TEAMCENTER

Design and BOM Alignment — Deployment and Administration

Teamcenter 2412

SIEMENS

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1. About setting up design and engineering BOM alignment

Before manufacturing a physical product, it is conceptualized and developed using a 3D visual representation. In a PLM system with design-part separation, the design and engineering BOM of a product are managed as separate entities. Therefore, for 3D visualization, the design and engineering BOM must be aligned with each other.

> Example:
>
> To know what the part *Wheel* of a car looks like in the floor position, the part is aligned to its corresponding design. In Teamcenter, this alignment is called the *design-part alignment*. To know what the *Wheel* looks like when placed in the car, the four instances of the wheel are aligned with the corresponding design occurrences of the *Wheel*'s design structure. This alignment is called the *design occurrence-part occurrence* alignment.

Users can manually align the design and engineering BOM of a product. But this is a complicated, error-prone, and time-consuming process. To reduce this complexity, the alignment process is automated by default so that an engineering BOM automatically generates from a design structure and gets aligned to it. Similarly, a design structure automatically generates from an engineering BOM along with the alignment.

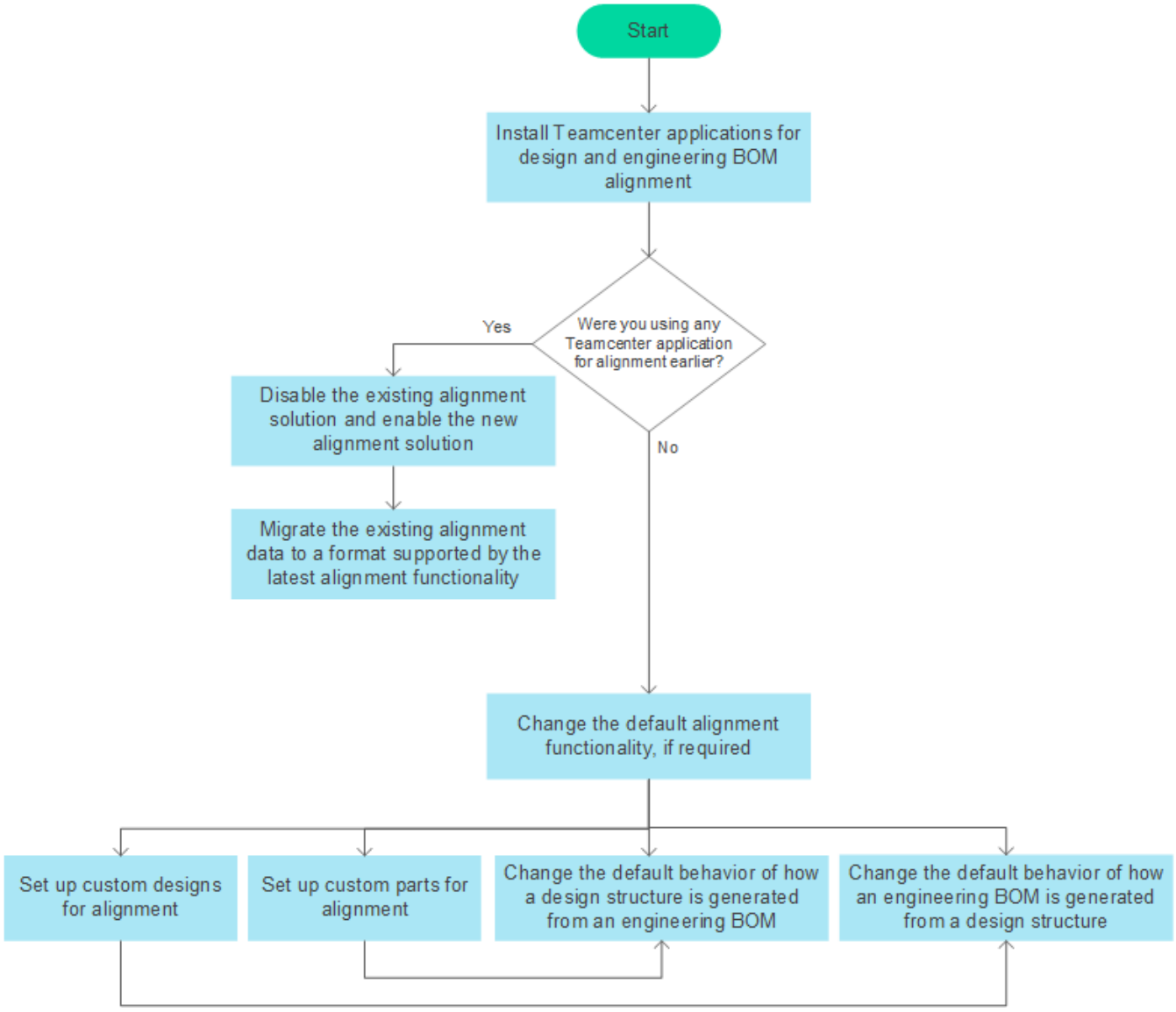
As an administrator, you must **set up** Teamcenter for alignment, and configure it as per your business requirement.

Where do I go from here?

Business User	See *Design and BOM Alignment — Usage*.
Administrator	
Users are currently using an existing Teamcenter solution for alignment. What should I do to set up the new alignment solution?	**You must first disable the existing alignment solution and then enable the new one.** Next, you must **migrate** the absolute alignment data as relative alignment data.
Is there a process I can follow to deploy and administer design and engineering BOM alignment?	You may refer to the **task flow** to set up design and engineering BOM alignment.
Can certain parts or designs be skipped while generating the corresponding design structure or engineering BOM?	Yes, when configuring the generation of the **engineering BOM** and **design structure**, you can choose to skip certain parts and designs by setting preferences.
How can I group part occurrences in the generated engineering BOM?	You can **set a criteria to group** design occurrences into a single part occurrence in the generated engineering BOM.

Can I use custom parts and designs for alignment?	See the processes to set up **custom parts** and **custom designs** for alignment.
Where can I get a list of preferences that I need to set for the design and engineering BOM alignment?	There are several sources from which you can retrieve a list of preferences. You can view the list in Administration data report, Teamcenter rich client, Active Workspace, and raw XML file. The preferences that are specifically used for alignment start with the prefix **pma**.

2. Task flow to set up design BOM and engineering BOM alignment



3. Install design and BOM alignment using Deployment Center

Add the design and engineering BOM alignment application to your existing Teamcenter environment so that users can align designs and engineering BOM for BOM-driven mockups.

Prerequisites

- Teamcenter is already set up. If not, follow the instructions in *Teamcenter Installation Using Deployment Center* to deploy Teamcenter.
- If Teamcenter is already set up, verify if **Visualization Server** is installed. If it is not installed, first ensure that the hardware and software requirements for **Visualization Server Manager** are met. For this, refer to *Visualization Server Manager prerequisites* section in the *Teamcenter Installation Using Deployment Center* documentation help. Next, Next, read the *Visualization Server overview* to setup **Visualization Server**.
- Deployment Center is setup. If not, plan its deployment.

Procedure

1. Log on to Deployment Center and select the environment to which you want to add the design and engineering BOM alignment.
2. Go to the **Applications** task. Click **Add or Remove Selected Applications**.
3. In the **Available Applications** panel, use the web browser search to find the **Product Master Automation for Active Workspace** application. Select the application, and then click **Update Selected Applications**.

   Deployment Center automatically selects any additional dependent applications.
4. Go to the **Components** task.
5. In the **Selected Components** list, note any remaining components whose configuration status is not **100%**. Select each incomplete component, enter required parameters, and save component settings until all components in the environment show a configuration status of **100%**.

   When all components are fully configured, the **Deploy** task is enabled.
6. Go to the **Deploy** task. Click **Generate Install Scripts** to generate deployment scripts you will use to update affected machines.

   When script generation is complete, note any special instructions in the **Deploy Instructions** panel.

7. Locate deployment scripts, copy and run each script to its target machine.

   For more information about running deployment scripts, see *Deployment Center — Usage*.

4. Install design and BOM alignment using TEM

Before installing ensure that **Visualization Server** is installed in your Teamcenter setup.

Next, update your Teamcenter setup to install the following features through Teamcenter Environment Manager (TEM):

- **Base Install** > **Active Workspace** > **Client** > **Product Master Automation**
- **Extensions** > **Product Master Automation for Active Workspace**
- **Extensions** > **BOM Management** > **Product Master Automation**

5. Enable design and engineering BOM alignment

For users to use the latest Teamcenter alignment solution to align design and engineering BOM, you must first enable the solution. If a different Teamcenter solution is already set up for alignment, you must disable the existing solution. To do these, you set the following preferences:

Preference	Value
MEDesignToBom_Enabled	**false**
FND0_ENABLE_DESIGN_BOM_ENGINEERING_BOM_ALIGNMENT	**true**

To ensure that variant formulas are copied from the design structure to the engineering BOM during generation, you must set the **PSM_enable_product_configurator** preference to **true**. Additionally, configure the **FND0_CBA_SHOW_DESIGN_VARIANT_ON_EBOM** preference, which controls the display of the variant formula for the aligned design on the EBOM structure. By default, the variant formula of the aligned design is hidden. Set this preference to **true** to display the variant formula.

