.

2. Open the updated source structure.

   Warning:

   Do not change the state of the **Show Excluded by Effectivity** and **Show Suppressed** toggles. The state of these toggles must be the same while creating and updating the solution variant.

3. Click **More Commands** ••• > **Manage** > **Submit to Workflow**.

4. In the **Submit to Workflow** panel, select **Update Solution Variants** in **Template**, and click **Submit**.

   All the solution variants of the structure that are impacted due to the structure change are updated. If a solution variant is already released, it is first revised and then updated.

   For a newly added part in the structure, Teamcenter first checks if the **Assembly Indicator** of the part is marked as **Configurable Assembly** or **Generic Part**. Teamcenter then checks if a solution variant is already created for the part and reuses this solution variant in the updated solution variant structure. If a solution variant is not available, Teamcenter creates a new one for the part and reuses this new solution variant in the updated structure.

   Note:

   Currently, only changes to **Quantity** in a structure are updated in the corresponding solution variants.

To verify if the solution variants are updated correctly, go to the **Solution Variants** tab and open the required solution variants to see the updates.

After the solution variant is updated, if your administrator has set the preference with required values, the absolute occurrence properties (**Position Designator**, **ID in Context**, and **Usage Address**) for a part within the solution variant are updated.

Finally, release the active change. To do so, click **Changes**, select the change, and click **Release Change**.

Disable updating an existing solution variant and create a new one

You can disable updating an existing solution variant of the type *Reuse* by specifying a status for the solution variant.

When a structure is revised multiple times and a solution variant is revised alongside, the changes to the structure might make the solution variant incompatible with the structure. In such cases, you must mark the existing solution variant as obsolete and create a new one for use instead.

Procedure

1. In the **Solution Variants** section on the **Solution Variants** tab, select the solution variant to be marked as obsolete.

2. Specify a valid release status for the solution variant item revision. You can use a workflow, a custom flow, or a business logic configured by your administrator to set the release status on the solution variant item revision.

   After you set the release status, the solution variant is obsoleted. Teamcenter changes the solution variant category to **Unmanaged**, restricting any further updates to the solution variant.

   You can create a new solution variant for the same configuration to replace the obsoleted solution variant.

3. In the **Solution Variants** section on the **Solution Variants** tab, select the variant for which you want to create a new solution variant.

4. Click **Create** ⊕.

5. In the message dialog box, you can choose to create the solution variant in the background or foreground by selecting or clearing the **Run in Background** check box, respectively. Click **Yes** to create the solution variant.

   If you choose to create the solution variant in the foreground, the solution variant is created and displayed in the **Solution Variant** column.

   If you chose to create it in the background, go to **Alerts** 🔔 to open the solution variant.

For the solution variants that are obsoleted at a lower level in the hierarchy, Teamcenter automatically changes the solution variant category to **Unmanaged** and creates a replacement solution variant during the update process.

View solution variants

1. Open the structure for which you created solution variants.

2. Go to the **Solution Variants** tab.

   The **Solution Variants** section lists the solution variants that were created for the selected structure element.

Solution variants for a configurable product, assembly, or component are displayed in the table in the **Solution Variants** section depending on the fully qualified match of the Saved Variant Rule (SVR) recipe of the top-level product or assembly. The solution variants that do not match the top-level product SVRs are displayed with an empty value in the **Variant Rule** column.

19. Review engineering BOM data

Compare structures

Compare the content in structures

You compare similar engineering BOM data, such as two engineering BOMs, to view the differences between them. Your administrator sets up the properties that can be compared.

To compare engineering BOM data:

1. Perform the action listed in the following table depending on your task:

Task	Action
To compare two parts	Select two parts. Click **Compare** > **Compare Structures**.
To compare two engineering BOMs	Select two engineering BOMs from one of the following, and then click **More Commands** ••• > **View** > **Compare Structures**: • Search results • **Change History** table on the **History** tab • Favorites
To compare two revisions of a part on the **History** tab	In the **Revision History** section on the **History** tab, select two revisions of a part and click **More Commands** ••• > **View** > **Compare Structures**.

   In the **Compare** panel, the parts that are unique to both structures are displayed with color bars under **Results**. This comparison is performed with the default comparison options.

