



Andhra Pradesh State Skill Development Corporation



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DIGITAL MANUFACTURING WITH DELMIA

MANUFACTURING BILL OF MATERIALS



Manufactured Item Definition

Manufactured Item Definition provides a powerful but easy-to-use interface for defining items, authoring manufacturing assemblies, and managing Product to item assignments.

Manufactured Item Definition includes the following capabilities:

- Create manufacturing assemblies in the item editor
- Drag and drop products on items
- Edit properties of item references/instances
- Manage Item-Product scope
- Assign products to items
- Generate manufacturing assemblies from product structure
- Assign products to items using the Assembly Assignment Assistant
- Manage capable resources
- Manage design changes

Module-1. A: About the Item Editor

The item editor provides tools for defining and editing manufacturing assemblies. items are displayed as tiles in a graph and are also displayed in a tree.

This section describes:

- Item Editor
- Tile Description
- Tabs on Tiles and Context Toolbar
- Item-Product Scope Management
- Item Management
- Selecting Products
- Product to Item Assignments
- Cross Highlighting Between Item Editor and Tree
- Management of PPR Editor Views

A. Item Editor

The item editor provides tools for defining and editing manufacturing assemblies.

The editor comprises of the following elements:

- A grid on which you can build an item flow represented by tiles in a graph
- A tree
- A group of commands enabling you to insert items, manage the grid layout, and so on.

The item representations in the graph are known as predecessors (that is, child items) and successors. That is, parent items. items are connected by data requirement links and precedence constraints, and this represents the item flow.

A data requirement link goes from the output of a predecessor to the input of its successor. A precedence constraint connects two sibling items on the same level.

By default, data requirement links appear in blue and precedence constraints appear in orange. You can customize Connection colors in Me > Preferences > App Preferences > Simulation > Process Engineering > Manufactured Item Definition > Item Grid Editor.





B. Tile Description

The item editor visualizes items by tiles laid out in a graph. If products are assigned to an item, a 3D representation of the products appears on the corresponding tile.

The general layout of a tile in the item editor is as follows:



The name of the item is displayed at the bottom of the tile.

The icon in the upper left represents the item type, in this example a Manufacturing Assembly. This is a larger version of the icon that represents the item type in the creation command icon or in the node in the tree.

Other icons on the tile are as follows:

- : appears in the lower left corner if a Item-Product scope link is defined for the item. If products are assigned to an item, a 3D representation of the products appears on the corresponding tile.
- : appears next to the Item-Product scope icon if the scope is broken.
- : appears in the lower right corner if a System-Item scope is defined for the item. In this case, the System must be loaded in the session.
- : appears at the bottom center if an output product is linked to the item. See Managing the Resulting Product.
- : appears in the upper right if a resource is associated with the item.

The and commands are displayed at the input and/or output for a tile. These commands enable you to expand or collapse the graph to show predecessors or successors.

Note: You can include a customized picture (2D representation) on a tile. See Associating a Picture to a Tile.

Several items with the same reference such as Fasten step, Removal Material, Provided Part, or Continuous Provided Material can be stacked on a single tile. In the figure below, the number in the upper-right corner shows the number of items that are stacked. Stacking is done using the Stack items with the same reference contextual command. Unstacking is done using the Un-stack items contextual command.

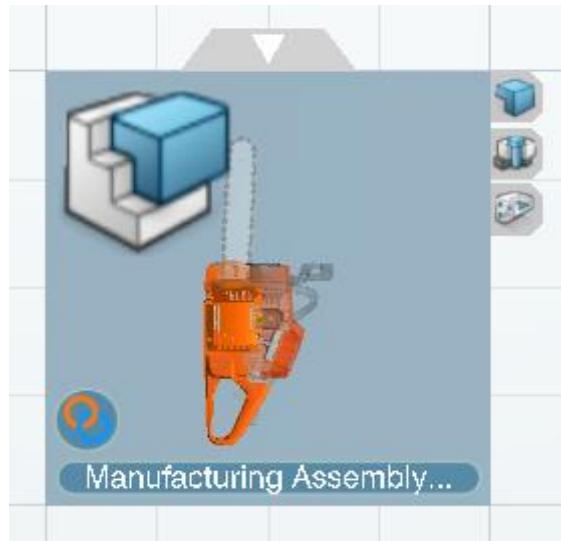


C. Tabs on Tiles and Context Toolbar

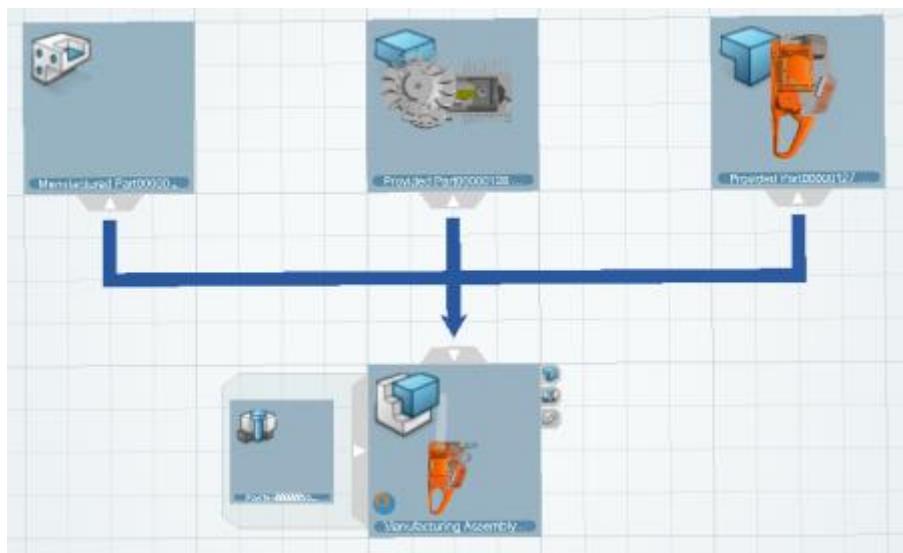
Tabs on tiles and a context toolbar are provided in the item editor for analyzing the manufacturing assembly structure, identifying which predecessors are used, and rerouting items.

1. Tabs for Indicating Predecessors

The tabs on the right of a tile indicate whether the item has predecessor Provided Parts, Fasten steps, and Manufactured Parts. In the example below, the Manufacturing Assembly has a Provided Part tab, a Fasten step tab, and a Manufactured Part tab.

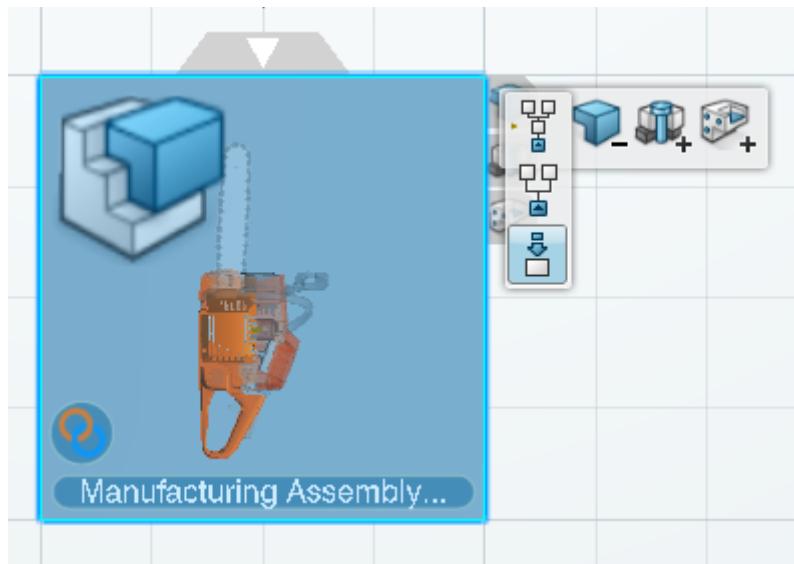


When the graph is expanded, the Provided Part, Fasten, and Manufactured Part tiles can be seen as predecessors of the Manufacturing Assembly.



2. Contextual Commands for Expand/Collapse and Hide/Show

Contextual commands are available for expanding/collapsing the graph and hiding/showing Provided Parts, Manufactured Parts, and Fasten steps. See Managing the Tiles in the Graph.



3. Contextual Commands for Rerouting

Contextual commands are available for rerouting an item that has an input (such as Manufacturing Installation, and Transform). See Rerouting items.

D. Item-Product Scope Management

Item-Product Scope is managed in the item editor.

The Item-Product scope delimits a subset of the product structure that can be implemented by an item. For example, this enables product structure subsets to be isolated and assigned to different system planners.

The scope is defined by an implement link from a reference item to a reference product. See Item-Product Scope.

In the item editor, you can:

- define the scope between an item and a product using the Create item-product scope contextual command. In this case, the  icon appears on the tile
- delete the scope between an item and a product using the Remove item-product scope contextual command.

A scope between an item and a system can be defined in Process Planning. In this case, the  icon appears on the tile.

Tooltips on the tile give information about Item-Product and System-Item scopes.

E. Item Management

A number of capabilities are available for managing items in the item editor.

Capabilities include:

- **Insert Predecessor** context menu on tile
- **Insert Predecessor** context menu in the tree
- **Drag and drop** to modify Data Requirement links.

F. Selecting Products

Products can be selected using the 3D view in the item editor, Smart Zoom, and tree.

Smart Zoom Capability

The Smart Zoom capability is useful for investigating the 3D representation and for selecting and assigning products. It can be activated at any time by pressing the **F6** key. The 3D representation becomes detached from the tile and then it can be rotated and zoomed.



Press **F6** again to exit the Smart Zoom.

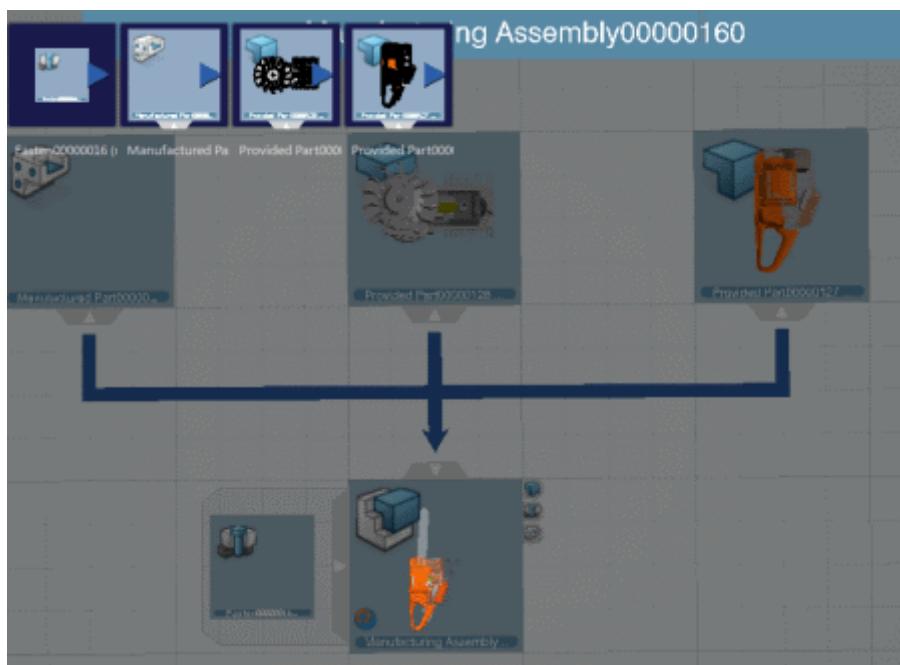
Tip: To activate the Smart Zoom by default, select the Automatic activation option in **Me > Preferences > App Preferences > Simulation > Process Engineering > Manufactured Item Definition > Grid Editors.**

Digger Functionality in Smart Zoom

The digger functionality is available when Smart Zoom is active. It is used to temporarily disable geometry that hides other parts of 3D. Move the mouse cursor onto the outer geometry and press the **F7** key. The hiding geometry becomes transparent and the hidden geometry can be selected or also made transparent. Use the **F8** key to make geometry visible again. See Using Digger.

Thumbnail Navigation in Smart Zoom

In Smart Zoom mode, you can click a left-hand or right-hand thumbnail to change to a predecessor or successor in the graph.



Show Unassigned Parts Using Smart Zoom and the B.I. Essentials Panel

- In Smart Zoom mode, when **Product Assignment Status** is clicked in the **B.I. Essentials** panel, two contextual commands enable you to display either the unassigned parts or all parts.
- You access the **Show Only Unassigned Parts** contextual command by right-clicking an empty area.
- The 3D representation is then displayed showing the unassigned parts only.
- You can display all the parts again by right-clicking an empty area and selecting the **Show All Parts** contextual command.
- You can navigate to a predecessor or a successor using the thumbnails. To do this, quit and relaunch the Smart Zoom, the **Show All Parts**, or **Show Only Unassigned Parts** display mode is kept.



G. Product to Item Assignments

A product can be assigned to an item using a variety of methods such as drag and drop, Smart Zoom, and Assignment Assistant.

When a product is assigned to a Manufacturing Assembly, a Provided Part is created with an implement link to the assigned product. Similarly, when a fastener is assigned to a Manufacturing Assembly, a Fasten step is created with an implement link to the assigned fastener.

For more information, see:

- Assign Products Using Drag and Drop
- Managing Product to Item Assignments
- Using the Assembly Assignment Assistant
- Assign/Unassign Parts Using Smart Zoom
- Assign Product to Item Command
- Managing Manufacturing Assembly Structure
- Use the F5 List to Show and Reassign Objects

Assign Products Using Drag and Drop

- It is possible to drag a product/part/fastener from the tree to a tile or another node in the tree.
- When you drag a tile or element from the tree to the border of the viewer, the grid automatically pans in the direction of the mouse cursor.
- The implemented parts/fasteners can be displayed in an F5 list by pressing the **F5** key.
- When items implement products/parts/fasteners that have 3D information, the parts/fasteners are shown on top of the item tiles.
- Parts that are displayed on top of item tiles can also be dragged directly from these tiles to other item tiles.
- If the product is already assigned to at least one item in the session, a dialog box appears asking whether or not you want to assign the product again.
- When you drag an object, the grid automatically centers on the selected object.

The following table summarizes the behavior for dragging and dropping a product on a Manufacturing Assembly:

Product implemented by a single object	Product implemented by multiple objects	Drag and drop used with Ctrl
The implemented Manufactured Part is rerouted under the target Manufacturing Assembly.	A dialog box appears to indicate that there is already an implement link and requires confirmation before creating a new one. If OK, a new Manufactured Part is created under the target Manufacturing Assembly. The Part is assigned to the created Manufactured Part.	A new Manufactured Part is created under the target Manufacturing Assembly. The Part is assigned to the created Manufactured Part.

The following table summarizes the behavior for dragging and dropping a part on a Manufactured Part:

Part implemented by a single object	Part implemented by multiple objects	Drag and drop used with Ctrl
The Part is assigned to the target Manufactured Part.	The Part is assigned to the target Manufactured Part.	The Part is assigned to the target Manufactured Part.



The following table summarizes the behavior for dragging and dropping a product on a Provided Part:

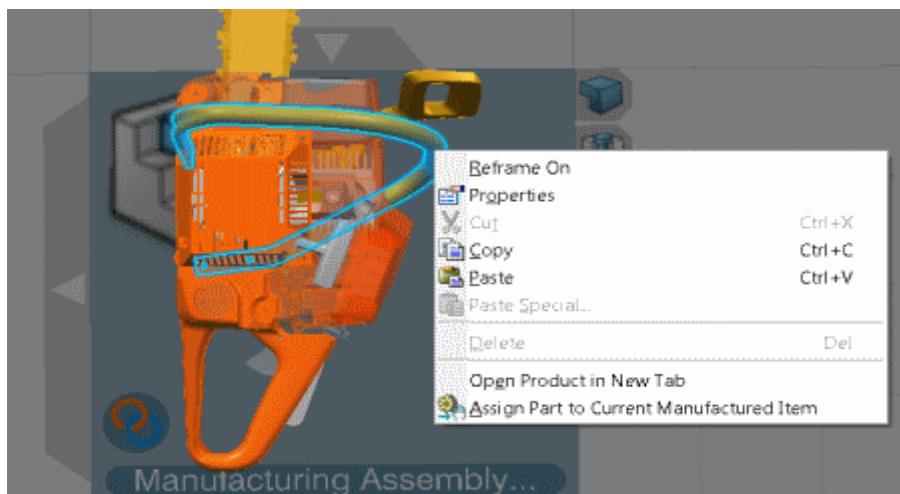
Product implemented by a single object	Product implemented by multiple objects	Drag and drop used with Ctrl
The previous implemented link is deleted and a new link is created.	A dialog box appears to indicate that there is already an implement link and requires confirmation before creating a new one. If OK, the product is assigned to the target Provided Part.	The product is assigned to the target Provided Part.

Note: When Spot Fastener Assembly/Single is dragged and dropped on a Manufacturing Assembly, a Fasten step is created to implement it. Sometimes a Product is dragged and dropped on a Manufacturing Assembly and it is already assigned to a Manufacturing Assembly in the session. In this case, the implemented Manufacturing Assembly is rerouted under the target Manufacturing Assembly.

Assign/Unassign Parts Using Smart Zoom

When parts/fasteners that are displayed as unassigned, you can assign them to the current item by double-clicking them in Smart Zoom mode.

You can also do this using the Assign Part to Current Item contextual command.



For example, in the Smart Zoom mode, if you select an unassigned part, then assign it to the current item using the contextual command. The part is no longer displayed.



When you exit the Smart Zoom mode by pressing F6, the assigned part is visible on the tile.



Assign Product to Item Command

Assign Product to Item in the Authoring section of the action bar enables assigning a product to a selected item. The product is then displayed on the tile. A scope must be defined before any assignments. If a product is already assigned to at least one item in the session, a dialog box appears asking whether or not you want to assign the product again.

Note: The 3D localization part of a bead fastener cannot be selected, so this part cannot be assigned to an item.

Unassign Product from Item Command

The Unassign Product from Item command in the Authoring section of the action bar enables unassigning a product from an item directly in the item editor or in Smart Zoom mode. This command is available for all item types except Manufacturing Assembly and Manufactured Part.

Show Assigned Items Only Command

Show Assigned Items Only in the Authoring section of the action bar shows in the 3D view only those items that are related to the item, and hides others. This command is available for a Manufacturing Assembly only.

Implementation Management for Multi-Instantiated Products

For item types that implement products, it is possible to reuse an existing item reference when multi-instantiated products are implemented. This is available for all product-to-item assignments: Drag and Drop, Assign Product to Item command, Smart Zoom, Assignment Assistant, Create/Update commands, and F5 list.

For implemented products, the Use same item reference to implement multi-instantiated parts option must be selected in Me > Preferences > App Preferences > Simulation > Process Engineering > Manufactured Item Definition > items Management.

H. Cross Highlighting Between Item Editor and Tree

The cross highlighting capability enables objects to be highlighted simultaneously in both the item editor and the tree.

For example, if an item tile is selected, the tile and the corresponding node in the tree are highlighted.

Management of PPR Editor Views

The item editor, System Editor, and 3D View can be displayed as independent widgets of the same tab. In previous releases, the three PPR views could be displayed in different frames of the same window. Now, to be consistent with the 3DEXPERIENCE platform and improve usability, these views can be displayed as independent widgets of the same tab.

App Transition

Transition to an app that uses a System Editor opens a System Editor widget. This is the only widget for this type of DELMIA app.

Transition to an app that uses an item editor opens an item editor widget. This is the only widget for this type of DELMIA app.

Opening a PPR Structure in Different Widgets

When you open a PPR structure, the structure is opened in the widget corresponding to the last compatible app.

For example, if Manufactured Item Definition was the last compatible app opened, the PPR structure opens in an item editor widget.

Then, if you start Process Planning, the structure opens in a System Editor widget in the same tab.

Finally, if you start Planning Structure, the structure opens in a 3D View widget in the same tab.



App Transition for Apps with Same Type of Grid

If you switch from one DELMIA app to another that has the same widget type, you change app. For example, you can switch from Manufactured Item Definition to Fastened Item Definition. In this case, the item editor widget stays open but the current app is now Fastened Item Definition. As can be seen from the app name in the window header and the commands in the action bar.

Special Transition

Special transition is a quick way to open a structure in a specific app.

For example, search and then select a structure you want to open. Then, you can select the app where you want to open the structure from the list of apps. The structure opens in the selected app.

New Content

If you select a new system or workplan system from the New Content panel, by default the system opens in a System Editor widget. However, if the last opened widget was a 3D View widget, the system opens in a 3D View widget.

If you select a new item from the New Content panel, by default the item opens in an item editor widget. However, if the last opened widget was a 3D View widget, the item opens in a 3D View widget.

I. Using the Item Editor

You can use the item editor to define and detail manufacturing assemblies, specify Item-Product scope, and manage Product assignments.

This task shows you how to:

- Open the Item Editor
- Reroute Item Flow Using Drag and Drop
- Edit item Properties
- Access Properties of Implemented Objects
- Delete an item
- Reframe the Editor on a Tile
- Center Tree to Locate an item
- Open Product in New Tab
- Use Visualization Modes
- Use Scale Modes
- Change the Viewpoint of 3D Representations on Tiles
- Use the F5 List to Show and Reassign Objects
- Show Information for Selected Tiles

J. Open the Item Editor

When you start the Manufactured Item Definition or Fastened Item Definition app, the item editor appears in the work area.

1. Open your content comprising product and manufacturing assembly structures in your app. The manufacturing assembly appears in the graph and under a PPR context in the tree.

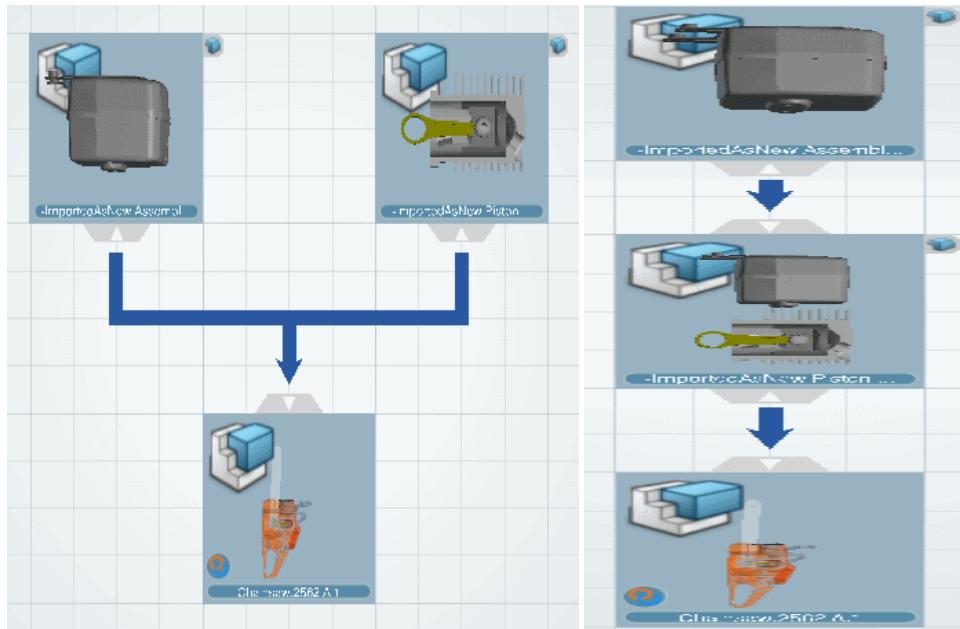
2. Expand and collapse the graph using the commands on the tiles to obtain the required view.

K. Reroute Item Flow Using Drag and Drop

The Data Requirements links in the item flow can be modified using the drag and drop mechanism.

1. In the example below, select one of the two predecessor tiles.
2. Drag and drop the selected tile on to the other one.

The dropped item becomes a predecessor of the target item.



The item flow and data requirement links (in blue) are modified. The target item now includes the output of the dropped item.

Note: Rerouting is also possible using contextual commands. See Rerouting items

L. Edit item Properties

You can edit the reference, configuration, instance, and effectivity attributes of an item in the Properties dialog box.

1. Right-click the required tile in the item editor and select Properties.
The Properties dialog box appears.

2. Make any required modifications to the item properties and click OK.
Note: most of the attributes are initialized by default and cannot be edited.

M. Access Properties of Implemented Objects

You can access the properties of implemented objects (such as products) of an item in the **Properties** dialog box.

1. Right-click the required item tile or tree node and select **Implemented Object Properties**.
The **Properties** dialog box appears.

2. In the **Current selection** list, select an implemented object of the selected item.
You can access the properties of the selected object using the tabs.

N. Delete an item

You can delete an item using the **Delete** contextual command.

1. In the tile or tree, right-click the item that you want to delete.
2. Click **Delete** to delete the item.

Note: You can click **Undo** to recover the item.

O. Reframe the Editor on a Tile

You can reframe the editor on a tile using the **Reframe On** contextual command on an item node in the tree.

1. In the tree, right-click the item that you want to reframe.
2. Click **Reframe On**.

The corresponding item tile is reframed in the editor.

Note: If the tile was collapsed, using **Reframe On** in the item node, then the tree expands and reframes the tile.



P. Center Tree to Locate an item

When you use the **Center Tree** contextual command on a tile, the tree expands and positions the corresponding tree node in the middle of the work area.

1. Right-click a tile.
2. Click **Center Tree**.

The tree is expanded and the corresponding tree node is positioned in the middle of the work area.

Q. Open Product in New Tab

You can open the 3D representation on a tile in a new authoring tab using the **Open Product in New Tab** contextual command.

1. In the tile, right-click the 3D representation that you want to open in a new tab.
2. Click **Open Product in New Tab**.

A product corresponding to the selected 3D representation is opened in a new authoring tab. It can then be edited like any other product.

R. Use Visualization Modes

The 3D representation on the item tile is the result of the realized items. You can manage the display using a group of visualization commands.

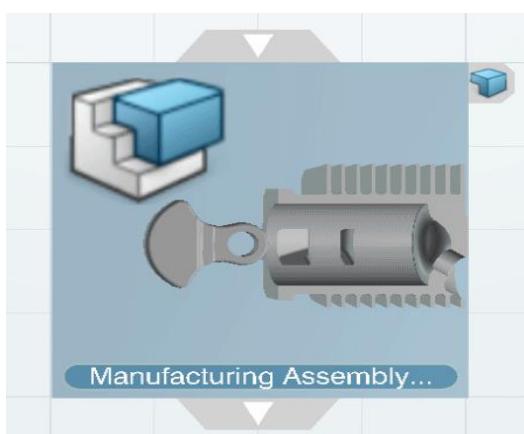
1. From the **Tools** section of the action bar, click **App Options**
2. From the **App Options** panel, click **Show All Parts**

All parts that are assigned to the current item and output from predecessors are visible.



3. Click **Show Only Concerned Parts**

Only the parts assigned to the current item are visible.



4. Click **Show Unconcerned Parts as Transparent**

Parts assigned to the current item are visible and parts from predecessors are displayed as transparent.

5. Click **Hide All Parts**

Parts are no longer displayed on the tiles. This is particularly useful for improving performance when large 3D representations are used.

For more information, see Flyout for Managing the Visualization of 3D Representations on Tiles.

S. Use Scale Modes

You can manage the scale of the 3D representation on the item tile using a group of visualization commands.

1. Open your content comprising product and manufacturing assembly structures in your app.

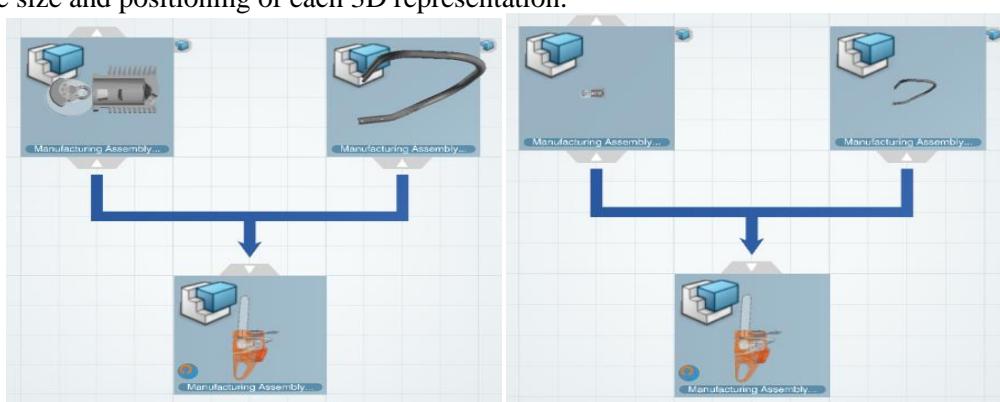
2. From the **Tools** section of the action bar, click **App Options**

3. From the **App Options** panel, click **Display Parts in Absolute Scale**

The 3D representations displayed above each tile are displayed in an absolute way: they take up the same percentage of space above the tile.

4. Click **Display Parts in Relative Scale**

The 3D representations are displayed within the context of the highest scoped product. This lets you see the relative size and positioning of each 3D representation.



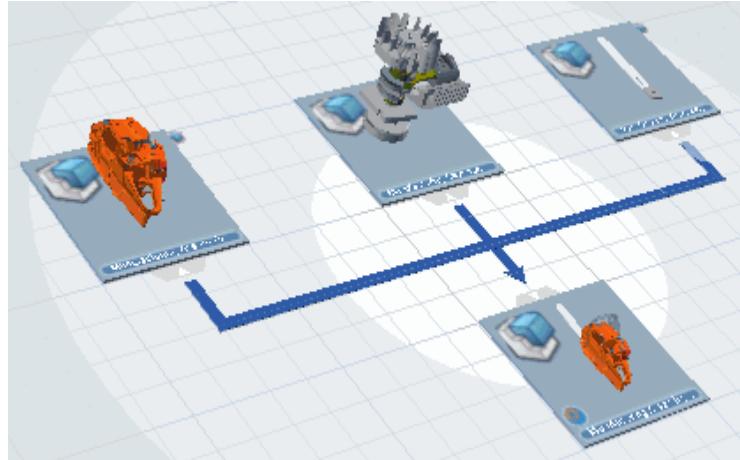
The 3D representations are displayed according to the **Scale factor** specified in **Me > Preferences > App Preferences > Simulation > Process Engineering > Manufactured Item Definition > Grid Editors**.



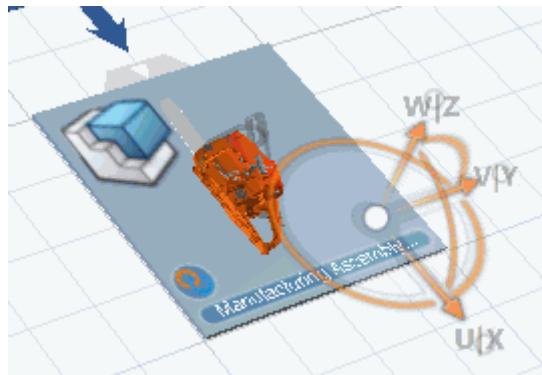
T. Change the Viewpoint of 3D Representations on Tiles

You can change the viewpoint of 3D representations on tiles using the **Robot**.

1. Expand the tiles in your graph.



2. Drag and drop the **Robot** on the root tile.



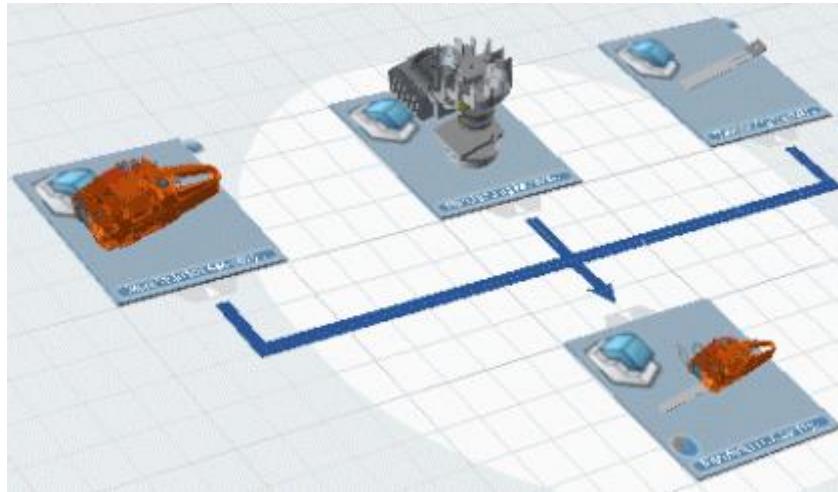
3. Double-click the **Robot**, and in the dialog box that appears, enter 90 degrees for a rotation about the z-axis.

Alternatively, you can use the z-axis curve on the **Robot** to rotate the 3D representation by 90 degrees.

4. Click **Apply** then **Close** in the dialog box.

5. Drag and drop the **Robot** to the background to unsnap it from the root tile.

The 3D representations on the tiles are all rotated by 90 degrees.

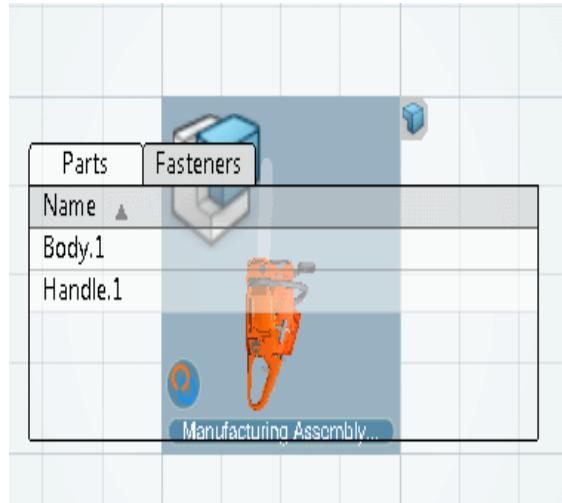




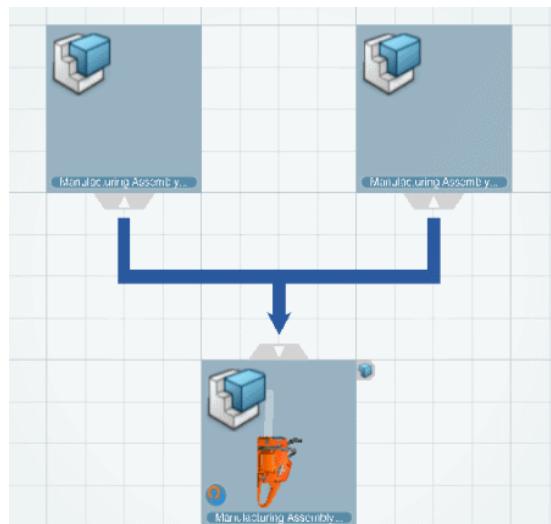
U. Use the F5 List to Show and Reassign Objects

You can use the **F5** key to list the parts associated with an item. The assigned parts are displayed in an F5 list by their respective names. It is possible to **drag and drop** an object from the F5 list of one item to reassign it to another item.

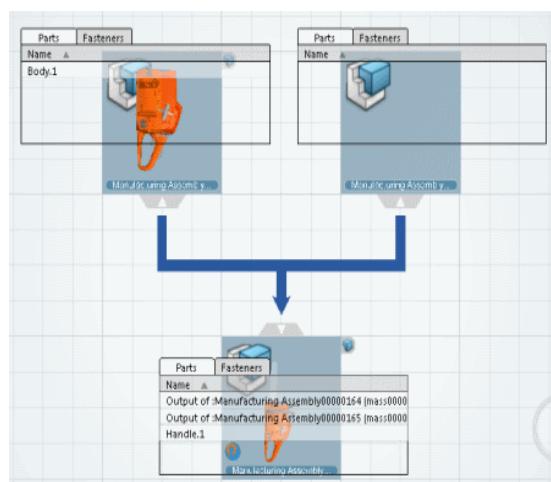
1. In the root item below, press **F5** on the keyboard to display assigned parts in an F5 list.



2. Insert two predecessors on the root item.

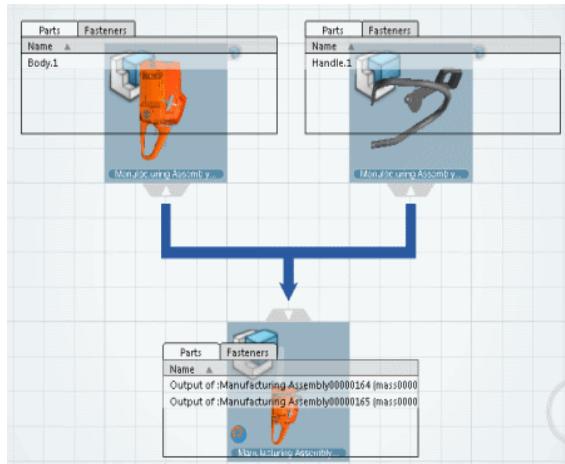


3. Press **F5** and drag the Body.1 line in the F5 list and drop it on to one of the empty tiles.





4. Drag the Handle.1 line in the F5 list and drop it on the other empty tile.



Note: input objects from other items are displayed as **Output of: item**.

V. Show Information for Selected Tiles

You can use the **Show Information** contextual command to display information panels for selected tiles.

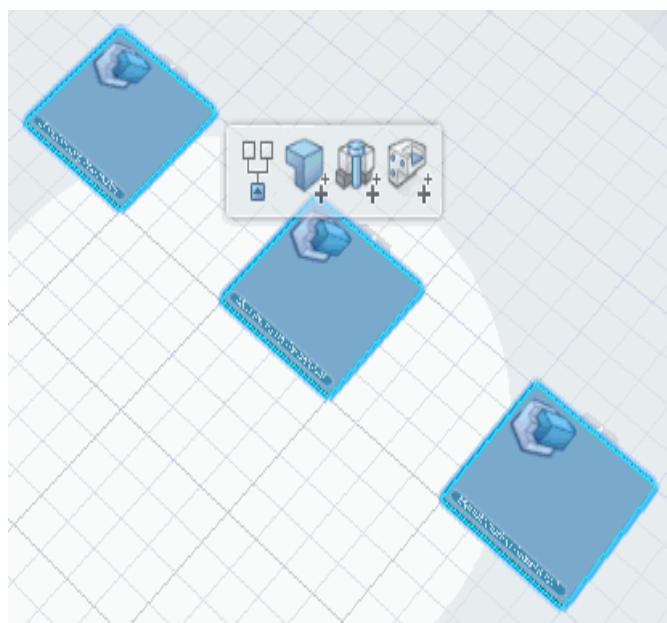
1. Select one or more tiles, then right-click and select **Show Information**.
An information panel appears next to each selected tile.

2. **Optional:** Press the **F4** key to show and hide the information panels as required.
Note: By default, the description of the item is given in the information panel.

W. Managing the Tiles in the Graph

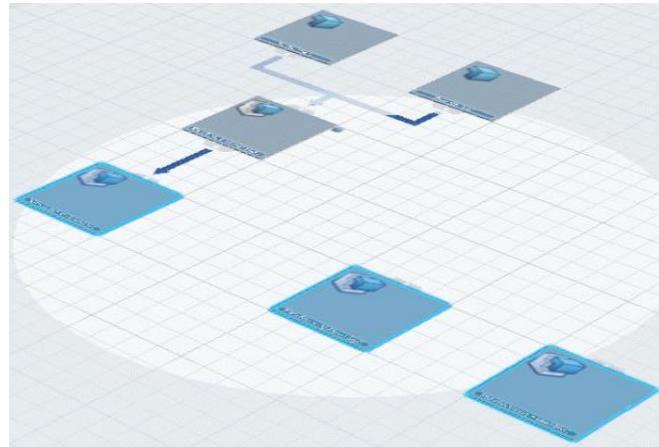
You can hide/show and expand/collapse the tiles in the graph using context toolbar commands.

1. Load your manufacturing assembly containing Provided Parts, Fasten steps, and Manufactured Parts in the item editor.
2. Ctrl-click the three root Manufacturing Assembly tiles.

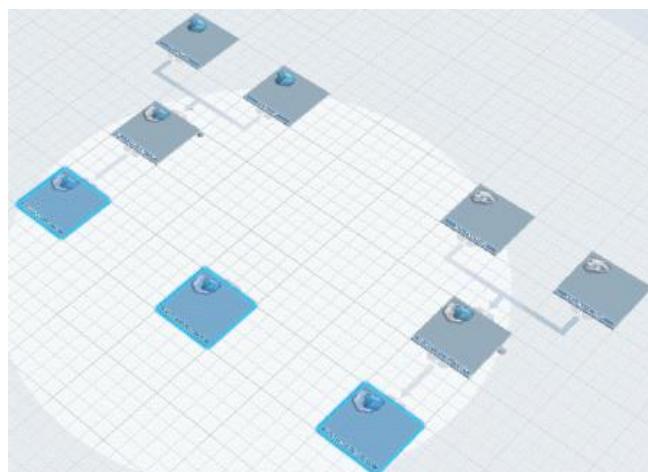




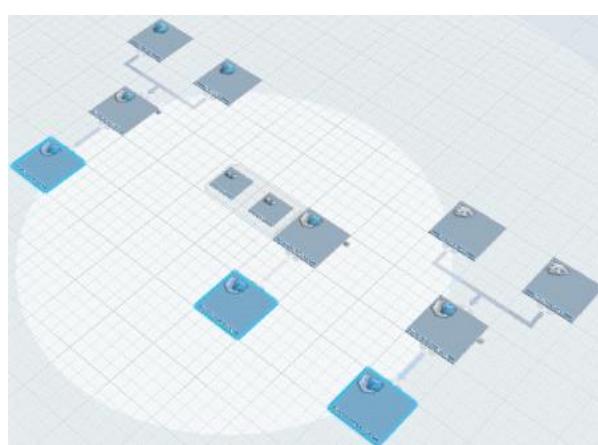
3. Click **Show All Provided Part Tiles**
- All Provided Part tiles are shown in the graph.



4. Ctrl-click the three root Manufacturing Assembly tiles.
5. Click **Show All Manufactured Part Tiles**
- All Manufactured Part tiles are shown in the graph.



6. Ctrl-click the three root Manufacturing Assembly tiles.
7. Click **Show All Fasten Tiles**
- All Fasten step tiles are shown in the graph.



8. Ctrl-click the three root Manufacturing Assembly tiles.
9. Click **Collapse Child**
- All the child tiles are collapsed and only the three root tiles are displayed.



X. Rerouting items

You can reroute an item that has an input using context toolbar commands.

The following items have an input and can be rerouted:

- Manufacturing Installation
- Transform
- Remove Material steps (Pre Drill, Drill, No Drill, Cut, Grind, and Bevel)
- Machining
- Split
- Mark

This task shows you how to:

- Insert Between
- Reroute Output
- Reroute Input

Before you begin: Load your manufacturing assembly in the item editor.