Next, you must **migrate** the absolute alignment data, if any, as relative alignment data if you want the relative alignment functionality that allows the reuse of an assembly without performing the alignment of its child parts again.

6. Migrate absolute alignment data as relative alignment data

Design occurrences and part occurrences can be aligned based on their absolute position or relative position.

The absolute position of an occurrence is its position in a structure with respect to the topmost part of the structure irrespective of whether the occurrence belongs to another assembly within the structure. The relative position of an occurrence is its position with respect to the assembly it belongs to.

Restrictions and limitations

The newest Teamcenter solution to perform design and engineering BOM alignment supports only relative alignment. If a different Teamcenter solution is already set up for alignment, you must migrate the existing absolute alignment data as relative alignment data.

Procedure

1. Install **Product Master Automation** for design and engineering BOM alignment.

2. Disable the existing alignment application and **enable** the new alignment functionality.

3. Run the following utility at the Teamcenter command prompt to migrate the absolute alignment data as relative alignment data:

   cba_migrate_design_ebom -u=*user_id* **{-p=***password* **| -pf=***password_file***}**
   -g=*group* **-dbomroot=***dbom_item_id* **-drevrule=***dbom_revision_rule*
   -ebomroot=*ebom_item_id* **-erevrule=***ebom_revision_rule* **-log=***absolute_path_to_logfilename*
   -report=*absolute_path_to_fileName* **-removeJT=***true/false*

   Here, the **-log** and **-report** arguments are optional. For more information about this utility, see its help:

   ```
   cba_migrate_design_ebom -h
   ```

Results

After the data is migrated, a migration report is available in the file name that you specified in the **-report** argument of the **cba_migrate_design_ebom** utility. In case you did not specify a location in the **-report** argument, the report is available in the folder from where you ran the **cba_migrate_design_ebom** utility.

CBA Migration Report										
Total Alignments found:	9									
Migrated Alignment:	7									
Failed Migration:	2									
Top Design	Top Part	Aligned?	Action							
DefaultD1	DefaultP 1	No	New Alignment Created							
Design	Design ID	Aligned Part	Part ID	Status	Error Info	CBA1 publish link ID	New CBA3 publish link ID	pma0IsPart Required Property	fnd0Assembly Indicator Property	fnd0HasMu ltipleDesig ns Property
D1_1	217	P1_1	220	New CBA3 Publishlink Created		kJuJP87$AAgcRA	AZpJfBA5AAgcRA	unchanged	unchanged	unchanged
D2_1	223	P2_1	231	New CBA3 Publishlink Created		kdiJP87$AAgcRA	AZvJfBA5AAgcRA	unchanged	unchanged	TRUE
D3_1	224			No Alignment				FALSE	unchanged	unchanged
D4_1	225	P4_1	234	New CBA3 Publishlink Created		k1jJP87$AAgcRA	AdjJfBA5AAgcRA	unchanged	unchanged	unchanged
D1_2	218	P1_2	221	New CBA3 Publishlink Created		0NpJP87$AAgcRA	AZrJfBA5AAgcRA	unchanged	unchanged	unchanged
D2_2	226	P2_2	235	New CBA3 Publishlink Created		0dnJP87$AAgcRA	AdhJfBA5AAgcRA	unchanged	unchanged	unchanged
D2_2	226	P2_2	235	No Alignment				unchanged	unchanged	unchanged
D2_2	226			No Alignment				unchanged	unchanged	unchanged
D1_3	219	P1_3	222	New CBA3 Publishlink Created		01oJP87$AAgcRA	AZnJfBA5AAgcRA	unchanged	unchanged	unchanged
D2_3	228	P2_3	236	New CBA3 Publishlink Created		EGmJP87$AAgcRA	AZtJfBA5AAgcRA	unchanged	unchanged	unchanged
D3_3	229			No Alignment				FALSE	Component	unchanged
D4_3	230			No Alignment				FALSE	unchanged	unchanged
D1	102	testD2	103	Failed	43241: 000102/	BTgJP87$AAgcRA		unchanged	unchanged	unchanged
D2	105	testD2	108	Failed	43241: 000105/	BnmJP87$AAgcRA		unchanged	unchanged	unchanged

The column	Displays
Status	Any alignment data that failed to migrate. A link is created between the design and its corresponding part when the data is migrated successfully.
Error Info	Information related to the error returned by the migration utility.
CBA1 publish link ID	The absolute alignment links that are found by the utility before the migration.
New CBA3 publish link ID	The alignment links that are newly created by the utility after the migration.
pma0IsPartRequired Property	Any change made to the **pma0IsPartRequired** property of a design.
fnd0AssemblyIndicator Property	Any change made to the **fnd0AssemblyIndicator** property of a design.
fnd0HasMultipleDesigns Property	Any change made to the **fnd0HasMultipleDesigns** property of a part.

7. Set a BMIDE template project to set up custom parts, designs and BOM for alignment

You can configure Teamcenter to set custom parts, designs, and BOM for alignment. You set these up for alignment within a new BMIDE template project.

To this BMIDE template project, add the following as the dependent templates:

- **pma0automation**
- **pma1awautomation**

8. Set up custom product BOM for alignment

About setting up product BOM for alignment

Before setting up product BOM for alignment, first ensure that they are qualified as product engineering BOM. Next, set up the product engineering BOM for alignment as follows:

1. **Create a link** between a product engineering BOM and a design by specifying the design types to which the engineering product BOM can be aligned to.

2. **Set up custom parts**, which will be added to the product engineering BOM, for alignment.

Create a link between a product engineering BOM and design

Users can align the engineering parts within a product engineering BOM to engineering designs within a design structure. For this alignment, you must create a link between the design (default or custom) and the product engineering BOM.

1. In BMIDE, open the **required BMIDE template project,** for example, **B4**.

2. Click **BMIDE→Editors→GRM Rules Editor**.

3. In **GRM Rules**, click **Add**.

4. In the **New GRM Rule** dialog box, enter the following details, and click **Finish**:

Field	Value
Primary Object	Name of the product engineering BOM, for example, **B4CustomEBOMProduct**
Secondary Object	Name of the design, for example, **B4CustomDesign**
Relation Object	**fnd0DesignToBomLink**
Condition	**isTrue**

Next, **set up custom parts**, which will be added to the product engineering BOM, for alignment.

9. Set up custom parts for alignment

About setting up custom parts for alignment

Before setting up custom parts for alignment, first ensure that they are qualified as engineering parts so that the custom parts also inherit the alignment properties along with other part properties. Next, set up the custom part for alignment as follows:

1. (Optional) Specify if a **corresponding design is required** for the custom part by creating a persistent property, if it is not available already.

2. (Optional) Specify if the corresponding **design must be automatically created** when the part is created by defining a runtime property, if it is not available already.

   You may skip the above steps if you created custom parts and custom designs from the default part and design business objects.

3. Next, **enable the display** of the persistent and runtime properties.

After setting up custom parts for alignment, you must **configure the generation of the corresponding design structure**.

Specify if a corresponding design is required for a custom part

While creating a custom part, users can choose if a corresponding design is required for the part. For this, you first set up a **Is Design Required** persistent property.