2. (Optional) Change the comparison level:

   a. Specify the comparison level by selecting one of the following from **Options**:

Comparison option	Description
All Levels	Compares the elements at every level in the two structures. If this option is selected for very large structures, performance may be adversely affected.
Components Only	Compares only the parts that are at the lowest level (components).

Comparison option	Description
Current Level	Compares only the parts that are immediate children of the selections in the two structures. This is the default level of comparison.
Linked Assemblies or Components	Compares two structures by using accountability check. This comparison level is displayed only if Multi-Structure Foundation is available in your Teamcenter environment. Accountability check is a verification mechanism to check if all the parts in one structure have equivalent parts in the other structure. You can define your own properties for equivalence.

b. Specify what you want to display in the comparison results by selecting one or more of the following options from **Options** > **Display**:

Comparison option	Description
Matched	Displays the parts that are a match in both structures.
Different	Displays the parts that differ across the two structures.
Multiple Matches	Displays the different numbers of occurrences of the same part in the comparison as a difference.
Unique in Left View	Displays the parts that are only listed in the structure displayed on the left.
Unique in Right View	Displays the parts that are only listed in the structure displayed on the right.

c. For **Linked Assemblies or Components**, select the **Dynamic Equivalence** check box.

In some cases, the occurrences that are slightly different in the two structures might not be reported as equivalent. The dynamic equivalence check reports such occurrences.

This check box is displayed only if Multi-Structure Foundation is available in your Teamcenter environment.

d. (Optional) Select the **Run in Background** check box to perform the comparison in the background. This is recommended when you compare all levels or only the components in large structures. You can view the results later by selecting the relevant notification from **Alerts**.

> Note:
>
> The **Run in Background** check box is not displayed when you select the comparison level as **Current Level**.

e. (Optional) Select the **Generate Report** check box to generate the comparison report.

f. Click **Compare**.

The comparison results are listed under **Results**. Clicking a part in the list highlights that part in the structure.

Comparison results are retained for a specific period. If a comparison result is older than the retention period or if a more recent result exists, the old result is automatically deleted by the system.

If you selected the **Generate Report** check box, the comparison report is generated in Excel. If you have the permissions to edit the target engineering BOM, the report is attached to it. You can click the **Attachments** tab of the target engineering BOM to download the report. If you do not have permissions to edit the target engineering BOM, the report is saved in the **Newstuff** folder. The file name for the comparison report is in the format *Compare_Report_<Source_ID>_AND_<Target_ID>_YYYYMMDD_HH_MM_SS*, where *Source_ID* is the ID of the first engineering BOM that you want to compare and *Target_ID* is the ID of the engineering BOM with which you want to compare the first engineering BOM. You can also click 🔔 to understand the location of the comparison report if the BOMs are compared in the background.

> Tip:
>
> In case you closed the **Compare** panel and want to perform any further comparison, click **Compare** on the task bar to view the **Compare** panel.

You can select some other parts either from the same structure or one each from the two structures displayed side-by-side for further comparison.

To reconcile the differences found in the structure, you can drag a part from one structure to another and compare them again.

Compare the content in partitions

You can compare the content that is in two partitions when two different configurations are available for comparison, for example, when the content in each partition has a different revision, date, units, variants, and partition schemes. You can compare the content from a single structure where two different partition schemes are applied and where only one structure has a partition scheme applied. However, you must select the same element on both sides in a split view. You can compare the content in partitions that are present in two different structures as well.

Restrictions and limitations

You cannot compare the partition content at the root level in a structure. You must select either a partition or a BOM line for comparison. Further, you must select the same element on both sides in a split view. For example, if you select a partition on one side, you must select a partition on the other side as well. You cannot select a BOM line on the other side.

The content is compared only at the **Current Level**. Therefore, child partitions are not considered. The selected BOM lines are compared and child BOM lines are not considered.

Procedure

1. Open a structure.
2. Click **Split Context**.

   The **Split View** displays the structure side by side in two views.
3. Change the structure configuration, as required. You can do this in both views.
4. Click **Compare** on the task bar.
5. In the **Compare** panel, from **Options** > **Display**, select one or more of the following options to specify what you want to view in the comparison results:

Comparison option	Description
Matched	Displays the elements that are a match in both views.
Different	Displays the elements that differ across the two views.
Unique in Left View	Displays the elements that are only listed in the view displayed on the left.
Unique in Right View	Displays the elements that are only listed in the view displayed on the right.