Y. Insert Between

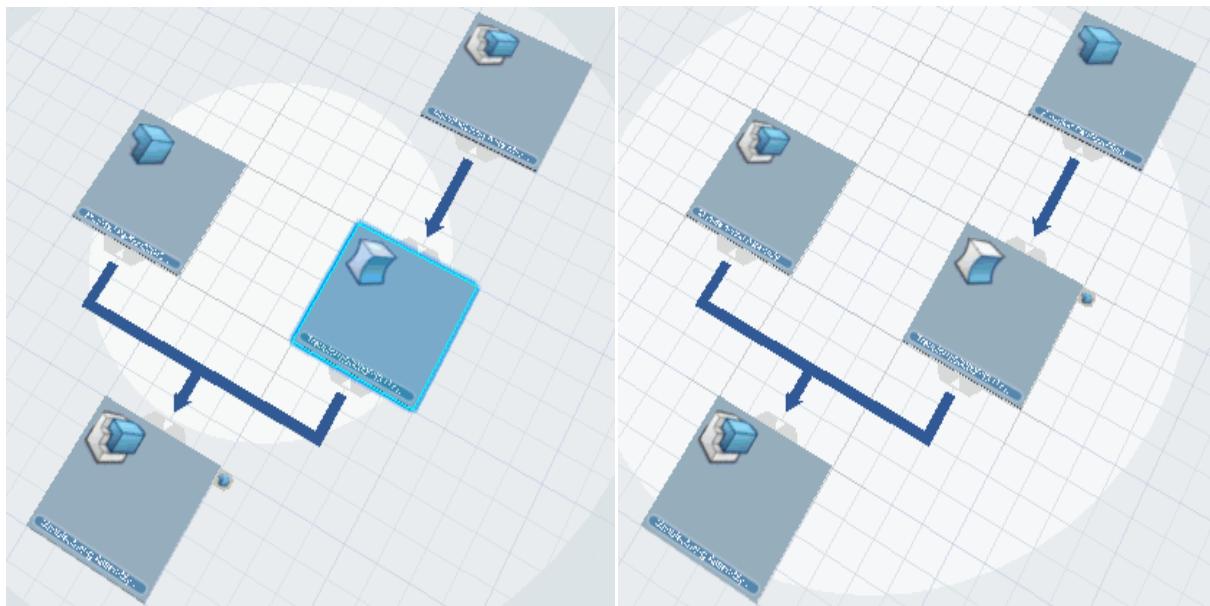
You can insert a selected item between an input and an output item.

1. Select the Transform step tile in the graph.
2. Click **Insert Between** in the context toolbar.
3. Select the Provided Part as an input item, and the root Manufacturing Assembly as an output item.

The selected input and output items must be:

- Either siblings, at least one of them must have an input.
- Or, from a tree point of view, parent, and child.

The Transform step is inserted between the Provided Part and the root Manufacturing Assembly.



Z. Reroute Output

You can reroute the output of an item to another item.

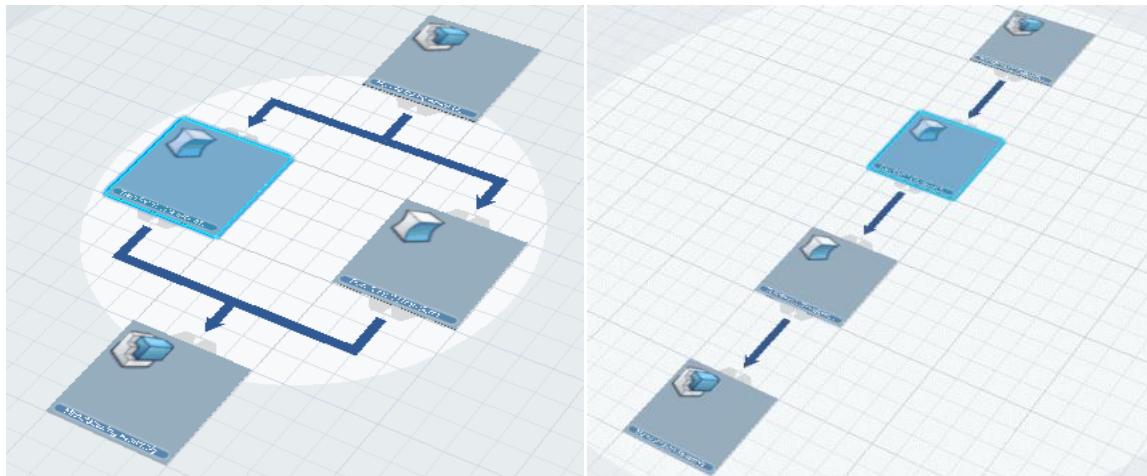
1. Select the first Transform step tile in the graph.



2. Click **Reroute Output**  in the context toolbar.
3. Select the second Transform step tile as an output item.

The new output item must have the same parent as the original one. It also needs to allow several predecessors as inputs.

The first Transform step is inserted between the second Transform step and the second Manufacturing Assembly.



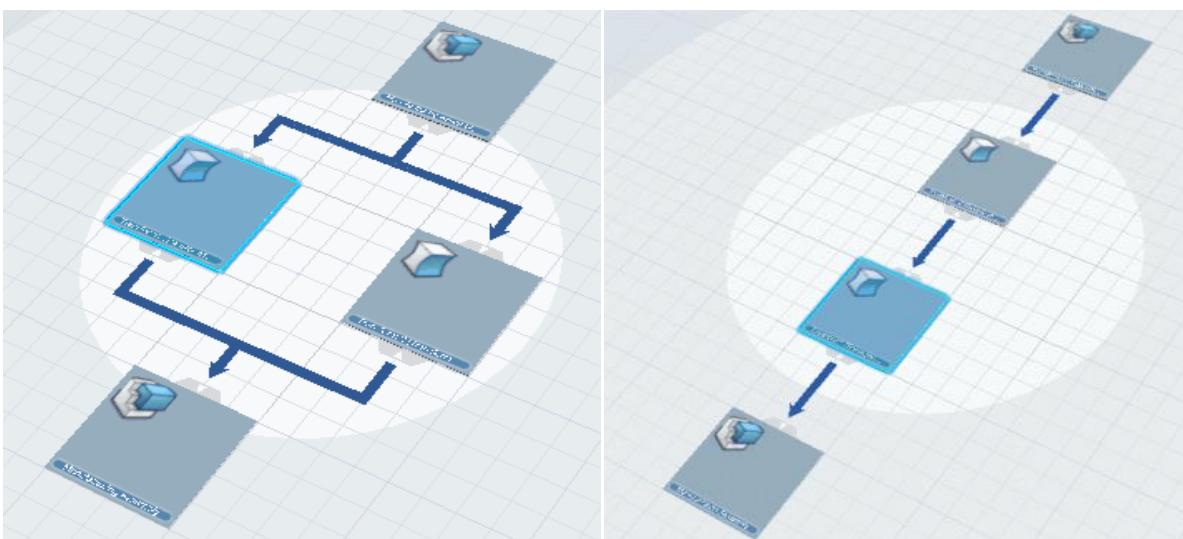
AA. Reroute Input

You can reroute an input of an item to another item.

1. Select the first Transform step tile in the graph.
2. Click **Reroute Input**  in the context toolbar.
3. Select the second Transform step tile as input item.

The new input item must be a sibling of the original one. It also needs to allow several successors as outputs.

The first Transform step is inserted between the second Transform step and the root Manufacturing Assembly.





Module-2. B.Defining Items

This section provides background information about items and describes how to insert items, and define precedence constraints between items.

In this section:

- About Manufactured Items
- Creating an Item from Tile or Tree
- Creating Items with Explicit Attributes
- Inserting an Existing Item
- Creating Precedence Constraints Between Items
- Checking the Status of Items with B.I. Essentials

A. About Manufactured Items

Manufactured items enable assembling the output of predecessors, consuming products, and transforming the state of the input.

- Default Item
- Manufactured Items and B.I. Essentials
- Configuration Effectivity and B.I. Essentials
- Manufacturing Assembly
- Provided Part
- Transform Step
- Fasten Step
- Remove Material Type Steps
- Manufactured Part
- Manufactured Part and B.I. Essentials
- Manufactured Material
- Manufacturing Kit
- Installation
- Continuous Items
- Creation of New Root Items
- Items and Libraries
- Hide/Show Behavior for Items

B. Default Item

- The software automatically creates a default root item under the PPR Context when you enter your app. This root item is usually a Manufacturing Assembly. However, you can also use other item types as a root item.
- It is possible to add other root items, using contextual commands under the PPR Context.
- At a lower level of the tree, it is possible to insert new and existing objects.
- All created items have a type. This determines aspects of the item, such as what the item does and the type of allowed parent.

C. Manufactured Items and B.I. Essentials

- You can view the update status of an item with B.I. Essentials. B.I. Essentials computes the status of the selected items and its Resulting Product.



- The **Item Update Status** menu option in the **B.I. Essentials** panel contains the following information about any type of item:

B.I. Essentials

Color	Information
Green	The item and its Resulting Product fit the specifications.
Yellow	Unloaded or deleted objects indirectly impact the item or its Resulting Product.
Orange	Unloaded or deleted objects directly impact the item or its Resulting Product.
Pink	The item or its Resulting Product is removed.
Dark Blue	The Resulting Product of the item is not synchronized and does not fit the specifications. The status of the Resulting Product is based on its links and if the user has modified it.
Light Blue	The Resulting Product of the item is not of the latest revision and does not fit the specifications. The status of the Resulting Product is based on its links and if the user has modified it.

D. Configuration Effectivity and B.I. Essentials

B.I. Essentials color codes the object tiles and the objects in the tree according to their configuration effectivity status. To compute the configuration effectivity status, B.I. Essentials takes into account Manufactured Items.

The Configuration Effectivity menu option in the B.I. Essentials panel contains the following information:

B.I. Essentials

Effectivity	
Effectivity having Evolution	Yellow
Effectivity having Variants	Blue
Effectivity having both Evolution and Variants	Green
Effectivity having at least Non Validated Change	Pink
No Effectivity	White



Color	Information
Yellow	The effectiveness meets the evolution requirements.
Dark Blue	The effectiveness meets the variants requirements.
Green	The effectiveness meets both the evolution and the variants requirements.
Pink	The effectiveness contains nonvalidated change criteria.
White	There is no effectiveness.

E. Manufacturing Assembly

The Manufacturing Assembly creates an assembly.

The Manufacturing Assembly allows creating a manufacturing assembly structure. It is usually the owner of at least one Provided Part.

You can insert all item types as predecessor.

F. Provided Part

The Provided Part consumes products, and has an implement link to the consumed product.

It is possible to create a Provided Part as a predecessor of a Manufacturing Assembly. In this case, the tree marks the Provided Part as the child.

It is also possible to create a Provided Part as a predecessor of a Transform or Remove Material type step. However, in this case, the tree marks the Provided Part not as the child but instead as the sibling.

This item type cannot have a predecessor: no creation is possible from a Provided Part.

G. Transform Step

The Transform step transforms the state of the input without adding or removing any parts. For example, cleaning or painting a part.

A Transform step does not implement anything.

You can insert all item types as predecessor.

Note: You cannot insert a Transform step as a root under a PPR Context.

H. Fasten Step

The Fasten step consumes fasteners, and has an implement link to the consumed fastener.

It is possible to create a Fasten step as a predecessor of a Manufacturing Assembly. In this case, the tree marks the Fasten step as a child.

It is also possible to create a Fasten step as a predecessor of a Transform or a Remove Material type step. However, in this case, the tree marks the Fasten step not as a child but as a sibling.

This item type cannot have a predecessor: no creation is possible from a Fasten step.

I. Remove Material Type Steps

The Remove Material type steps transform the state of the input by removing part of the product.

For example, such a step could involve drilling holes or machining a part.



Remove Material type steps are as follows:

- Pre Drill
- Drill
- No Drill
- Cut
- Grind
- Bevel

You can insert all these types as predecessor.

J. Manufactured Part

The Manufactured Part implements a design part and realizes a Manufactured Part. The Manufactured Part does not belong to the product structure.

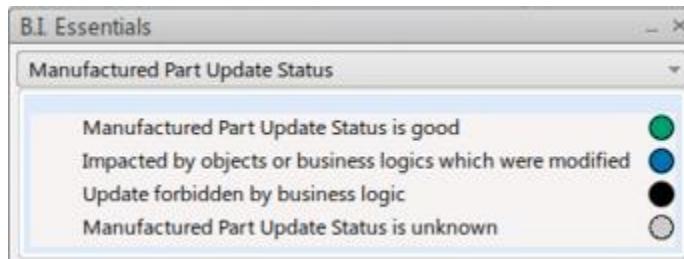
For example, a Manufactured Part can produce a drilled part from a design part.

You can insert Provided Part, Transform, and Remove Material type steps as predecessor.

K. Manufactured Part and B.I. Essentials

You can view the update status of a Manufactured Part with B.I. Essentials. B.I. Essentials computes the status of the selected Manufactured Part and its Resulting Product.

The Manufactured Part Update Status menu option in the B.I. Essentials panel contains the following information only about a Manufactured Part:



Color	Information
Green	The Manufactured Part and its Resulting Product fit the specifications.
Blue	The Manufactured Part or the Resulting Product do not fit the specifications because of the modified objects or business logics.
Black	The business logic prevents the update of the selected Manufactured Part.
Gray	The Resulting Product of the selected Manufactured Part is not present, so B.I. Essentials cannot compute the status.

L. Manufactured Material

The Manufactured Material conceptualizes the creation of a product out of nothing.

The Manufactured Material conceptualizes the item of creating an all-new product from its children to give an output with the correct semantic.



Compared to a Transform function, it has no input. Compared to a Manufacturing Assembly, it modifies its children to create its output.

You can insert all item types as predecessor.

M. Manufacturing Kit

The Manufacturing Kit provides a group of items. The resulting kit is not an assembly because there is no physical link between its constituent elements: they are independent from one another. However, a kit is required to execute the next assembly stage properly.

The aim of the Manufacturing Kit is to deliver the group of items together and unsorted.

You can insert the following item types as predecessor: Manufacturing Assembly, Provided Part, Manufactured Part, Manufactured Material, and Manufacturing Kit.

N. Installation

The Installation provides the capability to manage the installation of components on a larger assembly. A Manufacturing Installation has one input item and one output item. It can also contain one or more items. The assembly creates the Installation between the input item and the output item.

For more information, see About Manufacturing Installations.

O. Continuous Items

Continuous Manufactured Material and Continuous Provided Material items have quantities such as length, mass, area, and volume.

There are two families of continuous items:

- Continuous Manufactured Material with:
 - Length magnitude: the created quantity measures as a length (m, mm, inch, and so on)
 - Mass magnitude: the created quantity measures as a mass (kg, pound, and so on)
 - Area magnitude: the created quantity measures as an area (m², cm², and so on)
 - Volume magnitude: the created quantity measures as a volume (m³, liter, and so on)
- Continuous Provided Material with:
 - Length magnitude: the provided quantity measures as a length (m, mm, inch, and so on)
 - Mass magnitude: the provided quantity measures as a mass (kg, pound, and so on)
 - Area magnitude: the provided quantity measures as an area (m², cm², and so on)
 - Volume magnitude: the provided quantity measures as a volume (m³, liter, and so on)

You can insert all item types as predecessor for both Continuous Manufactured Material and Continuous Provided Material items.

For more information, see Creating Continuous Manufactured Items.

P. Creation of New Root Items

You can create root items under the PPR Context using the **New Content** dialog box that appears when you select **Add > Content**.

The **Item** section of the **New Content** dialog box lists the available root item types.

If you right-click an item type, the **Set attributes at creation** command enables you to specify an explicit or implicit creation mode for each item type. User **Preferences** stores this information.

Note: The Administrator can define the explicit or implicit creation mode for each item type.

When the creation mode for the item type is explicit, an attributes dialog box appears. You can define attributes for the item and configuration in the tabs of the dialog box. For a Continuous Provided Material item, you can define the magnitude in a dedicated tab.

When the creation mode for the item type is implicit, the attributes dialog box does not appear and the creation mode creates the item directly.

Implicit creation of items occurs in the following cases:

- Enter Manufactured Item Definition with creation of a root item.
- Create and update item structures.



- Create and update Manufacturing Assembly structure.
- Assign parts using the Assembly Assignment Assistant, Drag & Drop, Smart Zoom, or an assignment command.

For more information, see 3DEXPERIENCE Platform: *Creating New Content*.

Q. Items and Libraries

You can create and store items as well as access them through libraries.

You can enrich a Manufacturing Assembly using a template, which you must make using a copy from a library.

Create the template and store it in a library. Then, you must use the Copy from Library command to enrich the service assembly with the content of the template.

Template reuse cannot be done using the Insert Existing item command. This is because the command requires that the service item you plan to insert has a scope compatible with the scope of the service item you plan to complete. This is to avoid violation of encapsulation rules.

This functionality exists for the insertion of a Manufacturing Assembly that possibly has links to implemented parts and a scope.

For more information, see the Design IP Classification *User's Guide*.

R. Hide/Show Behavior for Items

When the tree hides/shows an item, then the tree also hides/shows the products implemented by the item. If the tree hides/shows an item that has multiple child items, then the tree hides/shows all the products implemented by the selected item and its children.

The possible Hide/Show statuses for item occurrences are:

- Shown: the tree node icon displays normally.
- Partially Shown: the tree node icon is partially gray.
- Not Shown: the tree node icon is fully gray.

When you hide an item using the **Hide** contextual command:

- The tree hides the selected item.
- The tree hides the children of the selected item.
- The tree hides the products linked with the selected item.
- The tree hides the products linked with the children (and their children).

When you show an item using the **Show** contextual command:

- The tree shows the selected item.
- The tree shows the children of the selected item.
- The tree shows the products linked with the selected item.
- The tree shows the products linked with the children (and their children).
- The tree shows the parents of the selected item with the tree node icon partially grayed.
- The tree shows the products linked with the direct parents.

S. Creating an Item from Tile or Tree

You can create items in the item editor using contextual commands on a tile or a node of the tree. A new item can be created as a predecessor of an existing item only.

Before you begin: Open the product content for which you require to create the item. Start your app: a PPR Context and a root item are created in the tree, and an item tile appears in the item editor.

1. Right-click the tile on the grid or the item node in the tree and select Insert Predecessor.
2. Select the required item type.



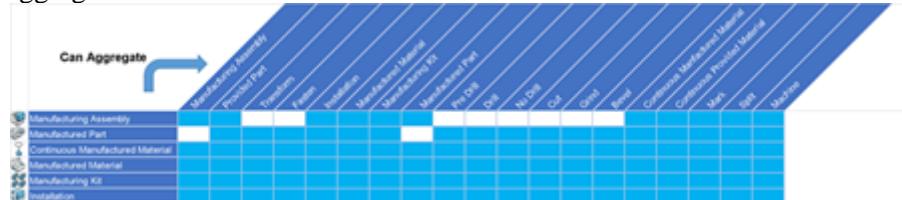
Available types are:

- Manufacturing Assembly
- Provided Part
- Continuous Provided Material
- Transform
- Fasten
- Remove Material
- Manufactured Part
- Manufactured Material
- Continuous Manufactured Material
- Manufacturing Kit
- Installation
- Mark
- Split
- Machine

A new tile is created on the grid and a new node is added to the tree.

Notes:

- The Insert Predecessors context menus is adapted accordingly to the following aggregation rules:



- A data requirement link is automatically created from the new item (predecessor) to the parent item (successor). A data requirement link can be modified by dragging and dropping tiles. For more information, see Reroute Item Flow Using Drag and Drop.
- You can also create items by selecting the required item type from the Authoring section of the action bar. Double-clicking a command in the action bar lets you quickly create several items of the selected type.
- If the Always display interactive dialog for attributes option is clicked in the Me > Preferences > Content Access > Identification tab, a dialog box is displayed for specifying attribute values each time you create an item.
- You can insert a new root item using the context menu on the PPR Context. This root must be an item such as Manufacturing Assembly or Manufactured Material that can hold a scope. You can remove a root from the tree or the grid. In fact, it is possible to have no root item under the PPR Context, and therefore no tile on the item editor grid. The grid contains as many tile structures as there are roots.

T. Creating Items with Explicit Attributes

You can create items in the item editor while defining the attributes explicitly in a dialog box for each item.

Before you begin: Open the product content for which you want to create the item.

Under **Add > Content**, make sure that the **Set attributes at creation** option is selected when you right-click the required item type in the **New Content** dialog box. Start the Manufactured Item Definition or Fastened Item Definition app: a PPR Context and a root item are created in the item editor.

1. Right-click a tile on the grid or a node in the tree and click **Insert Predecessor** in the context menu to choose the required item type.

A dialog box appears showing the property attributes of the item to be created, such as:



- Name
 - Estimated time
 - Make or buy decision: Unassigned, Buy, Make
 - Configuration attributes for defining variability space, variants, and evolutions.
2. Enter any required attribute values and click **Finish**.

The predecessor item is created in the item editor with the assigned attribute values.

3. Continue in the same way to add more items to the manufacturing assembly structure, defining the attitude values for each item.

Note: Sometimes the **Set attributes at creation** option is not selected when you right-click the required item type in the **New** dialog box. In this case, the attributes dialog box does not appear when creating an item. The item is created with default values.

item attributes can be modified at any time by right-clicking the tile or tree node and selecting **Properties**. See Using the Item Editor.

U. Inserting an Existing Item

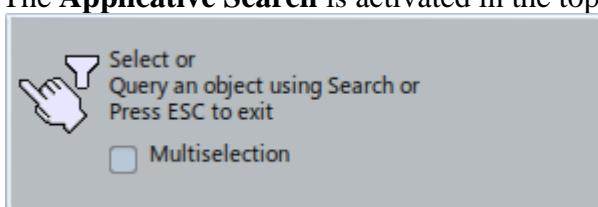
You can add one or more existing items to a manufacturing assembly structure from either the current session or from a search.

Before you begin: Open data containing an Item-Product scope.

1. Right-click an item and select **Insert Predecessor > Existing Item**.

Note: You can also select the required item and click **Existing Item** in the **Authoring** section of the action bar.

The **Applicative Search** is activated in the top bar and a small panel appears.



2. Select one or more items as follows:

- Type your search criteria in the **Applicative Search** box, click , then select the desired objects from the search results.
- Select an object in the tree or work area.
- Select the **Multiselection** check box, select several objects in the tree or work area, then click **Accept** .

The selected items are added as predecessors of the selected item.

V. Creating Precedence Constraints Between Items

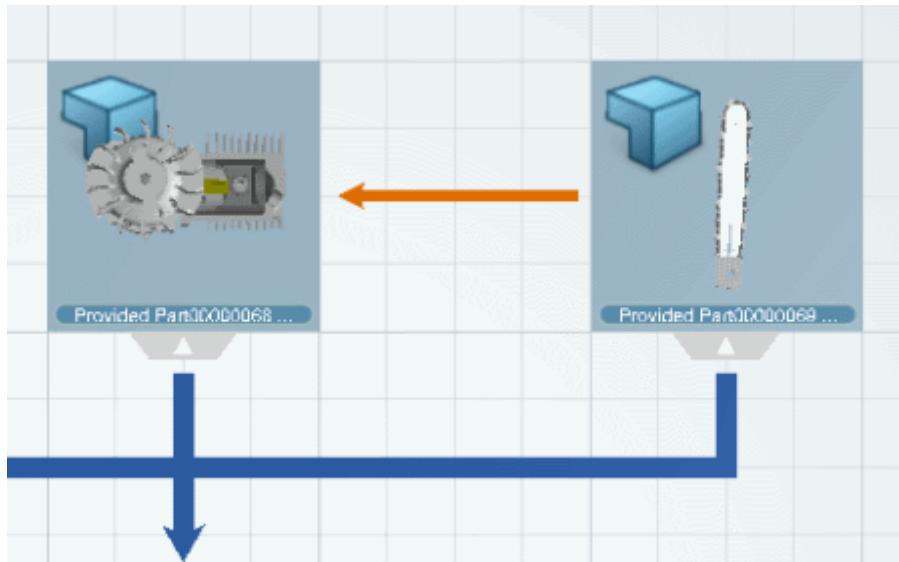
You can add, reverse, or delete a precedence constraint between two sibling items.



Before you begin: Open the manufacturing assembly structure on which you want to manage precedence constraints.

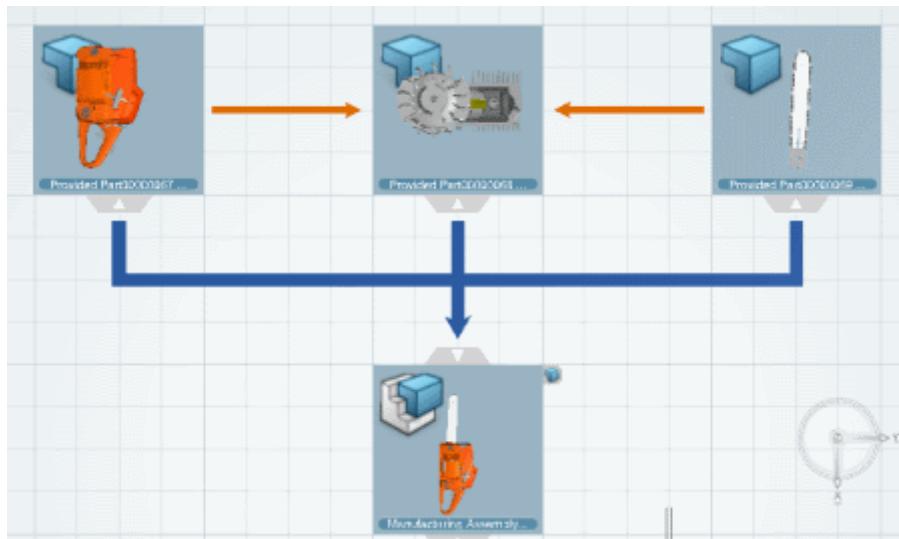
1. From the **Authoring** section of the action bar, click **Create Precedence Link**
2. Select the tile where the link is to start.
3. Select the tile where the link is to end.

The link is created between the two items, which is symbolized by an arrow linking the two tiles.



In this example, the first item must be done before the second one: the bar must be provided before the engine.

4. In the same way, create another precedence constraint by selecting start and end items.



In this example, the bar and the body are provided before the engine for the Manufacturing Assembly.



Notes:

- To reverse the direction of the link, double-click the arrow.
- To delete a link, click the arrow linking the two tiles then press the **Delete** key. Alternatively, right-click the arrow and select **Delete**.
- By default, precedence constraints appear in orange. You can customize this Connection colors in **Me** > **Preferences** > **App Preferences** > **Simulation** > **Process Engineering** > **Manufactured Item Definition** > **Item Grid Editor**.

W. Checking the Status of Items with B.I. Essentials

You can view the update status of an item, part, or an object's configuration effectivity with B.I. Essentials. B.I. Essentials computes the status of the selected item or part and its resulting product.

This task shows you how to:

- Checking the Update Status of an Item with B.I. Essentials
- Checking the Update Status of a Part with B.I. Essentials
- Checking the Status of the Configuration Effectivity with B.I. Essentials (Item)

Before you begin: Open your data, which must have product and manufacturing assembly structures.

X. Checking the Update Status of an Item with B.I. Essentials

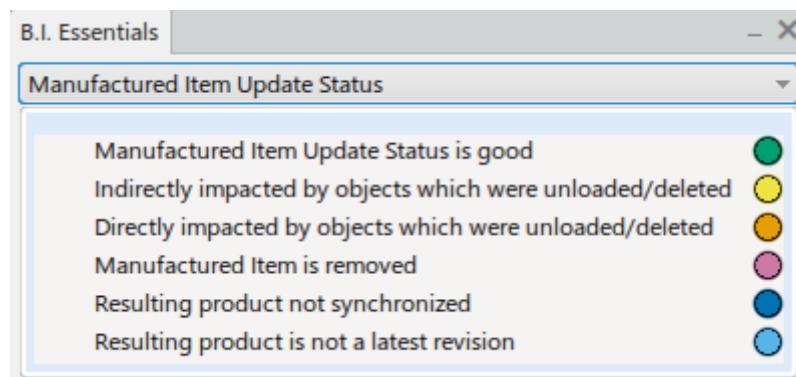
You can view the update status of an item with B.I. Essentials. B.I. Essentials computes the status of the selected item and its resulting product.

1. Select an item in the tree.
2. From the Tools section of the Action Bar, click B.I. Essentials .

The B.I. Essentials panel appears.

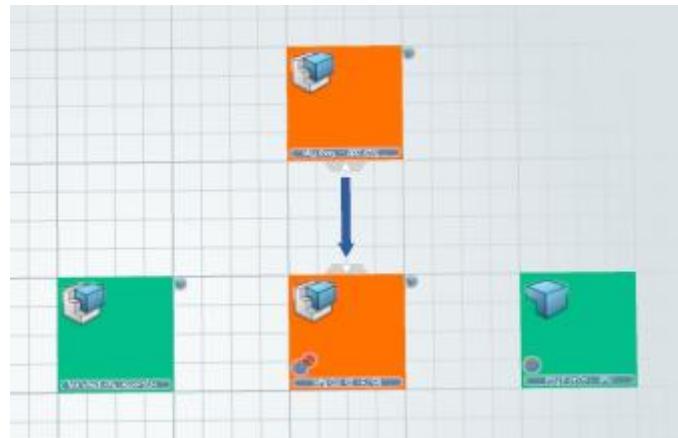
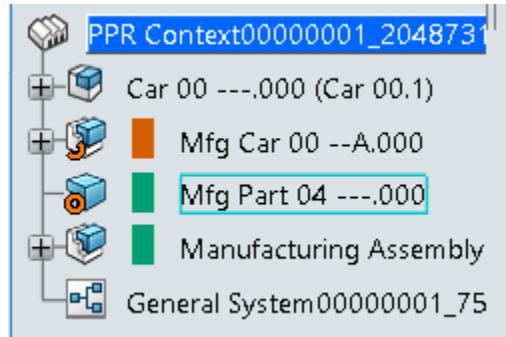
3. Click the Item Update Status menu option in the B.I. Essentials panel.

B.I. Essentials computes the status of the selected item as well as its resulting product. The list appears and contains information about the selected item.





B.I. Essentials has now color-coded the item in both the tree and the main 3D according to its status in the B.I. Essentials panel.



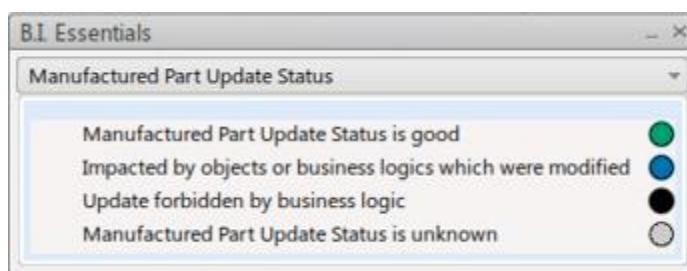
Y. Checking the Update Status of a Part with B.I. Essentials

You can view the update status of a part with B.I. Essentials. B.I. Essentials computes the status of the selected part and its resulting product.

1. Select a part in the tree.
2. From the **Tools** section of the Action Bar, click **B.I. Essentials**

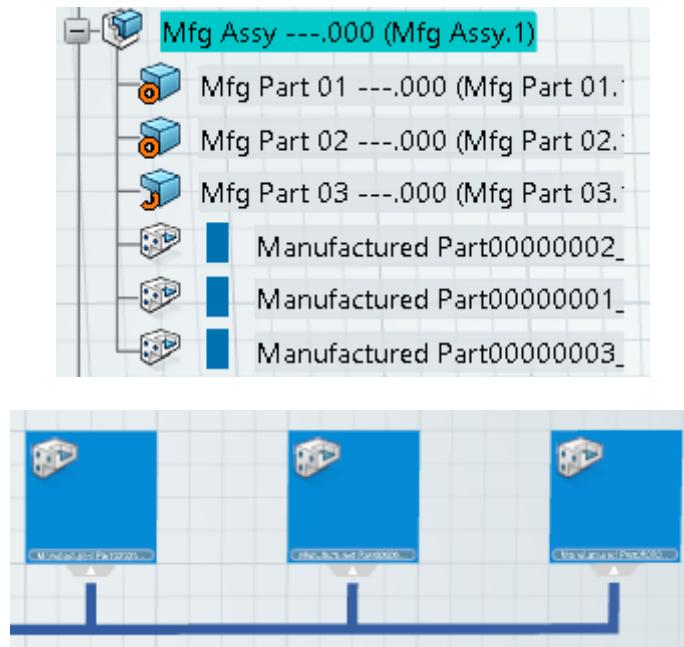
The **B.I. Essentials** panel appears.

3. Click the **Manufactured Part Update Status** menu option in the **B.I. Essentials** panel.
- B.I. Essentials** computes the status of the selected part as well as its resulting product. The list appears and contains information about the selected part.



Note: **Update forbidden by business logic** status is only displayed by the **B.I. Essentials** panel if you define the DELMA_ElementaryEndItemValidation_ID open ID.

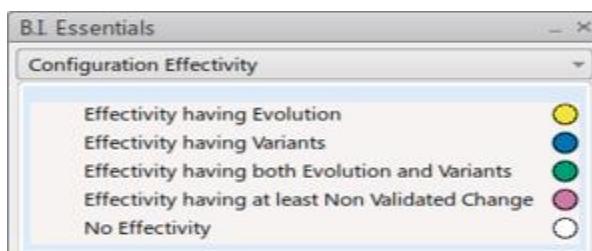
B.I. Essentials has now color-coded the selected part in both the tree and the main 3D according to its status in the **B.I. Essentials** panel.



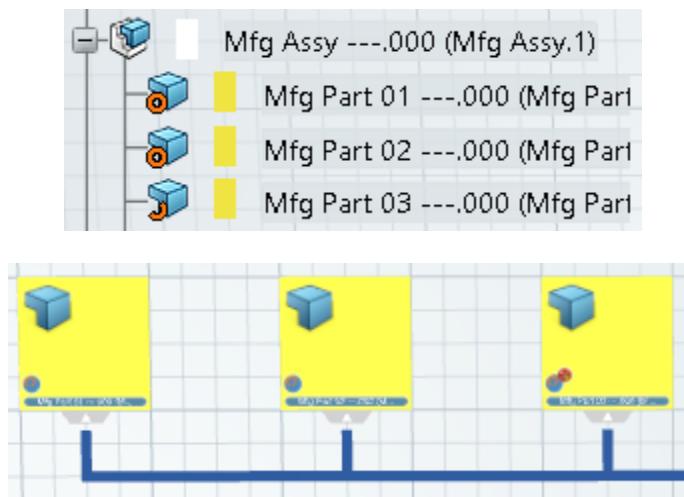
Z. Checking the Status of the Configuration Effectivity with B.I. Essentials (Item)

You can compute the configuration effectivity status with B.I. Essentials, which takes into account Manufactured Items. B.I. Essentials color-codes the object tiles and the objects in the tree according to their configuration effectivity status.

1. Select a Manufactured Item in the tree.
 2. From the **Tools** section of the Action Bar, click **B.I. Essentials** .
- The **B.I. Essentials** panel appears.
3. Click the **Configuration Effectivity** menu option in the **B.I. Essentials** panel.
- The list appears and contains information about the configuration effectivity status.



B.I. Essentials has now color-coded the selected Manufactured Item in both the tree and the main 3D according to its status in the **B.I. Essentials** panel.





Module-1. C:Item-Product Scope

This section provides background information about item-product scope links and describes how to manage them.

In this section:

- About Item-Product Scope
- Creating an Item-Product Scope
- Modifying or Repairing Item-Product Scopes
- Managing Assignment Filters

A. About Item-Product Scope

The Item-Product scope delimits a subset of the product structure that can be implemented by an item. For example, this enables product structure subsets to be isolated and assigned to different system planners. The scope is defined by an implement link from a reference item to a reference product.

The following topics are discussed:

- Scope Link Definition
- Item-Product Scope Symbols
- Collaborative Work
- Multiple Reference items
- Reuse
- Openness for System-Item Scope
- Assignment Filters
- Inconsistent Item-Product Scopes

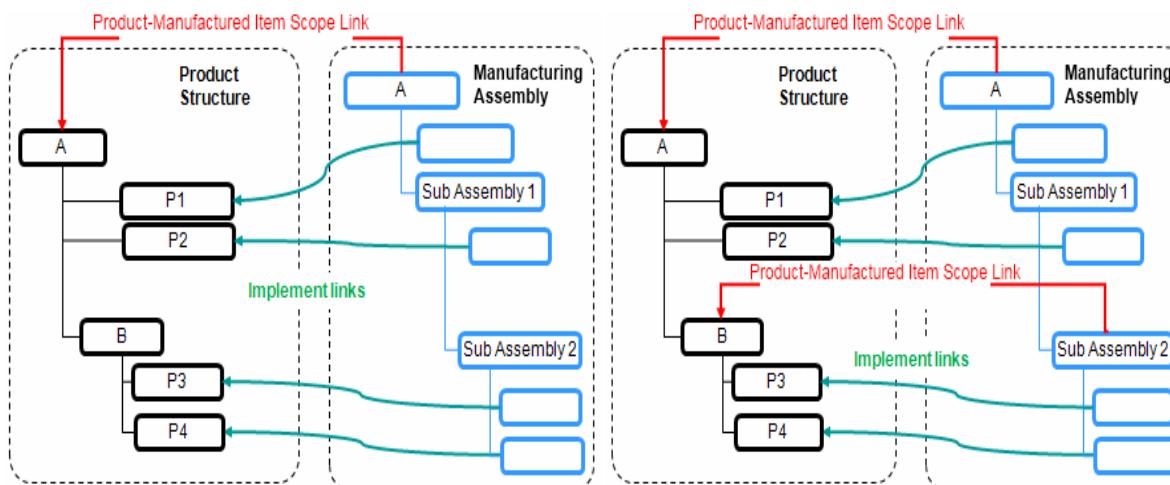
B. Scope Link Definition

A Item-Product scope is defined by an implement link from a reference item to a reference product. The scope link specifies a contract between the item and the product. It delimits a subset of the product structure that can be implemented by an item. Additional scope links can be defined at lower levels of the structures to further identify which parts can be implemented by specific items.

In the figure below, the reference Manufacturing Assembly A:

- Creates/manufactures the reference Product A
- It is impossible to implement a product that is not part of the structure of Product A
- Implements all the parts of Product A

It is possible to define subcontracts. For example, item Sub Assembly 2 has a contract with Product B: it creates/manufactures Product B and implements all the parts of that product.





C. Item-Product Scope Symbols

When a Item-Product scope is defined, a mask appears on the item.

A symbol appears on the item node in the tree. If the scoped product is not loaded in the session, the mask appears on the item node.

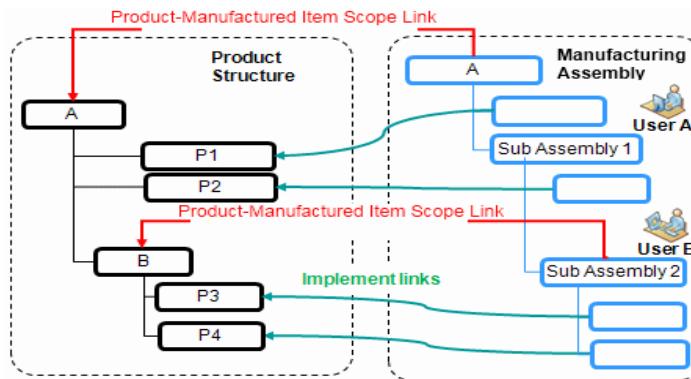
In addition, an icon appears in the lower left corner of the item tile.

D. Collaborative Work

A collaborative working environment can be set up using Item-Product scope links.

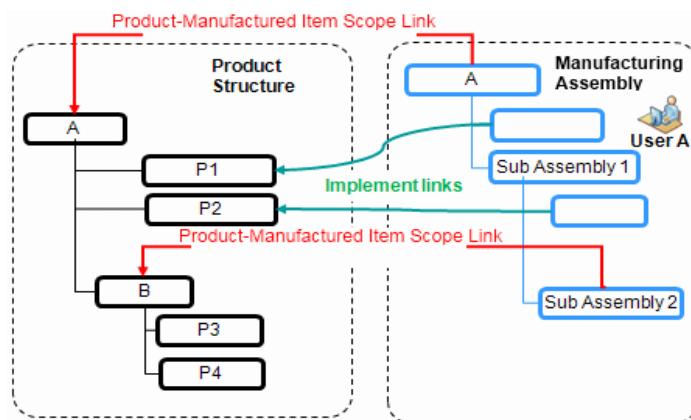
An item-by-item collaborative working environment can be set up as follows:

- User A is responsible for Manufacturing Assembly A
- User B is responsible for Sub Assembly2

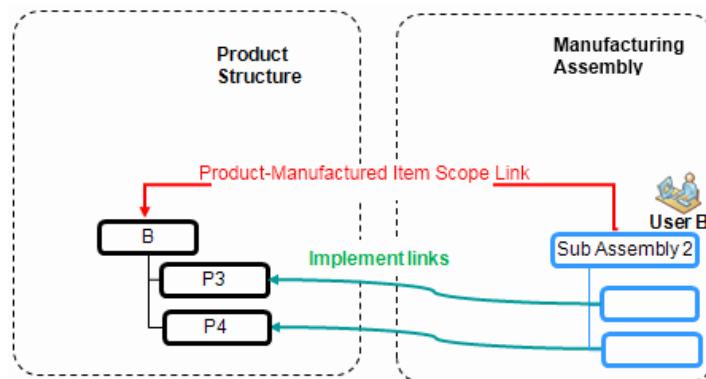


User A is not concerned about the planning of Product B. The work that remains to be done is clear because the scope of the work is defined and identifiable.

User A does not need to know how Product B is manufactured.



User B is not concerned about the planning of Product A. The work that remains to be done is clear because the scope of the work is defined and identifiable.

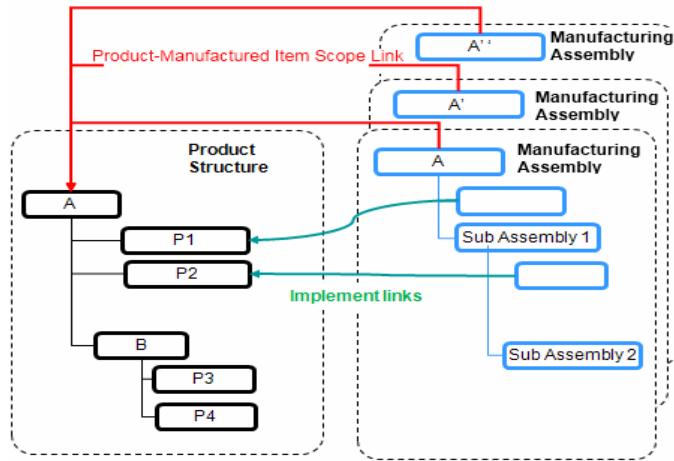




E. Multiple Reference items

Multiple reference items can implement the same reference product using Item-Product scope links.