1. Create a **Is Design Required** persistent property:

   a. In BMIDE, open the **required BMIDE template project,** for example, **B4**.

   b. Open the custom part, for example, **B4CustomPart**.

   c. In the **Properties** tab, click **Add**.

   d. In the **Property Definition** dialog box, select **Persistent**, and click **Next**.

   e. In the **Persistent Property** dialog box:

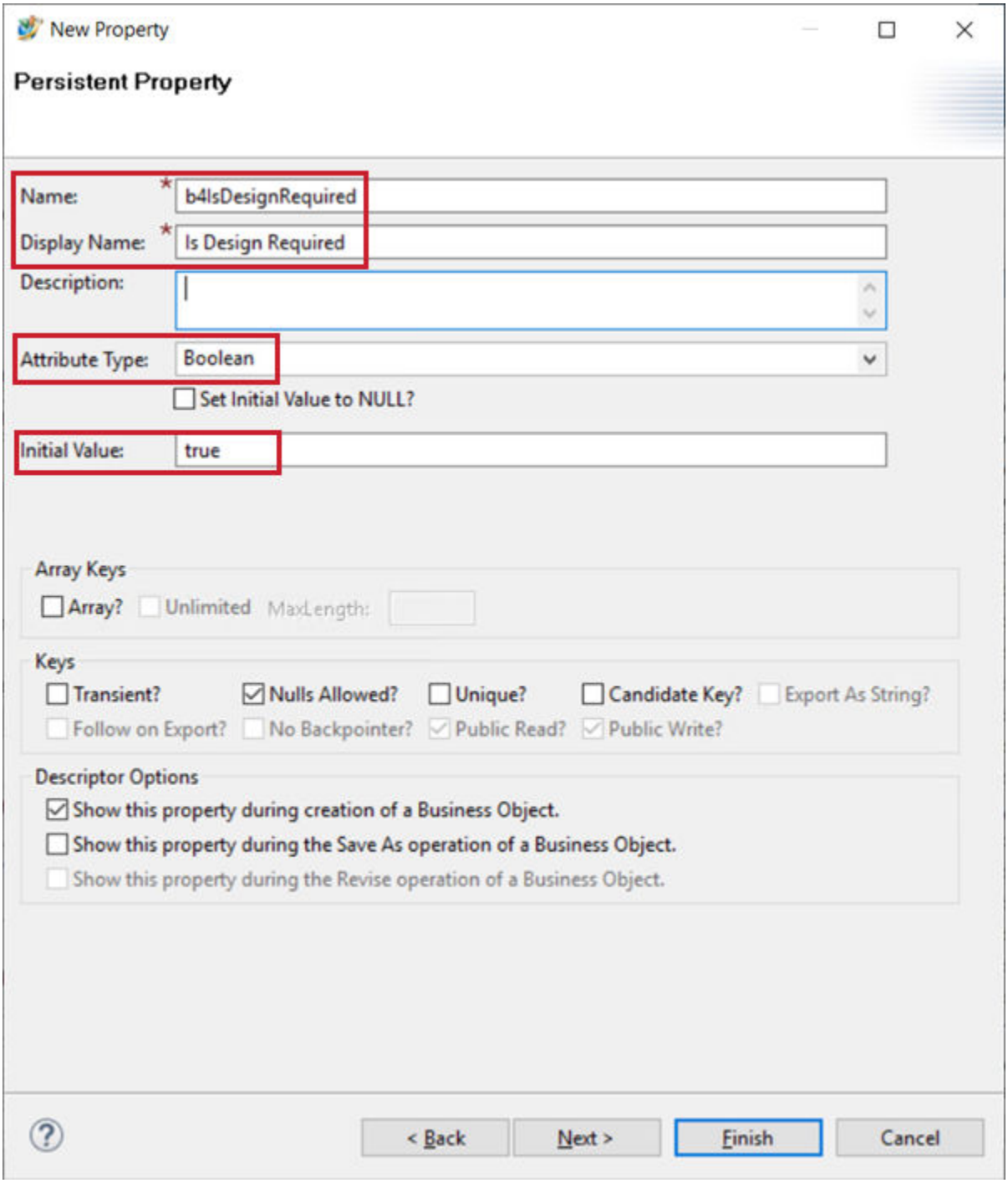
      A. Append **IsDesignRequired** to the BMIDE template project prefix in **Name**, for example, **b4IsDesignRequired**.

      B. Enter **Is Design Required** in **Display Name**.

C. Select **Boolean** in **Attribute Type**.

D. Enter **true** in **Initial Value**.

E. Click **Finish**.

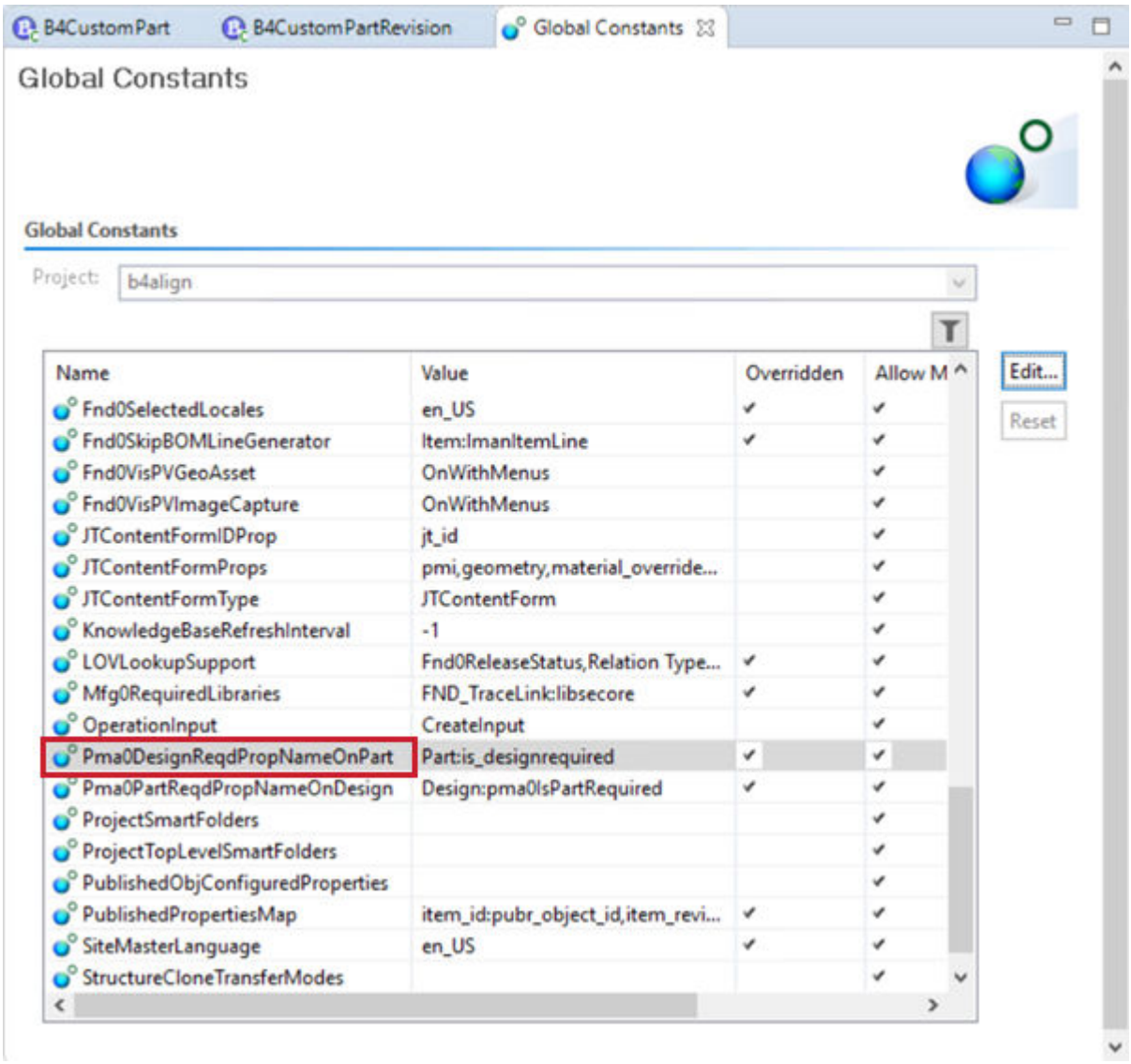


If the custom part is a subtype of commercial part, you must also set the initial value for the custom part master. For example, if the custom part is **Commercial Part**, after setting the initial value for this part, perform the above steps to set the initial value of **Commercial Part Master**. **Commercial Part Master** is listed in the **Form** field of the custom part.

2. Add the persistent property to the **Pma0DesignReqdPropNameOnPart** global constant:

   a. Click **Open Global Constant Editor** from the toolbar.

   b. In the **Global Constants** tab, select **Pma0DesignReqdPropNameOnPart** and click **Edit**.



   c. In the **Modify Global Constant** dialog box, click **Add**.

   d. In the **Add a value** dialog box, add a value for the custom part and click **Finish**. For example, enter **B4CustomPart:b4IsDesignRequired**.

e. In the **Modify Global Constant** dialog box, click **Finish**.

After setting up the persistent property, **enable its display**.

Set the automatic creation of a design for a custom part

If a corresponding design is required for a custom part, the **Is Design Required** property of the part is set to **true**. In such a case, you can configure the design to be automatically created and aligned to the custom part.

1. Add a **Create Aligned Design** runtime property to the custom part:

   a. In BMIDE, open the **required BMIDE template project,** for example, **B4**.

   b. Open the custom part, for example, **B4CustomPart**.

   c. In the **Operation Descriptor** → **CreateInput** tab, click **Add**.

   d. In the **OperationInput Property** dialog box, select **Define and add a new Runtime Property from Business Object** and click **Next**.