6. Click **Compare**.

   The comparison results are listed under **Results**. Clicking an element in the list highlights that element in the structure. Clicking an element in the structure highlights that element in the list.

> Note:
>
> If you close and relaunch the **Compare** panel by clicking **Compare** on the task bar, the panel is reset and it does not display the previous results.

Validate design and engineering BOM alignment

About validating alignment

After generating a design structure, you must validate if the corresponding BOM is created correctly with proper alignment. You must also validate the alignment after aligning design occurrences and part occurrences manually. To verify if the alignment is performed correctly, you can view the:

- **Aligned designs and parts**.
- **Aligned design occurrences and part occurrences**.

You can also **view the product manufacturing information** available in an aligned engineering BOM.

View aligned parts and design

To visualize what a part looks like in the floor position, you align it with its corresponding design.

1. Open the part revision or the design revision for which you want to view the aligned designs or parts.
2. For a part, the corresponding designs are listed in the **Aligned Designs** section of the **Overview** tab.

   For a design, the corresponding parts are listed in the **Aligned Parts** section of the **Overview** tab.

   These sections also list additional details such as which design is set as the primary representation of a part or if there is some alignment mismatch.

View the product manufacturing information

Product manufacturing information (PMI) includes information, such as geometric dimensions, tolerances, 3D annotation, and surface finish specifications, required for manufacturing a product. PMI is available in a design structure. You can view PMI in the context of an aligned engineering BOM.

To view PMI:

1. Log on to the Teamcenter rich client.
2. Search for part revisions and open the required engineering BOM.
3. Click **Start/Open in Lifecycle Visualization**.

   Currently, you can view PMI only in the standalone viewer.
4. In the standalone Lifecycle Visualization viewer, from the **3D Load Options** dialog box, select **Open document** and click **OK**.
5. Right-click the aligned engineering BOM and select **Show PMI**.

View aligned part occurrences and design occurrences

You view the aligned part occurrences and design occurrences in order to validate the alignment.

1. Open the required structure.

2. Click **Align** > **Open Alignment View**.

   The design structure and the engineering BOM are now displayed side by side. If you had applied any variant and configuration criteria to the engineering BOM, the aligned design structure is displayed based on the applied variant and configuration criteria. If you had set a specific partition scheme on the engineering BOM, only the engineering BOM loads with that scheme in the alignment view. The partition scheme is not applied to the design structure.

   By default, **Alignment Status** shows an **Intermediate** status. This status is not set for the topmost BOM line and for occurrences for which the **Design Required** or **Part Required** is set as **False**.

3. You can view the alignment between specific design and part occurrences or for all aligned design and part occurrences.

   - To view specific aligned design and part occurrences, you can either click the **Intermediate** indicator icon or right-click the icon to choose **Show Alignment**.

     For a design that occurs multiple times in the design structure, the aligned part occurrence is summarized as a single instance. The quantity of the part occurrence is set as the number of times the design occurs. The part is summarized based on the grouping criteria set by the administrator.

     > Note:
     >
     > You cannot unpack the part occurrence in Active Workspace to view its separate instances. To view the separate instances, open the part in a Rich Client application such as Structure Manager or Manufacturing Process Planner.

   - To view all the aligned part and design occurrences, enable the **Show Alignment Status** option. It is recommended that you select this option if your structure is not very large.

     For larger structures, click **Alignment Report** to generate a report containing the alignment details. You will be notified in **Alerts** when the report is generated.

   The icons in **Alignment Status** indicate the alignment status of the design occurrences and part occurrences. And, the icons in **Advance Status** indicate the alignment status of the corresponding design revisions and part revisions.

Alignment Status		Advance Status	
Indicator	**Description**	**Indicator**	**Description**
○	Indicates that the design occurrence and part occurrence are not aligned with each other.		
✓	Indicates that the design occurrence and part occurrence are aligned with each other. And, the corresponding design revision and part revision are aligned correctly.		
✓	Indicates that the design occurrence and part occurrence are aligned with each other.		Indicates that the corresponding design revision and part revision are not aligned with each other.
			Indicates that the corresponding design and part are not aligned with the latest revisions.
?	Indicates that the parent design occurrence and part occurrence are not aligned with each other. Note: This indicator is displayed only when you enable the **Show Alignment Status** option. It is not displayed in the report that is generated when you click **Alignment Report**.		