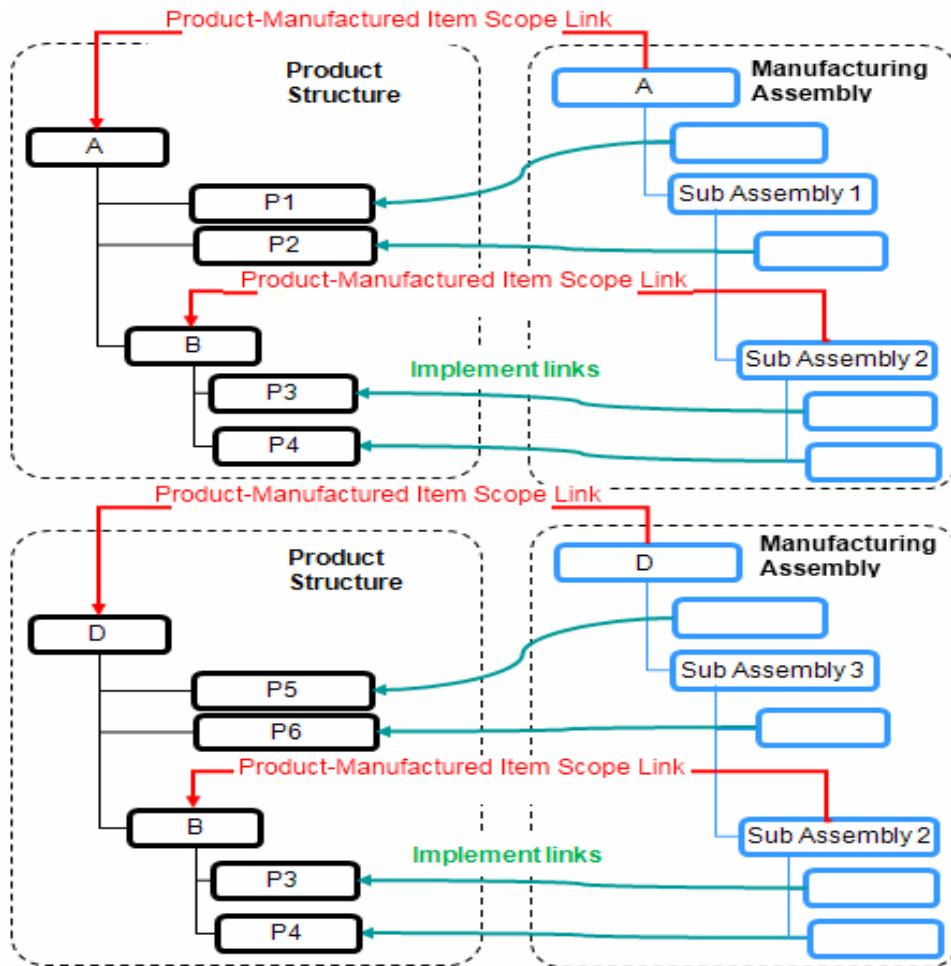
In this way, the items can describe different revisions or alternates of Product A.



F. Reuse

Item-Product Scope enables a subassembly to be reused or carried over into another manufacturing assembly structure.

In the figures below, Sub Assembly2 is used in both Manufacturing Assembly A and Manufacturing Assembly D.





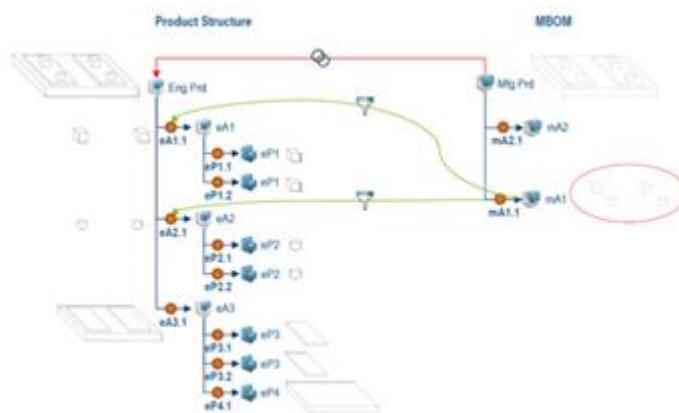
G. Openness for System-Item Scope

- A dedicated attribute on a Manufacturing Assembly allows a System-Item scope to be defined between the item and a system that is not yet present in the session. In this case, a Loading operation is created and the item is consumed. Later, if the item is to be realized by a system, a real scope can be created and a General operation is created.
- A System-Item scope is used to delimit a subset of the item structure that can be realized by the group of operations and subsystems of the system. You can define System-Item scopes in Process Planning. For more information, see the *Process Planning User's Guide*.
- However, in Manufactured Item Definition, a **Planning Required** attribute is available in the **Properties** dialog box of a Manufacturing Assembly. It allows you to simulate the System-Item scope for this item.
- If the attribute on the Manufacturing Assembly is set to **YES**, this item has, or will have, a scope with a system that is not in the session. This means that this item can only be consumed and a Loading operation is created. If you want to realize the item and create the General operation, you must create the scope with the system in the normal way.
- If you create a scope between an item and a system while the attribute is still set to **YES**, the attribute is ignored: the scope has priority over the attribute.
- Note: To use the **Planning Required** attribute on a child item, you must have at least one scope between one of its ancestor items and a system.

H. Assignment Filters

An assignment filter delimits an area inside a scope on which parts can be selected. It also allows for defining intermediate manufactured assemblies. The available assignable products in the Assignment Manager and Assignment Assistant are limited to the content of the selected engineering assemblies.

You can only assign parts that are similar and inside a scope link. You cannot select parts outside of the assignment filter. For example, in the following chart depicting assignment filters, any part of eA1.1 and eA2.1 can be assigned to mA1.1, but no part of eA3.1 can be assigned to mA1.1..



When you define an assignment filter on an item, it applies to all its children. If a child also has assignment filters, the assignable products are the intersection of the parent and the child assignment filters.

You can manage assignment filters with the **Manage Assignment Filters** command in the **Authoring** section of the action bar. With this command, you can create, remove, and reconnect assignment filters.

Impact on assignment commands:

- You cannot assign a product using drag-and-drop if it has an assignment filter.
- Only products belonging to an assignment filter are available for assignment in the **Assignment Manager**, the **Assignment Assistant**, and **Smart Zoom for B.I. Essentials**.
- The **Relations** panel shows assignment filter information.



I. Inconsistent Item-Product Scopes

An Inconsistent Item-Product Scope can be a broken scope or a resolved scope.

Types of Inconsistent Item-Product Scopes:

- Broken Scope: when the scoped product is not loaded in the session or is removed from the tree.
- Resolved Scope: when a scope is reconnected but it has a related implement link that refers to a reference product.

You can manage Inconsistent Item-Product Scopes using the **Manage Inconsistent Item-Product Scopes** command

In the Knowledge Base

Default setting for the Planning Required attribute is set to TRUE

J. Creating an Item-Product Scope

You can define a scope between an item reference and a product reference. This scope then lets you manage product assignments and analyze implement links.

This task shows you how to:

- Create an Item-Product Scope
- Create an Item-Product Scope from Search

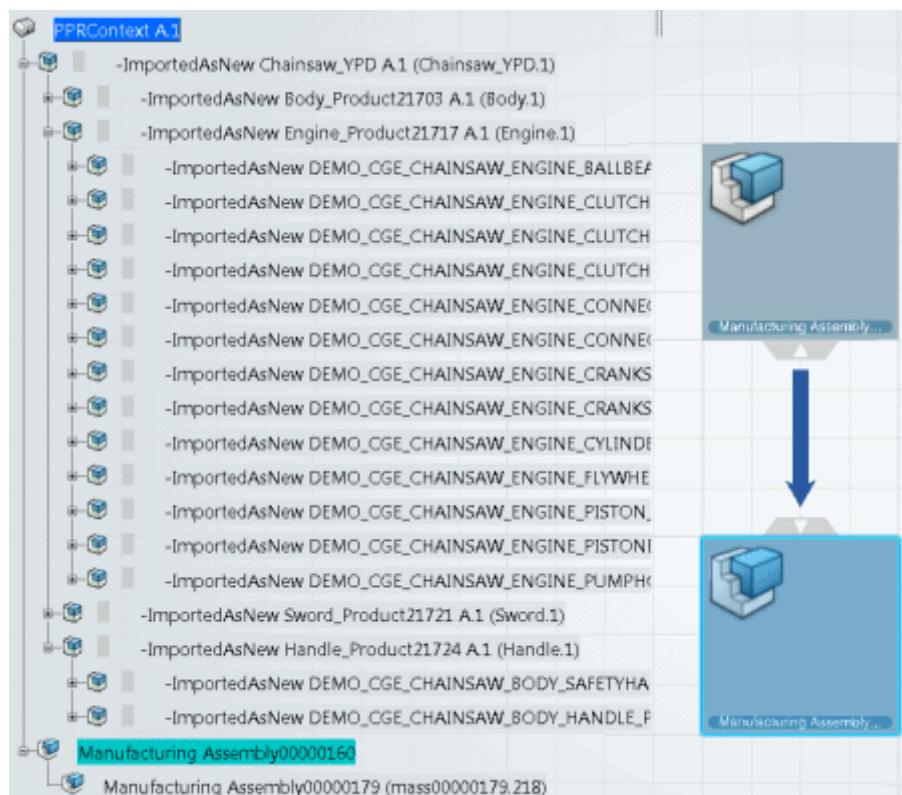
Before you begin: Open your content, which must have product and manufacturing assembly structures.

K. Create an Item-Product Scope

You can create an Item-Product scope by directly selecting objects in the tree.

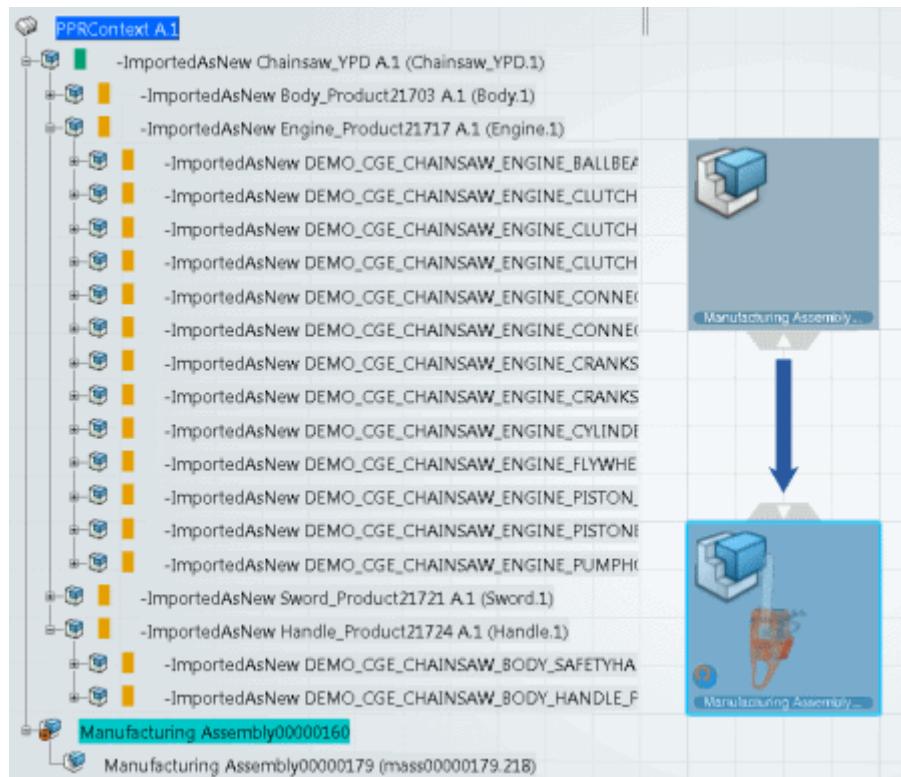
1. Select **Product Assignment Status** in the **B.I. Essentials** panel.

The products have the **Non-assignable** status in the tree, because there is no scope defined.



2. From the **Authoring** section of the action bar, click **Create item-product scope** and select the root item.
3. Select the root Product in the tree.

The Item-Product scope is created. The products now have the **Assignable** status in the tree.



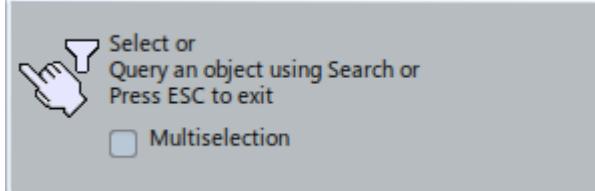
When a Item-Product scope is defined, the selected product appears in transparent mode on the tile. In addition, a mask appears on the item node in the tree and an icon appears on the tile.

L. Create an Item-Product Scope from Search

You can create a Item-Product scope by searching a product.

- From the **Authoring** section of the action bar, click **Create Item-Product Scope From Search** and select the root item.

The **Applicative Search** is activated in the top bar and a small panel appears.



- To select a product, do one of the following:
 - Select a product in the tree or work area.
 - Type your search criteria in the **Applicative Search** box, then click and select the product from the search results.

For more information, see Using the Applicative Search.

The Item-Product scope is created using the root item and the selected product.

M. Modifying or Repairing Item-Product Scopes

You can modify or reconnect scopes between products and items.

This task shows you how to:

- Stretch an Item-Product Scope
- Reconnect or Resolve an Inconsistent Item-Product Scope
- Manually Reconnect an Item-Product Scope



N. Stretch an Item-Product Scope

You can transfer an Item-Product Scope to an upper level in the product structure. Implement links are automatically reconnected.

Note: This functionality does not deal with effectivity, that is, no instance is evolved when stretching the links.

1. Select a product that fits the following conditions:

- The scope link and the implement links under it must be loaded in the session.
- The new scoped product must be a parent of the previous one.
- The new scoped product must be inside the global scope.

2. Right-click the item holding the scope, then click **Stretch Item-Product Scope**

A confirmation dialog box appears, listed the affected implement links.

Warning: This command modifies the scope link everywhere the item holding it is used, including in data saved in the database but not opened in the current session.

3. Click **Yes** to apply the modification.

The scope is stretched to the selected product and implement links under it are reconnected.

O. Reconnect or Resolve an Inconsistent Item-Product Scope

An inconsistent scope can be a broken scope or a resolved scope. You can reconnect an Inconsistent Item-Product scope link between a product and an item.

Before you begin: Open your content, which must have product and manufacturing assembly structures with an inconsistent Item-Product scope between the root item and the root product.

1. In the **Authoring** section of the action bar, click **Manage Inconsistent Item-Product Scopes**

The **Manage Inconsistent Item-Product Scopes** panel appears and lists the products with inconsistent Item-Product scopes.

2. Click a command under **Suggestion to Perform**:

- **Replace by New Revision:** creates a new revision of the item and replaces the item with the new instance.
- **Replace by New:** duplicates the item and replaces the item with the new instance.
- **Replace by Existing:** replaces the item with the item proposed by the business logic.
- **Reroute Only:** reroutes the item scope link on the product. The item is not replaced in this case.
- **Ignore:** the system does nothing for this item.
- **Replace by New Branch:** creates a new branch of the item and replaces the item with the new instance.

Tip: The [Business Logic](#) suggests automatic action, but you can choose a different action than the one suggested. You can do so by right-clicking the item in the list and choosing a different action among the list below. The only command that you cannot override the suggested action with is the **Replace by Existing** command.

3. After clicking the suggested action listed in the panel, the action is performed.

4. Click **Perform action on selected lines**.

The panel is updated.

If an inconsistent Item-Product scopes remains, this message appears: Some inconsistent item-product scopes are remaining.

If no inconsistent Item-Product scopes remains, this message appears: No more inconsistent item-product scopes.

P. Manually Reconnect an Item-Product Scope

You can manually reconnect a broken scope link between an item reference and a product reference. You can do this by using the **Reconnect Item-Product Scope** that appears after right-clicking the root-manufacturing assembly tile.

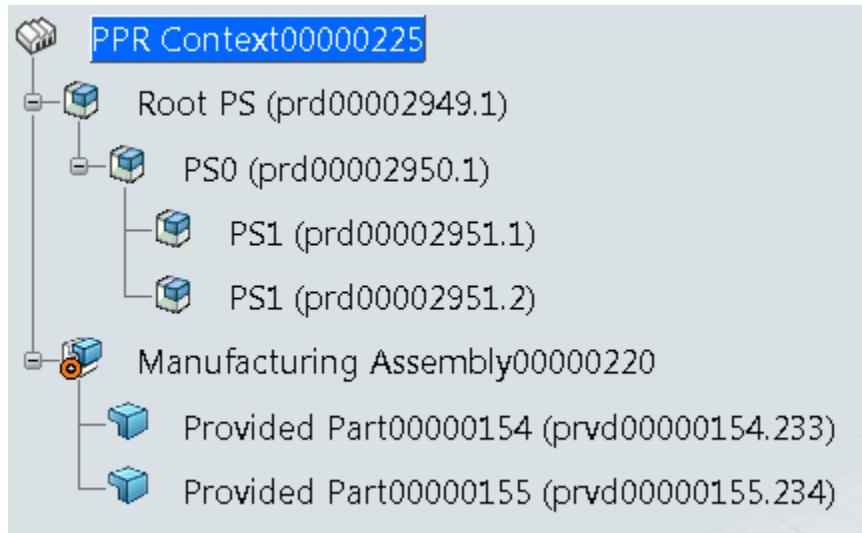
Before you begin: Open your content, which must have product and manufacturing assembly structures with an inconsistent item-product scope between the root item and the root product.

1. Create product and manufacturing assembly structures in a PPR Context as shown below and save

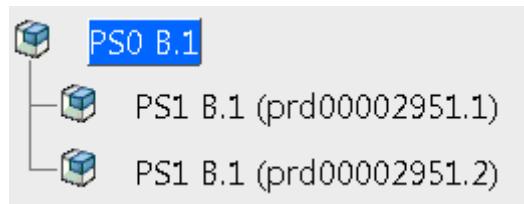


it.

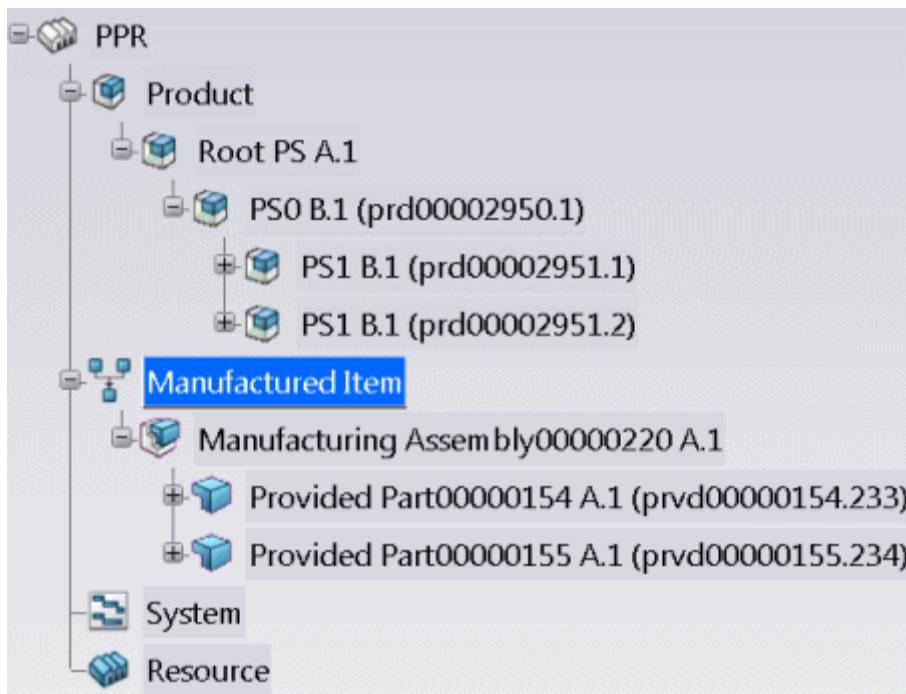
Note: Create a scope between the root manufacturing assembly and the PS0 product.



2. Create a new revision (B1) of PS0 and each of the PS1 products.
3. Open the new revision of PS0.
4. Use **Replace by Revision** to create the following structure and save it.

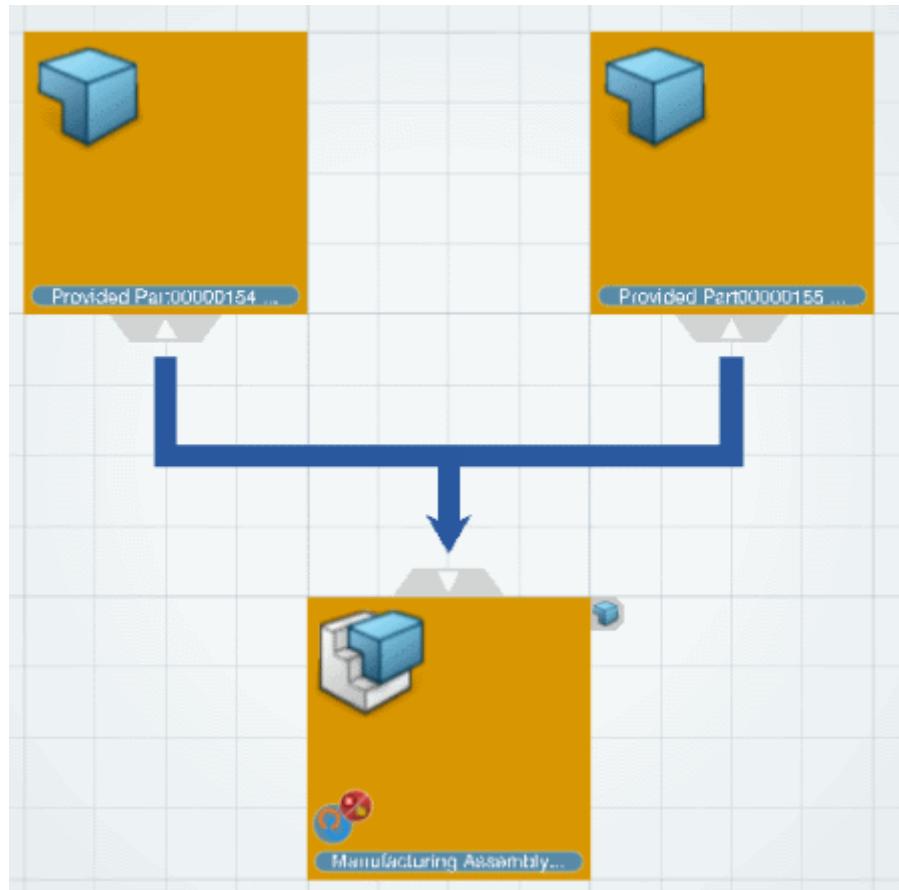


5. Build the following structure using Manufacturing Finder.



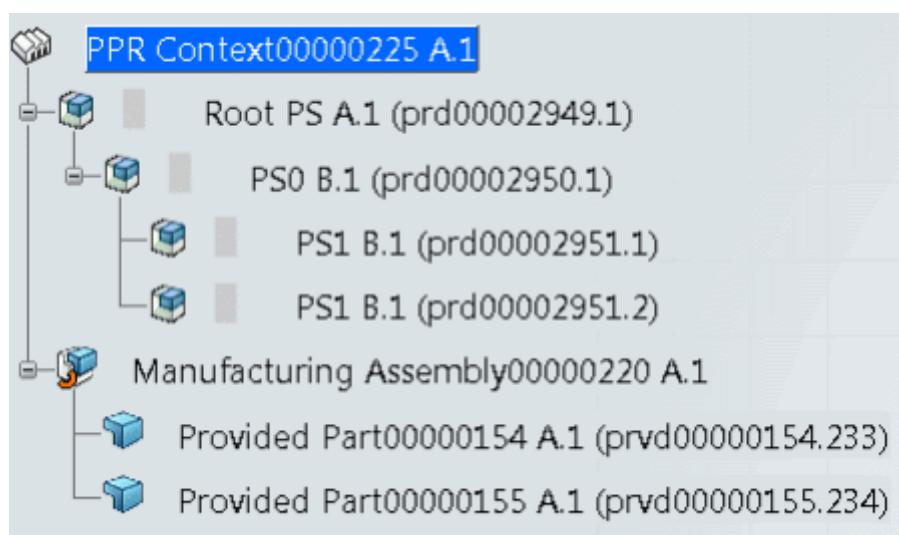
6. Open the structure in the item editor, and expand all the Provided Parts.
7. Select **Item Update Status** in the **B.I. Essentials** panel.

The tiles are colored orange because linked objects were either unloaded or deleted.

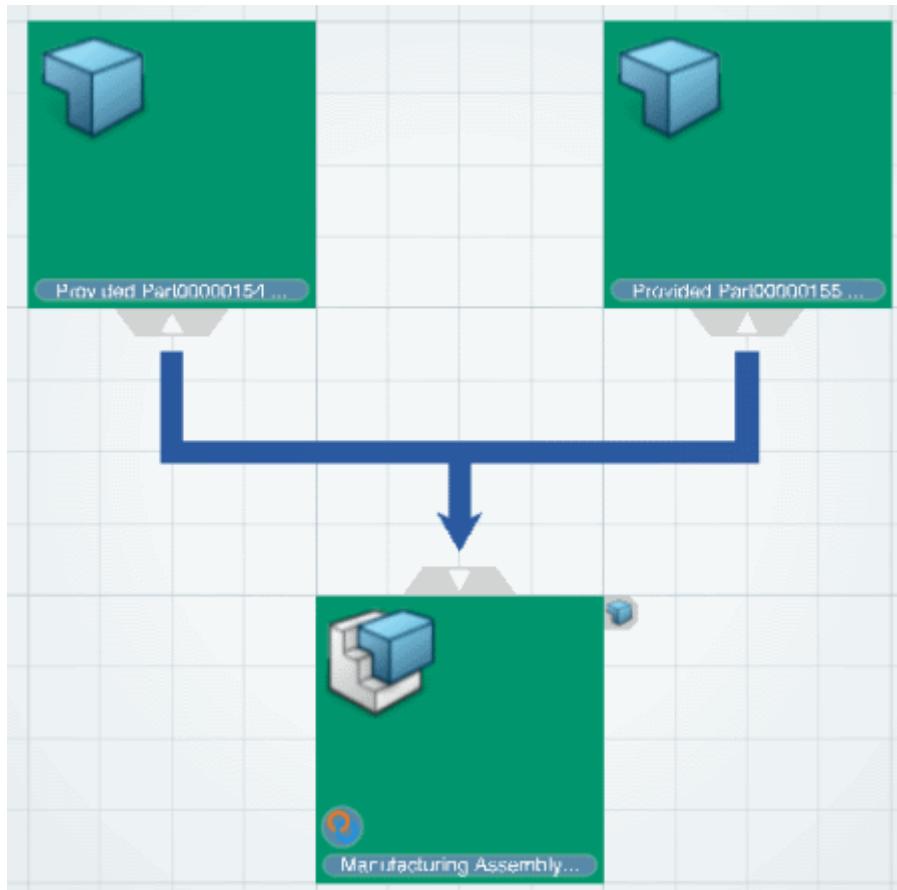


The red icon on the tile next to the Item-Product scope icon indicates that the scope link is broken.

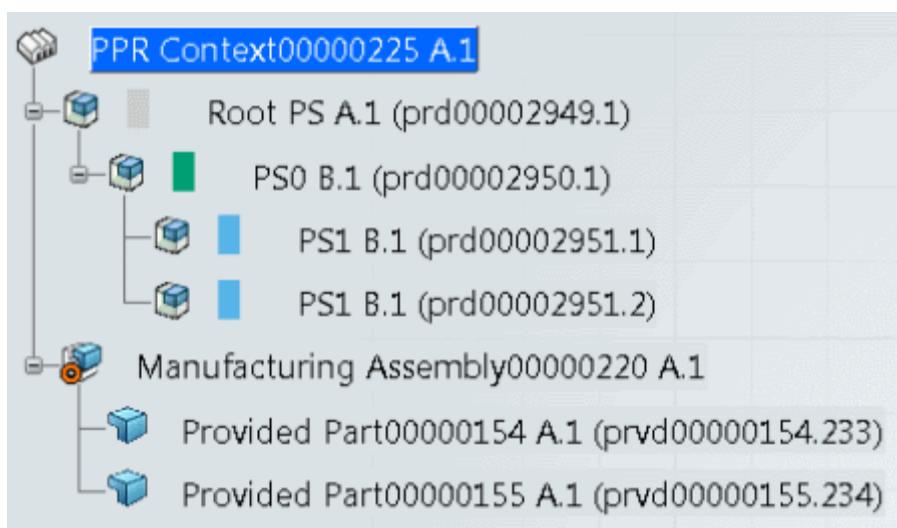
8. Select **Product Assignment Status** in the **B.I. Essentials** panel.
The Products have **Non-assignable** status (gray squares next to the tree nodes), because there is no scope defined.



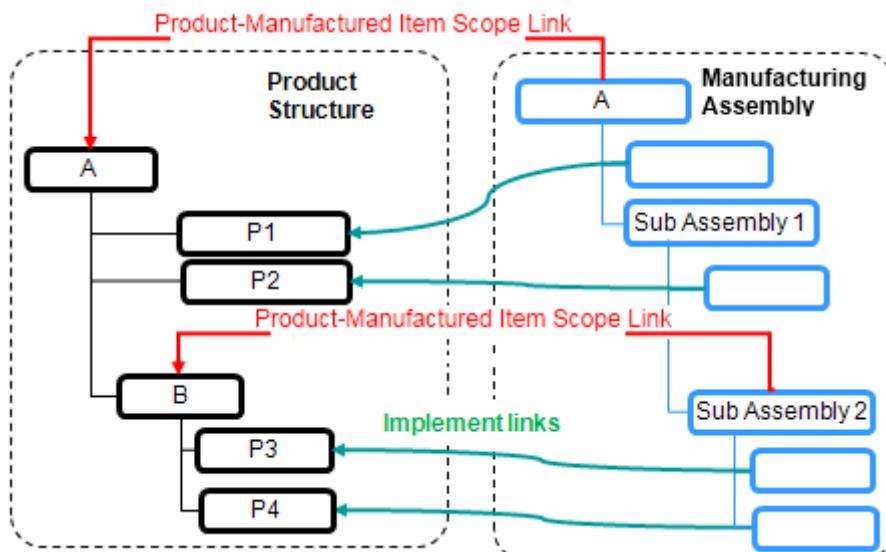
9. Right-click the root-manufacturing assembly tile and select **Reconnect Item-Product Scope**.
The tiles are colored green because the scope is reconnected.



10. Select Product Assignment Status in the **B.I. Essentials** panel.
The Products have **Associated with Scope** and **Assigned directly** status: the scope is reconnected.



Note: This command reroutes a product scope on another scope that has the same logical identifier. The lower implement links up to the next scope are also rerouted. In the figure below, if you reroute the scope link A, the two lower implement links (in green) are rerouted. However, it does not reroute the scope link B and its two lower implement links.



Q. Managing Assignment Filters

You can manage assignment filters with the Manage Assignment Filters command.

This task shows you how to:

- Create Assignment Filters
- Remove Assignment Filters
- Reconnect Assignment Filters

Before you begin: Open your content, which must have product and manufacturing assembly structures with an item-product scope between the root item and the root product.

R. Create Assignment Filters

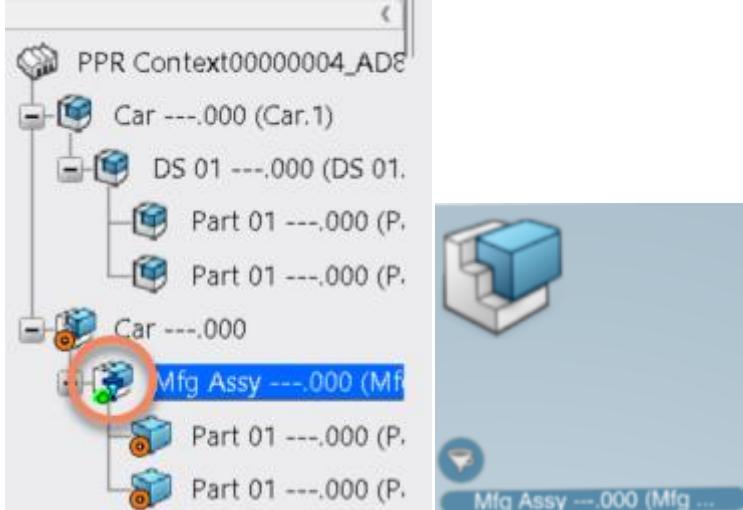
You can create an assignment filter with the Manage Assignment Filters command.

1. From the Authoring section of the action bar, click Manage Assignment Filters .
- The Manage Assignment Filters dialog box appears.
2. Click an item, then click Create an Assignment Filter and select a product or part from the tree or the main 3D.

Note: You can repeat this step as required to create multiple assignment filters. Multiple filters can be created on one item.

The assignment filter is created and is listed in the Manage Assignment Filters dialog box.

The assignment filter icon appears in the tree and on the item tile



Note: The icon will not appear if a scope link is also defined on that item. In this case, only the scope link icon  will be displayed.



S. Remove Assignment Filters

You can delete an assignment filter with the **Manage Assignment Filters** command.

- From the **Authoring** section of the action bar, click **Manage Assignment Filters** .
- The **Manage Assignment Filters** dialog box appears.

- In the dialog box, click the delete icon  on the assignment filter.

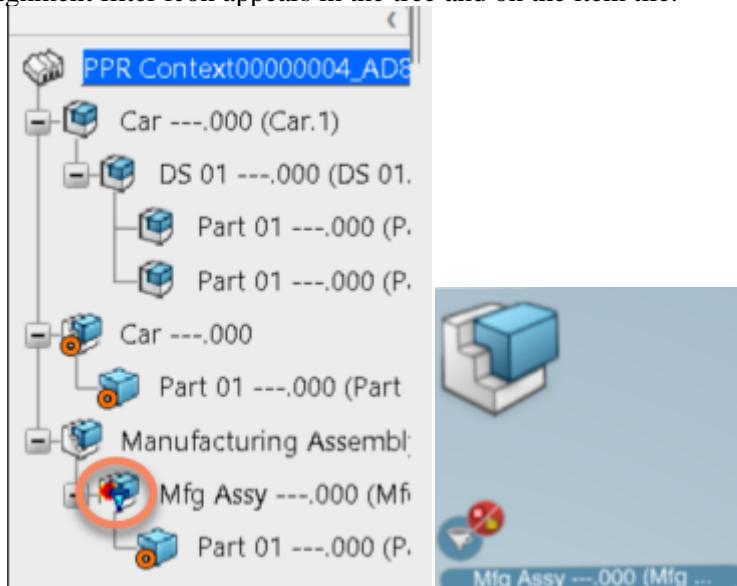
The assignment filter is removed, and the assignment filter icon disappears from the tree and the item tile.

T. Reconnect Assignment Filters

You can reconnect an assignment filter for a product with a scope link that is not in session with the **Manage Assignment Filters** command.

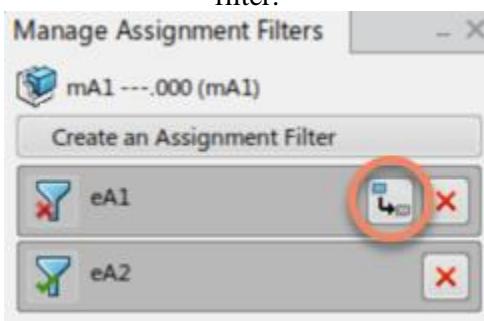
- Select a manufactured product with a broken assignment filter.

Note: The broken assignment filter icon appears in the tree and on the item tile.



- From the **Authoring** section of the action bar, click **Manage Assignment Filters** .
- The **Manage Assignment Filters** dialog box appears.

- Click the reconnect  icon in the line for the manufactured product with a broken assignment filter.



The assignment filter is reconnected and the reconnect icon in the panel disappears. The broken assignment filter icon is also replaced by the connected assignment filter icon.

U. Managing Product to Item Assignments

If an Item-Product scope exists, you can assign one or more products to a selected item using the **Assignment Manager** command. You can also unassign products that are already assigned to the item. The products that are available for assignment are derived from the Item-Product scope definition. This task shows you how to:

- Assign Products to Items That Implement Products Directly
- Assign Products to Items That Implement Products Indirectly



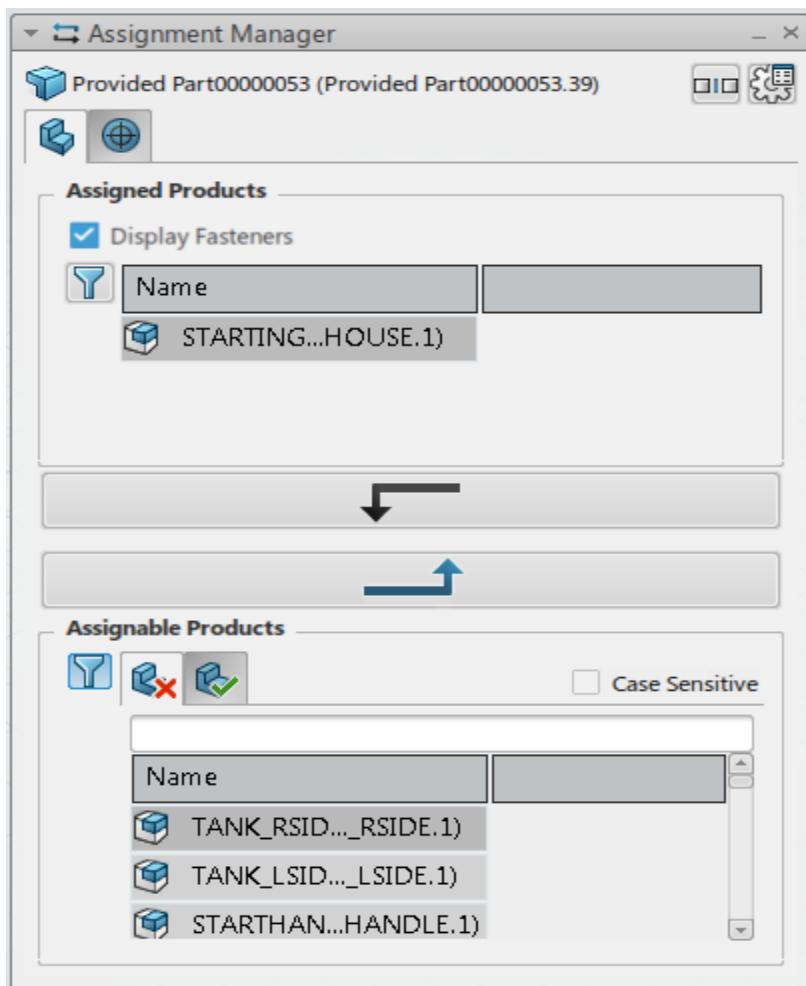
Before you begin: Open your data, which must contain product and manufacturing assembly structures.

V. Assign Products to Items That Implement Products Directly

You can assign products to items such as Provided Parts or Fasten steps that implement products directly.

1. From the **Authoring** section of the action bar, click **Assignment Manager**
2. Select a Provided Part or a Fasten step.

The **Assignment Manager** panel appears with the **Product to Item Assignment** tab selected. It lists assigned and assignable products of the selected item.



All the products that are listed are derived from the Item-Product scope definition.

You can change the active object by double-clicking an assigned object in the **Assignment Manager** panel. After double-clicking an object in the panel, it is also highlighted in the tree and the main 3D.

Note: The **Requirement to Item Assignment** tab is used for managing requirements on items and operations. See [About Requirements](#).

The **Assigned Products** area lists the products that are already assigned to the selected item. In the example above, one product is already assigned.

You can also display or exclude any assigned fasteners in the list by clicking **Display fasteners** . In the **Assignable Products** area:

- the tab lists the products that are not assigned, but can be assigned to the selected item.
- the tab lists the products that are already assigned to other items. These can also be assigned to the selected item.



3. You can manage the assignments as follows:

- Assign a product: in the tab, when you click a product from the **Assignable Products** list, you can assign it to the item by clicking **Assign Selected Product** . The product is added to the **Assigned Products** list.
- Unassign a product: in the tab, when you click a product from the **Assigned Products** list, you can unassign it from the item by clicking **Unassign Selected Product** . The product is added to the **Assignable Products** list.
- Filter attribute content: you can filter the content of an attribute column by clicking **Filter** . A box appears in which you can specify the data to filter. Then, if you select a column header, the entire column is filtered. To deactivate the filter, click **Filter** again.
- Customization: you can customize attribute columns by clicking **Attributes Customization** .
- Panel layout: you can switch the layout from vertical to horizontal by clicking **Change Layout** .

4. Close the **Assignment Manager** panel to save any modifications made to the assignments.

W. Assign Products to Items That Implement Products Indirectly

You can assign products to items such as Manufacturing Assembly, Manufactured Material, and Manufacturing Kit that implement products indirectly. Those types of items aggregate items that implement products.

- From the **Authoring** section of the action bar, click **Assignment Manager** .
- Select a Manufacturing Assembly, Manufactured Material, or Manufacturing Kit.

The **Assignment Manager** panel appears with the **Product to Item Assignment** tab selected. It lists assigned and assignable products of the selected item.

The screenshot shows the Assignment Manager panel with the following details:

Assigned Products tab (selected):

Name	Assigned Ma...
TANK_RSID..._RSIDE.1)	Provided Pa...
TANK_LSID..._LSIDE.1)	Provided Pa...
SILENCER...UPPORT.1)	Provided Pa...
STARTHAN...HANDLE.1)	Provided Pa...

Assignable Products tab:

Name	
SILENCER A...ILENCER.1)	
SAFETYTRIG...TRIGGER.1)	
PETROLCAP...ROLCAP.1)	
OILCAP A.1 (OILCAP.1)	
HOOK_FR4 ...OOK_FR4.1)	



All the products that are listed are derived from the Item-Product scope definition.

You can change the active object by double-clicking an assigned object in the **Assignment Manager** panel. After double-clicking an object in the panel, it is also highlighted in the tree and the main 3D.

The **Assigned Products** area lists the products that are already assigned to the selected item. In the example above, several products are already assigned.

You can also display or exclude any assigned fasteners in the list using the **Display fasteners** check box.

In the **Assignable Products** area:

- The tab lists the products that are not assigned, but can be assigned to the selected item.
- The tab lists the products that are already assigned to other items. These can also be assigned to the selected item.

3. You can manage the assignments as follows:

- Assign a product: in the tab, when you click a product from the **Assignable Products** list, you can assign it to the item by clicking **Assign Selected**

Product

Note: When you assign a product clicked from the tab, it creates a new item with an implement link to the product at the targeted position. The previously existing item remains in the MBOM structure but its implement link to the product is removed.

- Assign already assigned products: in the tab, when you click an already assigned product from the **Assignable Products** list, you can assign it again to the same item by clicking **Assign Selected Product**

Product

Note: After this new assignment, you get two items implementing the same product.

- Unassign a product: in the tab, when you click a product from the **Assigned Products** list, you can unassign it from the item by clicking **Unassign Selected**
- Delete a Provided Part or a Fasten step that implements the selected product by clicking .
- Filter attribute content: you can filter the content of an attribute column by clicking **Filter** . A box appears in which you can specify the data to filter. Then, if you select a column header, the entire column is filtered. To deactivate the filter, click **Filter** again.
- Customization: you can customize attribute columns by clicking **Attributes Customization** .
- Panel layout: you can switch the layout from vertical to horizontal by clicking **Change Layout** .

4. Close the **Assignment Manager** panel to save any modifications made to the assignments.

Module-1. D. Assembly Assignment Assistant



This section describes the Assembly Assignment Assistant interface and explains how to use it for assigning products to items.

In this section:

- About the Assembly Assignment Assistant
- Using the Assembly Assignment Assistant



A. About the Assembly Assignment Assistant

The Assembly Assignment Assistant can be used to manage assignments of products to items. It is possible to assign, unassign, and reassign products.