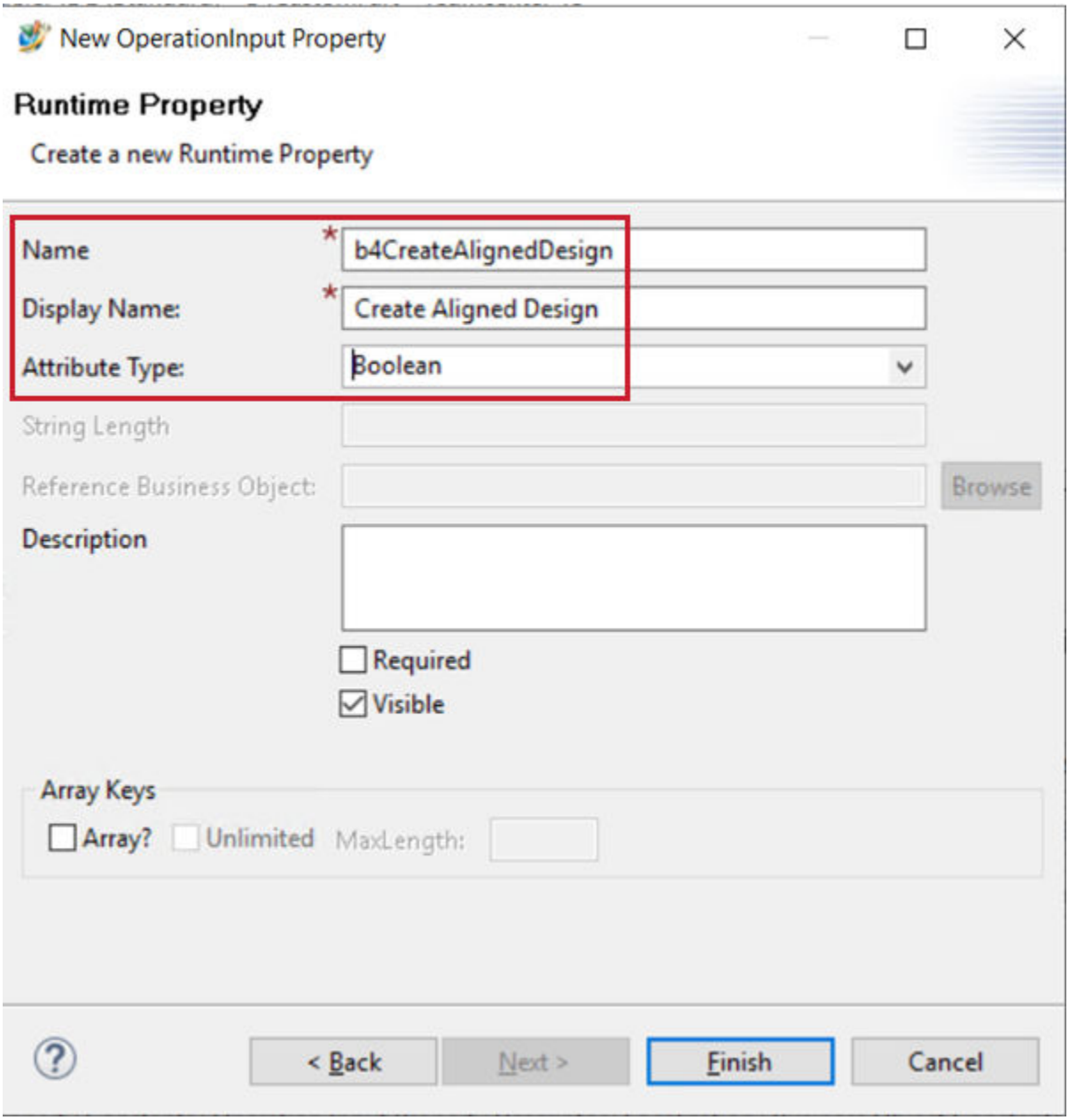
   e. In the **Runtime Property** dialog box:

      A. Append **CreateAlignedDesign** to the BMIDE template project prefix in **Name**, for example, **b4CreateAlignedDesign**.

      B. Enter **Name** and enter **Create Aligned Design** in **Display Name**.

      C. Select **Boolean** in **Attribute Type**.

      D. Click **Finish**.



2. Add a BMIDE condition to create a custom design automatically:

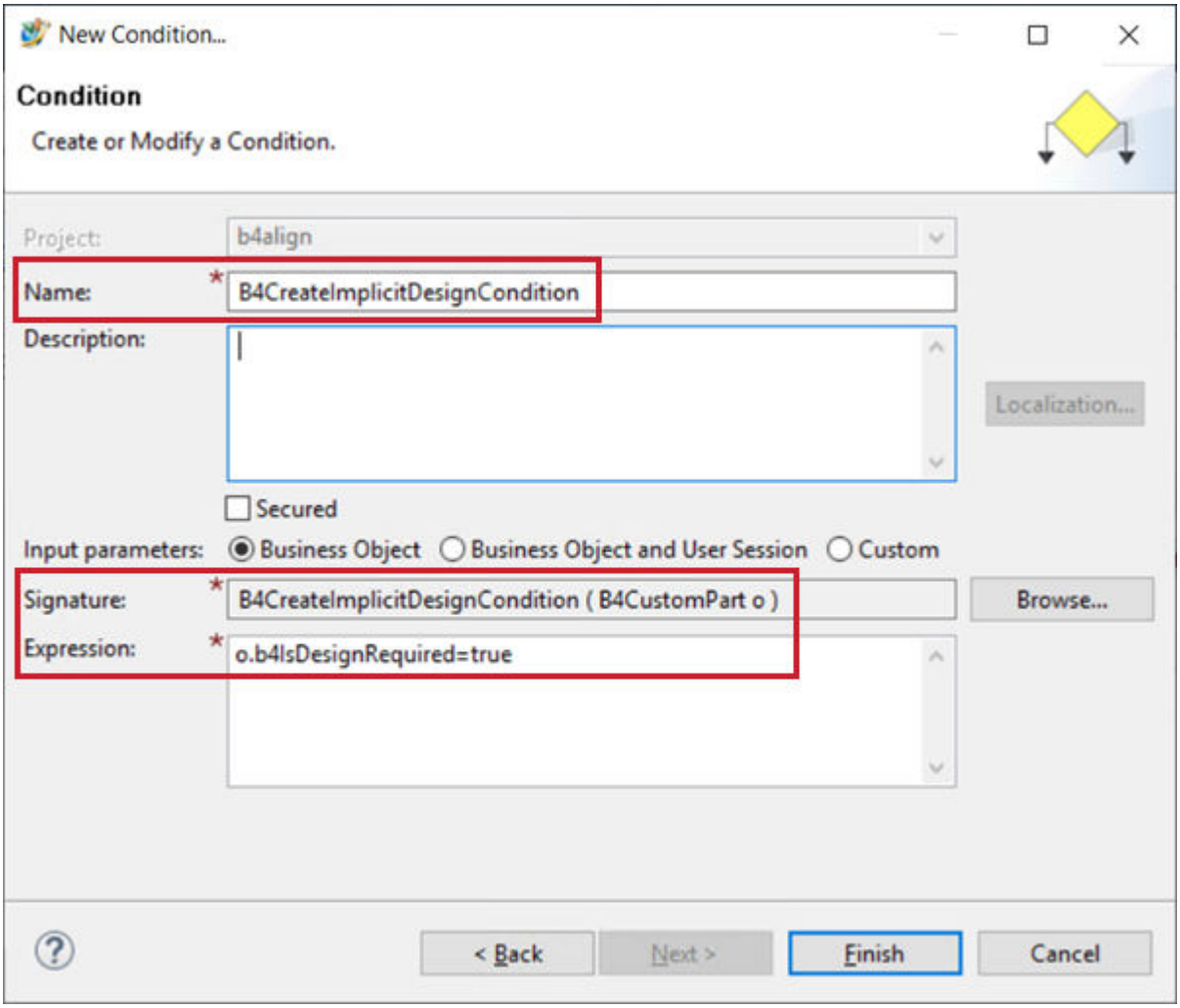
   a. On the menu bar, click **BMIDE** → **New Model Element**.

   b. In the **Model Element Type** dialog box, type **Condition** in **Wizards** and click **Next**.

   c. In the **Condition** dialog box, type **CreateImplicitDesignCondition**, for example, **B4CreateImplicitDesignCondition**.

   d. Click **Browse** next to **Signature** and select the custom part, for example, **B4CustomPart**.