If you choose to run the alignment report, the following additional indicators are displayed in the report:

Alignment Status		Advance Status	
Indicator	**Description**	**Indicator**	**Description**
✓	Indicates that the design occurrence and part occurrence are aligned with each other		The corresponding design revision and part revision are not aligned with each other. Also, indicates that the one or more of the child design occurrences are not aligned with the corresponding part occurrences.
			Indicates that the corresponding design and part are not aligned with the latest revisions. It also indicates that:

Alignment Status		Advance Status	
			• One or more child design occurrences and part occurrences are not aligned. • One or more child designs and parts are not aligned. • One or more child designs and parts too are not aligned with the latest revisions.
			Indicates that the design and part are not aligned with the latest revisions.
	Indicates that the design occurrence and part occurrence are not aligned with each other.		Indicates that the design and part are not aligned with the latest revisions.

Based on the indicators, you can take appropriate actions such as aligning part occurrences and design occurrences, aligning parts and designs, and revising a structure to fix the missing or mismatched alignments.

You can visualize the aligned design occurrences and part occurrences in **3D**. If the revision rules of the design structure and engineering BOM are different, the designs that you visualize are based on the revision rule of the engineering BOM, by default. However, your administrator can change this default behavior so that the designs seen are based on a different but valid revision rule.

View and visualize structures

View a structure in other applications

You can open and view a structure in other applications, such as NX and CATIA. If the structure exists within a partition, you can open the partition itself in some other application, so that one or more structures within that partition are opened.

Procedure

Application	Action
Teamcenter Lifecycle Visualization	Select **Open** > **Open in Visualization**.
Rich Client	Select **Open** > **Open in Rich Client**.
NX	Select **Open** > **Open in NX**.
Solid Edge	Select **Open** > **Open in Solid Edge**.
Illustrator	Select **Open** > **Open in Illustrator**.

Application	Action
CATIA	Select **Open** > **Open in CATIA**.
Supplyframe	Select **Open** > **Open in Supplyframe**.

View information of an engineering BOM

The information related to the engineering BOM or part is available in the **PROPERTIES** section of the **Overview** tab.

Other tabs such as **Where Used**, **Variant Configurations**, **Requirements**, **Materials**, and **Vendor Parts** contain additional details about an engineering BOM or a part.

Viewing structures in the split view

You can split the structure view into two views using the **Split Context** command. Initially, identical structures are loaded in both panels. Both panels provide a toolbar with commands relevant for the structure being displayed.

You can also open two different structures side-by-side in the split view by selecting two root nodes and then using the **Open** command.

In the split view, you can modify the structures independently. Once either structure is updated to a different configuration, then the **Compare** functionality is enabled. You can also use the split view to move or copy an occurrence from one structure to another using the drag-and-drop functionality. If the two views have the same structure with the same applied configuration, then the occurrence is moved. Otherwise the occurrence is copied.

> Note:
>
> You cannot filter Smart Discovery Indexed structures in the **Split View**.

View where a part is used

In Teamcenter, you can view where, in which products or assemblies, a part is used.

Procedure

1. Search for and select the part.
2. Click the **Where Used** tab.
3. The **USED IN STRUCTURES** section lists the immediate parents of a part. You can expand the tree to go up in the structure.

4. Expand the **TOP LEVEL** section if it is not already expanded.

   The table shows all the top-level products in which the selected part is used.

5. The **PART USAGES** section lists all the part usages of the selected part across all the products. This is useful for *impact analysis* when you want to see which products or assemblies are affected if the part is changed.

Visualize structures

You visualize parts and product BOMs to verify if they are correctly aligned with their corresponding designs, check for clearance between parts, and verify if they are correctly place at the right proximity from other parts. However, you can perform the visualization only if **Product Master Automation** and **Visualization Data Server** are set up in your Teamcenter environment. To visualize the parts and product BOMs:

Procedure

1. Open a structure and click.**Details** > **3D** .

2. Select a structure element.

   The selected element is highlighted in the **3D** tab.