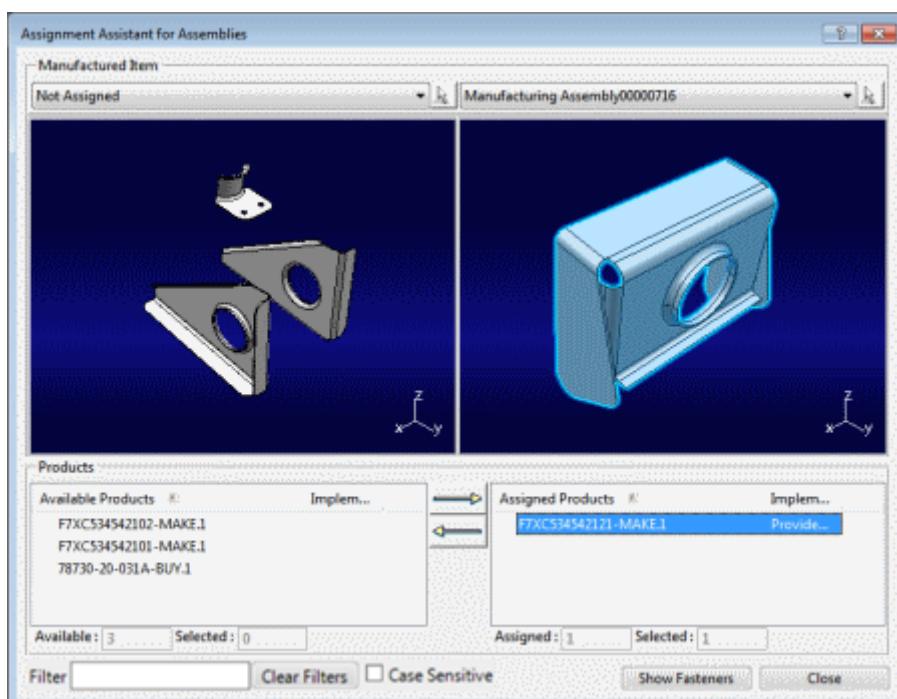
The following topics are discussed:

- Assignment Assistant Overview
- Selection and Display
- Center Tree and Reframe on Selection for Products
- Product Assignments

B. Assignment Assistant Overview

The Assembly Assignment Assistant can be used to assign products to items.

The assignment-assistant dialog box appears when you select **Assembly Assignment Assistant** .



The assistant comprises the following main parts: Items, Products, and 3D viewer.

C. Selection and Display

When you select an item in the right-hand and left-hand item lists, all products implemented by this item are displayed in the corresponding 3D viewer. These products are also listed in the Available Products and Assigned Products lists under the 3D viewer.

Selecting Not Assigned in the left-hand item list displays the products that are available for assignment.

When you select an item in the right-hand item list, the list of unassigned products is updated.

A product that is assigned to a predecessor is identified as Output of: <predecessor> in the products list and is displayed in the 3D viewer. However, it is not available for assignment. Selecting the Output of: line in the list highlights the resulting product in the viewer. Similarly, selecting the product in the viewer highlights the Output of: line in the list.

The 3D viewer offers Zoom, Pan, and Trap Selection capabilities, as well as a menu.

Cross highlighting is available between the 3D viewer and the lists in the assistant.

Note: In this document, objects in left-hand lists are known as source objects and objects in right-hand lists are known as destination objects.



D. Center Tree and Reframe on Selection for Products

A menu is available for the left and right product lists. The menu consists of two menu items **Center Tree** and **Reframe On Selection**.

Clicking **Reframe On Selection** reframes the selected product in the 3D viewer of the appropriate list.

Center Tree contains the following submenu items:

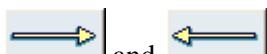
- **On Selected Part** centers the selected part in the tree.
- **On Selected item** centers the selected item in the tree.

When the selected object in the list is an output of a previous assembly that implements:

- a single part, **On Selected Part** centers the selected part in the tree
- a single part, **On Selected item** centers the assembly in the tree
- multiple parts, **On Selected Part** centers the tree with respect to the multiple parts
- multiple parts, **On Selected item** centers the assembly in the tree.

E. Product Assignments

The assignment assistant allows you to assign, unassign, or reassign a product, or a list of products between two items.

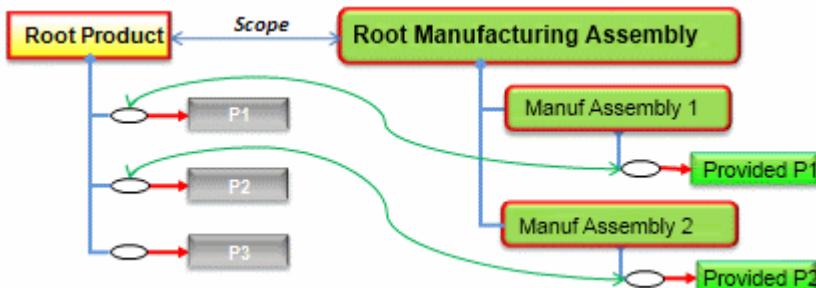


This is done using the assignment arrows as follows:

- Assigning a product from Not Assigned to a destination item creates a Provided Part under the destination item
- Assigning a product from a Manufacturing Assembly to Not Assigned unassigns this product from the Manufacturing Assembly and deletes the corresponding Provided Part
- Assigning a product from a source Manufacturing Assembly and a destination Manufacturing Assembly unassigns it from the source and assigns it to the destination.

In the following example, Products P1, P2, and P3 are instantiated under a Root Product:

- Product P1 is implemented by Provided Part P1; Provided Part P1 is instantiated under Manufacturing Assembly 1
- Product P2 is implemented by Provided Part P2; Provided Part P2 is instantiated under Manufacturing Assembly 2



- Product P3 is available for assignment on Manufacturing Assembly 1 or Manufacturing Assembly 2.
- Assigning Product P3 to Manufacturing Assembly 1 creates a Provided Part P3 that is instantiated under Manufacturing Assembly 1.
- Unassigning Product P1 from Manufacturing Assembly 1 deletes Provided Part 1.
- Reassigning Product P1 from Manufacturing Assembly 1 to Manufacturing Assembly 2 deletes Provided Part P1 under Manufacturing Assembly 1 and creates another Provided Part P1



instantiated under Manufacturing Assembly 2.

Notes: the assignment arrows in the assistant are disabled if:

- The source and destination products reference the same Manufacturing Assembly.
- No products are available for assignment in source and destination.

Under the source products list and the destination products list, there are two fields:

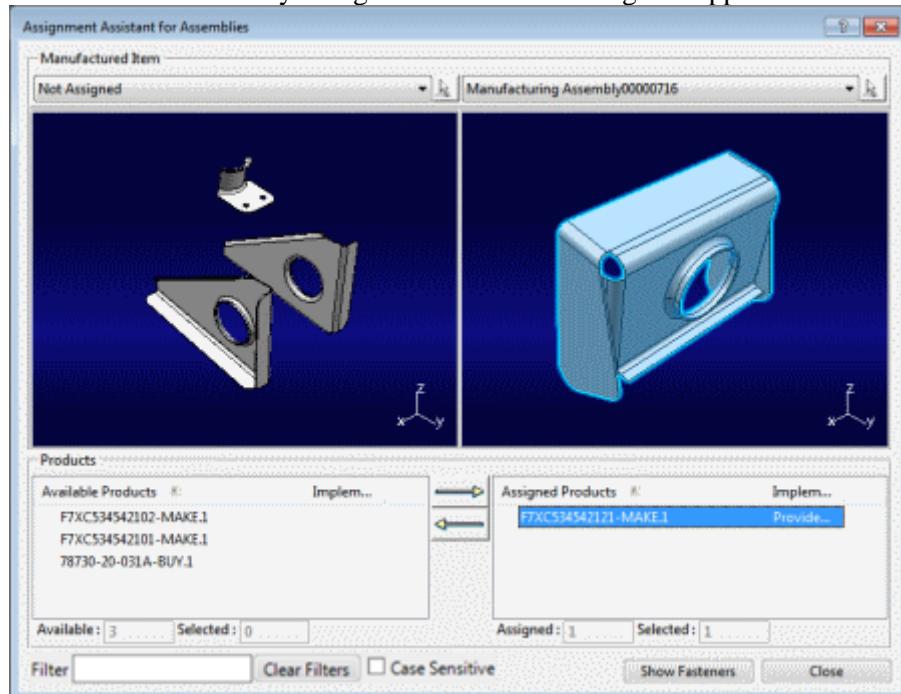
- Available or Assigned: displays the number of available or assigned products under the selected item.
- Selected: displays the number of selected products.

F. Using the Assembly Assignment Assistant

You can use the Assembly Assignment Assistant to manage assignments of products to items. It is possible to assign, unassign, and reassign products.

Before you begin: Open your session content that must include product and Manufacturing Assembly structures.

1. From the Authoring section of the action bar, click Assembly Assignment Assistant .
- The Assembly Assignment Assistant dialog box appears.



The right-hand and left-hand item lists are filled automatically. The left-hand list initially opens with Not Assigned.

2. Click an item from the left-hand list and an item from the right-hand list.
- You can now assign, unassign, or reassign products between these two items.

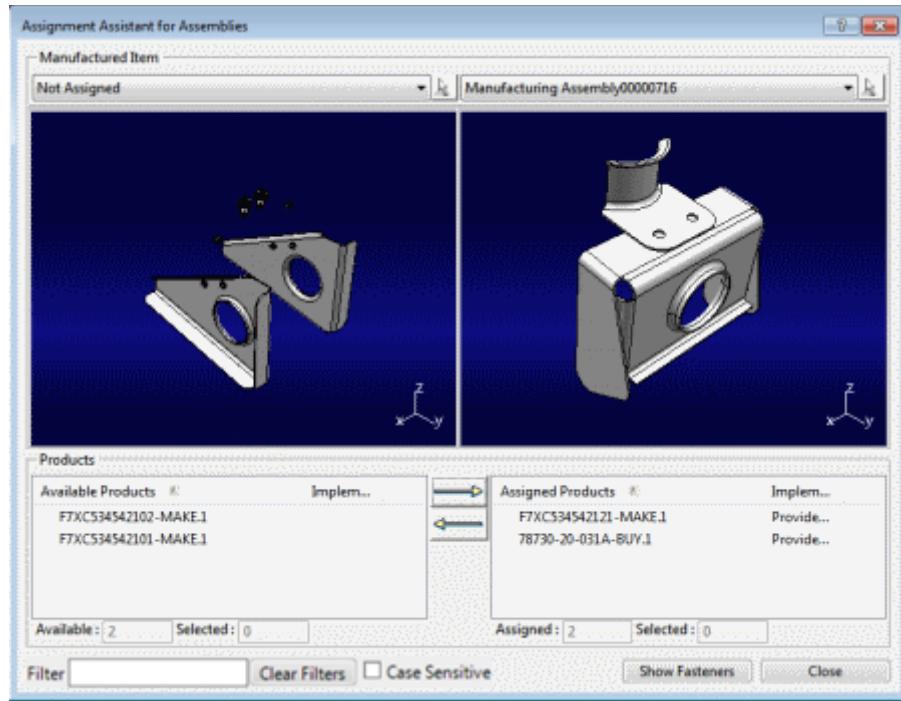
3. Use the 3D Preview to display the products in 3D. The preview offers zoom, pan, and trap selection capabilities.

Products are implemented by an item. Products that have yet to be implemented by any item are not included in the product lists.

4. Use the assignment arrows and to move products between left-hand and right-hand lists. Multiselection is possible.

The products that are displayed are based on the selected items. If Not Assigned is selected, then the products that are not assigned to any item *with respect to the first upper scope* are displayed.

On the right-hand side, the Available and Selected boxes display the number of products that are available and clicked in the list. Similarly, on the left-hand side, the Assigned, and Selected boxes display the number of products that are assigned and clicked in the list. These boxes are updated on each user interaction.



- Click Close when the assignments are complete.

G. Using B.I. Essentials for Product Assignment Status

You can use Product Assignment Status to manage the assignment of products to items. Product nodes in the tree are colored according to the product assignment status: not assigned, assigned, and so on. Products can be assigned by dragging and dropping tree nodes onto item tiles.

Before you begin: Open the item to which you want to assign the products.

- From the Tools section of the action bar, click B.I. Essentials .

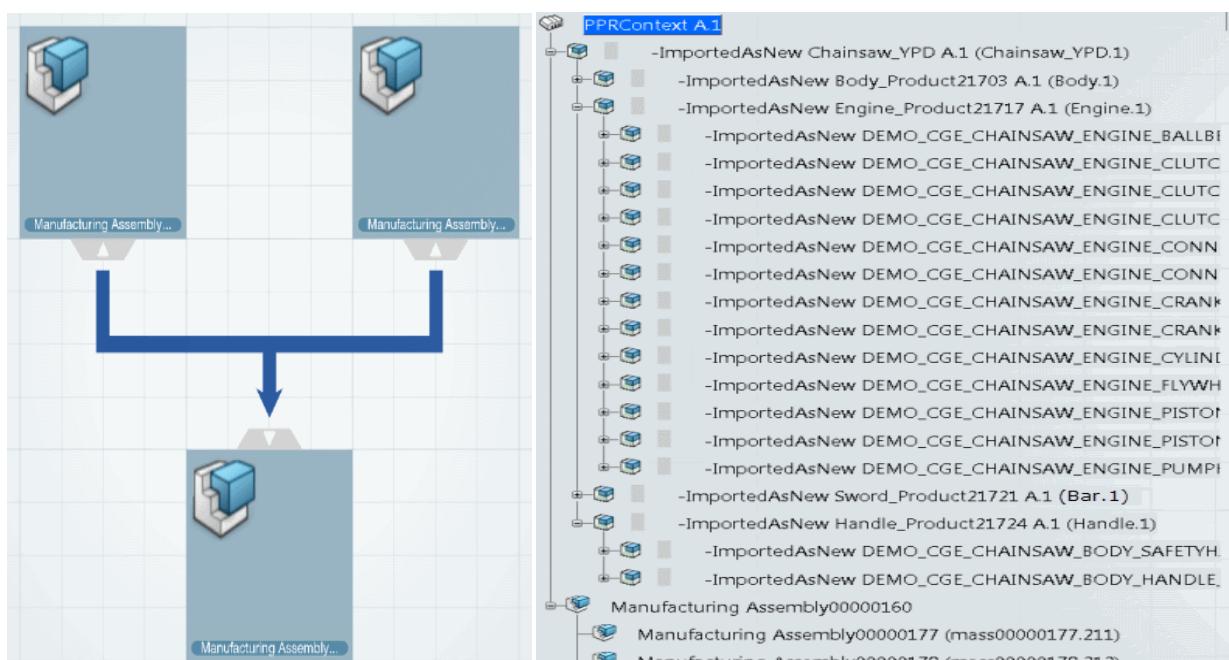
The B.I. Essentials list appears.

- Click Product Assignment Status from the list.

Colored squares are displayed in the tree in front of each product node according to a color code.

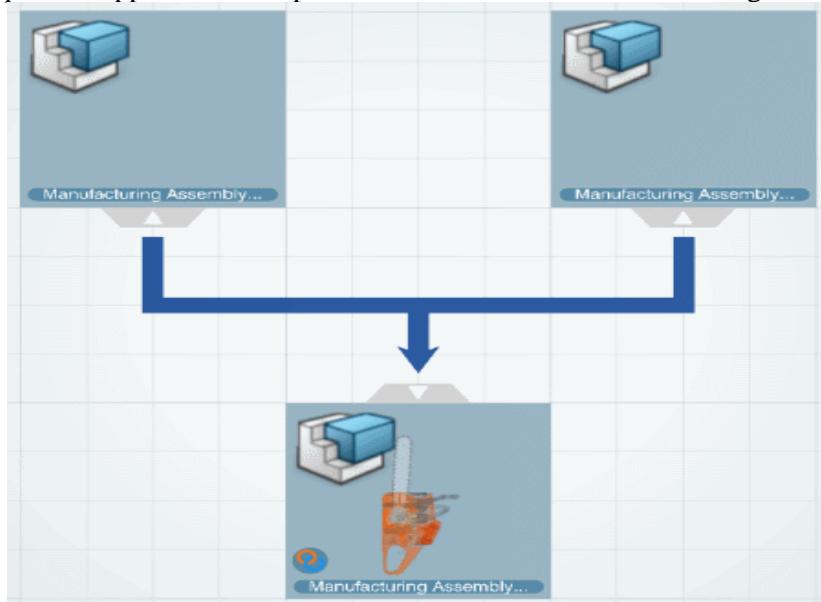
See Using B.I. Essentials in Manufactured Item Definition.

If no Item-Product scope is defined, all product nodes are Non-assignable as indicated by the gray squares.

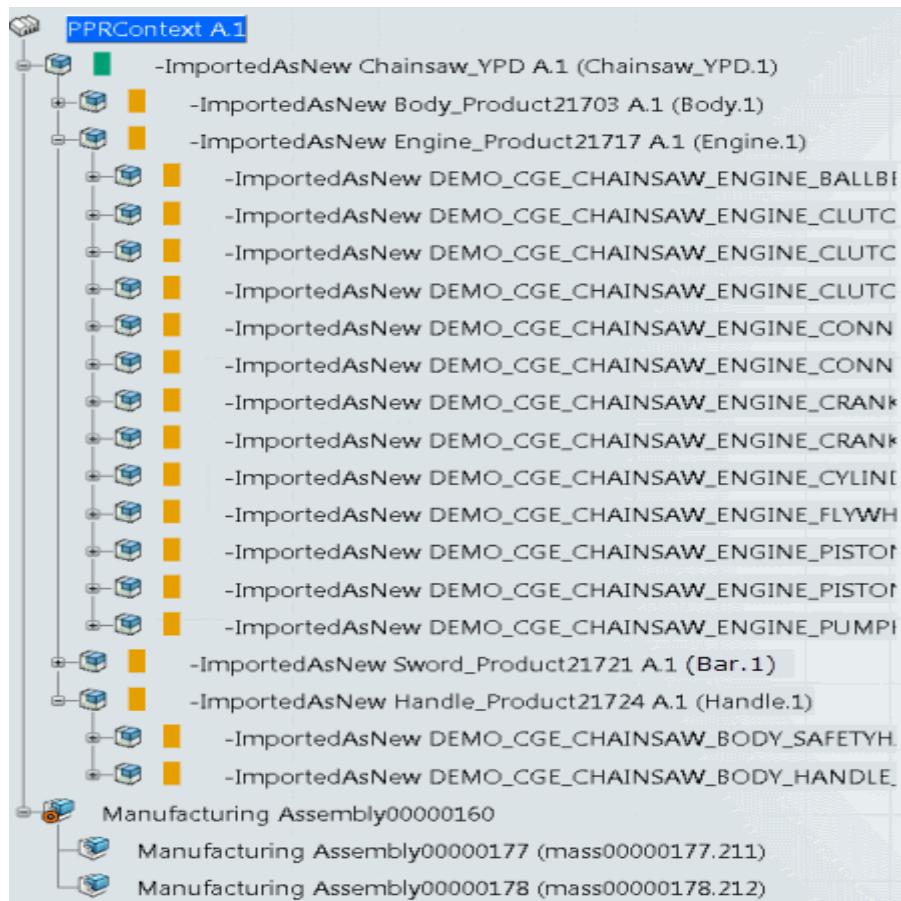




- Create a Item-Product scope between the root product and the root Manufacturing Assembly.
The root product appears, in transparent mode, on the root Manufacturing Assembly tile.

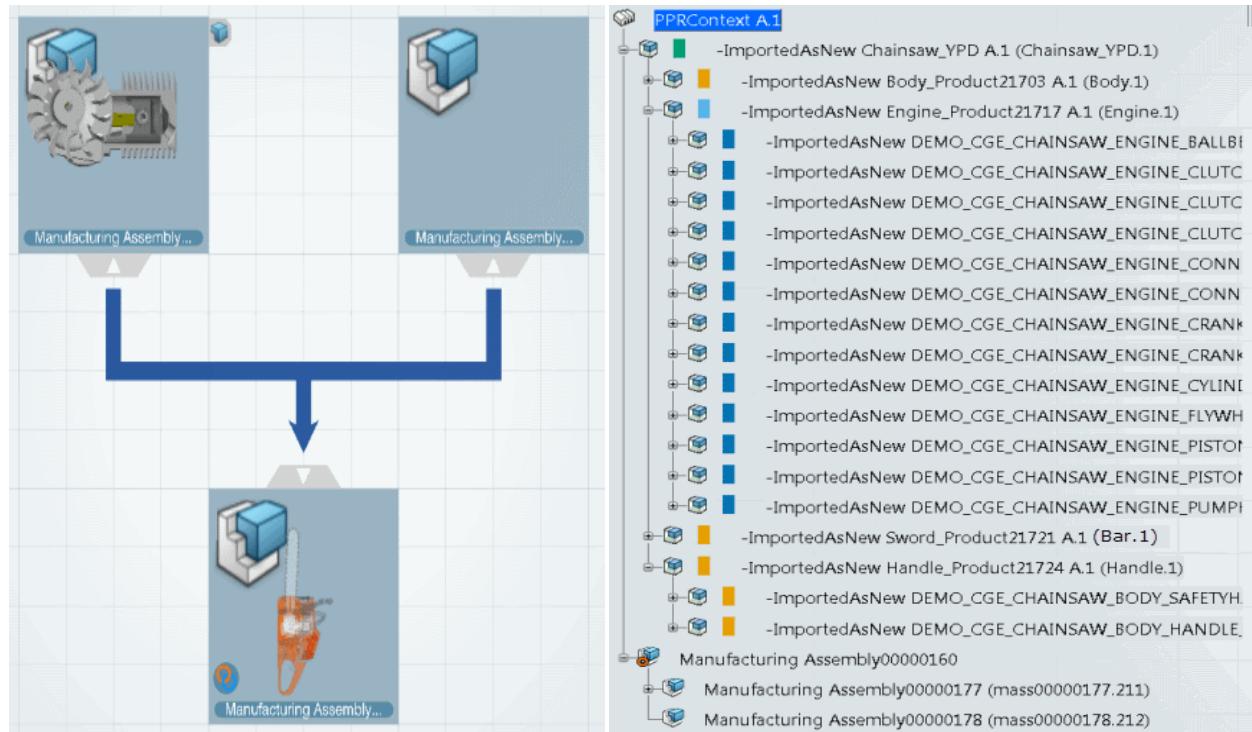


The statuses of the child products become Not assigned, as indicated by the orange squares.

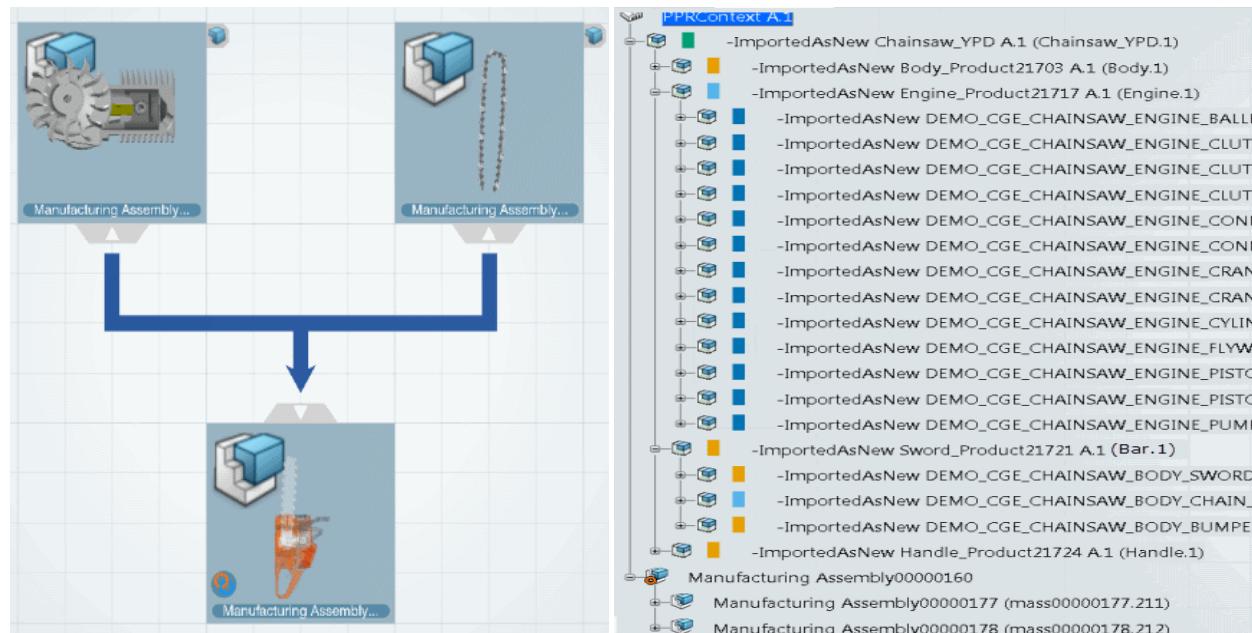


Note: the status of the root product node is Associated with scope, as indicated by the green square.

- Drag and drop the Engine_Product product node from the tree to the upper left Manufacturing Assembly tile as shown in the image below.
An implement link is created and the product node now has status Assigned directly, with a light blue square. The child product nodes, with dark blue squares, have status Assigned indirectly because they are implicitly assigned to the manufacturing assembly.



5. Drag and drop the CHAIN product node from the tree to the upper right Manufacturing Assembly tile as shown in the image below. This is a child of the Bar_Product product node, which is an assignable node in the tree.



This product now has status Assigned directly, with a light blue square. Its parent product remains Not assigned. It can be assigned, for example, by an item that has a different effectivity. The statuses of the other child products on the same level are also Not assigned.

H. Managing Inconsistent Links Between Products and Items

You can use the Manage Inconsistent Links Item - Product command to repair inconsistent implement links between products and items. You can use the Change Impact Management to repair inconsistent implement links between products and items. Inconsistent links are due to deletions, rerouting, and so on.



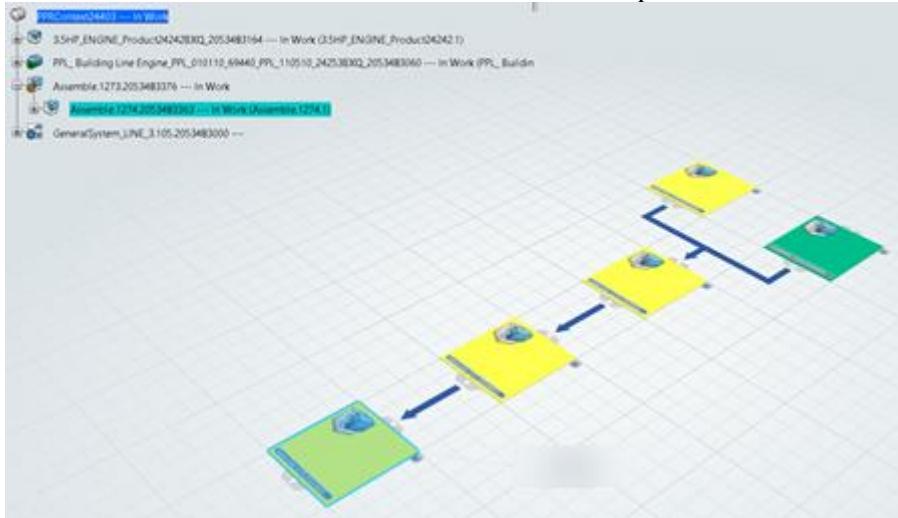
Before you begin: Open Manufacturing Assembly and Product structures in your app. The structures must contain inconsistent Product-Item links.

- From the Tools section of the action bar, click B.I. Essentials

The B.I. Essentials list appears.

- Click Item Update Status from the list.

The yellow status of the items indicates that one or more objects have been unloaded, deleted, or modified: this results in inconsistent links. See Item Update Status.



- From the Authoring section of the action bar, click Manage Inconsistent Links Item - Product

The Manage Inconsistent Links: Product-Item panel is displayed. It proposes actions to correct the inconsistent links.

Note: An item can be selected directly in the tree. In this case, the command retrieves all inconsistent links for the selected item and its children.

The columns in the panel are as follows:

Suggestion to Perform: The proposed action to fix the link:

- Ignore: By default, if there are several products in the same family in the session. The implement link will not be fixed even if it is selected in the dialog box.
- Remove Link: By default, if there is no product in the same family in the session. The implement link will be deleted.
- Reroute Only: By default, if there is only one product in the same family in the session. The implement link will be rerouted.
- Evolve Instance-Reroute: If only one candidate resource for rerouting is found in the session and no configuration mode is selected for the session.
- Interactive Reroute: If no candidate resource for rerouting is found in the session.
- Evolve Instance-Interactive Reroute: If no candidate resource for rerouting is found in the session and a configuration mode is selected for the session.
- Delete Manuf Item: Action available from the context menu, deletes the instance of the item.
- Delete Manuf Item & Operation: Action available from the context menu, deletes the instances of the item and of the operation involved.
- Replace By New Revision - Reroute: Action available from the context menu, replaces the instance of the item.

In this case, family means different revisions of the same product.

Rerouting Proposal: A candidate product for rerouting the link. This may be:

- <product instance name>: If there is only one product in the same family in the session
- None: If there is no product in the same family in the session
- Ambiguous: If there are several products in the same family in the session

Previous Product: The product previously linked with the item.

Item: The item involved in the inconsistent link.



Note: If a red cross is displayed instead of an item icon in the Item column, this means that the item can be deleted.

Operation: The operation involved in the link.

Note: An operation can be deleted only when it is linked to a single item.

Resource: The resource involved in the link.

Note: Manage the selected items with Center Tree Properties , and Reframe On. For more information, see Using the Item Editor.

4. Select the Delete line in the panel and click Apply.

The item-operation implement link is deleted. The item is deleted. If the operation was linked to a single item, it is also deleted. The panel is updated.

5. Select the Reroute line in the panel and click Apply.

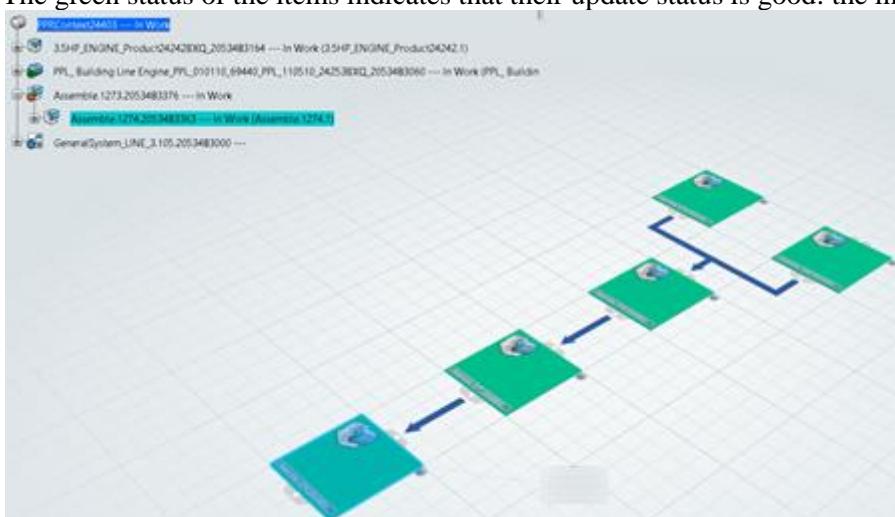
If there is only one product on the same family in the session, the link is rerouted.

If you try to reroute one or more ambiguous cases, a reroute assistant is launched. Then you can choose a product from all candidate products available in the session to reroute the link.

6. Right-click the Ignore line in the panel and select Delete.

7. Select the Delete line in the panel and click Apply.

The green status of the items indicates that their update status is good: the inconsistent links are resolved.



Note: If you work under a configuration, the reroute and delete actions occur under this effectiveness mode.

Module-1. E:Managing Manufacturing Assembly Structure

This section provides background information about managing manufacturing assembly structures and illustrates how to create a typical manufacturing assembly.

In this section:

- About Manufacturing Assembly Creation and Update
- Creating a Manufacturing Assembly in Advanced User Mode

A. About Manufacturing Assembly Creation and Update

The Create/Update Item Structure command provides a procedure for creating or updating a manufacturing assembly from a product structure. The manufacturing assembly is generated for a selected item from a product structure according to selected options, an industry mode. The structure can also take customized Make-Buy considerations into account.

The following topics are discussed:

- Create and Update Modes of the Command
- Command Options
- Industry Modes
- Make/Buy Management Using Business Logic
- Parent Customization Using Business Logic

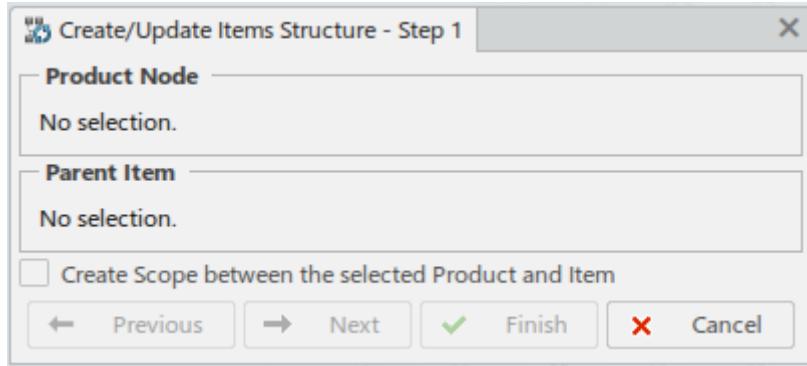


B. Create and Update Modes of the Command

The Create Manufacturing Assembly command is enabled when the selected item is a leaf node.

The Update Item Structure command is enabled when the selected item is a non-leaf node. A leaf node is a tree node with no children and a non-leaf node is a tree node with children.

The first step in the procedure is to associate a product with the selected item. If the selected item has a context link to a product, then that product is taken into account by the Create Manufacturing Assembly command. Otherwise you must select a product to create a context link between the product and the item.



If the Create Scope between the selected Product and Item option is selected, the scope is created between the selected Product and Item.

Notes:

- If the selected Item has an already existing "First Upper Scope" with a Product, the user can use this option to edit the value of the setting.
- If the selected Item does not have a "First Upper Scope" with a Product, this option is selected by default and disabled for the user.

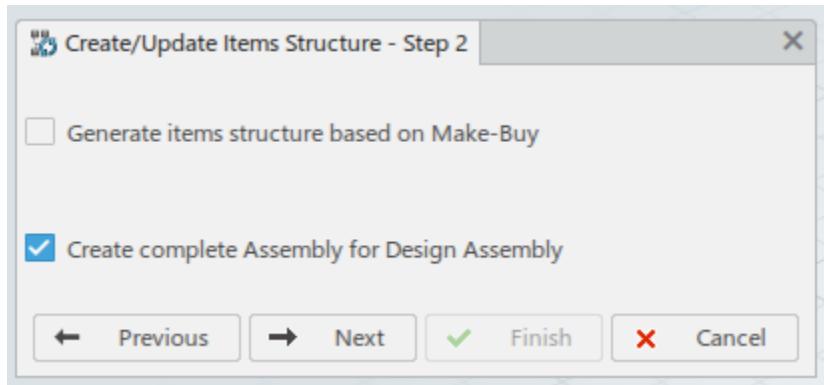
The Update Item Structure command creates additional items according to the current product structure and selected options. Any already existing manufacturing subassembly that corresponds to the current product structure is not modified.

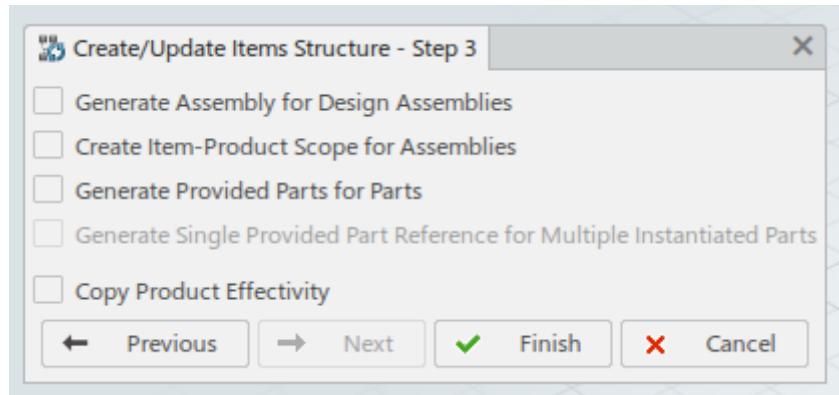
C. Command Options

A number of options are taken into account during the command execution. These options may be fixed and cannot be modified depending on the selected industry mode.

The second step in the procedure is to specify how the manufacturing assembly is to be generated.

In+ Advanced User mode, the options are presented in the following dialog box:





Generate Manufacturing Assembly Based on Make-Buy: If this option is selected, extra analysis is carried out and manufacturing assembly generation is determined depending on:

- The selected industry mode. For more information, see Items Management.
- The criteria used by a business rule to specify whether the product is Make or Buy. For more information, see Make/Buy Management Using Business Logic.

Create Complete Manufacturing Assembly for Assembly: If this option is selected, non-leaf product nodes are processed recursively. The product leaf nodes have a corresponding Provided Parts when conditions are met.

The third and final step in the procedure is to specify how the various items are to be generated. In Advanced User mode, the options are presented in the following dialog box:

Generate Manufacturing Assemblies for Assemblies: If this option is selected, a Manufacturing Assembly is created for the corresponding product node if this node is a nonleaf node. By default, this option is not selected.

Create item-product scope for Manufacturing Assemblies: If this option is selected, a scope is created between the product and the item for each Manufacturing Assembly that is created. By default, this option is not selected.

Generate Provided Parts for Parts: If this option is selected, Provided Parts are generated for parts. By default, this option is selected.

Generate Single Provided Part Reference for Multiple Instantiated Parts: If this option is selected, a Provided Part reference is created for multiple instantiated parts. By default, this option is not selected.

Copy Product Effectivity: If this option is selected, the Product's effectivity is copied onto its implementing Items on the leaf nodes.

Remove non-implementing items: If this option is selected, non-implemented manufacturing assemblies, provided parts, and fasteners are removed from the manufacturing item structure.

D. Industry Modes

The selected industry mode has a great influence on how the manufacturing assembly is generated. The industry modes are Administrator, Aerospace, or Advanced User.

Definition of the Industry Mode

You can specify the Generation mode for industry in Me > Preferences > App Preferences > Simulation > Process Engineering > Item Definition > items Management.

Working under the authority of an action: If this check box is selected, this option lets you manage a single level of the structure and define effectivities. A single level of the structure is a reference with a variability space and its child instances only.

Advanced User Mode

In Advanced User mode, the options of the Create/Update Item Structure command are proposed in dialog boxes.

If the Generate Manufacturing Assembly Based on Make-Buy option is selected, item generation is as follows.

- If the product is considered as Make:
 - For nonleaf nodes, a Manufacturing Assembly is created and a scope is created. The



nonleaf node's children are processed only if the Working under the authority of an action option is not selected.

- For leaf nodes, if the Generate Provided Parts for Parts option is selected Provided Parts are created accordingly.
- If the product is considered as Buy, a Provided Part is created if the Generate Provided Parts for Parts option is selected. The children of the product node are ignored.
- If the product is considered as Undefined:
 - For nonleaf nodes, nothing is created and the nonleaf node's children are processed only if the Create Complete Manufacturing Assembly for Assembly option is selected.

If the Generate Manufacturing Assembly Based on Make-Buy option is not selected, item generation is as follows.

- For nonleaf nodes, if the Generate Manufacturing Assemblies for Assemblies option is selected then a Manufacturing Assembly is created. If the Create item-product scope for Manufacturing Assemblies option is selected, then a scope is also created. If the Create Complete Manufacturing Assembly for Assembly option is selected, then its child nodes are processed.
- For leaf nodes, if the Generate Provided Parts for Parts option is selected Provided Parts are created accordingly.

Administrator Mode

In Administrator mode, the Generate Manufacturing Assembly Based on Make-Buy option is selected.

If the product is considered as Make, a Manufacturing Assembly is created and a scope is defined. The nonleaf node's children are processed only if the Working under the authority of an action option is not selected.

If the product is considered as Buy, no item is created and all the children of the product node are ignored.

If the product is considered as Undefined, no item is created. The nonleaf node's children are processed.

Note: The following options are overridden by rules of the Administrator industry mode: Generate Manufacturing Assemblies for Assemblies, Generate Provided Parts for Parts, Create item-product scope for Manufacturing Assemblies, and Create Complete Manufacturing Assembly for Assembly.

Aerospace Mode

In Aerospace mode, the Generate Manufacturing Assembly Based on Make-Buy option is selected by default.

If the product is considered as Make, a Manufacturing Assembly is created and a scope is defined for nonleaf nodes. Provided Parts are created for leaf nodes. The nonleaf node's children are processed only if the Working under the authority of an action option is not selected.

If the product is considered as Buy, a Provided Part is created and all the children of the product node are ignored.

If the product is considered as Undefined, no item is created for nonleaf nodes and no items are created for leaf nodes. The children are processed only in nonleaf nodes.

The Generate Single Provided Part Reference for Multiple Instantiated Parts option is active in Aerospace mode, so a Provided Part reference is created for multiple instantiated parts.

Note: The following options are overridden by rules of the Aerospace industry mode: Generate Manufacturing Assemblies for Assemblies, Generate Provided Parts for parts, Create item-product scope for Manufacturing Assemblies, and Create Complete Manufacturing Assembly for Assembly.

E. Make/Buy Management Using Business Logic

When a product or part is considered as either Make or Buy, the program can determine the item creation characteristics. The Make or Buy characteristics can be determined thanks to a dedicated business logic DELMA_MakeOrBuyTesting.

A MakeOrBuyTesting parameter is available in DELMA_MakeOrBuyTesting for Make or Buy processing. Processing can be applied on a product or part and the business rule looks for the required Make, Buy, or Undefined information located in the object. This information can be used when creating and updating manufacturing assemblies.



F. Parent Customization Using Business Logic

By default, the **Create/Update Item Structure** command assigns all products and parts under the selected product to its implementing item. The DELMA_ChooseParentInCUPS business logic enables you to choose the parent item based on attribute value.

The product instance to assign and the item instance you want to choose as parent must both have the same value for the **Description** attribute.

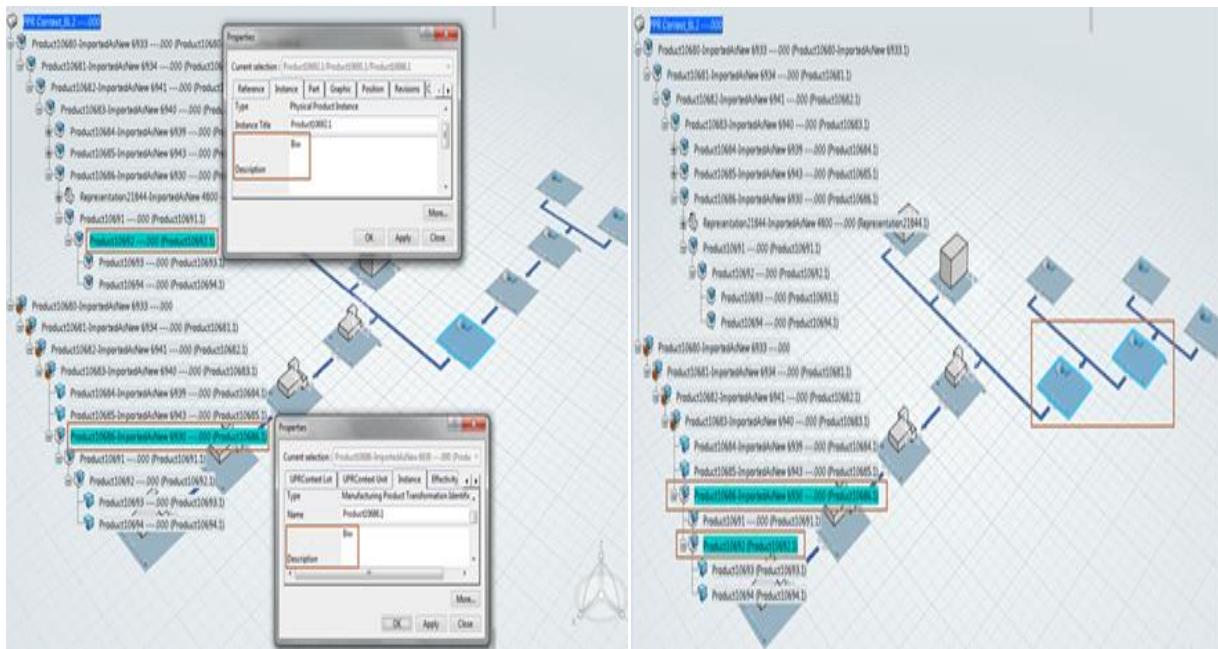
When you use the **Create/Update Item Structure** command,

the DELMA_ChoseParentInCUPS business logic is executed with the following steps:

1. The business logic retrieves the implementing item of the selected product.
2. From the implementing item, the business logic moves upward in the PPR tree, while remaining under the first upper-scoped item, until it encounters an item with the same attribute value as the product.
3. This item is chosen as parent, under which the **Create/Update Item Structure** command creates or repositions items.