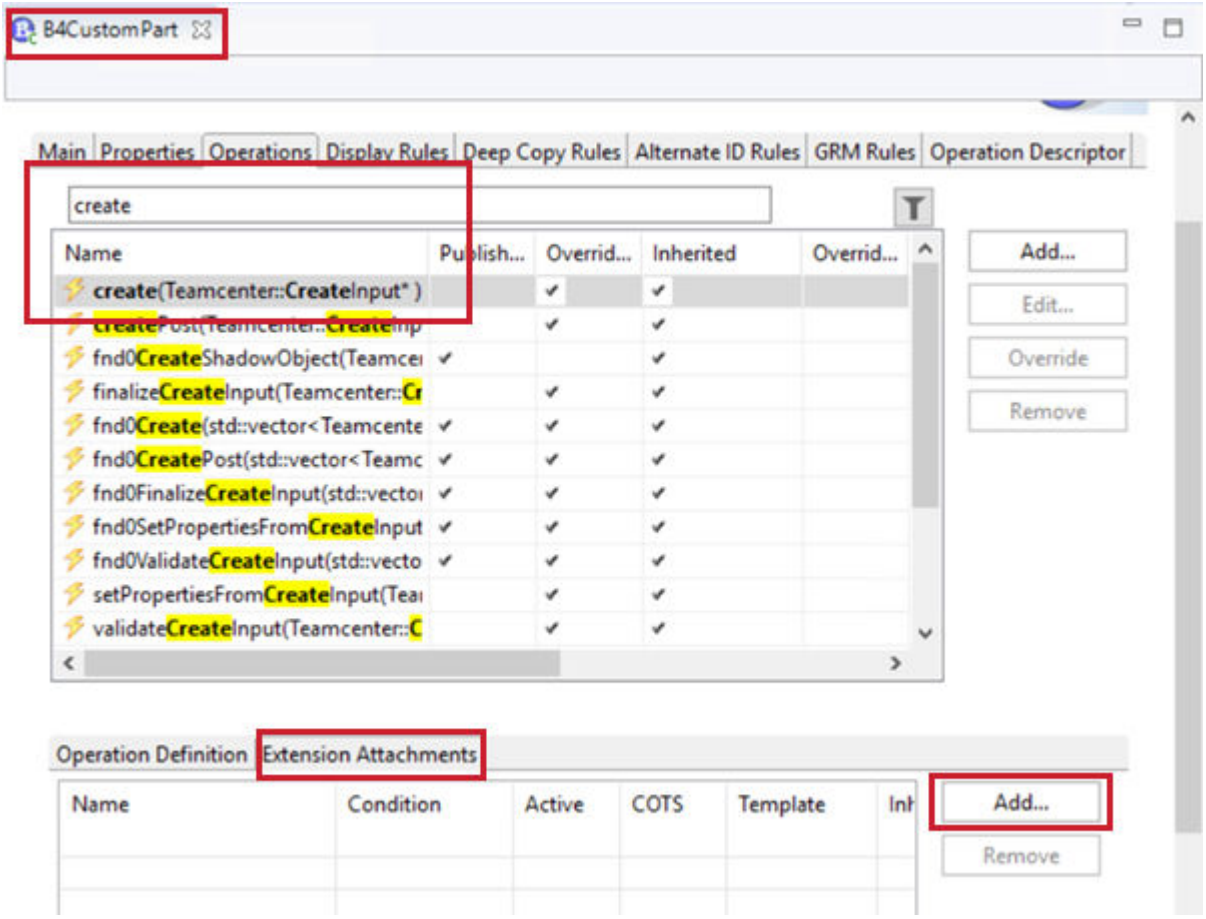
e. In **Expression**, type **o.b4IsDesignRequired=true** and click **Finish**.



3. Attach the **Pma0AutomateAndAlign** extension on the create operation of the custom part. On doing so, if a corresponding design is created, it is automatically aligned with the custom part.

   a. In the **Operations** tab of the custom part, search for the **create** operation.

   b. In **Extension Attachments**, click **Add**.

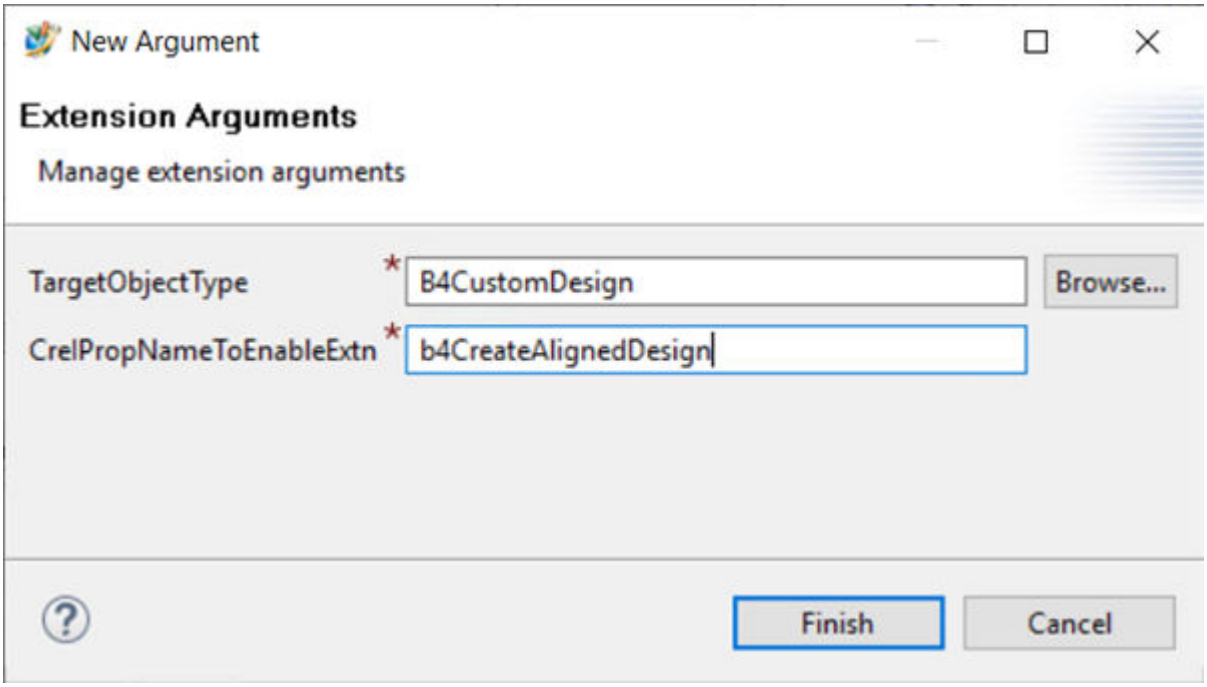


c. In the **Extension** dialog box, click **Browse** next to **Extension** and select **Pma0AutomateAndAlign**.

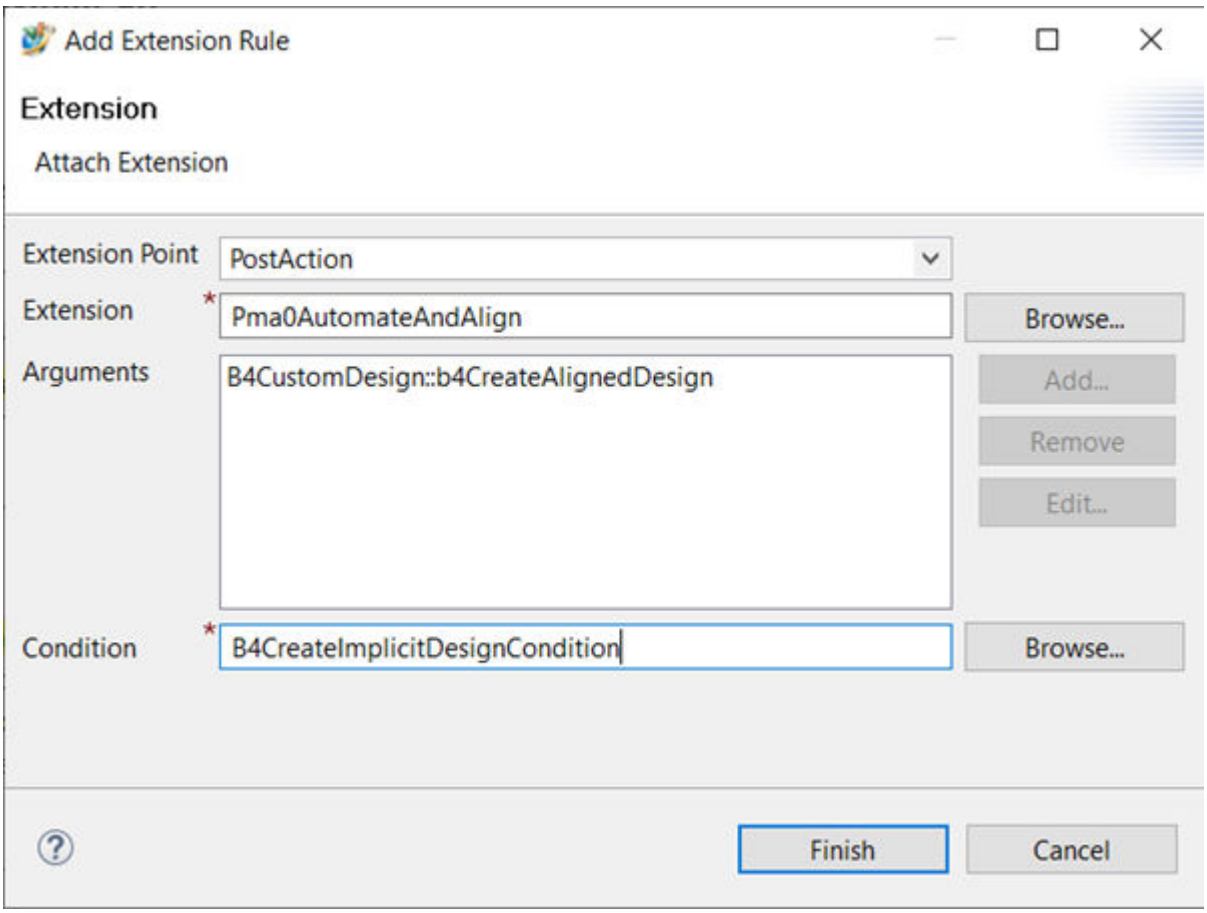
d. Click **Add** next to **Arguments**.