3. Select an element in the **3D** tab.

   The corresponding structure element is selected. However, multiselecting in the **3D** tab does not select the corresponding elements.

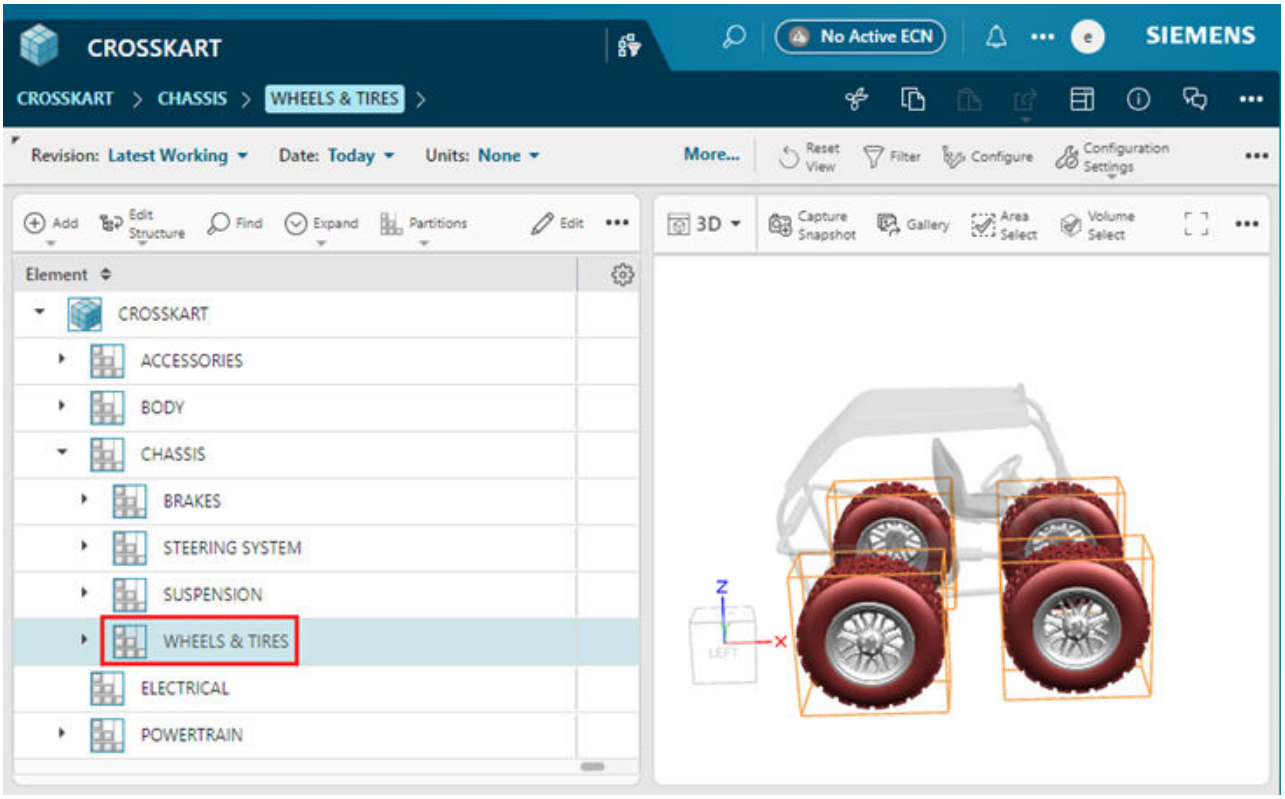
Visualize structure elements located within partitions

1. Open the structure that you want to visualize. By default, the structure opens in the partition scheme that is set as the primary scheme.