In the example below:

- The selected product **Product10692** is implemented by the item **Product10692**.
- From the implementing item **Product10692**, the first upper-scoped item is **Product10683-ImportedAsNew 6930**
- The item **Product10686-ImportedAsNew 6930** is under the first upper-scoped item, and has the same value for the **Definition** attribute as the selected product.



The **Create/Update Item Structure** executes the business logic. It moves upward the tree from the implementing item **Product10692**, while remaining under the first upper-scoped item. The item **Product10686-ImportedAsNew 6930** is the first encountered object with the same attribute value as the selected product.

As a result, **Product10686-ImportedAsNew 6930** is chosen as parent for the implementing item **Product10692**. The MBOM structure is updated.

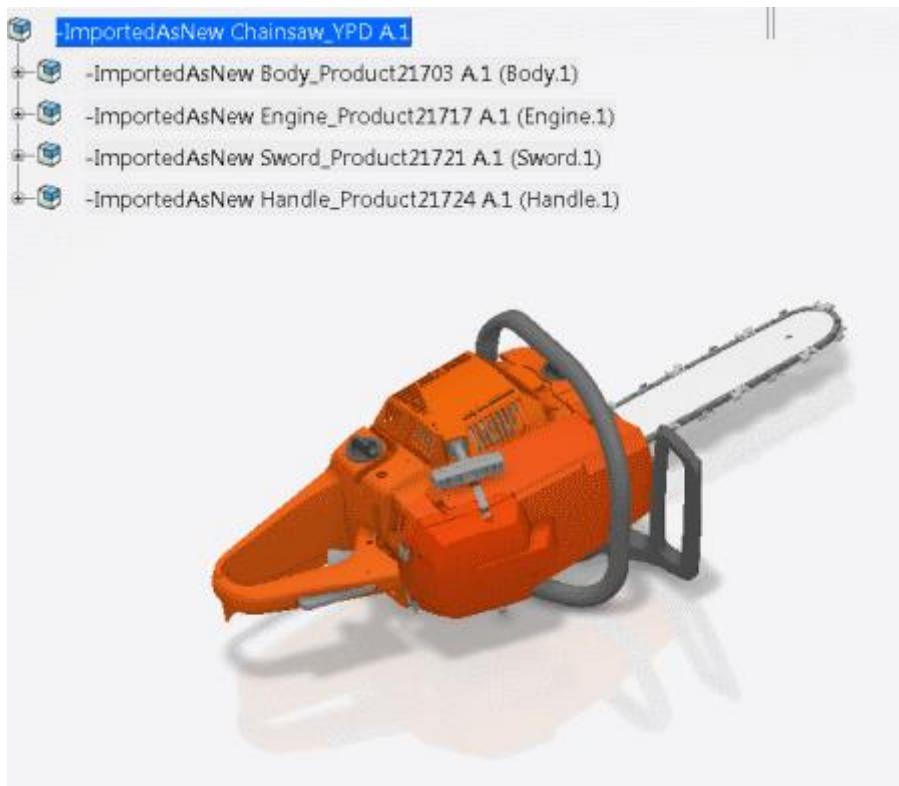
G. Creating a Manufacturing Assembly in Advanced User Mode

You can create a Manufacturing Assembly structure automatically using the Create/Update Item Structure command.

Before you begin: You must have a suitable product structure comprising parts and subassemblies. In this scenario, the **Advanced User** generation mode must be clicked in the **Item Definition** tab in **Me > Preferences > Manufacturing Planning**.

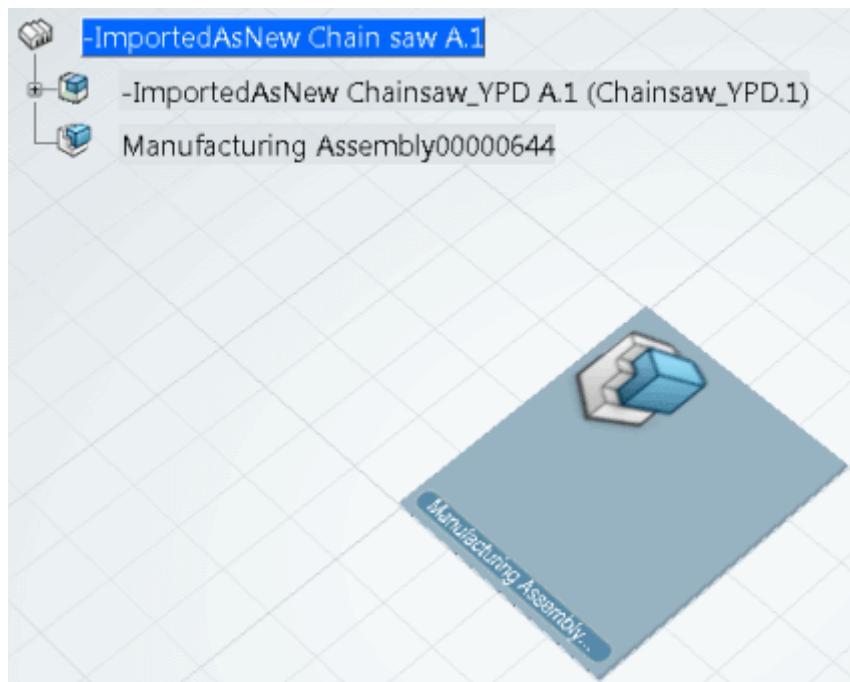


1. Open the product for which you want to create the Manufacturing Assembly structure.



2. Open the required app.

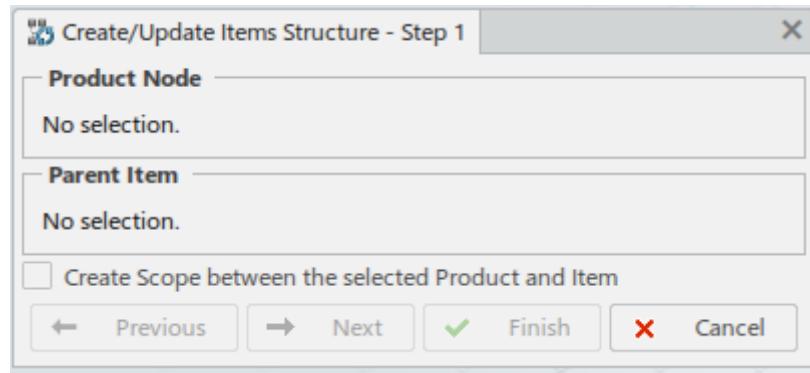
A PPR Context is created in a new tab, and the product is inserted in the PPR Context. A root item is also created, but there is no Manufacturing Assembly structure.



3. From the **Authoring** section of the action bar, click **Create/Update Item Structure**.

The **Create/Update Item Structure** dialog box appears.

4. To fill the required fields in the dialog box, select the root product and the root item in the tree.



5. Click **Next** to go to step 2 of the dialog.

6. Select the required options.

- **Generate Manufacturing Assembly Based on Make-Buy:** If this option is selected, item generation is determined according to selected industry mode, **Advanced User** in this scenario, and whether the product is considered as Make or Buy.
- **Create Complete Manufacturing Assembly for Assembly:** If this option is selected, nonleaf product nodes are handled recursively. The product leaf nodes have a corresponding Provided Part when conditions are met.

Note: When using the **Advanced User** generation mode, this option overrides the **Working under the authority of an action** defining in the following cases:

- **Generate Manufacturing Assembly Based on Make-Buy** is selected and Make or Buy attribute is specified as UNDEFINED for the current item.
- **Generate Manufacturing Assembly Based on Make-Buy** is not selected.

7. Click **Next** to go to step 3 of the dialog box.

8. Select the options for the items you want to generate.

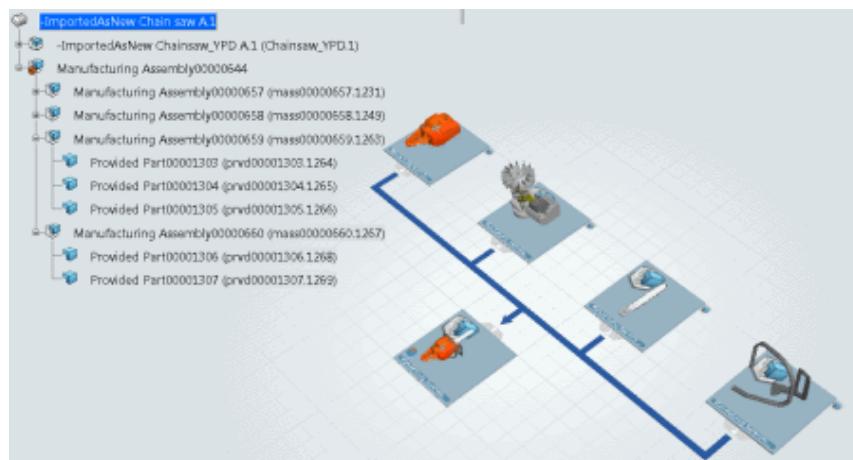
9. Click **Finish** to generate the manufacturing assembly structure. A **Create Update Items Structure - Report** panel displays, and gives a report of the created entities.

10. **Optional:** The following actions are available in the **Create Update Items Structure - Report** panel:

- Click **Export Content** to export the report content as a text, CSV, or TSV file
- Click the expand button to display the list of filters
- Click the cross button to delete messages one by one
- Click **Clear all messages** to clear the report
- Select a message row to highlight the newly created entity in the PPR tree and in the item tile structure
- Double-click a message or use the **Reframe On** contextual command to reframe the newly created entity in the item tile structure.

11. A scope is created between the root item and the root product.

The created manufacturing assembly structure appears under the root item.





You have created a manufacturing assembly structure comprising the required items to manufacture the selected product.

Note: With the **Create/Update Item Structure** command, you can update the manufacturing assembly structure with items that have links to the product structure. The scenario for updating is similar to the scenario for generating described above.

H. Unloading Objects

You can unload objects from an assembly or system if they are no longer used in session. Unloading object lets you display useful objects only and frees up memory.

This task shows you how to:

- Unload Objects
- Unload Evolved Instances of Objects

Before you begin: Save the objects before unloading them.

I. Unload Objects

You can unload instances of objects using Unload from a context menu or Tools section of the action bar. To use Unload from a context menu, select objects that are either systems or operations.

- An unload operation cannot be undone. To reload unloaded objects, reopen the content.
 - The unload operation deletes the history of all finished actions. Therefore, you cannot undo or redo actions after unloading objects, even on objects that are kept in session.
 - You cannot unload a root object from the tree.
 - The selected objects are unloaded from all editing tabs.
1. In the tree, right-click one or more instances of objects.
 2. From the context menu, select Unload.
 3. To confirm the unload operation, click OK.

The object and its children are unloaded and no longer displayed.

J. Unload Evolved Instances of Objects

You can unload all the evolved instances of objects belonging to the same node using Unload Evolved Instance.

From the Authoring section of the action bar, click Unload Evolved Instance .

In the tree, select a node containing the evolved instances to unload.

To confirm the unload operation, click OK.

All evolved instances belonging to the selected node are unloaded and no longer displayed.

K. Reordering Objects in the Tree

You can reorder items, systems, and operations in the tree, manually or based on alphabetical order of display names.

The scenario below illustrates reordering items. A similar procedure can be applied to reorder operations or systems.

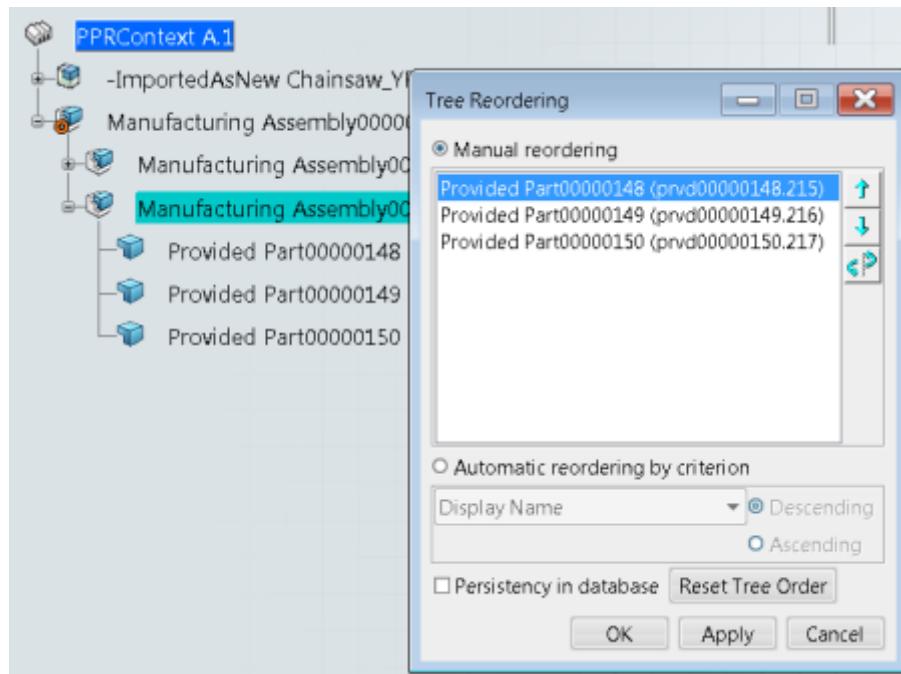
Systems and operations can be reordered in the Gantt chart, if a system or operation is present in the session or by drag and drop.

Before you begin: Load your session content, which must include a Manufacturing Assembly structure.

1. In the tree, select a manufacturing assembly that comprises items.

2. From the **Authoring** section of the action bar, click **Tree Reordering** .

The **Tree Reordering** dialog box appears. The **Manual reordering** mode is defined by default. The items of the assembly are listed in the dialog box.



3. Reorder the items as follows:

- Select the item you want to move and click **Selection**.
- Select another item: the first item is to be moved before this one.
- Click **Apply** to change the order of the items in the tree.

You can use the **Up** or **Down** arrow to move the selected item up or down the list.

- Optional:** Select **Automatic reordering by criterion**. Then reorder the items based on the alphabetical order of the display name or an attribute from the list such as creation date or last modification.
- Optional:** Select the **Persistency** check box if you want to memorize this tree structure for the next session.

In that case, the next time the structure is opened, the objects are listed in the newly defined order.

- Click **OK** to save the new order of the objects in the tree.

Note:

- You cannot reorder the objects that are directly under the PPR Context.
- Tree Reordering** can be run from the tree, the Item Editor, the System Editor, or the Gantt chart. After running the command, the tree, and Gantt chart are updated.

L. Selecting PPR Objects in the Tree

You can use various selection modes to select items, systems, operations, or resources from the tree in a single click.

The following scenarios illustrate how to use the selection modes on systems. You can use the same procedures on items, operations, or resources.

This task shows you how to:

- Use Select Children
- Use Select Others
- Use Select All
- Use Select Inversion
- Use Select Parent
- Use Select Siblings
- Use Select All Leaves

Before you begin: All the commands described below are also available from the context menu. Right-click an object in the tree, then go to Selection mode.

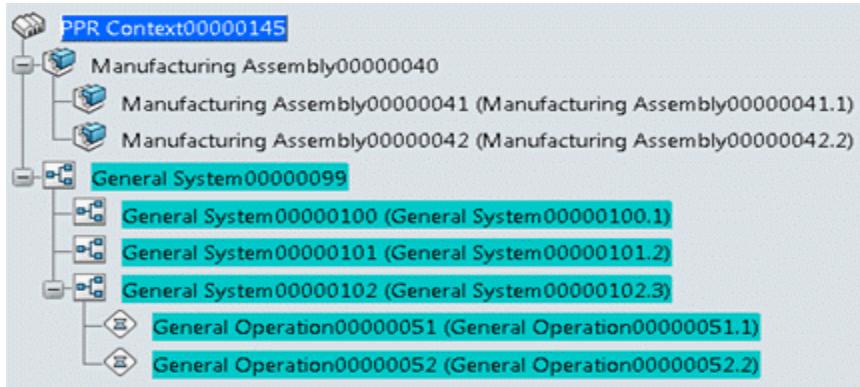


M. Use Select Children

You can use Select Children to select all the children of an item, system, or resource in the tree.

1. Select the root system in the tree.
2. In the View section of the action bar, click Select Children .

The root system and all of its child systems and operations are selected.

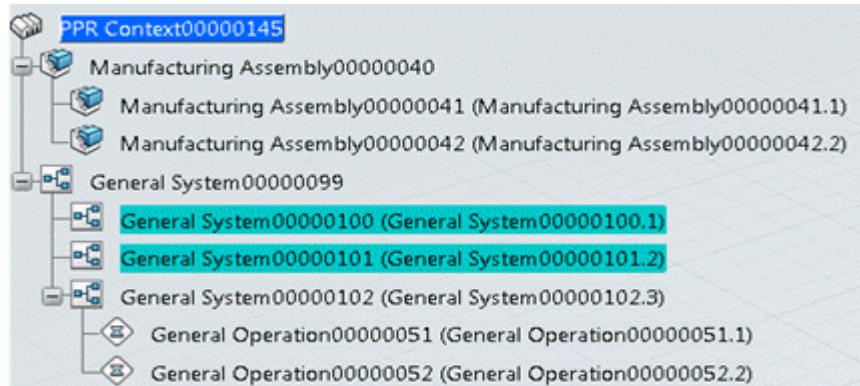


N. Use Select Others

You can use Select Others to select all items, systems, or resources in the tree other than those selected earlier.

1. Select the third child system of the root system in the tree.
2. In the View section of the action bar, click Select Others .

The two other child systems of the root system are selected.

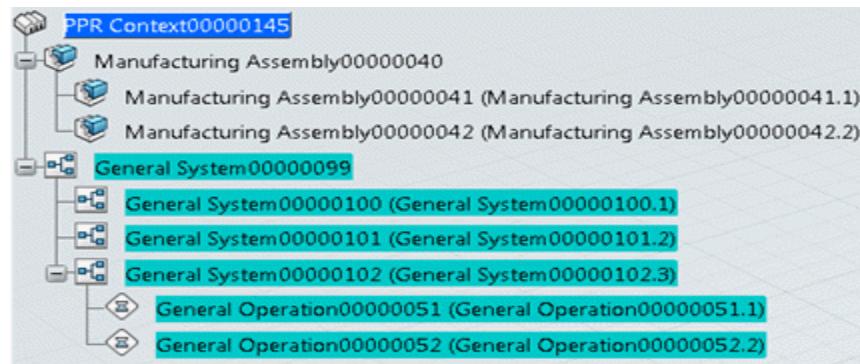


O. Use Select All

You can use Select All to select all the children of a root item, system, or resource in the tree.

1. Select one of the operations in the tree.
2. In the View section of the action bar, click Select All .

The root system and all of its child systems and operations are selected.



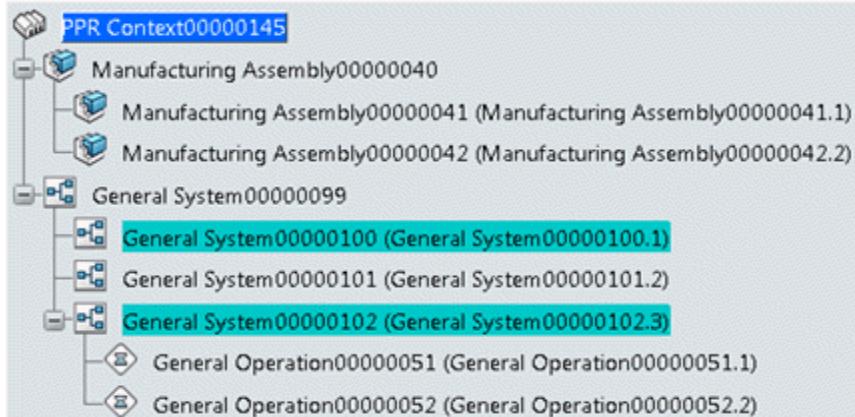


P. Use Select Inversion

You can use Select Inversion to select all the children of a root item, system, or resource in the tree.

1. Select the second child system of the root system in the tree.
2. In the View section of the action bar, click Select Inversion .

The two other child systems of the root system are selected.

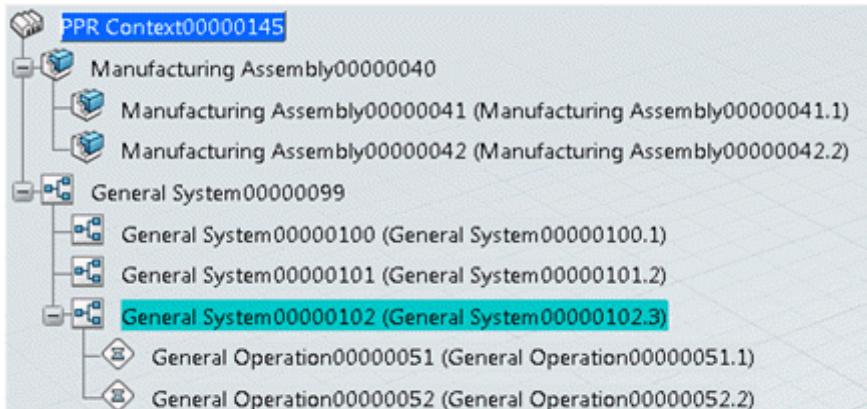


Q. Use Select Parent

You can use Select Parent to select the parent of an item, system, or resource in the tree.

1. Select one of the operations in the tree.
2. In the View section of the action bar, click Select Parent .

The parent system of the operation is selected.

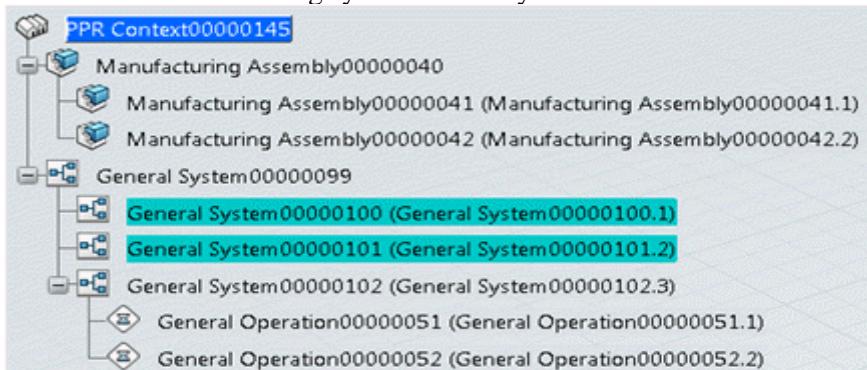


R. Use Select Siblings

You can use Select Siblings to select all the siblings of an item, system, or resource in the tree.

1. Select the third child system of the root system in the tree.
2. In the View section of the action bar, click Select Siblings .

The two sibling systems of the system are selected.





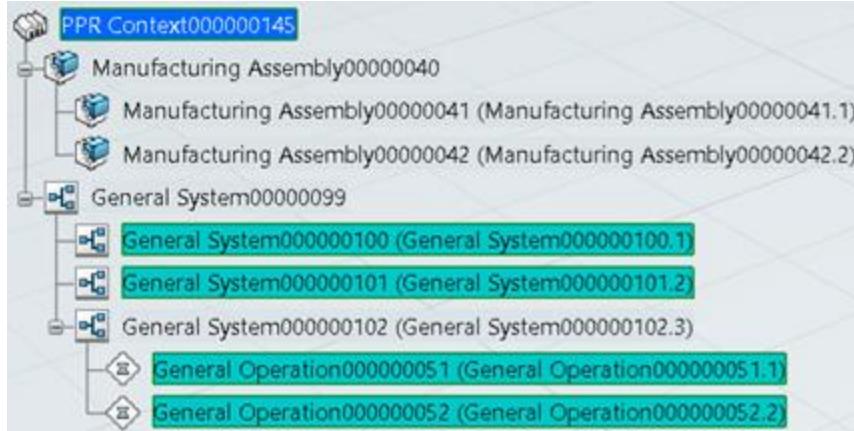
S. Use Select All Leaves

You can use Select All Leaves to select all leaf nodes under an item or a system in the tree.

1. Select the root system in the tree.
2. In the View section of the action bar, click Select All Leaves

All the leaf-systems and leaf-operations of the root system are selected.

Note: Time Analysis and Work Instructions are not considered leaf nodes.



T. PPR Configuration Filtering

The Filter PPR Content command enables you to filter content in root products, items, and systems that have predefined configurations. Filtering is done directly in an authoring session. Resource roots are not supported.

The following topics are discussed:

- General Principle
- Switching to an Authoring Session From Manufacturing Finder
- PPR Configuration Filtering Panel
- Techniques
- Assignment Commands Behavior After Filtering the Tree

U. General Principle

For a given root, which can be a product, a system, or an item, you can filter the content in the authoring session by predefined configurations.

Here is the workflow to load a configuration-filtered PPR content with two predefined configurations, A, and B.



The example below shows a root with two variants, A, and B.



The behavior is as follows:

- If no filter is applied to the root, all the child content is visible.
- If Effectivity B is selected, only the content with no effectivity and the one with Effectivity B is visible.
- If Effectivity A is selected, only the content with no effectivity and the one with Effectivity A is visible.

V. Switching to an Authoring Session From Manufacturing Finder

You can filter PPR content that has predefined configurations directly in an authoring session, which avoids switching back and forth from the Manufacturing Finder.

The figure below represents the tree visibility from the model structure in session. The filtered tree shows the visible occurrences according to their variant.

The occurrence tree is created according to the reference and instance original structure: four occurrences for each wheel, two for each axle, and one frame.

In the model structure, there is only one reference for the frame, the axle, and the wheel. For example, the same wheel reference has its 3D duplicated and is instantiated twice with four different positions.

In this example, effectivities A and B have been defined on the wheels and their related axles. When you switch from effectivity A to effectivity B, then the 3D visibility changes.

All the modifications - such as deleting an element in the tree, creating an implement link - are persistent in the authoring session even if you switch from one variant to another. This means that you can go back and forth, switching filters, and making modifications without losing them.

Note: The occurrence tree differs from the model assembly. All the related occurrences from the model assembly are created in the session. The purpose of the filter is to make only the required ones visible for the predefined configuration.

W. PPR Configuration Filtering Panel

The PPR Configuration Filtering panel allows you to filter content in root products, items, and systems that have predefined configurations.

The panel appears when you select Filter PPR Content in the Authoring section of the action bar. All root elements have a dedicated list to filter content with predefined configurations. There can be several root products, items, and systems: the panel shows a list for each root loaded in the authoring session.

From each list, you can select predefined configurations already defined on the root element.

From each list, you can select the required predefined configuration to make the content related to this predefined configuration visible.

If No Filter is defined, then no filter is applied and all the content is visible for this related root object.

The list shows all the predefined configurations defined on the root. Default value is No Filter, so all the children with variants under the root are visible in the tree.

You can select a predefined configuration from a list and select the Replicate predefined configuration check box. Then the selected predefined configuration is automatically replicated to the lists for each root element below, depending on the business logic customization.

It is possible to customize this filter using business logic. For more information, see Replicate Predefined Configurations to Remaining Roots (DELPPRFindSimilarConfigIndexInOrderedList_ID).

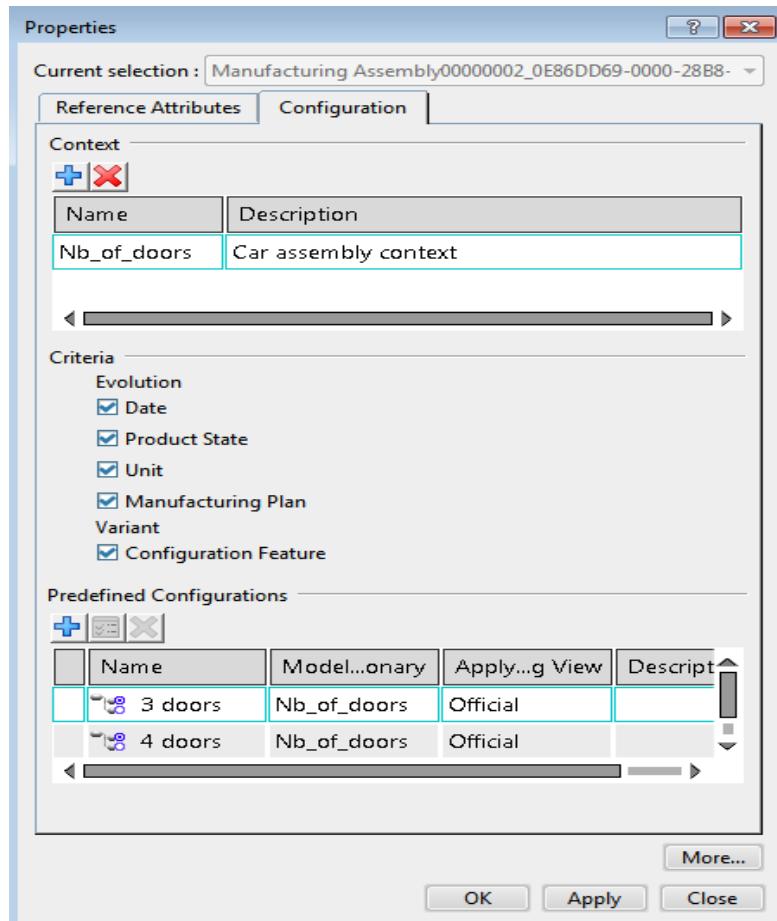
If No Filter is defined in one of the lists and you select the Replicate predefined configuration check box, No Filter is replicated to all the lists for root elements.



X. Techniques

You can consider a planning with a predefined 3 doors configuration for a car assembly.

The context defined on the car is Nb_of_doors (Number of doors).



The 3 doors content is filtered from a root product, item, and system.

An Nb of doors context has to be defined on the root product, the root item, and the root system each with three variants: Three doors, four doors, and five doors.

Filter with Root Product, item, and System

If you want to see only product content related to the 3 doors model assembly, you must select 3 doors on the product filter in the authoring session. Then select **Apply**.

You can apply several filters at the same time.

You may require to filter a planning with the 3 doors variant for the root product, the root item, and the root system. In this case, you can select the 3 doors effectivity for each root, then select **Apply**.

The tree visibility changes and only the elements with 3 doors effectivity and elements with no effectivity are visible under the different root objects.

Filter with Same Context Defined on Root and Its Children

The filter options only apply on the root with its defined context. So the predefined configuration clicked in the **PPR Configuration Filtering** panel filters the child content according to this predefined configuration. However, it is possible to have the same context defined on one of the children.

Sometimes one effectivity is selected for a root element in the **PPR Configuration Filtering** panel. In this case, only the content with the same effectivity and with a parent with the same context is visible in the authoring session.

Consider an example with a root with two contexts and three effectivities: the figure below shows what is visible if you switch filters in the lists from no filter, effectivity A, and effectivity B.

Element 4 and Element 4.1 are visible for effectivity A and effectivity B. This is because the context defined in Element 4 is different from the one defined in the root, Context 1.



Element 1.1 is visible if you select the effectivity A from the filter selection since Element 1 and the root have the same context, Context 1.

Assignment Commands Behavior After Filtering the Tree

You can use a filter from the **PPR Configuration Filtering** panel. In this case, the occurrence creation is different for the tree and some elements are no longer visible and some occurrences no longer exist.

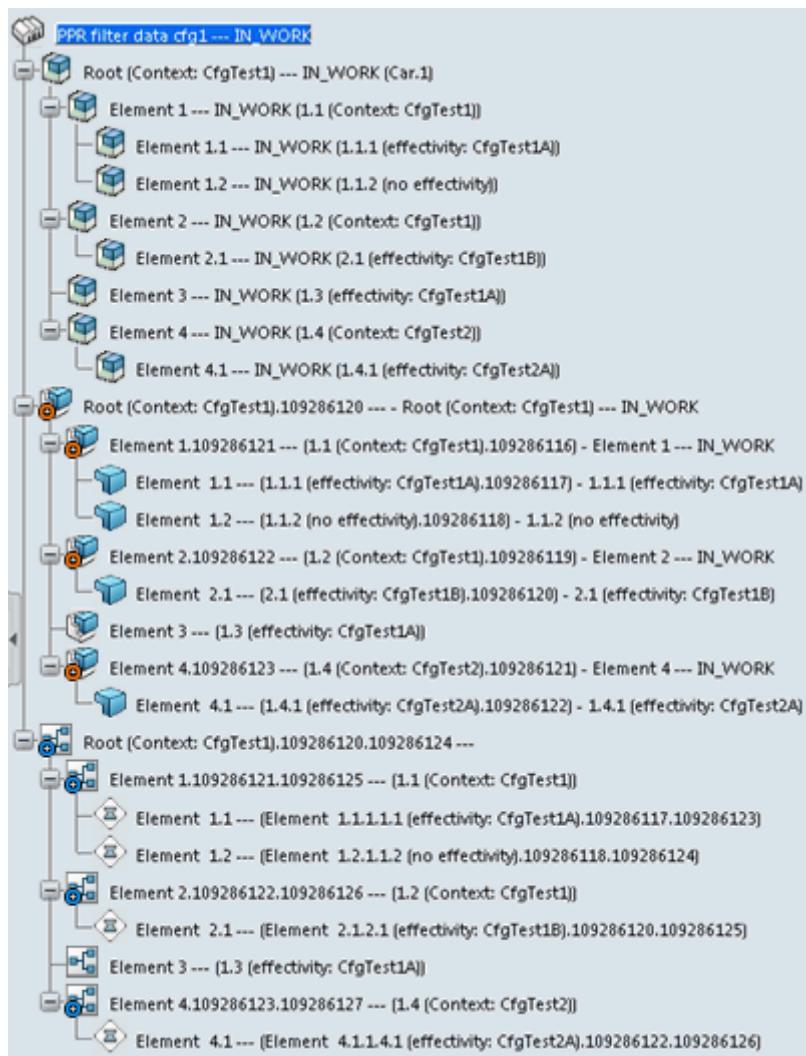
This section demonstrates filtering the product tree to see results with the F5 list, the Assignment panel, and the Assignment Assistant commands.

Consider the predefined configurations created for two contexts similar to that shown in Filter with Same Context Defined on Root and Its Children.

In the tree in the example below, the context and predefined configuration respect this scheme. The context and predefined configurations are:

- Context 1 stands for CfgTest1
- Context 2 stands for CfgTest2
- Effectivity A stands for CfgTest1A
- Effectivity B stands for CfgTest1B.
- Effectivity B stands for CfgTest2A.

Here is a view of the tree with those contexts and variants:



The required scopes between products, items, and systems must be created. Also, the required implement links between products and items, and between items and operations must be created.



Here is the 3D representation of the product assembly before filtering:

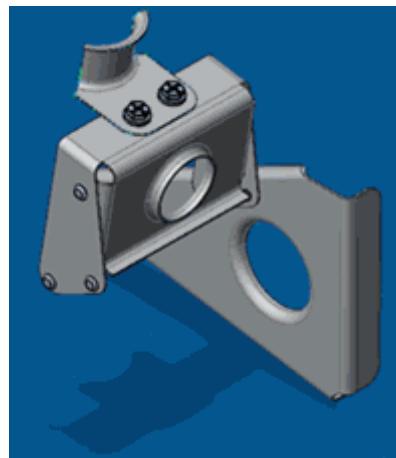


Product Assembly Filter with PPR Configuration Filtering

To filter the product tree for the CfgTest1B variant, select the list of the product roots and select CfgTest1B.

In this case, some occurrences are removed from the authoring. The products Element 1.1 and Element 3 are no longer visible in the tree.

When the tree is filtered, the 3D representation of the assembly changes and the new representation looks like this, with Element 1.1 no longer visible:



F5 List

You can run the F5 list command after product filtering in Manufactured Item Definition. In this case, the product Element 1.1 is no longer in the Assigned Parts list for the Provided Part Element 1.1 and the 3D representation is no longer visible.

After filtering in Process Planning, the 3D representation is no longer visible and the product Element 1.1 is no longer in the Parts list for the operation Element 1.1.

Assignment Panel

You can run the Assignment panel from the Provided Part Element 1.1 after filtering in Manufactured Item Definition. In this case, it shows that the assigned product Element 1.1 is no longer listed in the Assigned Products tab for the Provided Part Element 1.1.

You can run the Assignment panel from the operation Element 1.1 after filtering in Process Planning. In



this case, it shows that the assigned product Element 1.1 is no longer listed in the Products column for the Provided Part Element 1.1.

Assignment Assistant

You can run the Assignment Assistant from the Manufacturing Assembly Element 1 after filtering in Manufactured Item Definition. In this case, it shows that the assigned product Element 1.1 is no longer listed in the Assigned Products field. It also shows that the 3D representation is no longer visible in the 3D window.

You can run the Assignment Assistant from the System Element 1 after filtering in Process Planning. In this case, it shows that the assigned product Element 1.1 is no longer listed in the Assigned Products field. It also shows that the 3D representation is no longer visible in the 3D window.

Y. Inserting an Item with a Predefined Configuration

You can insert an item with predefined configurations and specify which configuration to insert.

Before you begin: You must have a PPR Context and root item created in the tree.

1. Right-click the root item and select Insert Predecessor > Product Configuration.
2. In the panel that appears, search for the item with predefined configurations.

For more information, see *3DEXPERIENCE Native Apps User Guide: Native Apps Common Services*:

Opening Content: Content Chooser: Using the Content Chooser.

3. In the list of predefined configurations that appears, select one configuration.

The item is inserted and its content is filtered according to the selected predefined configuration.

Module-1. F: Manufacturing Installations

This section provides background information about Manufacturing Installations and describes how to create and manage this type of item.

In this section:

- About Manufacturing Installations
- Creating Manufacturing Installations

A. About Manufacturing Installations

The Manufacturing Installation describes the installation of several products onto a much larger structure. This satisfies Final Assembly needs, particularly in the aerospace and automobile industries.

The following topics are discussed:

- General Description
- Item Assignments
- Other Behavior

B. General Description

A Manufacturing Installation has one input item and one output item. It can also contain one or more items. The Manufacturing Installation is created between the input item and the output item.

The table below shows that item types can be used as input, output, and contained items of a Manufacturing Installation.

Item type	Can be input	Can be output	Can be "contained"
Manufacturing Assembly	yes	yes	yes
Manufacturing Installation	yes	yes	yes
Provided Part	yes	no	yes
Continuous Provided Material	yes	no	yes
Continuous Manufactured Material	yes	yes	yes
Remove Material	yes	no	yes
Manufactured Part	yes	yes	yes
Fasten	no	no	yes
Unfasten	no	no	no



Item type	Can be input	Can be output	Can be "contained"
Split	no	no	yes
Machining	no	no	yes
Transform	yes	yes	yes
Manufactured Material	yes	yes	yes
Manufacturing Kit	yes	yes	yes
Mark	yes	yes	yes

The input and Manufacturing Installation must be siblings.

The data requirement between input and Manufacturing Installation is explicit.

The Manufacturing Installation can be included in a Group, but a Group cannot be the input or output of a Manufacturing Installation. Stacked items cannot be used as input or output of a Manufacturing Installation.

3D representation above a Manufacturing Installation tile is the 3D output of input item plus the 3D of assigned items on the Manufacturing Installation.

If there is at least one item assigned on the Manufacturing Installation, it can be expanded to display contained items.

Several Manufacturing Installations can be created in series or in parallel.

It is possible to have a hierarchy of Manufacturing Installations: one or more Manufacturing Installations can be created under a Manufacturing Installation.

C. Item Assignments

Contained items can be defined by dragging and dropping products or items on a Manufacturing Installation.

You can also use the Product-item assignment panel to define contained items. For more information, see Managing Product to Item Assignments.

Note: **Assign Product to Item**, **Unassign Product from Item**, and **Show Assigned Items**

Only commands cannot be used on Manufacturing Installations.

Drag and Drop a Manufacturing Assembly on a Manufacturing Installation

If a Manufacturing Assembly is dragged on the Manufacturing Installation, it is rerouted under the Manufacturing Installation.

Drag and Drop a Provided Part on a Manufacturing Installation

If a Provided Part is dragged on a Manufacturing Installation, it is rerouted under the Manufacturing Installation.

Sometimes a product is linked to the Provided Part and it is linked by fasteners to the products linked on the input item. In this case, Fasten steps are created under the Manufacturing Installation if the **Automatically Assign and Reassign Fasteners** option is defined. **Hide/Show Provided Part** and **Hide/Show Fasten** commands are available on the Manufacturing Installation if there is at least one Provided Part or Fasten step).

Drag and Drop a Product on a Manufacturing Installation

A Product can be dragged and dropped on a Manufacturing Installation. In this case, a Provided Part or a Fasten step linked to the product is created and aggregated directly under the Manufacturing Installation.

Unassignment of Contained Items

If a contained Manufacturing Assembly is dragged from the Manufacturing Installation and dropped on the output item, the Manufacturing Assembly is rerouted under the output item.

Drag and Drop Rules

Drag and drop of a Manufacturing Installation is not allowed.

Drag and drop of contained items between Manufacturing Installations is allowed. In this case, items are rerouted.

If the **Automatically Assign and Reassign Fasteners** option is selected:

- If the product linked to the item, which is dragged on the Manufacturing Installation, is linked by fasteners to a product assigned on the input item, the corresponding Fasten steps are created under the Manufacturing Installation.



- If the product linked to the item, which is dragged out of the Manufacturing Installation, is linked by fasteners to a product assigned on the input item, the corresponding Fasten steps are automatically deleted from the Manufacturing Installation.

D. Other Behavior

The Manufacturing Installation respects most of the common rules defined for other item types. The following points provide additional information about Manufacturing Installation behavior.

Show Only Concerned Parts command: 3D representation of all contained items is displayed.

Show Unconcerned Parts as Transparent command: 3D representation of input item is displayed as transparent.

Insert Existing item command: A Manufacturing Installation can be reused. Input item must be selected.

The F5 list is not displayed above a Manufacturing Installation when it is expanded. When a

Manufacturing Installation is collapsed, F5 list behavior is the same as for Manufacturing Assembly.

Smart zoom is not available on Manufacturing Installations.

A resulting product cannot be defined on a Manufacturing Installation.

A Manufacturing Installation cannot be created between an item and a Group, or dropped directly on a Group.

E. Creating Manufacturing Installations

You can use a Manufacturing Installation to manage the installation of several products on to a larger assembly. A Manufacturing Installation has one input item and one output item. It can also contain one or more items.