e. In the **Extension Arguments** dialog box, click **Browse** next to **TargetObjectType** and select a custom design, for example, **B4CustomDesign**.

f. In **CrelPropNameToEnableExtn**, enter the name of the runtime property that you created for the custom part, for example, **b4CreateAlignedDesign** and click **Finish**.



g. In **Condition**, enter **B4CreateImplicitDesignCondition** and click **Finish**.

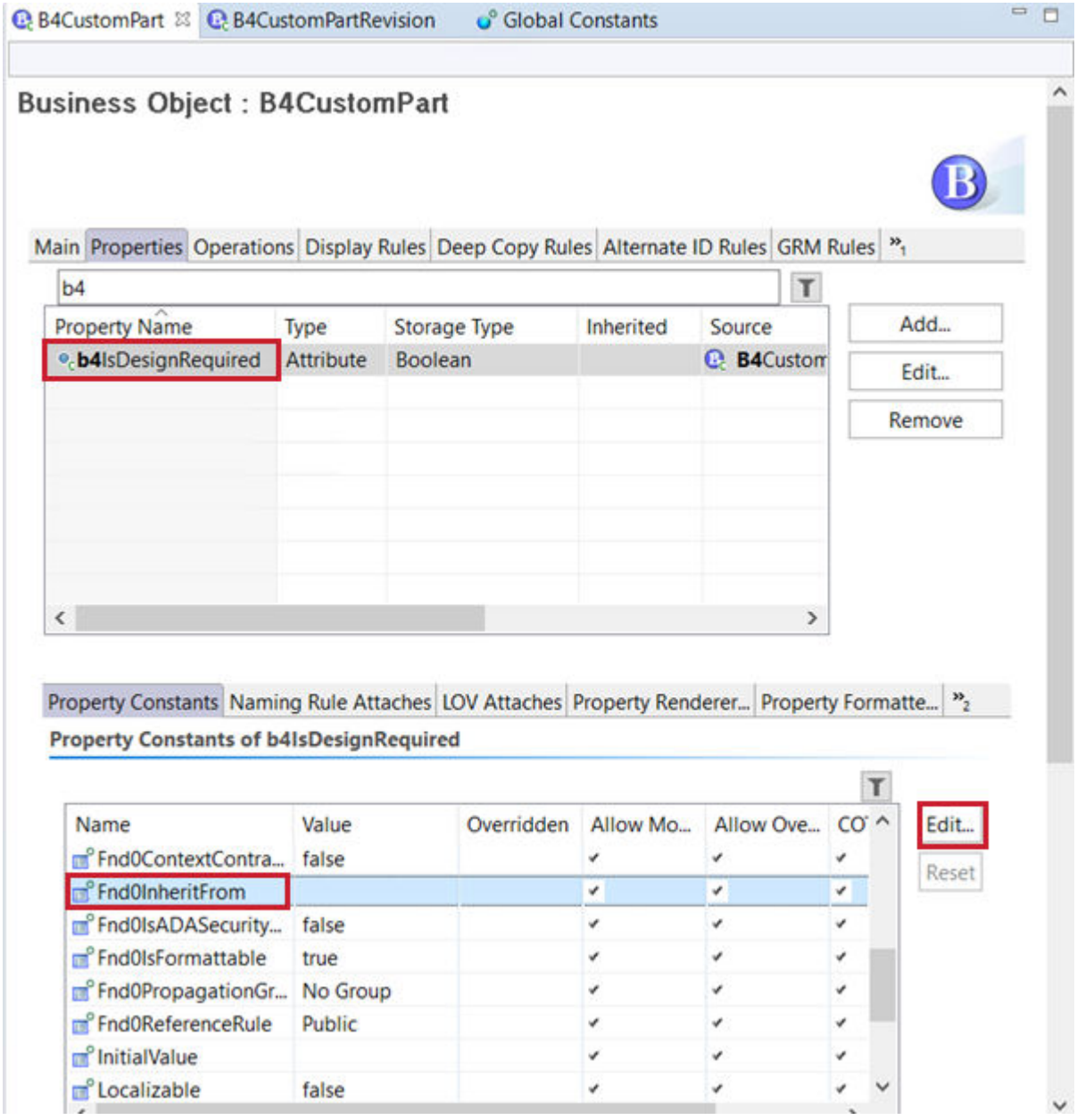


4. Set properties to be copied from the custom part to the corresponding custom design:

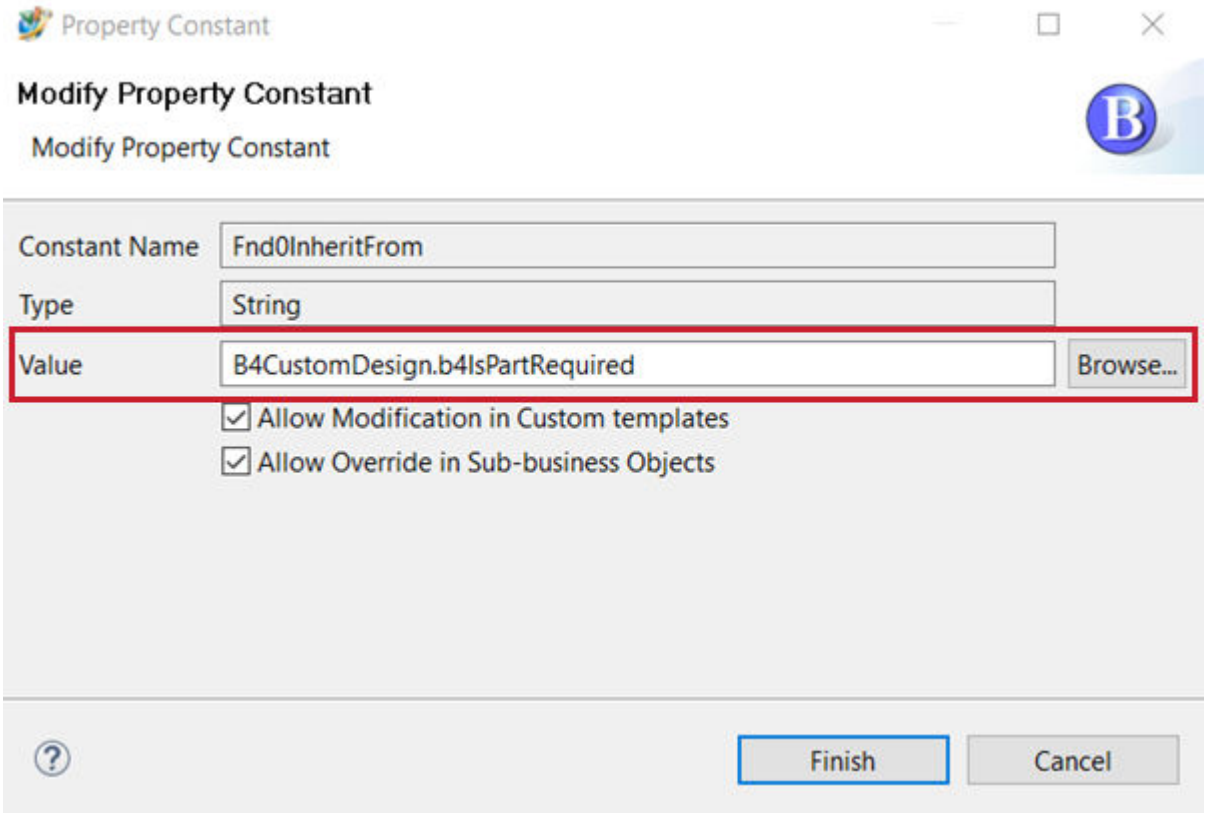
   a. Create a custom design (for example, **B4CustomDesign**) and add a **Is Part Required** persistent property to it.

   b. In the **Properties** tab of the custom part, search for the property to be copied (for example, **b4IsDesignRequired**)

   c. Edit the **Fnd0InheritFrom** property constant.



   d. In the **Modify Property Constant** dialog box, browse for the **B4CustomDesign** business object, select **b40IsPartRequired**, and click **Finish**.