2. Select the required scheme from **Partition Scheme** that contains the required partitions.

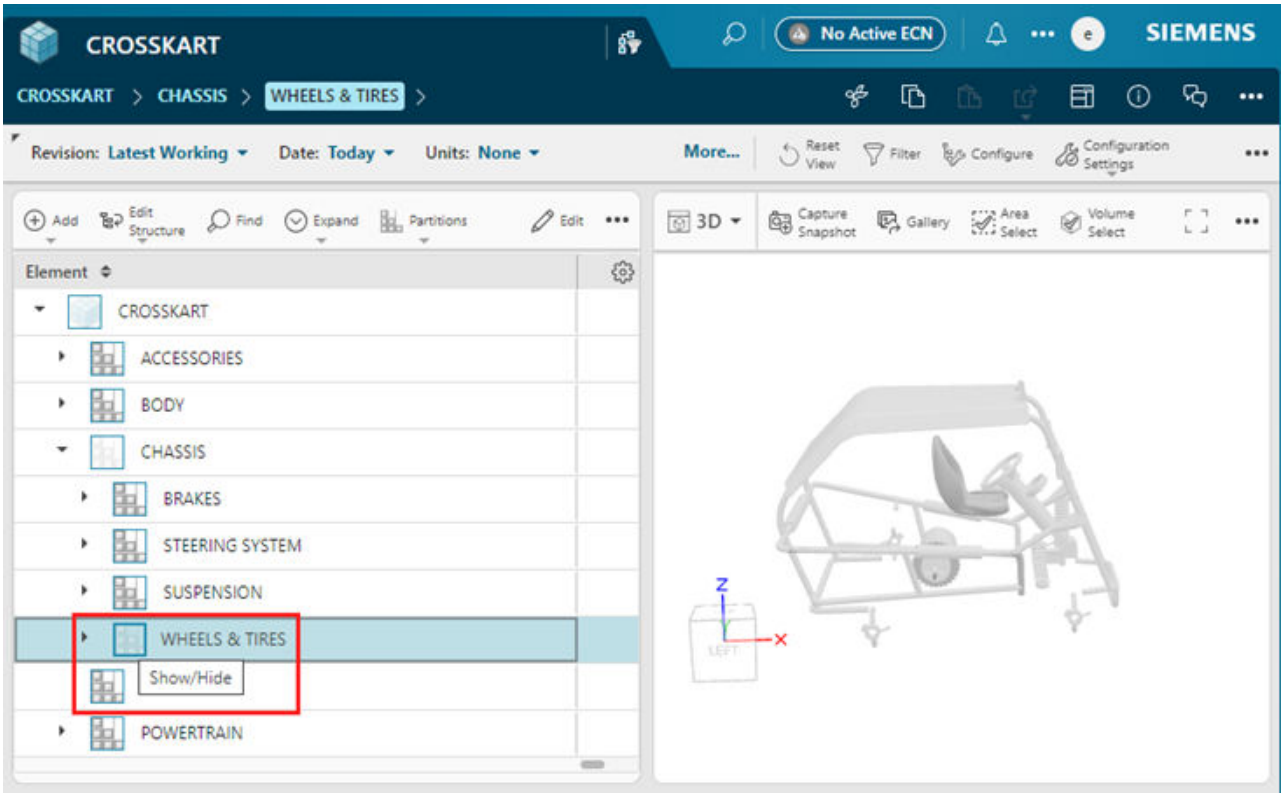
3. To visualize the structure elements located within a partition, select the partition, and go to the 3D viewer.

   All the elements within the selected partition are highlighted with their bounding boxes.



If the selected partition has in turn a child partition within it, all the structure elements within the child partition are also highlighted in the 3D viewer.

You can choose to not visualize the elements of a specific partition by clicking the **Show/Hide** icon. For example, the icon is displayed next to WHEELS & TIRES, as shown in the following image. To visualize the elements again, click the **Show/Hide** icon.



When you set variant criteria on partitions, the structure is configured to either show or hide the partitions and the elements within. Accordingly, the elements are displayed in the 3D viewer as well.

In several cases, the configured structure and the 3D viewer might not be synchronized.

- **Scenario 1**

  For a structure in a *workset*, a *Functional* scheme is applied and contains a variant criterion, VC1. In this case, the structure elements with a different variant criterion, VC2, are not included in the structure. However, the 3D viewer shows these elements. When you switch to a different partition scheme, the same scenario applies. In such cases, for structures in a workset, you can synchronize the partitioned structure and the 3D viewer by clicking **Replay**.

- **Scenario 2**

  A component resides in two different partitions. It is included in the structure configured for one partition, whereas it is not included in the structure configured for the other. When such a mismatch occurs, the component is displayed both in the partitioned structure and in the 3D viewer.