This task shows you how to:

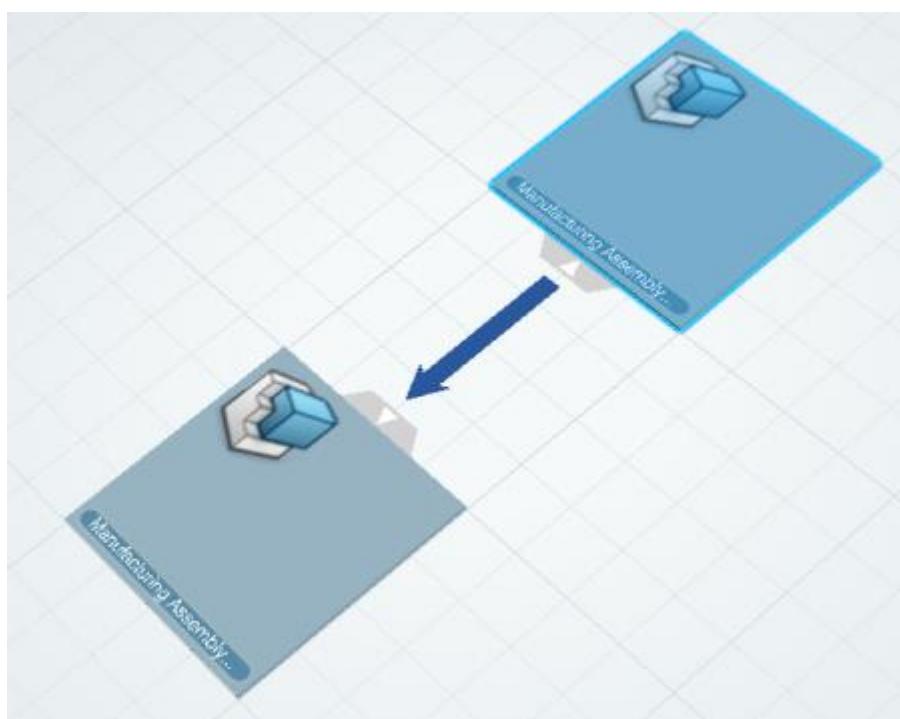
- Create a Manufacturing Installation in Series
- Create a Manufacturing Installation in Parallel
- Create a Hierarchical Manufacturing Installation
- Define Contained Items by Drag and Drop of a Manufacturing Assembly

Before you begin: Open your data, which must have product and manufacturing assembly structures.

F. Create a Manufacturing Installation in Series

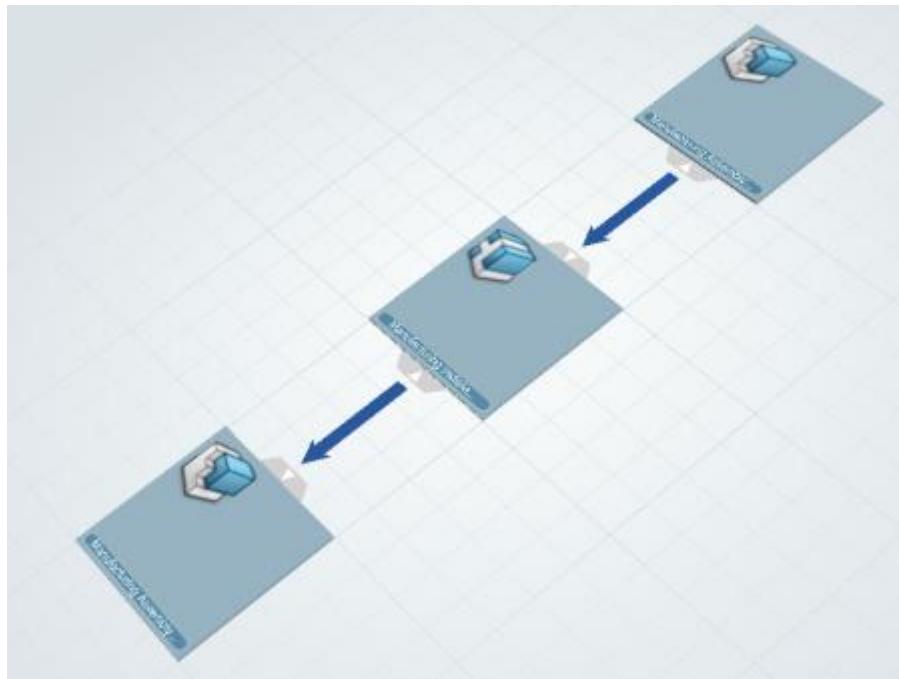
You can create Manufacturing Installations in series.

1. Right-click the input item and select **Insert Predecessor > Manufacturing Installation** .

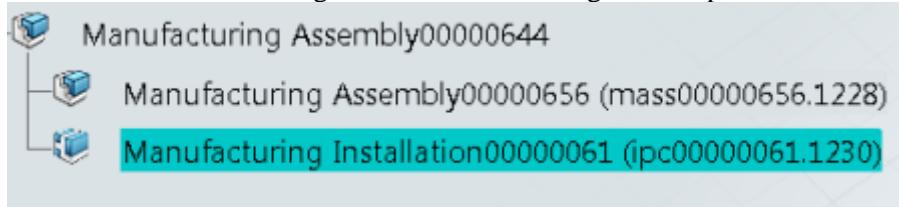




2. Select the output item.
- A Manufacturing Installation is created between the input and output items.



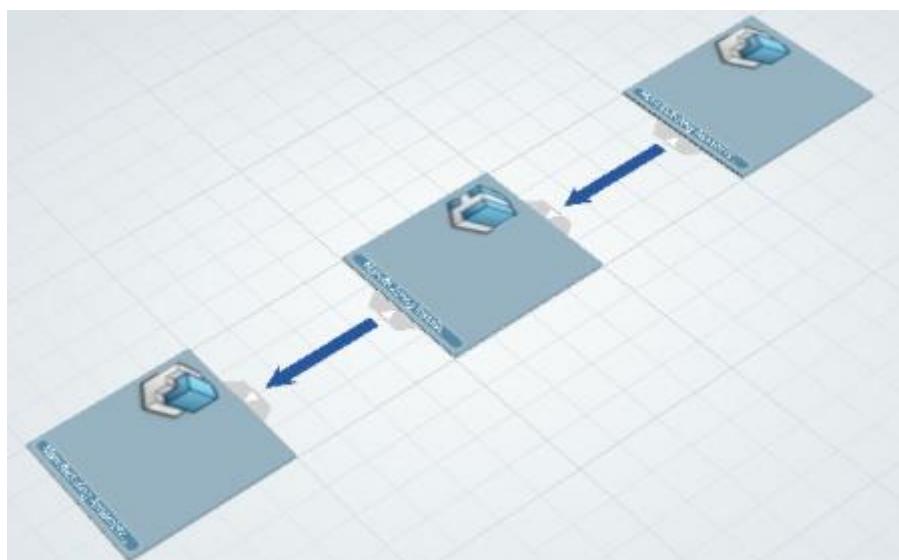
The Manufacturing Installation is a sibling of the input item.



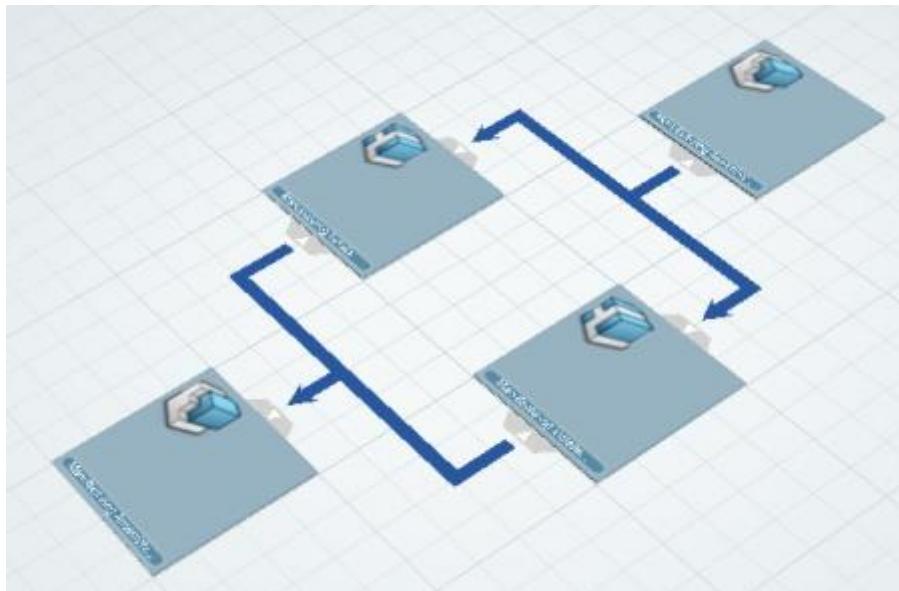
G. Create a Manufacturing Installation in Parallel

You can create Manufacturing Installations in parallel.

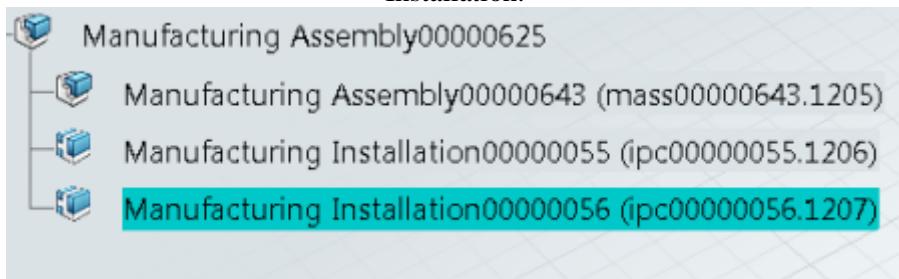
1. Right-click the input item and select **Insert Predecessor > Manufacturing Installation**.



2. Select the output item.
- A Manufacturing Installation is created in parallel with the existing Manufacturing Installation.



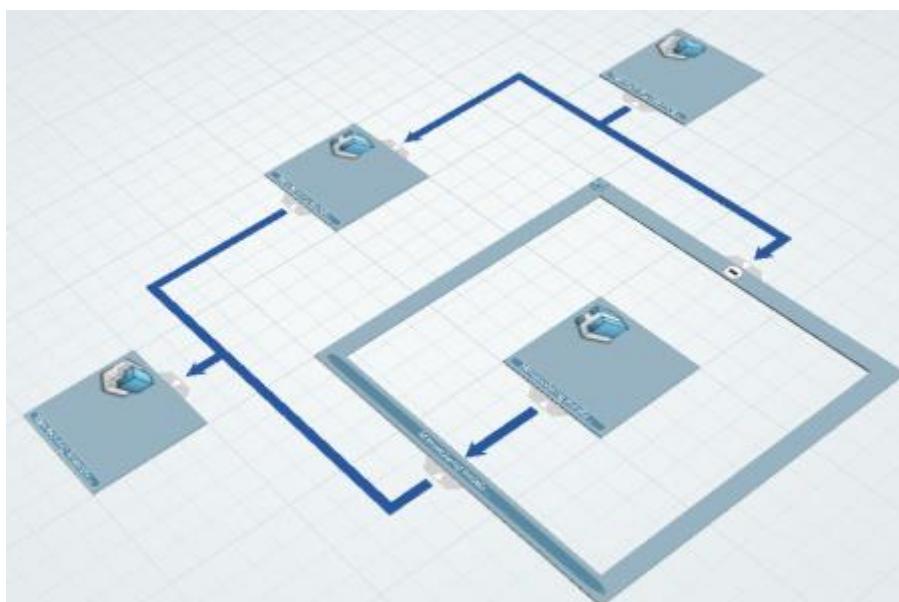
The created Manufacturing Installation is a sibling of the input item and the existing Manufacturing Installation.



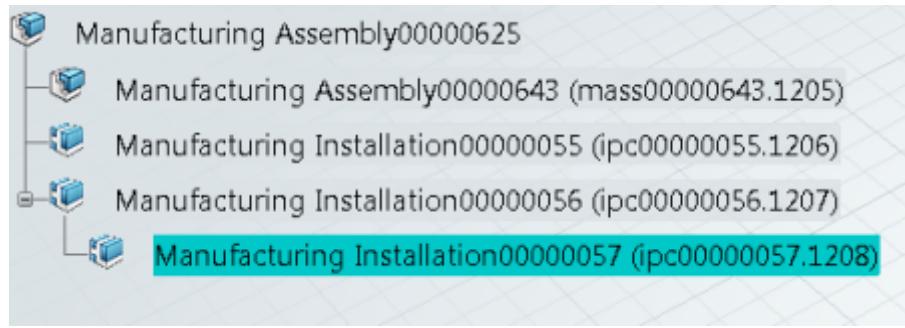
H. Create a Hierarchical Manufacturing Installation

You can create items that are contained in a Manufacturing Installation.

1. Right-click a Manufacturing Installation and select **Hierarchical Manufacturing Installation**.
A new Manufacturing Installation is created inside the existing Manufacturing Installation.



The created Manufacturing Installation is a child of the container Manufacturing Installation.



2. **Optional:** At the top of the container Manufacturing Installation tile:

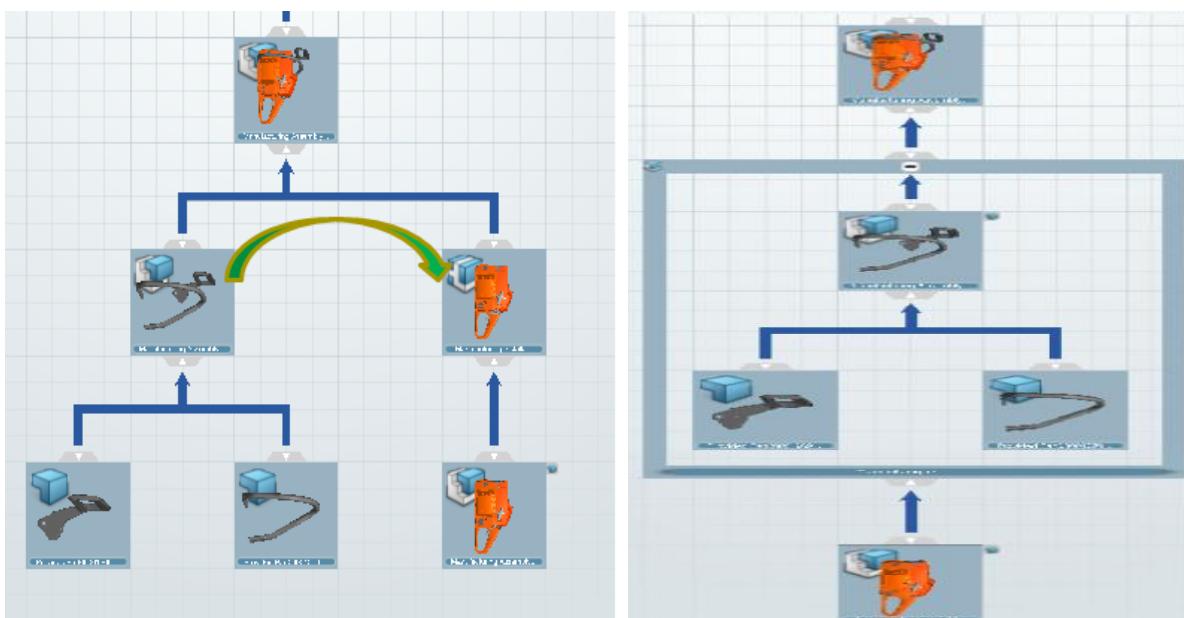
- Click **Collapse** to collapse the item.
- Click **Expand** to expand the item.

I. Define Contained Items by Drag and Drop of a Manufacturing Assembly

You can define contained items by dragging items and dropping them on a Manufacturing Installation.

1. Drop a Manufacturing Assembly on a Manufacturing Installation.
2. If required, expand the Manufacturing Installation tile.

The Manufacturing Assembly and associated Provided Parts and is rerouted under the Manufacturing Installation.



The Manufacturing Assembly and associated Provided Parts are contained in the Manufacturing Installation.





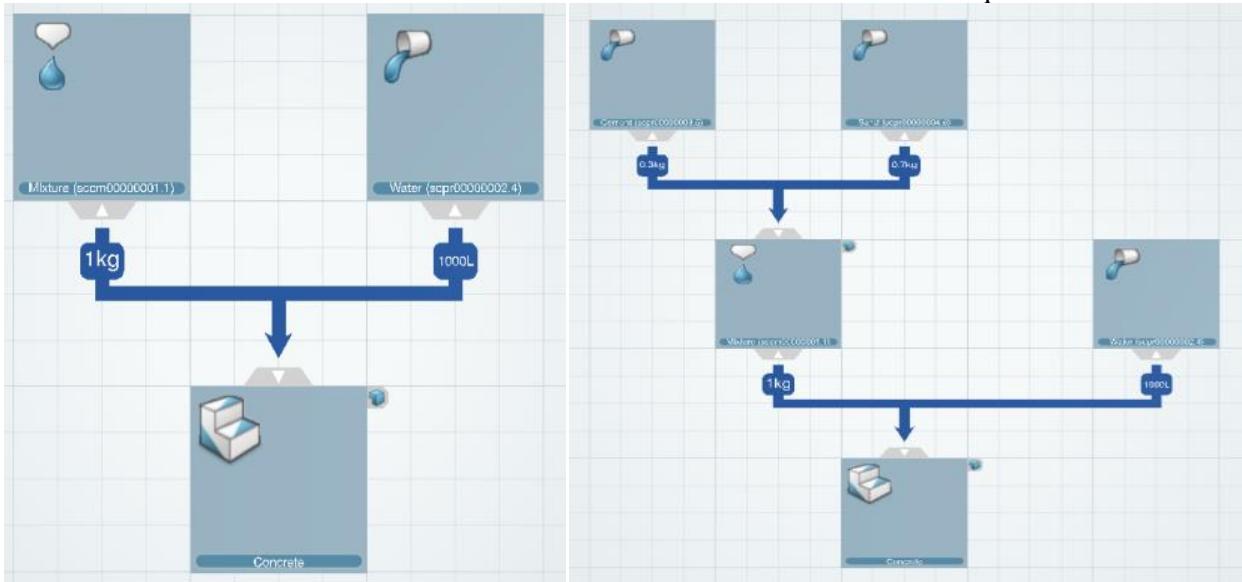
J. Creating Continuous Manufactured Items

You can create and manage Continuous Manufactured Material and Continuous Provided Material items that have quantities such as length, mass, area, and volume.

- Right-click the PPR Context and select Insert Item > Manufactured Material.
A root Manufactured Material is created.

- Right-click the Manufactured Material and select Insert Predecessor > Continuous Manufactured Material > Mass.
- Right-click the Manufactured Material and select Insert Predecessor > Continuous Provided Material > Volume.

The items are created with the default values for the mass and volume quantities.



- Use the context menu of the Continuous Manufactured Material item to create two more Continuous Provided Material items with mass quantities.

The items are created with the default values for the mass quantities.

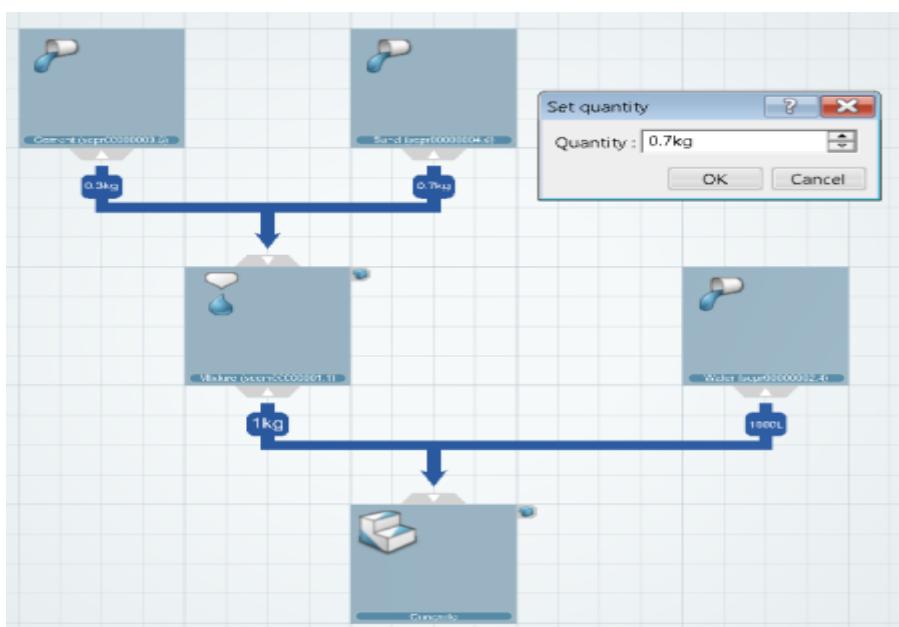
- Right-click one of the continuous items and select Quantity.

The Set quantity dialog box appears.

- Enter the required quantity value and click OK.

The quantity is updated.

- Modify the quantities of the other continuous items in the same way.





Module-1.G: Groups

This section provides background information about Groups and describes how to create and manage these objects in the item editor.

In this section:

- About Groups
- Managing Groups

A. About Groups

You can manage a large number of items more easily by creating groups. Capabilities such as collapse/expand and hide/show facilitate the handling of group objects in the item editor.

The following topics are discussed:

- Introduction
- Grid Layout
- Group Behavior and Rules
- Drag
- Visualization Modes
- Editability
- Libraries

B. Introduction

Groups are used in the item editor to create and manage groups and subgroups of items.

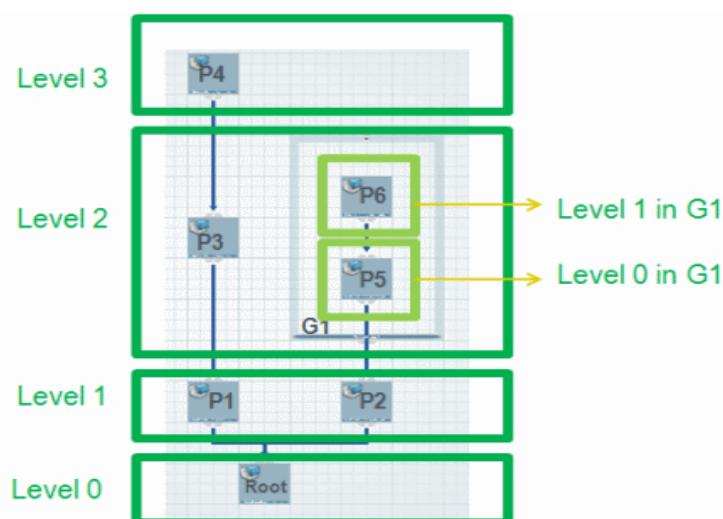
Advantages of grouping items include:

- Collapse or expand a group to simplify the user experience when there are a large number of items.
- Organize groups and subgroups.
- Manipulate a group as a single unit, for example, to drag it on a system.

C. Grid Layout

Items and groups are placed on the grid in a logical way, based on levels.

The item structure comprises one or more levels. In the example below, these levels appear as green boxes.



The Root item is located at the first level, Level 0. For an item on level n, its successors are on level n-1 and its predecessors are on level n+1.

In addition, groups have their own internal level.

In the example above, the item P3 and group G1 are at the same level, Level 2. P3 is positioned on the grid so that it is centered with respect to G1.



D. Group Behavior and Rules

Group behavior is determined by a number of rules.

All Item Types Can Be Included in a Group

The **Insert Group** command can be used on Manufacturing Assemblies, Manufactured Materials, Manufactured Parts, Manufacturing Kits, and on other groups to create groups. However, all item types can be included in groups.

Item Structure Is Not Modified When a Group Is Created or Deleted

When a group is deleted, the original item structure is not modified and no item is deleted.

Groups and items Can Be Included in a Group

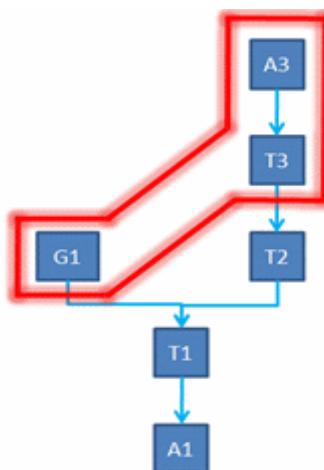
A group that is included in another group becomes a subgroup of that group.

Group Comprises of Items Owned by the Same Parent

The parent is also the owner of the group.

Group Is Made Up of Connected Groups That Have the Same Successor

Connected groups are from the data requirement graph. The successor of a connected group is the successor of the only item that does not have a successor in the connected group.



G1 and T3 cannot be joined by the data requirement graph. T3-A3 and G1 do not have the same successor.

Item Included in a Group and All Child Items Are Implicitly Included in Group

Sometimes an item that has several child items is dragged and dropped on a group tile. In this case, the item and child items are included in the group.

Group Can Be Made Up of Other Groups

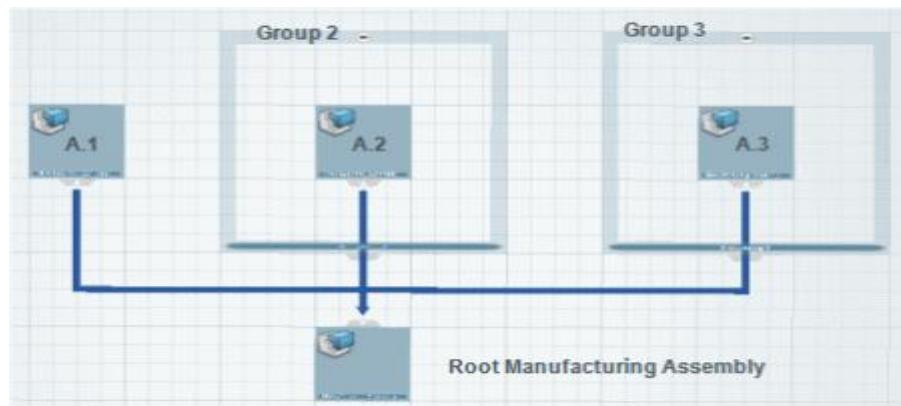
A group can be created as a subgroup under another group using the **Insert Group** command. In addition, you can create a group structure with empty groups and fill it later.

Item Can Be Put Outside Group Only If Parent Is Not Included in the Group

If an item or group is dragged and dropped on the area of a different group, the item or group is added to that group.

If an item or group is dragged and dropped on the area of a different group, the item or group is added to that group.

For example, if item A.1 is rerouted under A.2, then A.1 is added to Group 2, because A.2 is in a group.





If A.2 is rerouted under A.1, then A.2 is removed from Group 2.

If A.3 is rerouted under A.2, then A.3 is removed from Group 3 and added to Group 2, Group 3 is empty but it is not removed.

Group Deletion

When a group is deleted using the contextual **Delete** command:

- Included items and groups are not removed but the layout is updated
- If the deleted group is a subgroup, all included objects are moved to the upper group.

Item Configuration Split and Replace

If an item is split or replaced, a new item instance is added automatically to the group, if the instance is included in a group.

Multi-Instantiated Items

You can create a group on each item instance, which is multi-instantiated items.

Precedence Constraints

Precedence constraints can be created between:

- Items that are in a group
- Items that are not in the same group
- An item that is not included in a group and an item that is included in a group.

E. Drag

Dragging is possible when working with groups.

When a product is dragged to a group, an item is created under the parent item of the group and added to it. The parent item is the item below which the group is created.

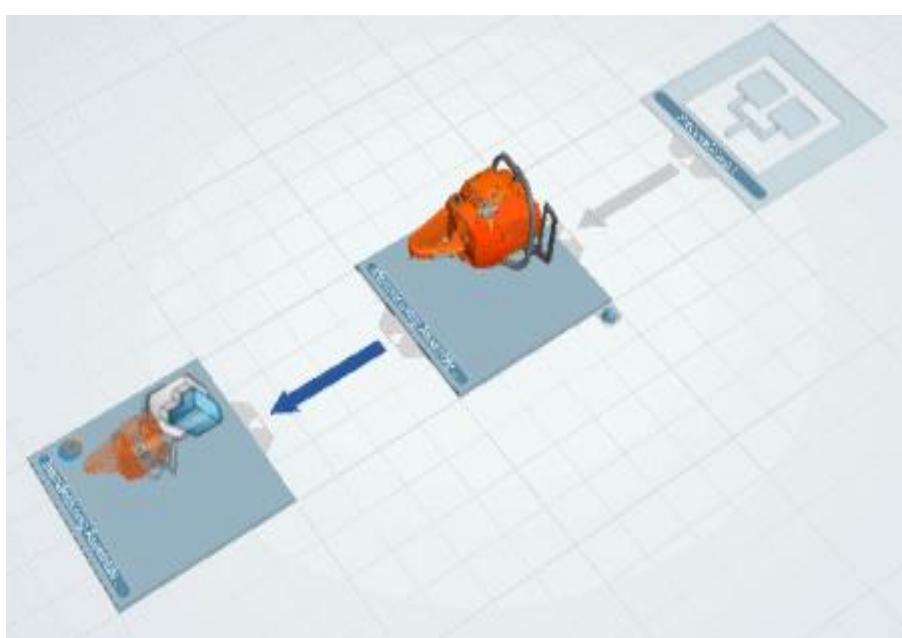
When a group is dragged to a system or operation in the System Editor, the group can be manipulated as a whole. This means that the group is a multiselection of items included in the group and any subgroups.

Therefore all items are assigned to the target operation or under the target system. Items that are already assigned to the operation target or under the system target are not implemented a second time.

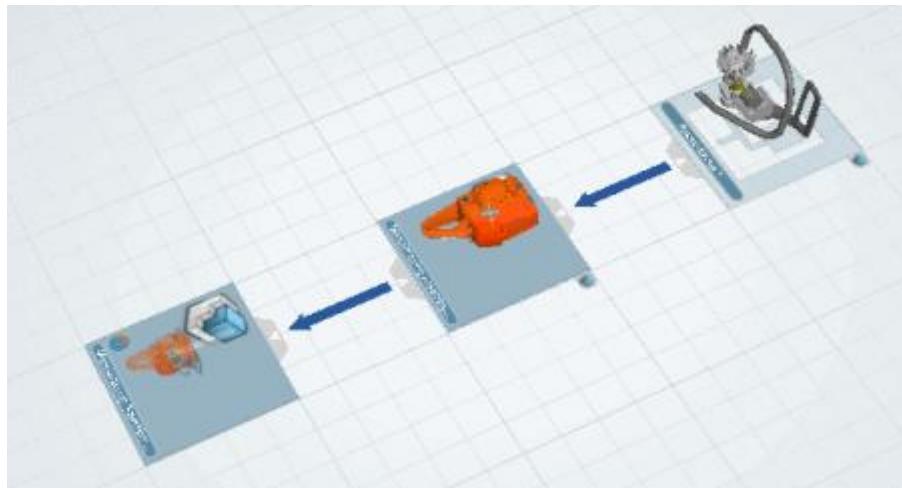
F. Visualization Modes

Standard visualization mode behavior applies for groups.

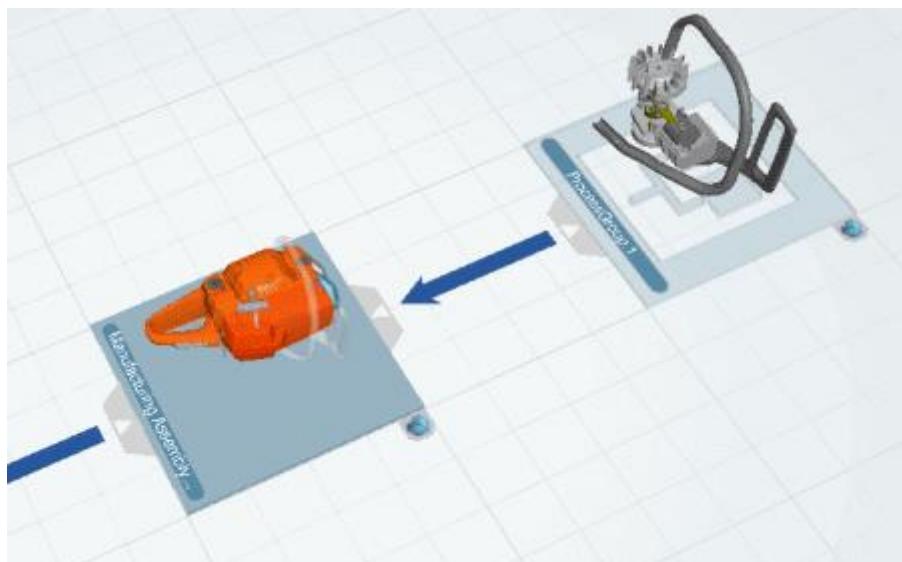
In the example below, the Show Only Concerned Parts mode is selected. All the items are created under the root and the group is empty.



When items are dropped to the group, the 3D representation on the group is updated.



Sometimes the Show Unconcerned Parts as Transparent mode is selected. In this case, all items that are included in the group appear transparent above the tile of the item under which the group is created.



G. Editability

Editability can be managed on a group. You can select the tile of the group to switch to read-only or editing.

When a group is read-only:

- A warning symbol appears at the upper right corner of the tile
- No item or group can be added to the group
- No item or group can be removed from the group
- The group cannot be removed
- Properties of the group cannot be modified
- Editability of items and groups included in the group cannot be modified

H. Libraries

A group cannot be saved in a library.

However, you can reuse a group by inserting a parent item from a library.

Note: You can explore a group by making a query in the Search. In the navigation, the parent item and all items included in the group are displayed.



I. Managing Groups

You can use commands in the item editor to create and manage groups and subgroups of items.

This task shows you how to:

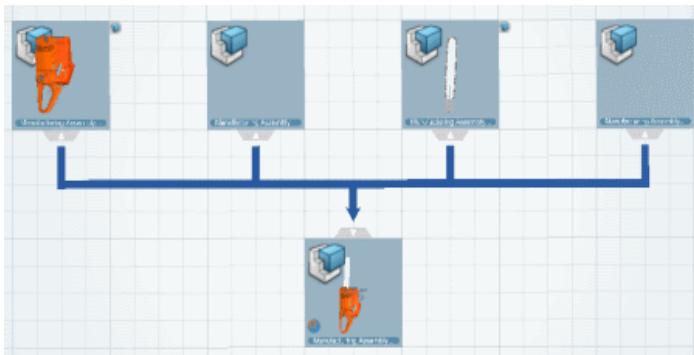
- Create a Group
- Create Subgroups

Before you begin: Load your manufacturing assembly structure in the item editor.

J. Create a Group

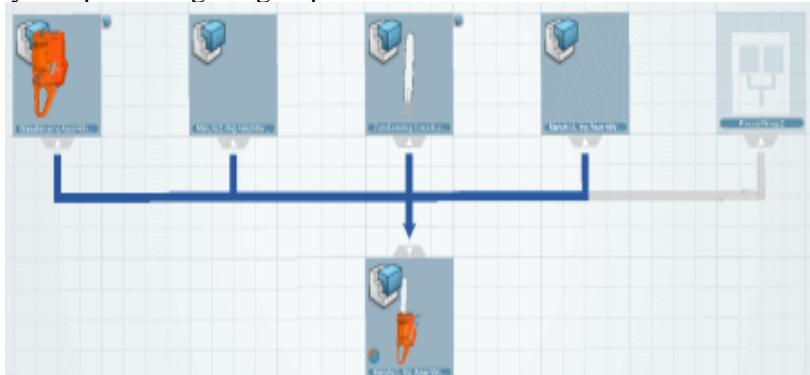
You can use the **Insert Group** command to group items, such as Manufacturing Assembly, Manufactured Material, Manufactured Part and Manufacturing Kit, and other groups.

1. Select the root item in the item editor and select **Expand First Level**



2. Right-click the root item and select **Insert Group**

A new tile is displayed representing the group.

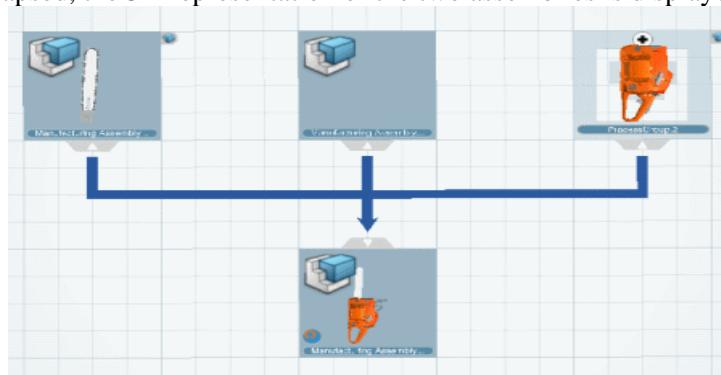


Note: The data requirement link is gray when a group is created. The group is empty at this stage.

3. Drag and drop two Manufacturing Assemblies on the group tile.

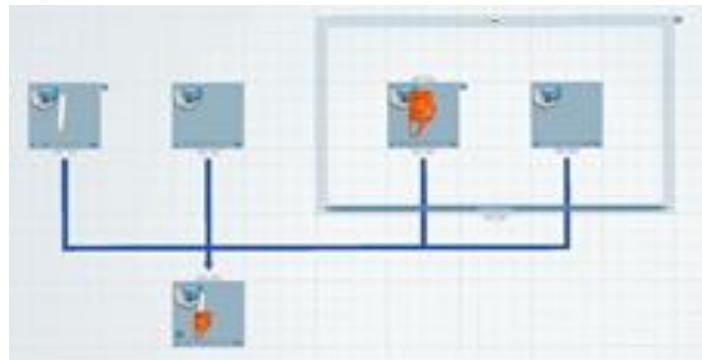
The two assemblies are included in the group.

Note: If the tile is collapsed, the 3D representation of the two assemblies is displayed on the tile.



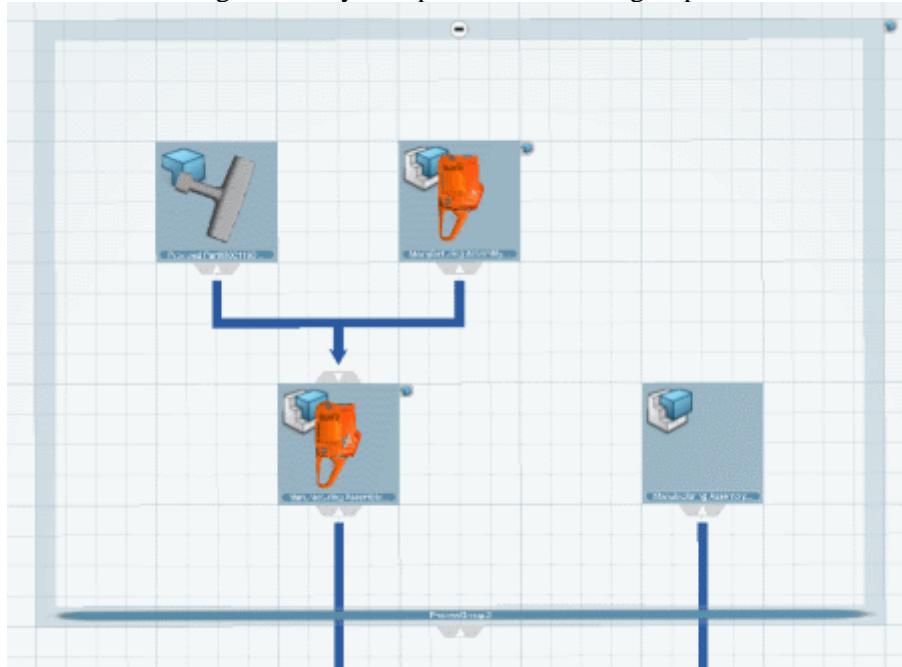


4. Click **Expand**  at the top of the group tile.
The tile is expanded.



5. Select the Manufacturing Assembly tile with the 3D representation and select **Expand First Level** .

The Manufacturing Assembly is expanded inside the group.

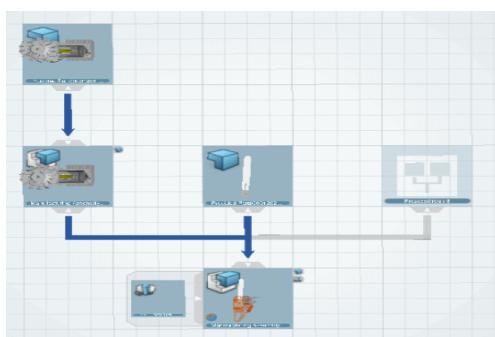


6. Right-click the group tile and select **Delete**.
The group is deleted.
Note: The original Manufacturing Assembly is not modified and no item has been deleted.

K. Create Subgroups

You can create subgroups of items using the **drag and drop** capability.

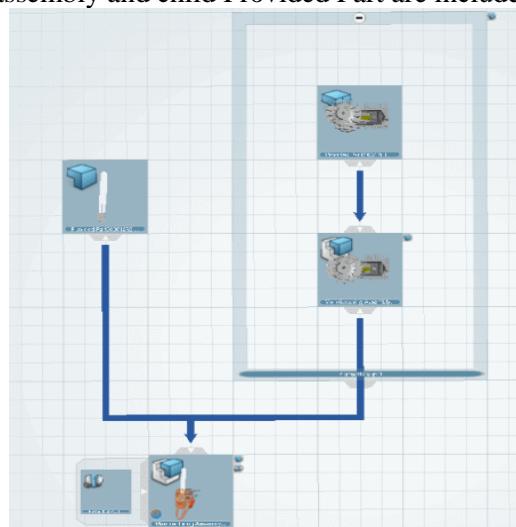
1. Create a group as shown below.



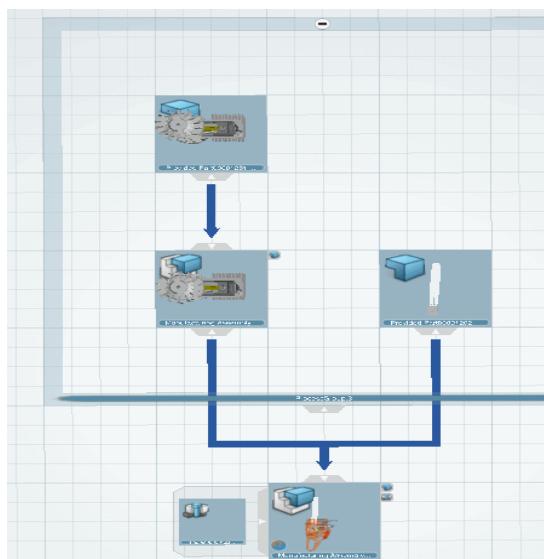


2. **Drag and drop** the Manufacturing Assembly on the group tile.

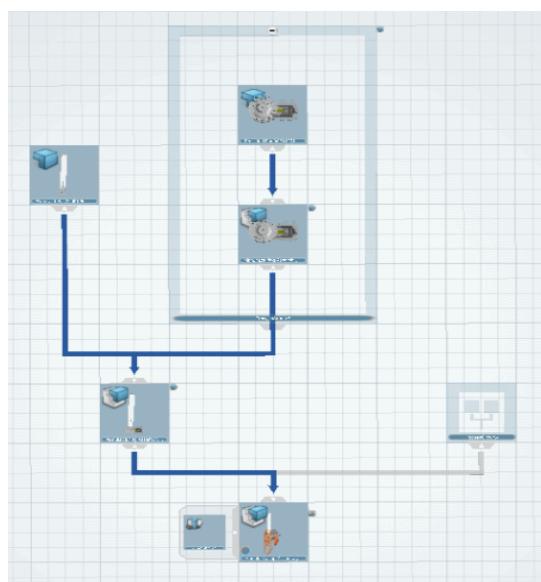
The selected assembly and child Provided Part are included in the group.



3. **Drag and drop** the Provided Part on the group tile.