Enable the display of properties required to create and align a corresponding design to a custom part

While **configuring a custom part for alignment**, you create a persistent property to specify if a corresponding design is required and a runtime property to set the automatic creation and alignment of the corresponding design. You must now enable the display of these properties in the **Add** panel. You must also enable the display of the persistent property in the **Summary** tab of the custom part.

1. Include the custom part in the **Awb0AssociatedElement** business object constant:

    a. In BMIDE, open the **required BMIDE template project,** for example, **B4**.

    b. Open the custom part business object, for example, **B4CustomPartRevision**.

    c. In the **Business Object Constants** tab, select **Awb0AssociatedElement** and click **Edit**.

    d. In the **Modify Business Object** dialog box, add **Awb0PartElement** in **Value** and click **Finish**.

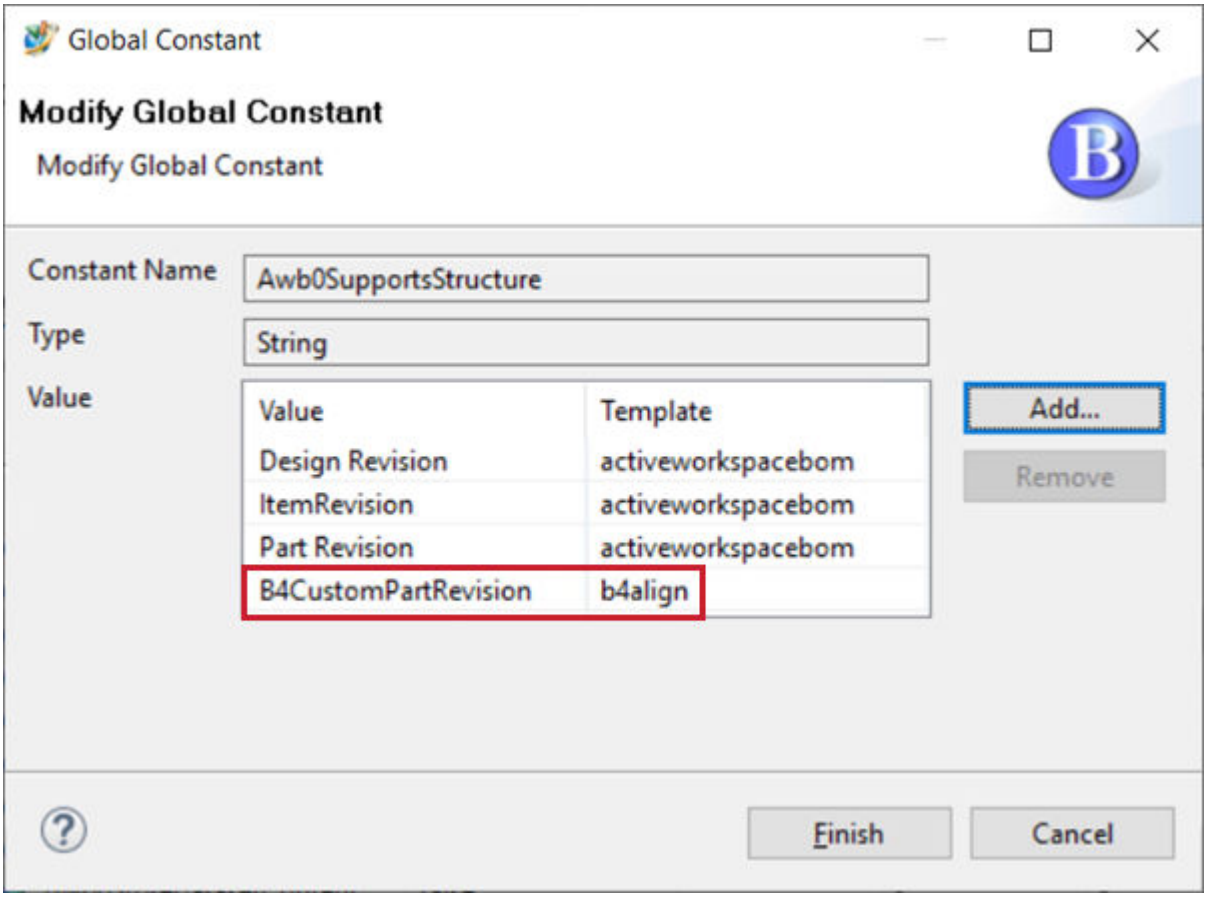
2. Include the custom part in the **Awb0SupportsStructure** global constant:

    a. Click **Open Global Constant Editor** and select **Awb0SupportsStructure**.

b. Click **Edit**.

c. In the **Modify Global Constant** dialog box, click **Add** next to **Value**.

d. In the **Add Value** dialog box, enter the custom part revision, for example, **B4CustomPartRevision**, and click **Finish**.



3. Create the following site preferences:

Preferences	Details
AWC_B4CustomPart.CREATERENDERING	Protection Scope: **Site** Category: **Product Structure.CAD BOM Alignment** Value: **Awp0PartCreate**
AWC_B4CustomPartRevision.SUMMARYRENDERING	Protection Scope: **Site** Category: **Product Structure.CAD BOM Alignment** Value: **Awp0PartRevisionSummary**
AWC_B4CustomPartRevision.INFORENDERING	Protection Scope: **Site** Category: **Product Structure.CAD BOM Alignment**

Preferences	Details
	Value: **Awp0PartRevInfoSummary**
AWC_B4CustomPartRevision.showObjectLocation.SUMMARYRENDERING	Protection Scope: **Site** Category: **Product Structure.CAD BOM Alignment** Value: **Awp0PartRevisionSummaryForShowObjectLocation**

4. Using XRT Editor, open the following style sheets and and the corresponding entries and save it.

Name of the style sheet	Entry to append	Description
Pma1PartCreate.xml	`<property name="b4IsDesignRequired"/>` `<property name="B4CreateAlignedDesign"/>`	Here, *B4* is the prefix of the BMIDE template that you have set. You add these entries so that the **Is Design Required** and **Create Aligned Design** properties are displayed on the **Add** panel.

Pma1PartRevSummary.xml	`<content visibleWhen="object_type==B4CustomPartRevision">`
	`  <property name="REF(items_tag,B4CustomPart).b4IsDesignRequired"/>`
	`</content>`
		Here, the entries are for the sample **B4CustomPart** and **B4CustomPartRevision**. You must make similar entries for the custom part and custom part revision that you created. You add these entries so that the **Is Design Required** and **Create Aligned Design** properties are displayed in the **Summary** tab.

Fnd0AlignedDesignsProvider.xml	`<content visibleWhen="object_type==B4CustomPartRevision">`
	`  <content visibleWhen="REF(items_tag,B4CustomPart).b4IsDesignRequired==true">`
	`  <inject src="AlignedDesigns" type="dataset"/>`
	`  </content>`
	`</content>`
	
	`<content visibleWhen="REF(awb0Archetype,B4CustomPartRevision).object_type==B4CustomPartRevision">`
	`  <content visibleWhen="pma1IsDesignRequired==true">`
	`  <inject src="AlignedDesigns" type="dataset"/>`
	`  </content>`
	`</content>`	

5. Deploy the BMIDE template.

10. Set up custom designs for alignment

About setting up custom designs for alignment

Before setting up custom designs for alignment, first ensure that they are qualified as engineering designs so that the custom designs also inherit the alignment properties along with other design properties. You can skip the steps 1 and 2 if you have created your custom parts and designs under the out-of-the-box (*OOTB*) part and design business object. Next, set up the custom design for alignment as follows:

1. (Optional) Specify if a **corresponding part is required** for the custom design by creating a persistent property, if it is not available already.

2. (Optional) Specify if the corresponding **part must be automatically created** when the design is created by defining a runtime property, if it is not available already.

3. **Enable the display** of the persistent and runtime properties.

After setting up the custom design for alignment, you must **configure the generation of its aligned engineering BOM**.