- **Scenario 3**

  In a partition scheme, structure elements at different hierarchical levels reside in two different partitions. When you set variant criteria on a partition to configure the structure such that the partition is not included in one case, the structure and the 3D viewer show a mismatch. Siemens

recommends configuring the system to restrict the addition of structure elements in partitions in such a manner.

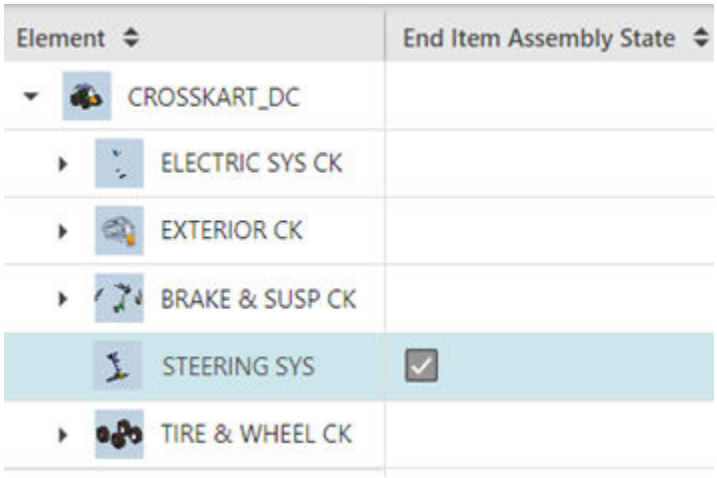
Working with end-item assemblies

To improve the system performance and hide information that is not relevant to the user's current task, one or more assemblies in a product structure can be set as *end-item assemblies* for that structure. When you expand a structure containing an end-item assembly, the nodes beyond the end-item assembly are not expanded.

The value of the **EndItemState** preference must be set to *true*. If it is set to *false*, the end-item assembly state is ignored and the end-item assemblies are expandable just like any other assemblies.

Although you cannot set any occurrence as an end-item, you can view a structure containing end-items. When a structure containing an end-item is opened, the end-item is displayed as a single line in the assembly tree.

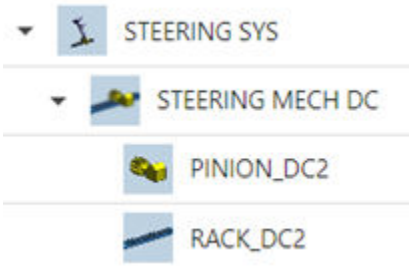
The **End Item Assembly State** column identifies the end-items in an assembly.



The 3D viewer displays the full assembly structure regardless of **End Item Assembly State**. To view the full structure of an end-item assembly in the tree, open the end-item as its own root node.

What happens when you search for a child component of an end-item?

To access the components of any subassembly, you expand the relevant subassembly.