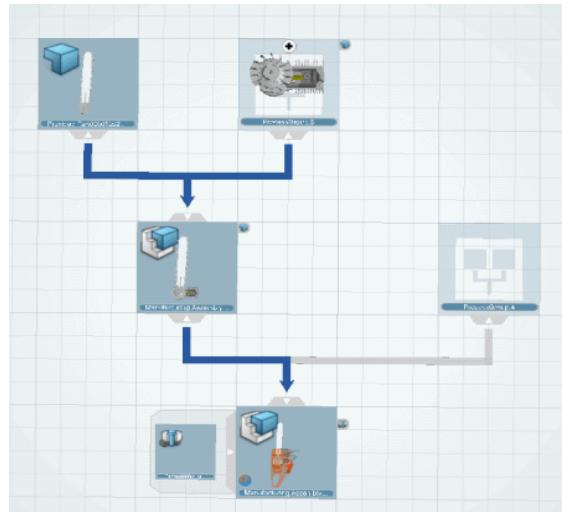


4. Create a new group as shown below.

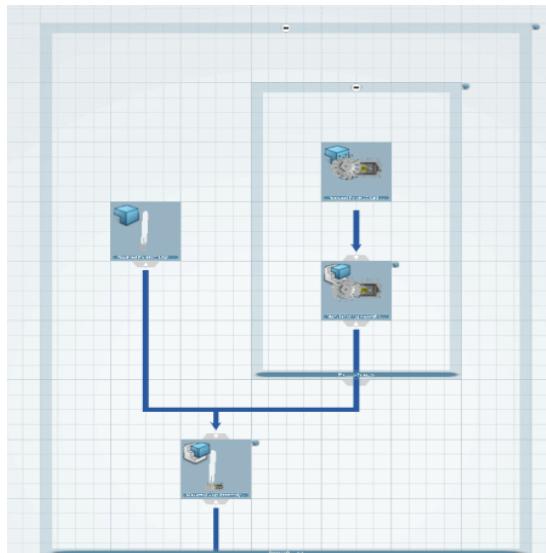




5. Click **Collapse** at the top of the first group tile.



6. **Drag and drop** the Manufacturing Assembly on the second group.



The selected assembly, its child items, and the first group are all included in the second group.
The first group is now a subgroup of the second group.

L. Using the 3D View in Manufactured Item Definition

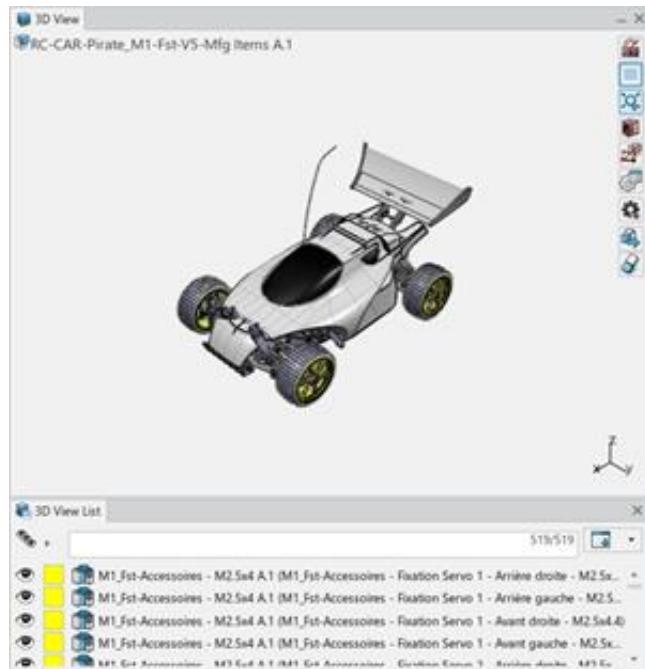
You can use the 3D View panel to visualize the 3D representation, FTA annotations, and product build-up of a selected item, product, system, operation, or resource.

The following scenario illustrates how to use the 3D View panel on a selected manufacturing assembly.
The same procedure can be used for a product, system, operation, or resource.

1. Select a manufacturing assembly in the tree.
2. From the Authoring section of the action bar, click 3D View .
3. To show the 3D View List panel, from the 3D View panel, select List Shown .

The manufacturing assembly is displayed in the 3D View panel according to design colors. This is the default option.

The 3D View List panel lists the products implemented by the selected manufacturing assembly. The colored square next to the product indicates the build-up category.



4. To manage the display of the implemented products, select General Options in the 3D View panel.
5. To apply the build-up colors of the manufacturing assembly in the 3D viewer, select Show Build-Up Colors ON .



Notes:

- To manage the displayed build-up categories, select Display Options in the 3D View panel.
- You can click Product Build-Up options at the right edge of the work area to display the Product Build-Up options panel.
- For more information about the 3D View panel and the product build-up, see the Common Services for Process Engineering Apps User's Guide.



Module-1.H: Using the Relations Panel

This section describes the Relations panel that, for a selected object, lists all the related objects in the current session.

In this section:

- About the Relations Panel
- Listing Related Objects in the Relations Panel
- Loading Related Objects in Session Using the Relations Panel

A. About the Relations Panel

When an object is clicked in the tree, the Relations panel provides a list of all the relations with the other objects in the current session.

- Relations Listed After Object Selection
- Lock Mode for Input Selection
- Display of First Upper Scope Objects
- Cross Highlighting
- Panel Update Capabilities

B. Relations Listed After Object Selection

When you select an object, the Relations panel lists all the relations with the other objects in the current session.

Note:

- You can start and update the panel with one or more selected objects. These objects must be of the same type.
- You can select one or more listed objects directly in the panel.
- You can edit properties of objects that are listed in the panel.
- You can delete relations between objects using Remove Relation from the context menu. Remove Relation does not support Multi-Selection.

Relations listed in the panel depend on the selected objects, and can include scope links, implement links, data requirements, product flows, time constraints, and so on. For example, if you select a product, all items that have scope and implement links with it are listed in the panel. If you select an operation, all items and resources that have relations with it are listed in the panel, including scope, implement, and requirement links as well as time constraints.

For more information about possible relations, see the list of the Table 1.

C. Lock Mode for Input Selection

The Lock mode lets you restrict input selection to the Relations panel.

Lock mode is enabled and disabled by clicking the icon at the top of the panel.

In Lock mode , you can select objects in the panel or update the panel by double-clicking an object of the panel. However, the panel is not updated if you select objects outside the panel, such as selecting objects in tree. If the selected objects are in one or more lists of the panel, the corresponding list objects are highlighted.

In Unlock mode , selecting objects outside of the panel updates the panel with these objects. You can Multi-Select objects in the panel and in the tree at the same time.

D. Display of First Upper Scope Objects

All the implemented objects of all the first upper scopes are displayed in the implemented objects list.

Selecting a first upper scope object highlights the corresponding implemented objects in the implemented objects list.

E. Cross Highlighting

You can cross highlight objects between the **Relations** panel and the tree is available.

Selecting an object in the **Relations** panel highlights the selected object in tree and on the tiles if your app has a grid editor.

For each object shown in the **Relations** panel, it is possible to select it by a single click. This object is



then highlighted in the tree.

Double-clicking an object in the panel will define this object as current, and update the panel accordingly. In addition, other applications and panels such as the **3D View** panel take the objects clicked in the **Relations** panel into account.

F. Panel Update Capabilities

The Properties panel is updated after structure modifications and during systems simulation.

The Relations panel is updated to reflect modifications in the model structure (such as adding a new item, operation or resource, creating new implement links, and so on).

The Relations panel is integrated in systems simulation. The panel is refreshed with the focused objects of the simulation each time these objects change. The Lock mode has no effect on systems simulation.

G. Listing Related Objects in the Relations Panel

When you select a product, item, resource, system, or operation, the Relations panel lists all the relations with the other objects in the current session.

1. From the Authoring section of the action bar, click Relations

An empty Relations panel appears.

2. Select an item in the tree.

You can select an item tile if your app has a grid editor.

The Relations panel lists the relations of the selected item with products, systems, operations, and resources as well as data requirement and precedence links.

The screenshot shows the Relations panel with the following details:

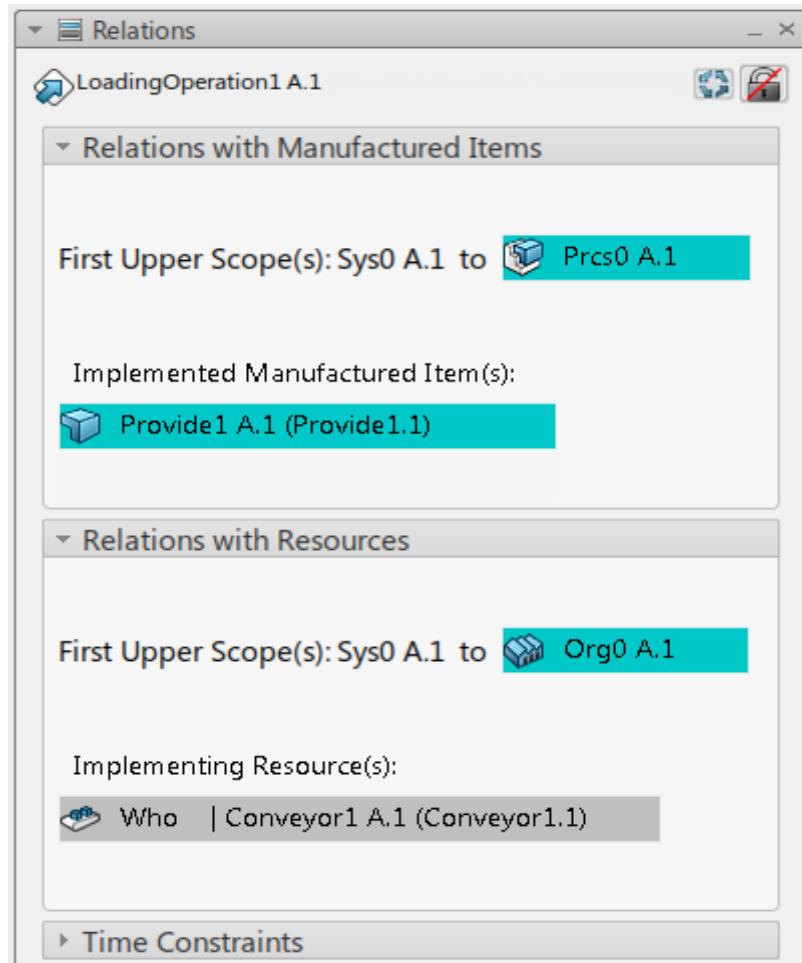
- Relations with Products:**
 - First Upper Scope(s): Prcs0 A.1 to Prd0 A.1
 - Implemented Product(s):
 - Prd1 A.1 (Prd1.1)
- Relations with Systems and Operations:**
 - First Upper Scope(s): Prcs0 A.1 to Sys0 A.1
 - Implementing Operation(s):
 - LoadingOperation1 A.1
- Data requirements:**
 - Predecessors:
 - Successors:
 - Prcs0 A.1
- Precedences**
- Relations with Resources**

3. Select an operation in the tree.

You can select an operation tile if your app has a grid editor.



The Relations panel lists the scope links and implement links of the selected operation with items and resources, as well as the time constraints with other operations.



Tip:

- You can access the Constraint Properties panel to edit time constraints or manage product flows by right-clicking one of them, then by clicking Constraint Properties in the context menu.
- You can customize the panel to your needs using XML files to define which information appears in the panel. For more information, see Relations Panel Customization.

H. Loading Related Objects in Session Using the Relations Panel

You can display linked objects that are not loaded in session and load these objects in session using the Update from database command in the Relations panel.

Before you begin: Load a Manufacturing Assembly and a System structure in your session. In this scenario, one or more items implemented by an operation must not be loaded in session.

1. From the Authoring section of the action bar, click Relations .

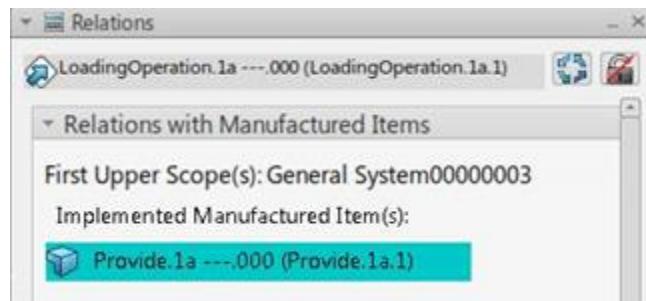
An empty Relations panel appears.

2. Select an operation in the tree (LoadingOperation.1a, for example).

You can select an operation tile if your app has a grid editor.

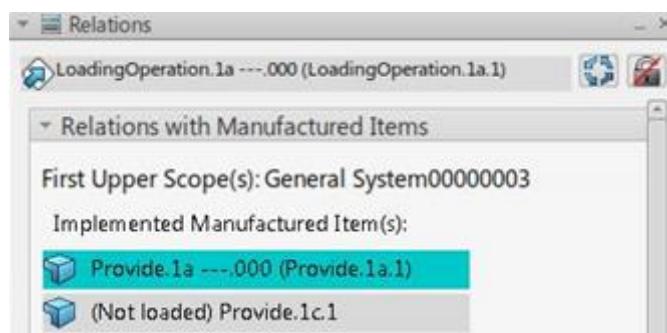
In this scenario, an item implemented by the selected operation is not loaded in session.

The Relations panel lists the related objects of the selected operation that are loaded in session.



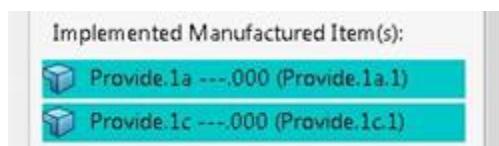
- Click Update from database in the panel.

The objects that are related to the selected operation that are not loaded in session are listed in the panel. They are prefixed with the text "Not Loaded" (item Provide.1c, in this example).



- Double-click the unloaded item in the panel.

The item (Provide.1c, in this example) is loaded at its correct location in the System structure, and it is listed in the Relations panel.



I. Using the Spreadsheet

You can use the spreadsheet to browse and edit planning content.

You can add custom attributes using business logic

(DELSSEListCustomizedAttributes_ID and DELSSESetCustomizedAttributeValue_ID).

This task shows you how to:

- Insert PPR Objects
- Manage PPR Object Attributes
- Filter PPR Objects
- Group PPR Objects
- Manage Presets
- Export Content

Before you begin:

- Open a PPR Context with a root Manufacturing Assembly in your app.
- To open the spreadsheet panel, click PPR Spreadsheet from the Authoring section of the action bar and select the root Manufacturing Assembly.

Tip: To make the spreadsheet dialog boxes floatable, click Show Preferences and select the Show Managers as Floatable option.



J. Insert PPR Objects

Using the spreadsheet, you can insert PPR objects such as items, operations, and systems.

The scenario below illustrates how to insert several unloading operations.

1. In the spreadsheet, click Insert New Content
2. From the list, select the type of PPR object you want to insert.
3. In the box, enter the number of PPR objects you want to insert.
4. Click Validate

K. Manage PPR Object Attributes

You can hide or show, reorder, and edit attributes.

1. In the spreadsheet, click Attributes Manager

The list of available attributes appears, in the order of the spreadsheet.

2. To manage attributes display, use the following commands:

Command	Description
	Hides or shows all attributes.
	Hides or shows a single attribute.
	Moves the selected attribute up or down the list.

3. To edit an attribute, select its value in the spreadsheet and enter a new one.

L. Filter PPR Objects

You can filter PPR objects based on attribute values.

1. In the spreadsheet, select an attribute then click Filters Manager

The list of available values for the attribute appears.

2. To filter values of the attribute, use the following commands:

Command	Description
	Hides or shows all attribute values.
	Hides or shows a single attribute value.

M. Group PPR Objects

You can create grouping nodes to group PPR objects based on attribute values. This enables you to select and edit all objects in a group simultaneously.

The scenario below illustrates how to group objects by type.

1. In the spreadsheet, click Groups Manager
2. Click Create Group
3. From the list, select an attribute such as Type.

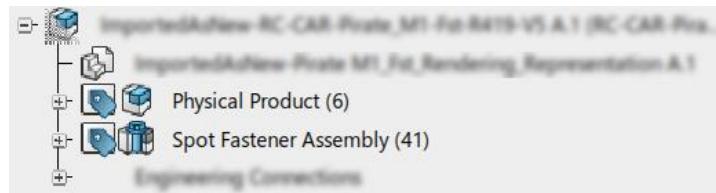
The list of available values for the attribute appears.

Type			
	Type here to filter content		
	Physical Product		
	Spot Fastener Assembly		

4. Using Hide and Show , display only the values for which you want to create a group.
5. Click Validate



A grouping node is created for each value.



N. Manage Presets

You can save the current configuration of the spreadsheet or apply an existing one.

1. In the spreadsheet, click **Presets Manager** .
2. To save the current configuration of the spreadsheet:
 - a. **Optional:** In the box, enter a name for the preset.
 - b. Click **Create Preset** .

A preset containing the current attributes, filters, and groups of the spreadsheet is created.

Tip: You can share the preset using the file automatically downloaded in the CAT settings.

3. To apply a preset to the spreadsheet, click **Load Preset** .

You can revert to the default configuration by clicking .

4. To update a preset with the current configuration of the spreadsheet, click **Save Preset** .

O. Export Content

You can export the spreadsheet content as a text, CSV, or TSV file.

1. Select the spreadsheet content.

Note: If only one line is selected, it will be the only line exported. To export the entire spreadsheet content, select all the lines.

2. Click **Export Content** .
3. Specify the folder in which to export the file, name the file, and choose a file type from the list.
4. Click **Save**.

A file containing the selected spreadsheet content is created in the specified folder.

P. Assigning Product Structure Nodes to Items

You can assign the nodes of a product structure to the items in a manufacturing assembly structure. The quantity for each item is automatically retrieved through business logic.

Before you begin: Open your content, which must contain a product structure and a manufacturing assembly structure with a scope defined between both roots.

1. From the Authoring section of the action bar, click PPR Spreadsheet .

The spreadsheet appears, displaying attributes of the objects. For more information, see Manage PPR Object Attributes.

Display Name	Continuous Quantity	Planning Required(R)
Skateboard	1	YES
Board	1	YES
Front Axle	1	YES
Rear Axle	1	YES



2. From the tree or from the spreadsheet, drag a product node to a manufacturing item. A provided part is created and appears in the spreadsheet and in the item editor.

Display Name	Continuous Quantity	Planning Required(R)
Skateboard	1	YES
Board	1	YES
Front Axle	1	YES
Rear Axle	1	YES

The products are assigned to the items. The quantity for each item is retrieved through business logic (Product or Part is Continuous (DELMA_IsContinuous_Product_ID)) and displayed in the spreadsheet.

Notes:

- You can drag a provided part with a discrete quantity from item A to item B. In this case, the dragged provided part is directly assigned to item B.
- If you drag provided part A with a continuous quantity from item A to item B:
 - Sometimes the continuous quantity specified for item B is smaller than the one specified for item A. In this case, a new instance of provided part A (Provided Part B_2) is assigned to item B.
 - Sometimes the continuous quantity specified for item B is smaller than the one specified for item A. Plus, that item B already has a provided part with a continuous quantity assigned. In this case, the specified continuous quantity is added to the existing provided part.
 - Sometimes the continuous quantity specified for item B equals the quantity specified for item A. In this case, provided part A is deleted and replaced with a new instance assigned to item B.

Q. Managing the Resulting Product

You can manage the resulting product using a group of contextual commands that is available on each tile of the item editor. A resulting product is made up of the products directly assigned to the item and the output of any predecessors. A resulting product can be either created automatically by computation or defined manually by selecting an existing product. It can be opened in a new authoring tab as a manufacturing assembly.

This task shows you how to:

- Compute Resulting Product
- Define Resulting Product
- Open Resulting Product in New Tab
- Remove Resulting Product
- Update Resulting Product
- Compute Resolved Resulting Product
- Display Resulting Product
- Reconnect an Item with a Resulting Product Revision
- Computing/Updating a Resulting Product

Before you begin: Open your manufacturing assembly and product structures.

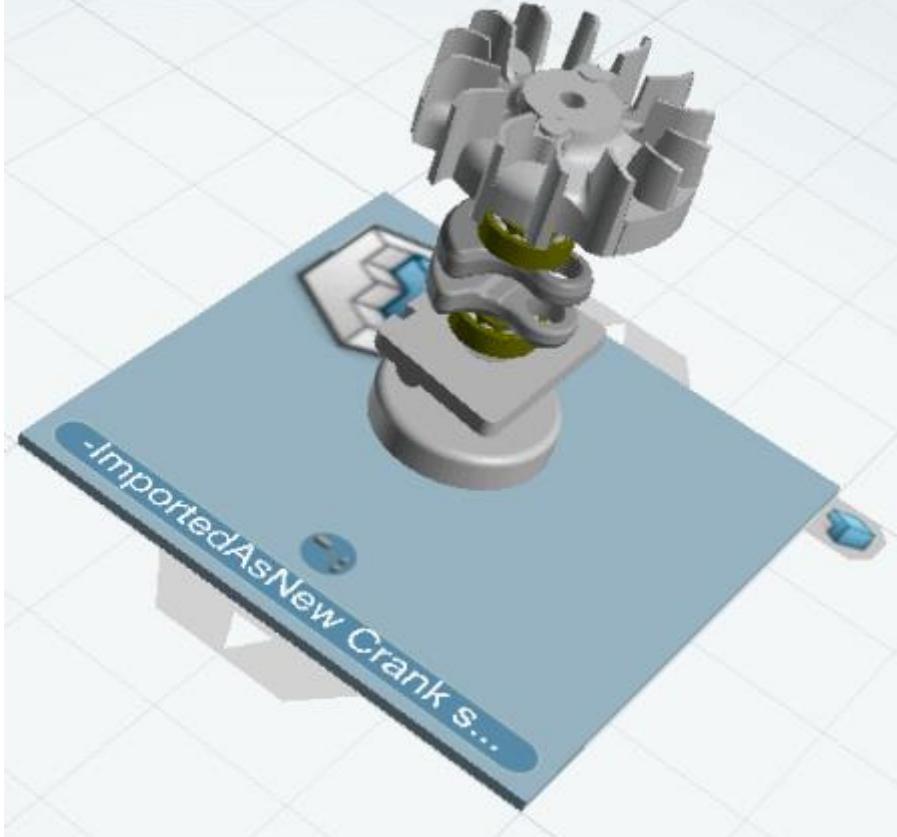


R. Compute Resulting Product

You can compute an item's resulting product from the output its predecessors and the products directly assigned to it.

- Right-click the tile and select Resulting Product > Compute Resulting Product.

The output product is then computed and associated with the item. A message is issued and an icon is displayed on the tile to indicate that a resulting product is linked to the item.



Note: The following commands become available in the context menu to manage a computed resulting product:

- Open Output in New Tab
- Remove Resulting Product
- Update Resulting Product

S. Define Resulting Product

You can select an existing product as an item's resulting product. If there was already a resulting product on the item, it is replaced.

- Right-click a tile and select Resulting Product > Set Resulting Product.
A dialog box appears allowing you to search for and select a product.

- Select the product to link to the item.

Sometimes one or more products are already assigned to the item. In this case, a message box appears prompting you to confirm that you want to replace the assigned products with the selected product.

The product is displayed on the tile. An icon shows that a resulting product is linked to the item.

Note: The following commands become available in the context menu to manage a resulting product that has been defined manually:

- Open Output in New Tab
- Remove Resulting Product



T. Open Resulting Product in New Tab

You can open a resulting product in a new authoring tab.

1. Select a tile that has a link to a resulting product.
2. Right-click the tile and select **Resulting Product > Open Output in New Tab**.

The resulting product, prefixed MfgAssy for Manufacturing Assembly, is opened in a new authoring tab, and can then be edited like any product.

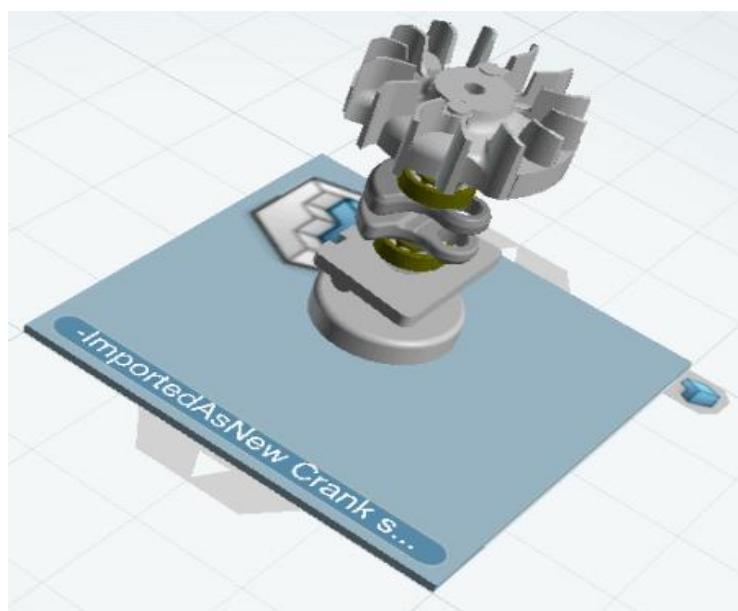


U. Remove Resulting Product

You can break the link between an item and the resulting product.

1. Select a tile that has a link to a resulting product.
2. Right-click the tile and select **Resulting Product > Remove Resulting Product**.

The link from the item to the resulting product is broken. A message is displayed and the icon is no longer displayed on the tile.



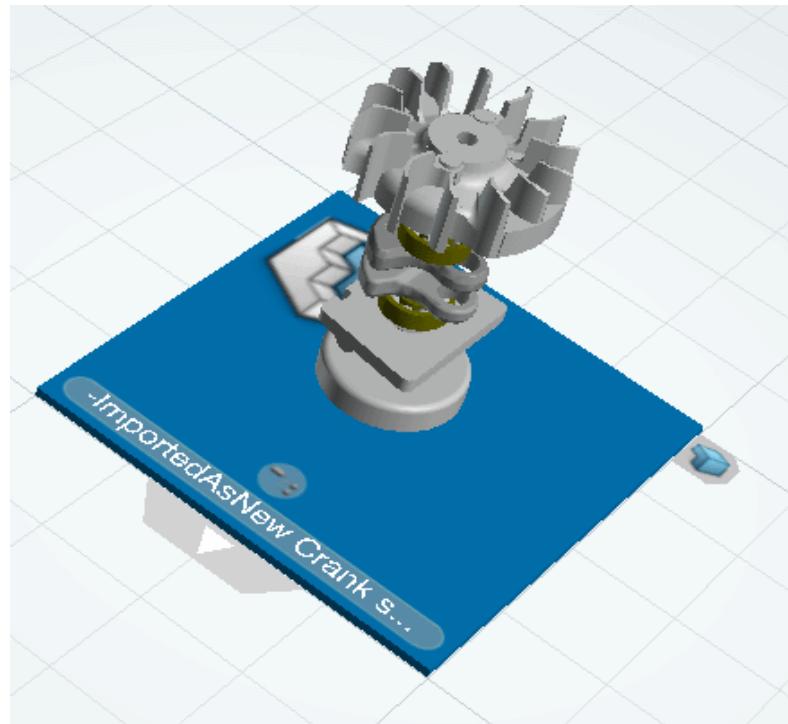


V. Update Resulting Product

Sometimes the resulting product was created automatically using **Compute Resulting Product**, and the specifications of the output have been modified. In this case, the resulting product can be recomputed using **Update Resulting Product**.

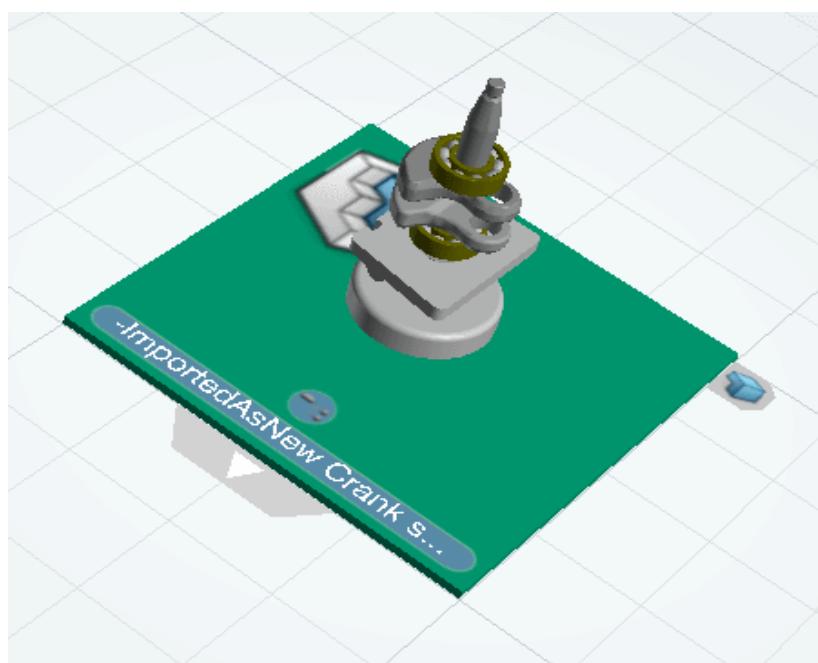
1. In the Manufacturing Assembly illustrated in the tasks above, delete a Provided Part such as the item that implements the FLYWHEEL product.
2. In the **B.I. Essentials** panel, select **Update Status**.

The tile is highlighted in blue, indicating that the item has been impacted by a modification and is not up-to-date.



3. Right-click the tile and select **Resulting Product > Update Resulting Product**.

The resulting product is recomputed from the specifications. The tile is highlighted in green, indicating that the item is up-to-date. The FLYWHEEL product is no longer shown on the tile.





4. Right-click the tile and select **Resulting Product > Open Output in New Tab**.
The updated resulting product is opened in the authoring tab.



The FLYWHEEL product is no longer present.

W. Compute Resolved Resulting Product

You can compute several resulting products for a single item reference, depending on the configuration filters defined on the item reference. The configurations must be created before defining or computing a resulting product.

1. On the root item, create two configurations, one per option: Japan and Britain.
2. Enable the **Define Effectivity** mode.
3. Drop the first two products on the tile and select the Japan effectivity.
4. Drop the last two products on the tile and select the Britain effectivity.
5. Right-click the root tile and select **Resulting Product > Compute Resulting Product**.

The **Selection of the Configuration** dialog box is displayed. The configurations have **Not computed** status.

6. Check that the two options then click **OK**.
7. Right-click the root tile and select **Resulting Product > Compute Resulting Product**.

A message is issued and an icon with a filter symbol is displayed on the tile to indicate that output products are computed for the item. The **Selection of the Configuration** dialog box is displayed. The configurations have **Up to date** status.

8. Right-click the root tile and select **Resulting Product > Open Output in New Tab**.
9. Select the Japan configuration in the **Selection of the Configuration** dialog box then click **OK**.

The output for Japan is displayed in a new tab.

10. Right-click the root tile and select **Resulting Product > Open Output in New Tab**.
11. Select the Britain configuration in the **Selection of the Configuration** dialog box then click **OK**.

The output for Britain is displayed in a new tab.

Note: The **Selection of the Configuration** dialog box is also displayed for the following contextual commands if configurations are defined:

- **Set Resulting Product**
- **Remove Resulting Product**
- **Update Resulting Product**



X. Display Resulting Product

You can display a resulting product on an item tile using **Load Resulting Product**. This command is useful to display products for specific items only.

1. Select one or more item tiles.
2. From the **Authoring** section of the action bar, click **Load Resulting Product**

The resulting product is displayed on the selected tiles.

Note:

- Alternatively, you can right-click an item and click **Load Resulting Product**
- If no item is selected, **Load Resulting Product** loads the resulting product of all the items in session.
- To automatically display products of all the items in session, select **Automatically Load Resulting Products** in Me > Preferences > Manufacturing Planning > Manufactured Item Definition.

Y. Reconnect an Item with a Resulting Product Revision

For resulting products that have been manually defined, you can use **Reconnect on Revision** to reconnect a new version of a resulting product on an item.

1. Right-click a tile and select **Resulting Product > Reconnect on Revision**.
2. In the panel that appears, select a revision from the list.

The new revision is loaded in session and the item is automatically linked to this new revision.

Z. Computing/Updating a Resulting Product

You can use the **Compute/Update Resulting Product** command to compute/update a manufactured or provided part's resulting product that was created with the **Replace by New** command.

1. Click a part with a resulting product in the tree.
2. Right-click the part and click **Resulting Product > Compute/Update Resulting Product**.

The resulting product is computed/updated.

AA. Loading Required Products and Parts to Items

You can assign required Products and Parts to items, making use of work delegation capabilities.

You can delegate the item detailing work to different persons, with the minimum required data loaded in session. You can also provide flexibility with different types of Product structures that can either be very structured or have only a few Product structure levels.

This task shows you how to:

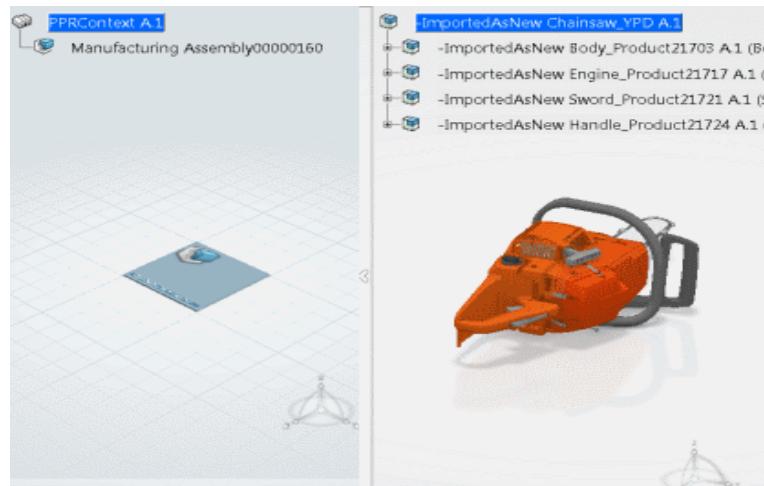
- Insert a Product Structure in PPR Context
- Assign Products

Before you begin: In Me > Preferences > App Preferences > Simulation > Process Engineering > Manufactured Item Definition > Item Grid Editor, select the **Insert product in PPR structure when item editor is opened on product** option.

BB. Insert a Product Structure in PPR Context

You can insert a Product structure in a PPR Context by dragging and dropping the root product node from one window to the PPR Context node in another window.

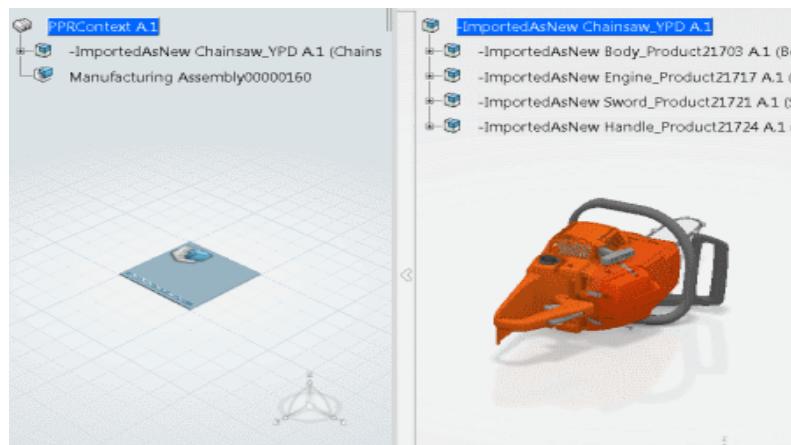
1. Open your Product in an authoring session.
2. Open the Manufactured Item Definition or Fastened Item Definition app. Tile your windows vertically as shown below.



Note: The Product structure is not inserted in the PPR Context due to the option defined in Me > Preferences.

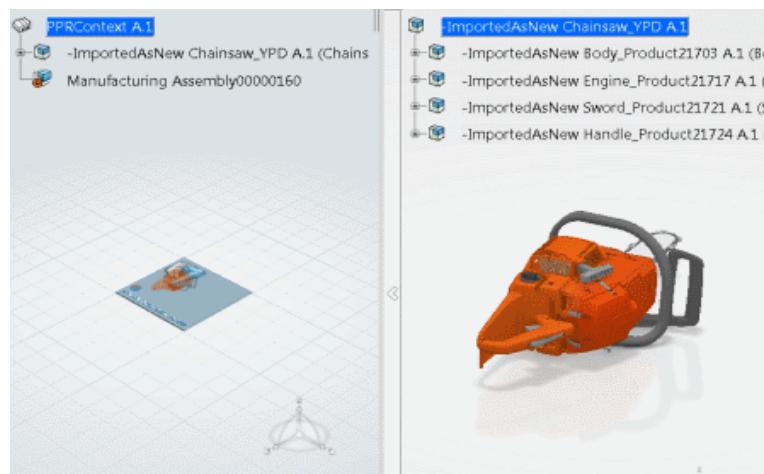
- Select the root product node in one window, then drop it on to the PPR Context node in the other window.

Product structure is inserted. However, no link is created.



- Right-click the Manufacturing Assembly tile in the item editor and select **Create item-product scope**.
- Select a product node.

A Item-Product scope is created from the root Manufacturing Assembly to the selected Product.



Note: A red mask appears on the Manufacturing Assembly node in the tree to indicate that a Item-Product scope has been created. Also, the Item-Product scope icon appears on the tile.



CC. Assign Products

You can assign products to items by **drag and drop**.

1. Expand the product tree to see the product structure.
2. Create predecessors in the item editor to create two Manufacturing Assemblies.
3. Select a Product, then drop it on one of the Manufacturing Assemblies.

The Product is assigned to the Manufacturing Assembly.



4. Select another Product, then drop it on the other Manufacturing Assembly.
- The Product is assigned to the Manufacturing Assembly.





Module-1. I: Navigating in the Item Editor

This section describes how to use navigation tools in the item editor.

In this section:

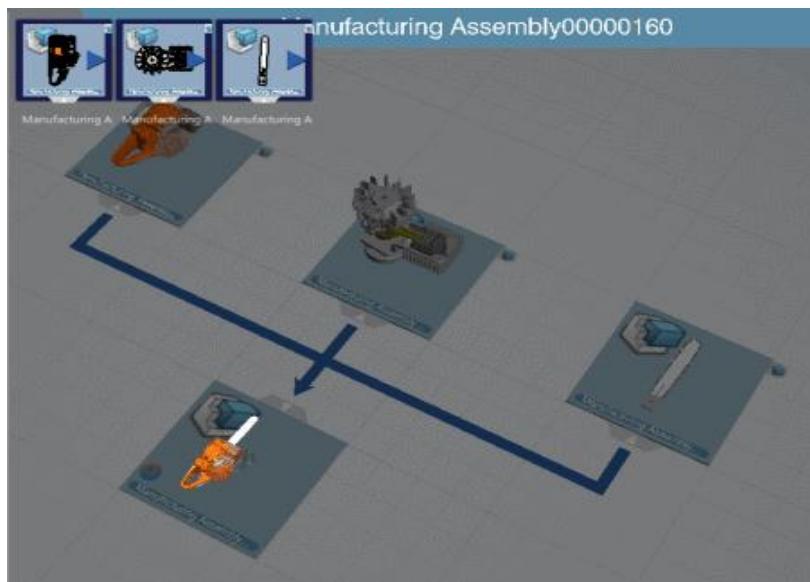
- Navigating in Smart Zoom
- Using Digger

A. Navigating in Smart Zoom

You can use Smart Zoom to navigate to predecessors and successors of a selected item. You enter and leave Smart Zoom by pressing the F6 key.

Before you begin: Open a manufacturing assembly structure in Manufactured Item Definition.

1. Click a tile then press the F6 key to activate the Smart Zoom mode.



You can use the mouse to manipulate the product content independently.

The left-hand thumbnails enable you to navigate to the predecessors.

The right-hand thumbnail enables you to navigate to the successors, if any exist.

2. Select one of the left-hand thumbnails.

The selected predecessor is viewed in Smart Zoom mode, and you can manipulate the product content.



3. Press the F6 key to deactivate the Smart Zoom mode.

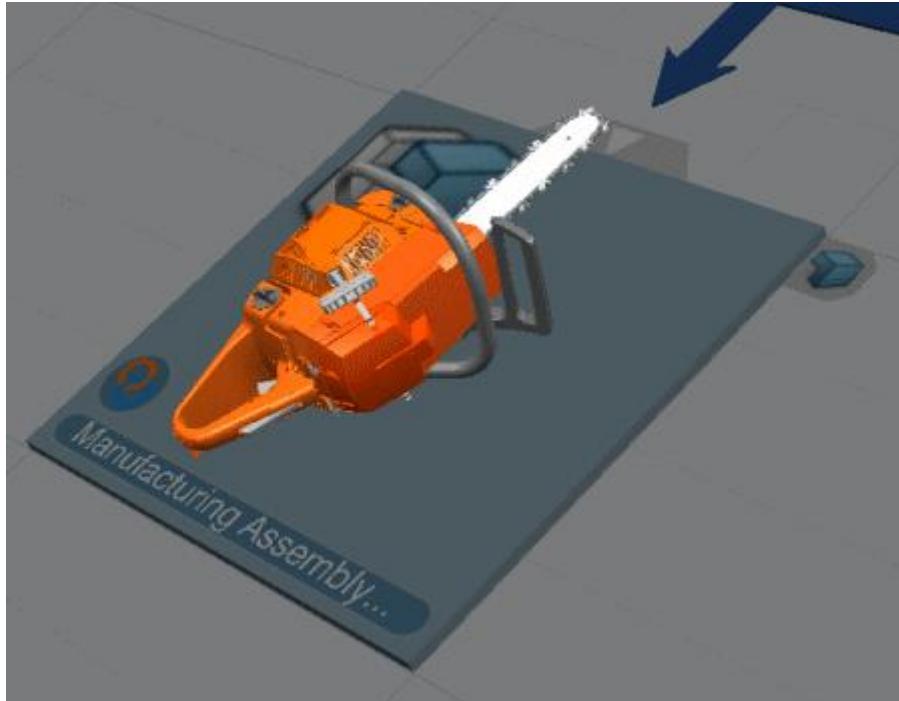


B. Using Digger

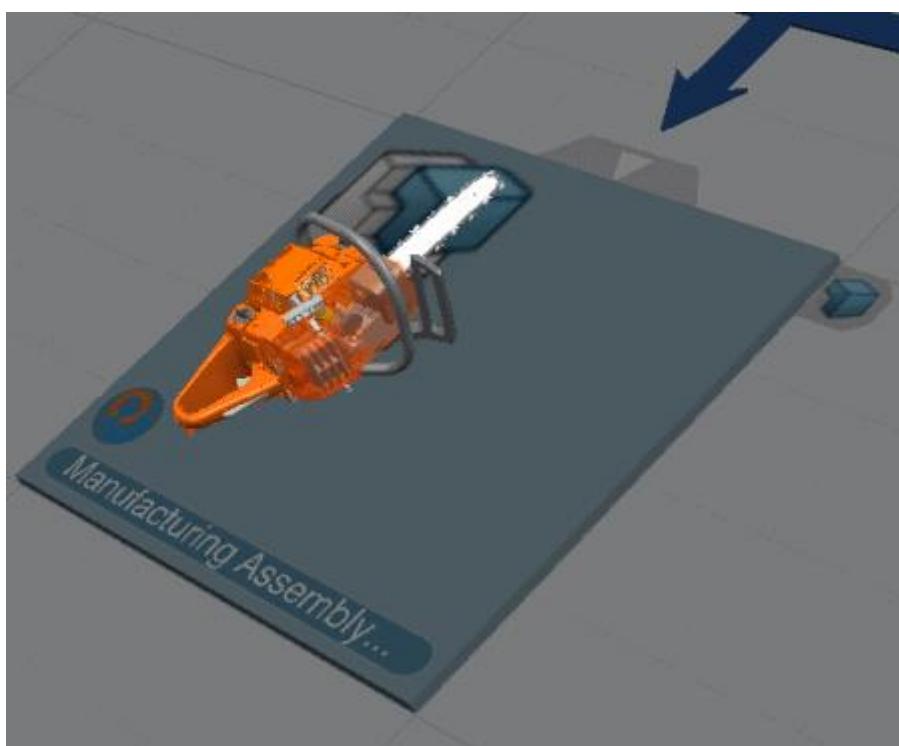
When the Smart Zoom is active, you can press the F7 key to activate the digger capability. The digger lets you expose geometry that may be hidden or obstructed by other parts of the 3D.