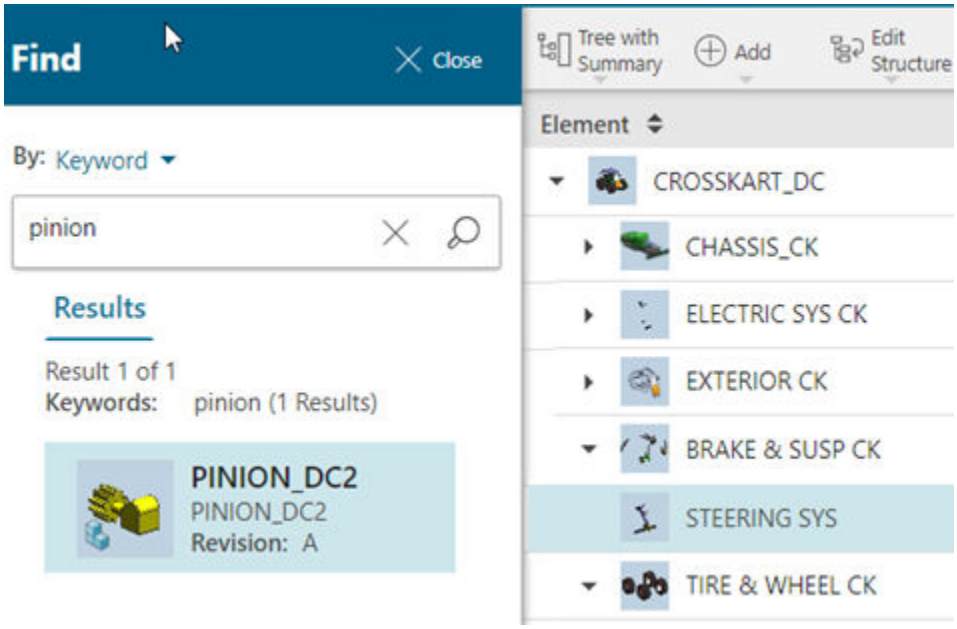


As the assemblies marked as end-items cannot be expanded within the structure, their child components are not visible when the structure is expanded.

For example, if the **steering system** assembly is marked as an end-item in a vehicle structure, its components, namely, **steering mech**, **pinion**, and **rack** are not visible in the structure.

However, when you perform an in-context search for a child component of an end-item, the search results return the child components. When you select the child component of the end-item in the search results, the parent end-item subassembly is selected in the structure.

For example, when you select the **PINION_DC2** child component from the search results, the parent **STEERING SYS** subassembly, which is an end-item, is selected in the structure.



Control the display of configured structures

When creating variable content or analyzing configured structures, it is important to understand which occurrences will be configured and the ones that will be excluded. When a structure is loaded, only objects that meet the applied effectivity and variant criteria are displayed. However, you can choose to hide or view the occurrences that are not configured as well.

> Note:
>
> You can do this only when you select an individual structure within the workset or any elements within the same structure. You cannot select multiple structures within the workset or multiple elements across different structures within the workset to hide or view such occurrences.

To perform this step	Do this
To show or hide the occurrences that are excluded by the currently applied effectivity	Click **Configuration Settings** > **Show Excluded by Effectivity**.
If you have **Partitions for Structure** deployed in your Teamcenter setup, and you have applied variability on partitions, to show or hide occurrences and partitions that are excluded by the variant configuration	Click **Configuration Settings** > **Show Excluded by Variants**.

To perform this step	Do this
To view all the structure elements including the ones that are not displayed due to the applied filters	Click **Configuration Settings** > **Show Excluded by Filtering**.
Occurrences in a structure can be hidden by setting the suppress property to True. When a structure is loaded, all occurrences including the suppressed occurrences are not displayed by default. To show or hide the suppressed occurrences	Click **Configuration Settings** > **Show Suppressed**.

20. Release engineering BOM data

Release engineering BOM data not created under an active change

You release the engineering BOM data for downstream tasks, such as planning the product manufacturing with engineering BOM data. If you created or updated the engineering BOM data without setting a change context, release the data as follows:

1. Open the engineering BOM data that you want to release. If the part is an assembly part, you can additionally choose its child parts to be released along with the parent part.

2. Click **More Commands** ••• > click **Manage** > **Submit to Workflow** .

3. In the **Submit to Workflow** panel, select the appropriate release workflow (for example,**TCM Release Process**) in **Template**.

4. Click **Submit**.

Release engineering BOM data by validating and releasing the active change

If you created or updated the engineering BOM data, by setting an active change notice, the data can be validated and released together by validating and releasing the active change notice.

Procedure

1. If the change is not yet submitted, **submit the change**.

   You can either use the change notice and the **EBOM Release Process** template or use a simple change and the **EBOM Simple Change Workflow** template.

2. Validate the change notice to perform validation checks on the engineering BOM before its release. This validation is based upon a set of predefined validation rules in the system. Your administrator can also create custom validation rules.

   a. On the **Home** page, click the **Changes** tile, and select the change under which the structure is created or modified.

   b. Click **Validate Change** in the **Overview** tab.

   If the validation fails, the issues are listed in the **Validation** tab under the **Validation Summary** section. Resolve the issues, as needed.

   Once the issues are resolved and the validation is successful, you can release the change.

3. Click **Release Change** to release the change notice.

   While releasing the change, Teamcenter validates the change again to resolve any issues found during the initial validation.

   If no issues found, structure is released. Note that, the workflow (**EBOM Release Process** workflow or the **EBOM Simple Change Workflow**) also releases the BOM view revisions of the *ItemRevisions* that are tracked by the change.