Before you begin: Open the Manufactured Item Definition or Fastened Item Definition app.

1. Press the F6 key to access the Smart Zoom capability.

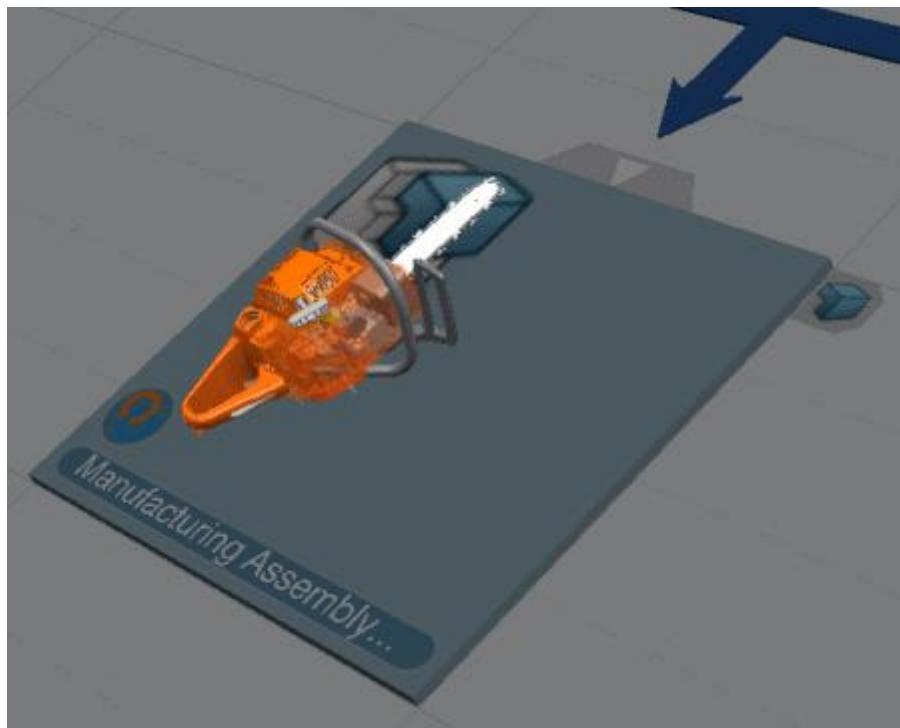


2. Position the pointer over an external part and press the F7 key.
The geometry below the selected part is exposed.





3. Position the pointer over another external part and press the F7 key.
The geometry below the selected part is exposed.



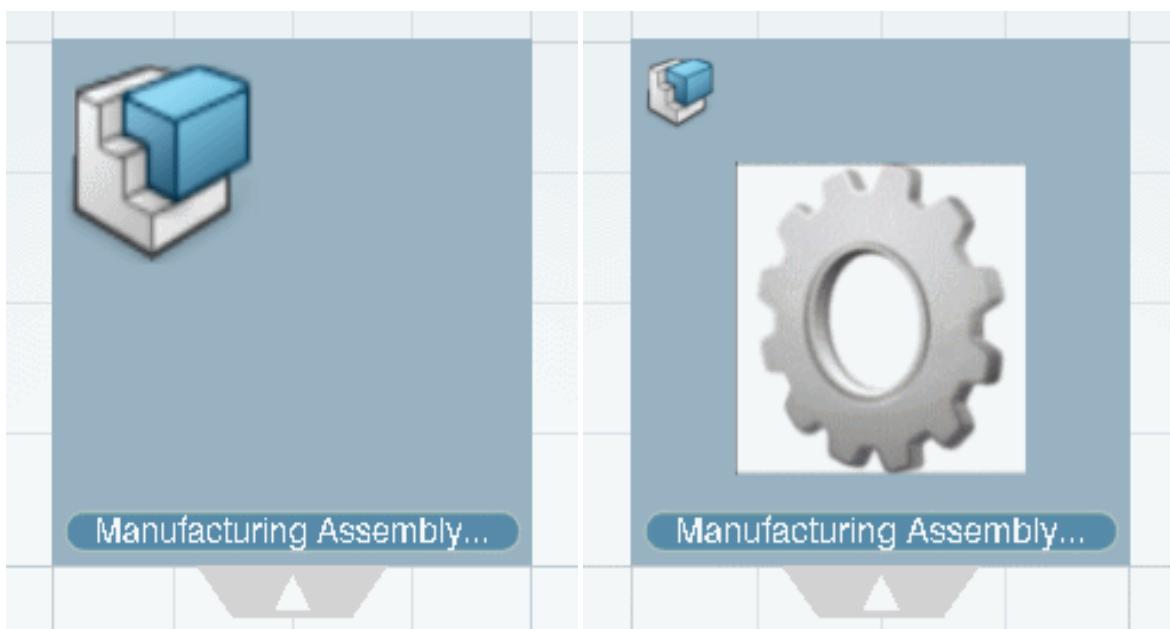
You can continue to press F7 to hide parts that become exposed, and so dig deeper into the assembly.

4. Press the F8 key as many times as required to make parts visible again.
The parts are made visible again in the reverse order of the previous selections.

C. Associating a Picture to a Tile

You can include a customized picture on an item tile. The picture is a 2D representation.

1. Right-click a tile and select Picture Definition > Define Picture.
A dialog box appears allowing you to select the required picture.
 2. Choose a picture and click OK.
- The picture is added to the tile.





Notes:

- You can select bmp, jpg, jpeg, and png images.
- A picture can be removed by right-clicking the tile and selecting Picture Definition > Remove Picture.
- Define Picture and Remove Picture are available only when the instance of the selected item is editable.

Module-1. J: Change Management and Manufacturing Assemblies

This section provides background information about managing design changes and editing the Manufacturing Assembly structure to produce the modified product.

In this section:

- About Change Management
- Managing Changes
- Managing Minor Revisions
- Managing Changes with Resulting Products

A. About Change Management

Depending on the nature and characteristics of a design modification, the manufacturing planner must be able edit the Manufacturing Assembly structure to produce the modified product.

The following topics are discussed:

- Design Changes
- Interchangeability
- How Item Minor Revisions Are Managed
- Effectivity and Variability Space
- Product Configuration
- Implement Link
- Replace Menu

B. Design Changes

Product design is an iterative procedure. Several changes are usually made to the initial product definition. A typical change could be the replacement of an object by a different one or by another revision of the object, usually a more recent revision.

An important function of the manufacturing planner is to save the design changes performed in the Product structure to the Manufacturing Assembly structure. The various types of design changes are discussed below.

Correction

A correction is a modification of the attributes or the representation attached to a Product structure object, mainly a reference object, that must have no impact on any downstream application.

Typically, corrections are performed by:

- Demoting an object from released or shared status to a modifiable one
- Modifying the object
- Promoting the object back to shared or released status.

Minor Modification

A minor modification is a change that does not impact the interface of the modified object, only its internal definition.

Minor modifications are performed by Replace by Revision under Design Action authority. The naming of the object is kept, only a suffix (- -) is added. Its history is also kept. The new instance becomes a substitute of the replaced one. Both instances can be assembled.

Major Modification

A major modification is a change that has an impact on the interface specification of the object. Major modifications are performed by Replace by under Design Action authority. The naming of the



object is not kept. However, a history link is defined between the references and the two instances have the same logical identifier.

C. Interchangeability

Two objects are interchangeable if they can fit to the same context, have the same form, and the same function (FFF). In this case, the objects respect the same contract.

Minor Revision

A minor revision, also called minor, is a member of a family of minors. It is an object that can be editable and interchangeable with other minors. It reflects minor changes, with low impact, from one part to another.

Two minors have the same external identification. They are often called Part Number, or Dash Number in the aerospace industry, for example. A minor revision index is incremented when creating a new minor revision.

Revision

A revision is a family of minor revisions. A revision is not editable as is. It is edited through the minors it comprises. Revisions are not meant to be interchangeable, because one of the FFF may be broken.

A revision reflects major changes between different revisions that may have some level of impact on assemblies relying on them.

Two revisions have the same external identification (Part Number or Dash Number in aerospace industry, for example). The revision index is incremented when a new revision is created.

Minor Sensitivity

A link is not minor sensitive if it can be solved on any minor of the family present in the session. A link is minor sensitive if it is physically linked to a minor of the family. If another minor of the family is present in session, the link is broken but it can be rerouted on that minor.

The minor sensitivity is described in the metadata that defines the link.

Item-Product Implement links are minor sensitive.

D. How Item Minor Revisions Are Managed

The impact of a minor change in the Product structure can be handled in the Manufacturing Assembly structure. A number of capabilities are available to create and manage item minor revisions to support common user scenarios.

item minor revisions may be created to:

- Take into account in the Manufacturing Assembly structure any modifications to the Product structure.
- Stop propagation of the impact in the Manufacturing Assembly structure of the management of item revisions.
- Take into account in the Manufacturing Assembly structure any low-impact modifications.

The available capabilities enable the following scenarios to be addressed:

- Creation of a minor revision of a part, which leads to creating a minor revision of the item that implements the part, to take into account this new part minor revision. Here, there are two distinct cases:
 - A standard part that is bought (BUY) and then provided to the Manufacturing Assembly.
 - A part that needs to be manufactured, MAKE. In this case, a Manufactured Part implements the part. A Manufactured Part is closely linked to a given part minor revision by means of a reference-reference link.
- Impact propagation of part revision in the Product structure is stopped by a minor revision of the product node that owns the part.

In this case, the manufacturing planner may want to take into account the part revision by a revision of the implementing item. The planner can then stop the propagation of the impact of this revision in the Manufacturing Assembly structure. They can do this by means of a minor revision of the item node that owns the implementing item. Here, there are two distinct cases:

- A standard part that is bought (BUY) and then provided to the Manufacturing Assembly
- A part that needs to be manufactured, MAKE. In that case, a Manufactured



Part implements the part.

- Without any modification on the product side, the manufacturing planner may want to manage different alternatives to manufacture the part by means of a minor revision of the item node, which is a Manufactured Part. Here, there are two distinct cases:
 - Stock modification.
 - Modification in the way the secondary fastener industrialization is managed.
- Creation of a revision of a part, which leads to creating a revision of the implementing item. Impact propagation in the Manufacturing Assembly structure is stopped by means of a minor revision of the item node that owns this revision.

In this case, no Product node corresponds to the intermediate item node for which minor revisions are created.

E. Effectivity and Variability Space

Effectivity is the criteria that define the availability of an object for usage in a controlled configuration. In general, an effectivity is built from an expression. For example:

- An interval of serial numbers such as [1...100], meaning that an instance is available for all serial numbers between 1 and 100
- An interval of two dates, such as [Aug 2009, 5th-Dec 2009, 23rd], meaning that an instance is available for dates between the 5 August 2009 and the 23 December 2009
- A category, such as a roadster or a coupe
- A specification.

A variability space is a dictionary of configurations. It contains the different elements that can be used to define an effectivity or a product configuration expression.

F. Product Configuration

Product configuration is the criteria that identifies the suitable product elements for a specific configuration based on their effectivity in a controlled configuration.

G. Implement Link

An implement link specifies that a function performs the transformation that realizes a product.

The main implement links are as follows:

- A reference-reference link, between an item reference and a product reference, which defines a scope.
- An occurrence-occurrence link, between an item occurrence and a product occurrence, to specify that an item occurrence performs the transformation that realizes the product occurrence.

H. Replace Menu

You can apply changes, corrections, minor and major modifications in the product structure to the Assembly structure. To do so, you can use the commands of the Replace menu, which is available for all item types.

Replace Commands for Single Selection

Replace by Existing: Replaces the current item occurrence by another one.

Replace by Revision: Replaces the current item occurrence by another revision of it.

Replace by Latest Revision: Replaces the current item occurrence by its latest revision.

Overload Minor Revision: Overloads the current revision of an item occurrence with an existing minor revision. The selected item occurrence is not replaced: it is overloaded with a minor revision in session.

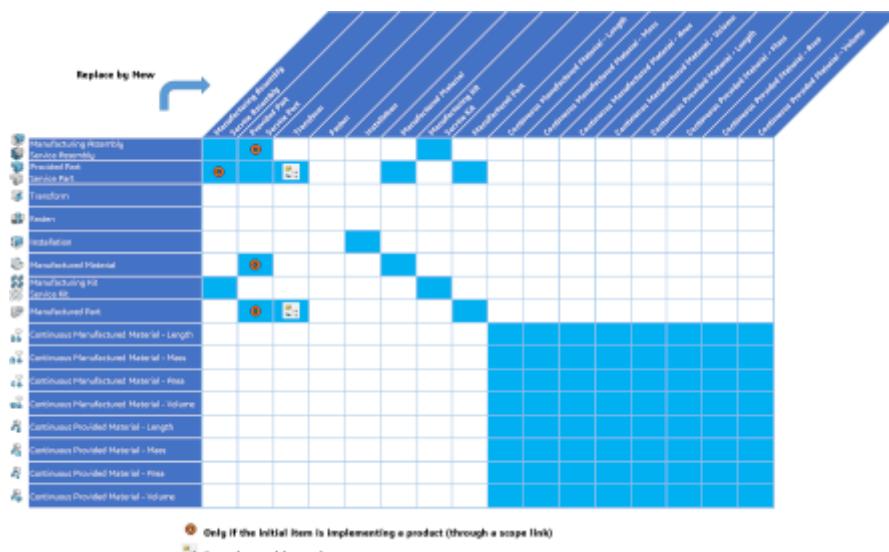
Overload Latest Minor Revision: Overloads the current revision of an item occurrence with the latest minor revision. The selected item occurrence is not replaced: it is overloaded with the latest minor revision in session.

Manage Latest Revisions: Displays a Revisions management options dialog box to let you update several item occurrences by their latest revisions.

Replace by New: Replaces the current item occurrence by a new item occurrence and creates the new



item's resulting product. From the submenu, select the target item type:



These commands have a similar behavior. First, you are prompted to select the replacing entity. Then the entity to replace is removed from the structure and the replacing entity is inserted in its place, if no effectivity split is requested. Finally, the relations impacted by the replacement are managed.

Replace Commands for Multiselection

You can multiselect objects to be replaced. In this case, two types of replacement can be done:

- N objects replaced by N objects.
- N objects replaced by 1 object.

Replace Items by Latest Revision

Replaces each selected object by its latest revision (N objects replaced by N objects). This command is available if different object types are selected (items and systems, for example).

Replace Items by Existing

Replaces selected objects by a single object of the same type (N objects replaced by 1 object). This command is not available if different object types are selected.

I. Managing Changes

You can save design changes performed in the Product structure to the Manufacturing Assembly. Design changes can be corrections as well as minor and major modifications. For that, you can use the commands of the Replace menu, which is available in the tree and on the tiles for all item types.

This task shows you how to:

- Replace by Revision, Without Effectivity Split
- Replace by Revision, With Effectivity Split
- Replace by Existing, Without Effectivity Split
- Replace by New, Without Effectivity Split

Before you begin: Open the Manufacturing Assembly to be modified in your app.

J. Replace by Revision, Without Effectivity Split

You can replace an item occurrence by another revision of the same entity and use mechanisms to handle the relations referencing the replaced entity. You can reconnect or duplicate in the case of a configured replace.

1. On the tile (or in the tree), select the entity to replace, then right-click Replace > Replace by Revision.

The Replace Options dialog box appears.

2. If relations point to the entity, select one of the proposed analysis options:
 - Automatically reconnect: the system tries to reconnect the relations and you are prompted



for input if no automatic reconnect is possible

- Browse: you are prompted for input to reconnect the relations
- No analysis: relations are not managed.

The Select a Revision dialog box appears.

3. Select the replacing revision and click OK.

The current item is replaced by the selected one.

4. In the Edit Links & Relations dialog box, if you selected Automatically reconnect or Browse, reconnect relations when required.

5. Click OK.

The item is replaced by the new revision.

K. Replace by Revision, With Effectivity Split

If you request an effectivity split, the previous item is kept with a split effectivity. A specific mask is shown in the tree and an instance of the new revision is added.

1. On the tile or in the tree, select the entity to replace, then right-click Replace > Replace by Revision.

The Replace Options dialog box appears.

2. If relations point to the entity, select one of the proposed analysis options:

- Automatically reconnect: the system tries to reconnect the relations and you are prompted for input if no automatic reconnect is possible
- Browse: you are prompted for input to reconnect the relations
- No analysis: relations are not managed.

The Select a Revision dialog box appears.

3. Select the replacing revision and click OK.

The Define Effectivity dialog box appears.

4. Select the new effectivity and click OK.

A message box appears proposing a number of effectivity actions.

5. Choose Yes to split the effectivity or No to work without effectivity.

6. In the Edit Links & Relations dialog box, if you selected Automatically reconnect or Browse, reconnect relations when required.

7. Click OK.

The item is replaced by the new revision.

L. Replace by Existing, Without Effectivity Split

You can replace an item occurrence by an existing one and use mechanisms to handle the relations referencing the replaced entity. You can reconnect or duplicate in the case of a configured replace.

1. On the tile or in the tree, select the entity to replace, then right-click Replace > Replace by Existing.

The Replace Options dialog box appears.

2. If relations point to the entity, select one of the proposed analysis options:

- Automatically reconnect: the system tries to reconnect the relations and you are prompted for input if no automatic reconnect is possible
- Browse: you are prompted for input to reconnect the relations
- No analysis: relations are not managed.

The Applicative Search is activated in the top bar and a small panel appears.

3. Select an item as follows:

- Type your search criteria in the Applicative Search box, click , then select the required item from the search results.
- Select an item in the tree or work area.

For more information, see Using the Applicative Search.

The initial item is replaced by the selected one.

4. In the Edit Links & Relations dialog box, if you selected Automatically reconnect or Browse, reconnect relations when required.

5. Click OK.

The item is replaced by the new revision.



M. Replace by New, Without Effectivity Split

You can replace an item occurrence by an occurrence of a new item reference.

- On the tile or in the tree, select the entity to replace, then right-click Replace > Replace by New > Provided Part, for example.

The Replace Options dialog box appears.

- If relations point to the entity, select one of the proposed analysis options:
 - Automatically reconnect: the system tries to reconnect the relations (you are prompted for input if no automatic reconnect is possible)
 - Browse: you are prompted for input to reconnect the relations
 - No analysis: relations are not managed.
- In the Edit Links & Relations dialog box, if you selected Automatically reconnect or Browse, reconnect relations when required.
- Click OK.

The item is replaced by a new one.

N. Managing Minor Revisions

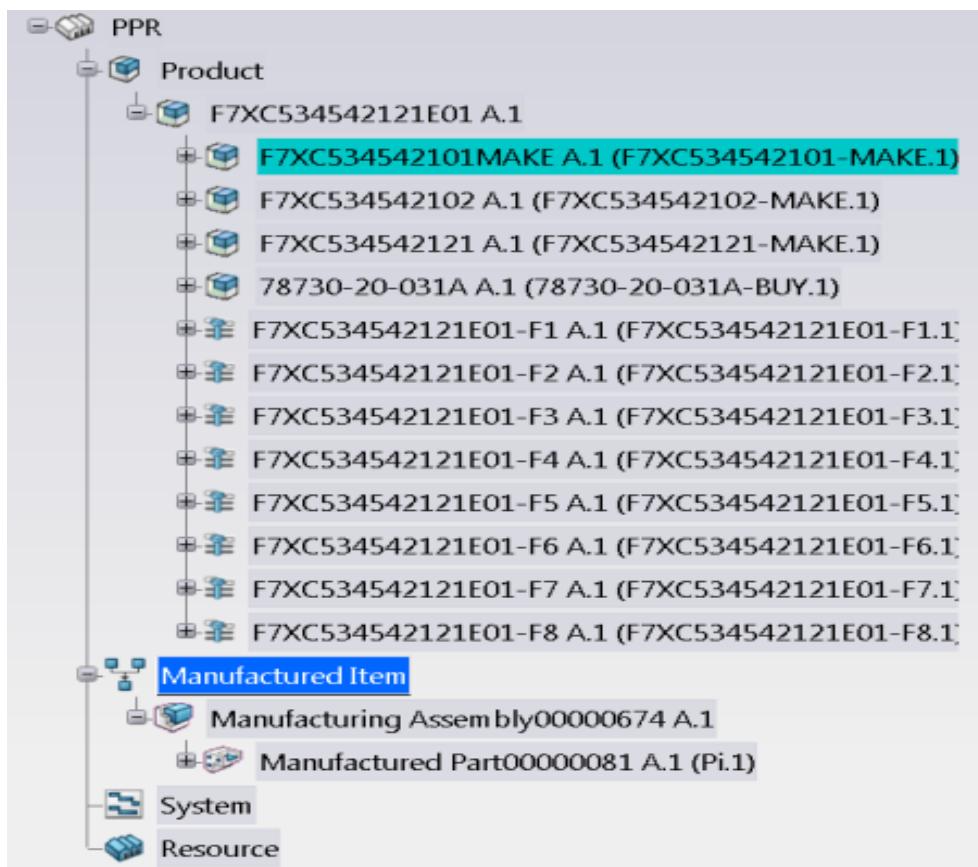
You can create a minor revision of a Manufactured Part to take into account the new minor revision of a part, and update the manufacturing assembly structure accordingly.

Before you begin: The product and manufacturing assembly data must be loaded in Manufacturing Finder. In the following example, an existing part was planned by means of a Manufactured Part. If a minor revision of the part is created and added to the product structure, the planner needs to take this new minor revision into account.

This is done by creating a minor revision of the Manufactured Part, then connecting the minor revision and the part.

For more information about changing maturity, creating new minor revisions, and filtering, refer to the Product Finder User's Guide.

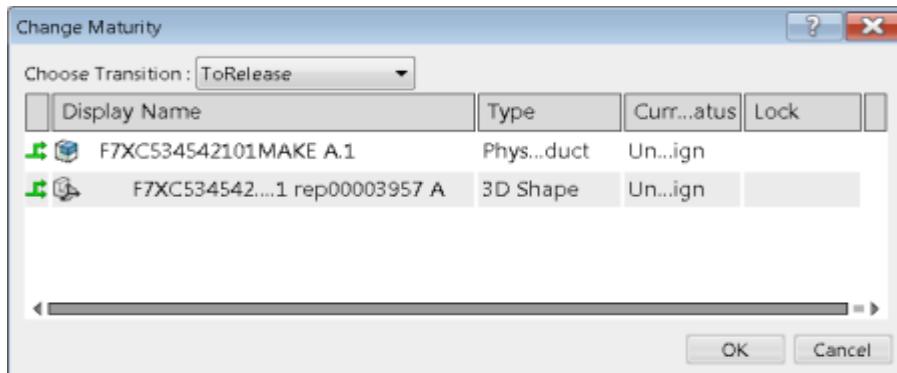
- Click Change Maturity and select the part that is to have a minor revision.





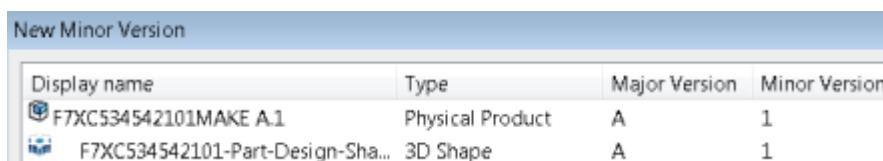
The Change Maturity dialog box appears.

- In the Choose Transition list, select Share, and click OK.



The maturity status of the part and its associated 3D shape representation becomes SHARED.

- Click New Minor Revision and select the part.
The New Minor Revision dialog box appears.



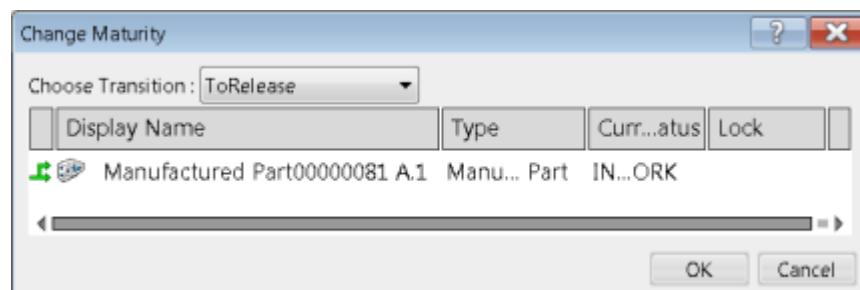
- Click OK.
A minor revision of the part and its associated 3D shape representation is created.

- Click Change Maturity and select the Manufactured Part that is to have a minor revision.



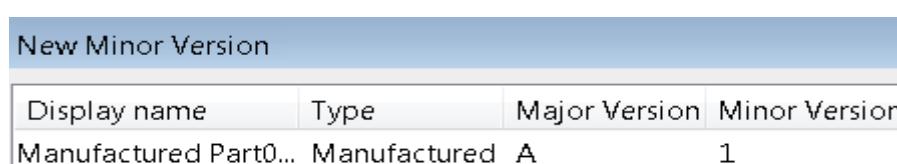
The Change Maturity dialog box appears.

- In the Choose Transition list, select Share, and click OK.



The maturity status of the Manufactured Part becomes SHARED.

- Click New Minor Revision and select the Manufactured Part.
The New Minor Revision dialog box appears.



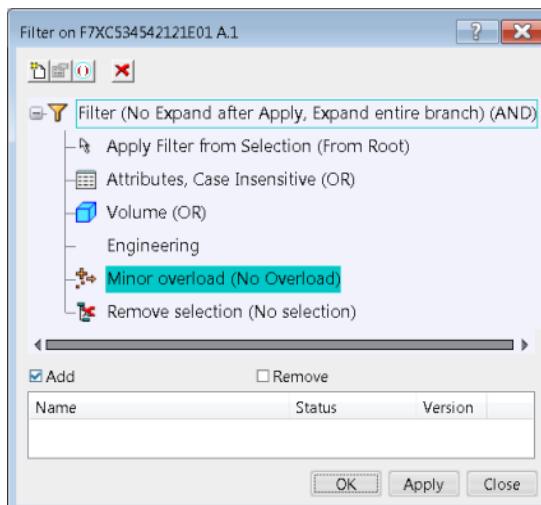


8. Click OK.

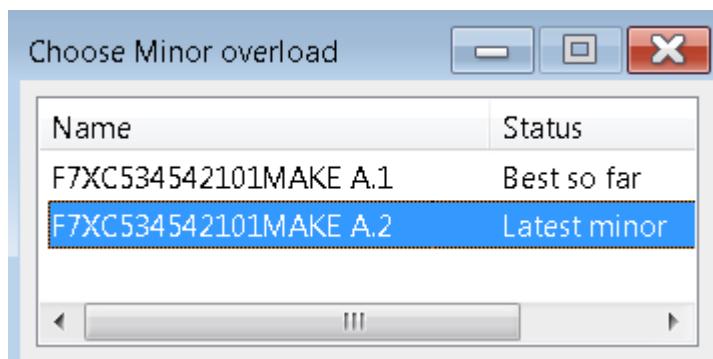
A minor revision of the Manufactured Part is created.

9. Select the root product and select Filter

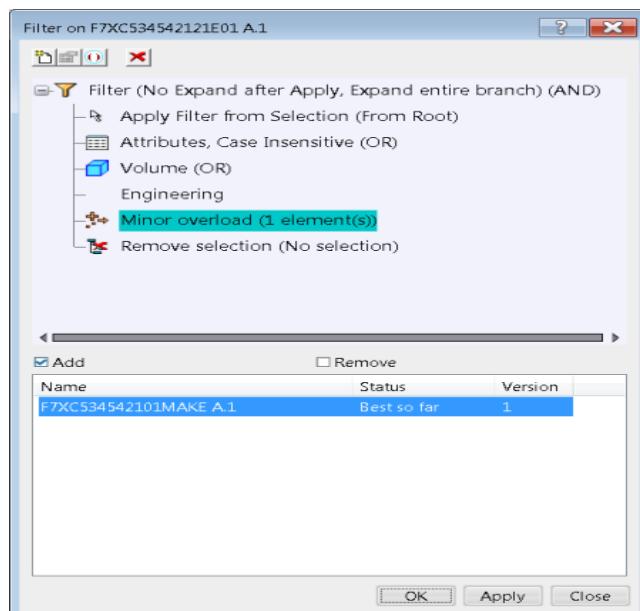
The Filter dialog box appears.



10. Choose the Minor Overload filter type, and select the minor-revised part in the tree. The Choose Minor Overload dialog box appears showing the available minor revisions.



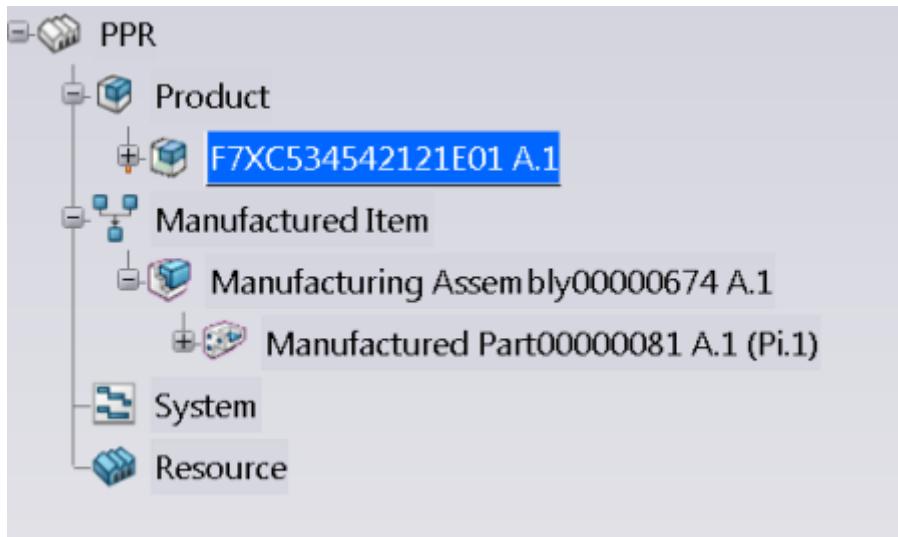
11. Select the minor revision of the part that has Best So Far status.
It is added to the Filter dialog box.





12. Click OK in the Filter dialog box.

The filter is applied to the root product, as indicated by a filter symbol on the tree node.



A filter needs to be applied to the root item in the same way.

13. Select the root item and select Filter

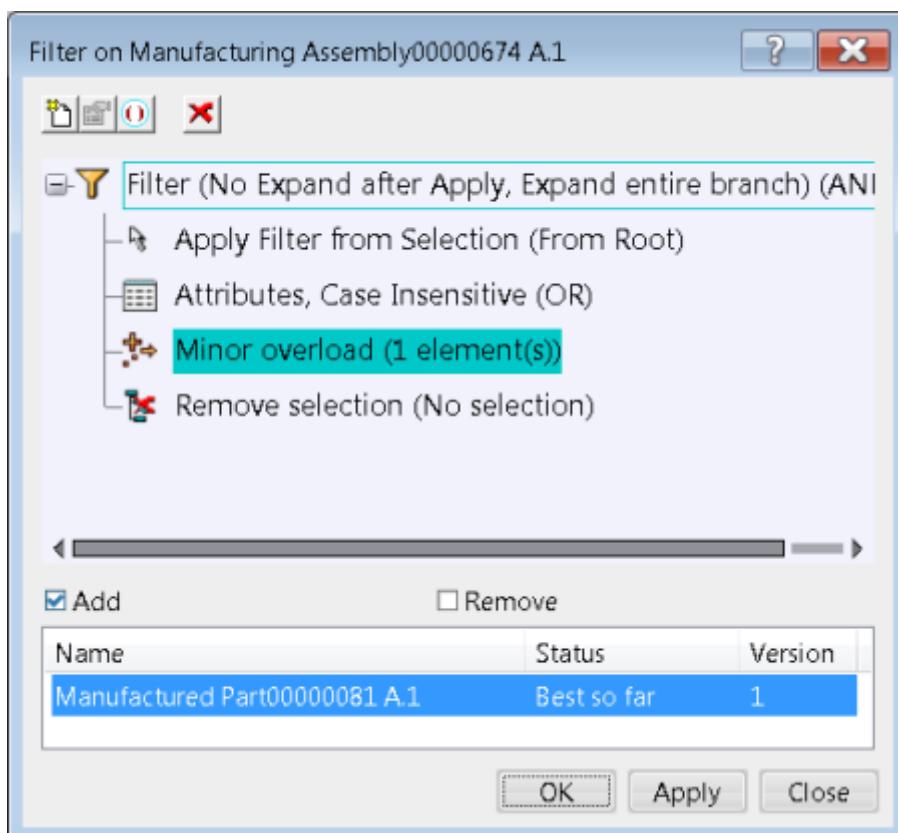
The Filter dialog box appears.

14. Select the Minor Overload filter type, and select the minor-revisioned Manufactured Part in the tree.

The Choose Minor Overload dialog box appears showing the available minor revisions.

15. Select the minor revision of the item that has Best So Far status.

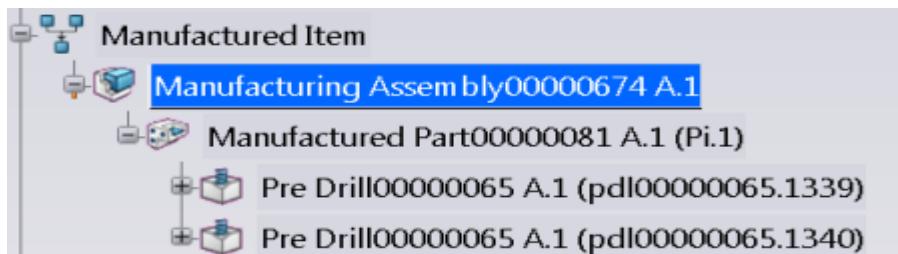
It is added to the Filter dialog box.





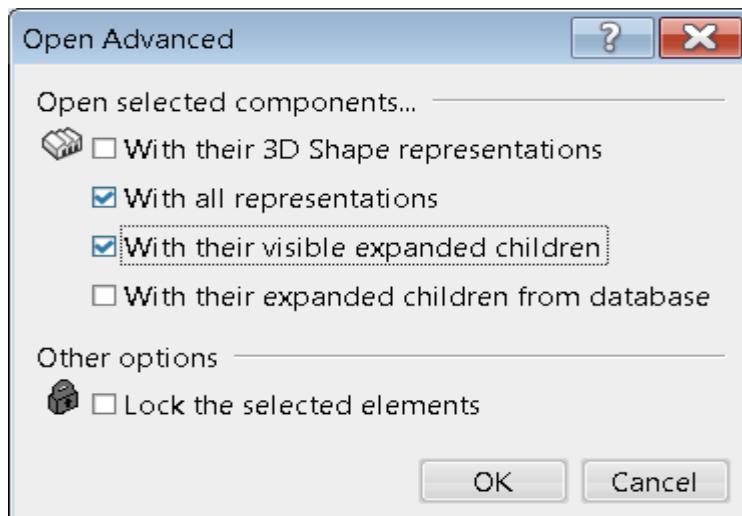
16. Click OK in the Filter dialog box.

The filter is applied to the root item, as indicated by a filter symbol on the tree node.



17. Expand the Product and Manufacturing Assembly structures, select the PPR node in the tree, and select Open Advanced .

The Open Advanced dialog box appears.



18. Select the options as shown and click OK.

The PPR content opens in Manufactured Item Definition.

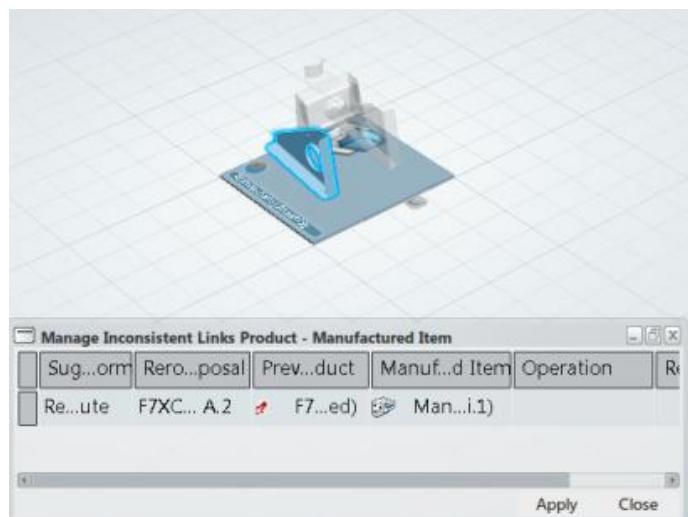
19. Select the Manufactured Part and click Manage Inconsistent Links .

The Manage Inconsistent Links: Product-item dialog box is displayed.

The link between the Manufactured Part and the implemented part is broken. The new minor revision of the Manufactured Part still references the previous revision of the part.

For more information, see Managing Inconsistent Links Between Products and Items.

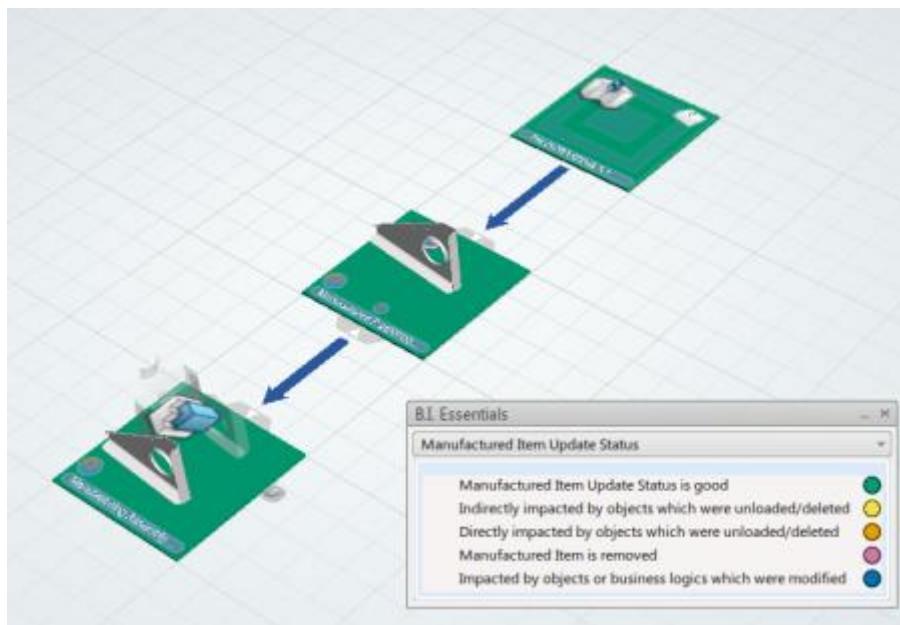
20. Click the Reroute line in the dialog box and click Apply.





The link is reconnected to the new minor revision of the part.

21. Select Update Status in the B.I. Essentials panel to check the status of the links between objects.
The update status of the items is OK.



The Manufacturing Assembly structure takes into account the new minor revision of the part by means of a new minor revision of the Manufactured Part.

O. Managing Changes with Resulting Products

Using the Replace by New command, you can replace an item with a new one of the same type or of a different type. You can then update the resulting product and view the item's status using B.I. Essentials. This task shows you how to:

- Replace an Item with a New Item
- Compute the New Item's Resulting Product
- Use B.I. Essentials to View the Status of the Resulting Product

P. Replace an Item with a New Item

You can replace an item with a new item using the Replace by New command.

1. Right-click the item, then click Replace > Replace by New, and select an item type.
The Replace options panel appears.

Note: For more information about replace options and types, see the Replace Menu.

2. Select the Replace all the instances of the selected element option and click OK.

The item is replaced with a new item. Implement links, quantity, current effectiveness, and revision are automatically transferred and the replaced instance is evolved according to the current effectiveness or change.

Q. Compute the New Item's Resulting Product

You can use the Compute Resulting Product to compute the resulting product of the item you created with the Replace by New command.

1. Select an item with a resulting product.
2. Right-click the item and click Resulting Product > Compute Resulting Product.

The resulting product is computed.

R. Use B.I. Essentials to View the Status of the Resulting Product

You can use the B.I. Essentials command to view an item's status, then update it using the Compute/Update Resulting Product command.

1. From the Tools section of the action bar, click B.I. Essentials



The B.I. Essentials panel appears.

2. In the Choose information to reveal list, click Item Update Status.
3. If the status is shown as Resulting Product is not a latest revision, then click the item in the tree with the resulting product.
4. Right-click the item and click Resulting Product > Compute/Update Resulting Product.

The resulting product is computed/updated and the status for the resulting product in the B.I. Essentials panel is Item Update Status is good.

S. Managing Capable Resources on Items

You can add, remove, and visualize capable resources associated with items.

This task shows you how to:

- Manage Capable Resources and Documents
- Manage Attribute Display
- Manage Filters

Before you begin: To open the Manage Capable Resources panel, select an item, then click Manage Capable Resources from the Authoring section of the action bar.

Tip: To display additional information in the panel, click Show Preferences and select the following options:

- Show Status Bar: Displays information about objects, at the bottom of each panel section.
- Show Advice Messages: Displays information about actions, at the bottom of the panel.

T. Manage Capable Resources and Documents

You can associate a capable resource with an item. You can then attach a document to the capable resource.

1. In the Capable Resource References section of the panel, click Add Resource .
2. Select a resource from the tree or from the database.

The resource appears in the panel and is associated with the item. In the System Editor, an icon appears on the item tile to show that a resource is associated with it.

3. Select the resource in the panel, then click Add Resource in the Associated Documents section.
4. Import or search for a document.

The document appears in the panel and is associated with the resource.

U. Manage Attribute Display

You can hide or show attributes of associated resources and documents.

1. In the Capable Resource References or in the Associated Documents section of the panel, click Edit Attributes .

The list of available attributes in the section appears.

2. To manage attributes display, use the following commands:

Command	Description
	Hides or shows all attributes.
	Hides or shows a single attribute.
	Moves the selected attribute up or down the list.



V. Manage Filters

You can filter associated resources and documents based on attribute values.

1. In the Capable Resource References or in the Associated Documents section of the panel, click Edit Filters .

The list of values for attributes in the section appears.

2. To filter attribute values, use the following commands:

Command	Description
	Hides or shows all attribute values.
 / 	Hides or shows a single attribute value.



► Discrete manufacturing

Products that are comprised of parts that can be easily touched, counted, sourced, etc.

Parts can be broken down and disposed of or recycled at the end of the product lifecycle.

Uses a bill of materials (BOM).

Assembles in a linear or routing way.

Examples are automobiles, computers, etc.





THANK YOU