Specify if a corresponding part is required for a custom design

When creating a custom design, users can choose if a corresponding part is required for the design. For this, you first set up a **Is Part Required** persistent property.

1. Create a **Is Part Required** persistent property:

    a. In BMIDE, open the **required BMIDE template project,** for example, **B4**.

    b. Open the custom design, for example, **B4CustomDesign**.

    c. In the **Properties** tab, click **Add**.

    d. In the **Property Definition** dialog box, select **Persistent**, and click **Next**.

    e. In the **Persistent Property** dialog box:

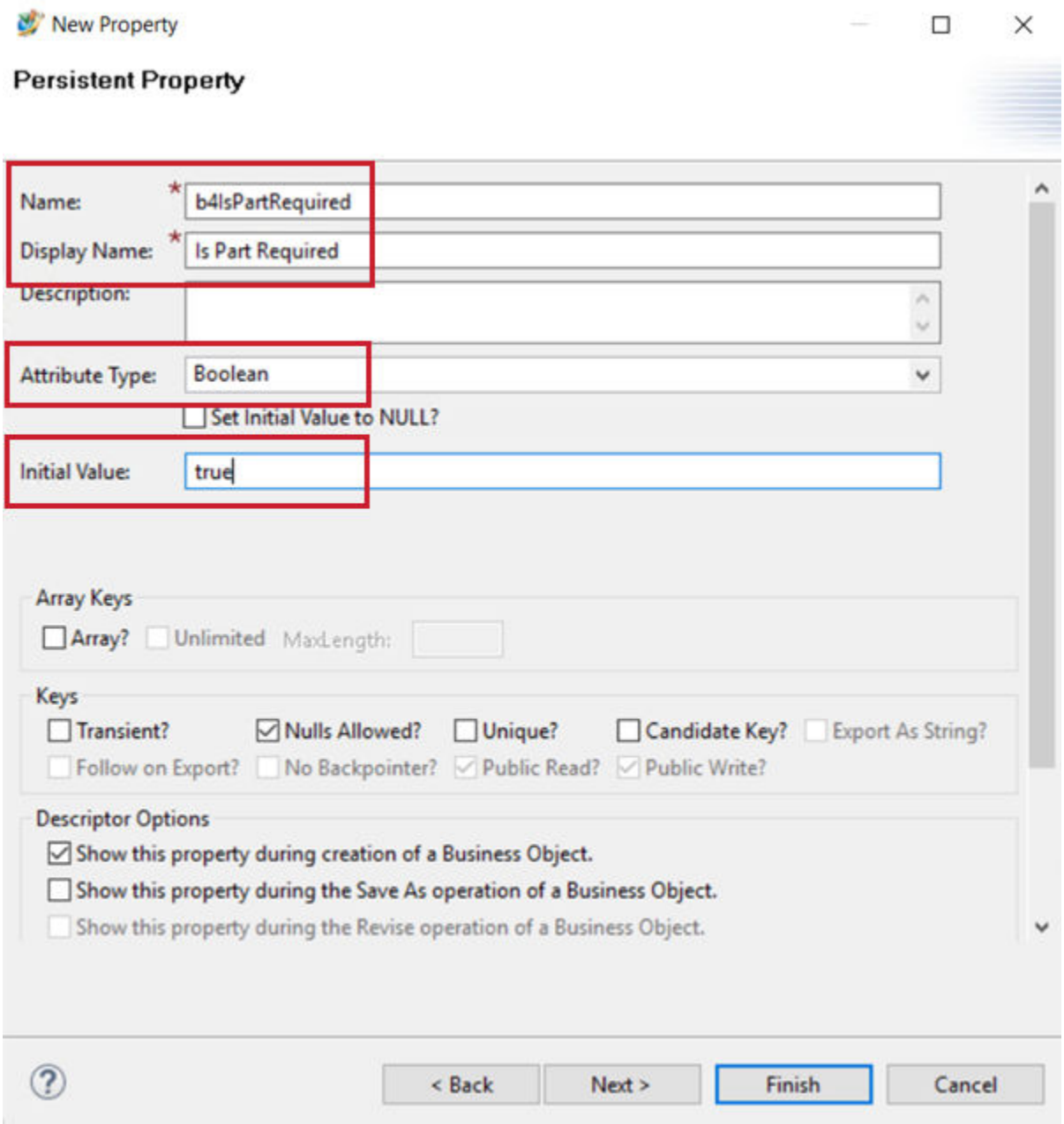
        A. Append **IsPartRequired** to the BMIDE template project prefix in **Name**, for example, **b4IsPartRequired**.

        B. Enter **Is Part Required** in **Display Name**.

        C. Select **Boolean** in **Attribute Type**.

D. Enter **true** in **Initial Value**.

E. Click **Finish**.

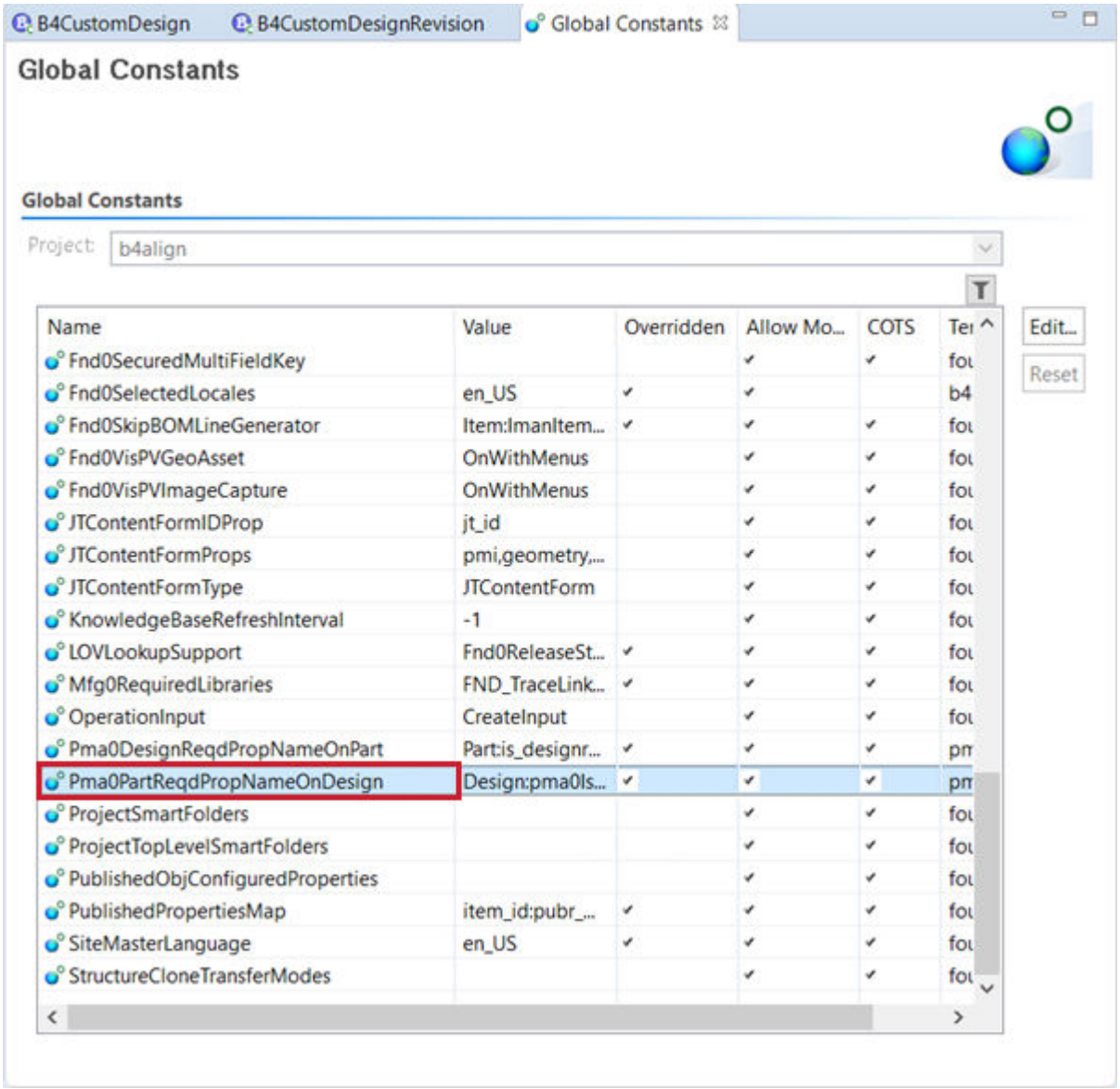


2. Add the persistent property to the **Pma0PartReqdPropNameOnDesign** global constant:

Add the persistent property to the Pma0PartReqdPropNameOnDesign global constant

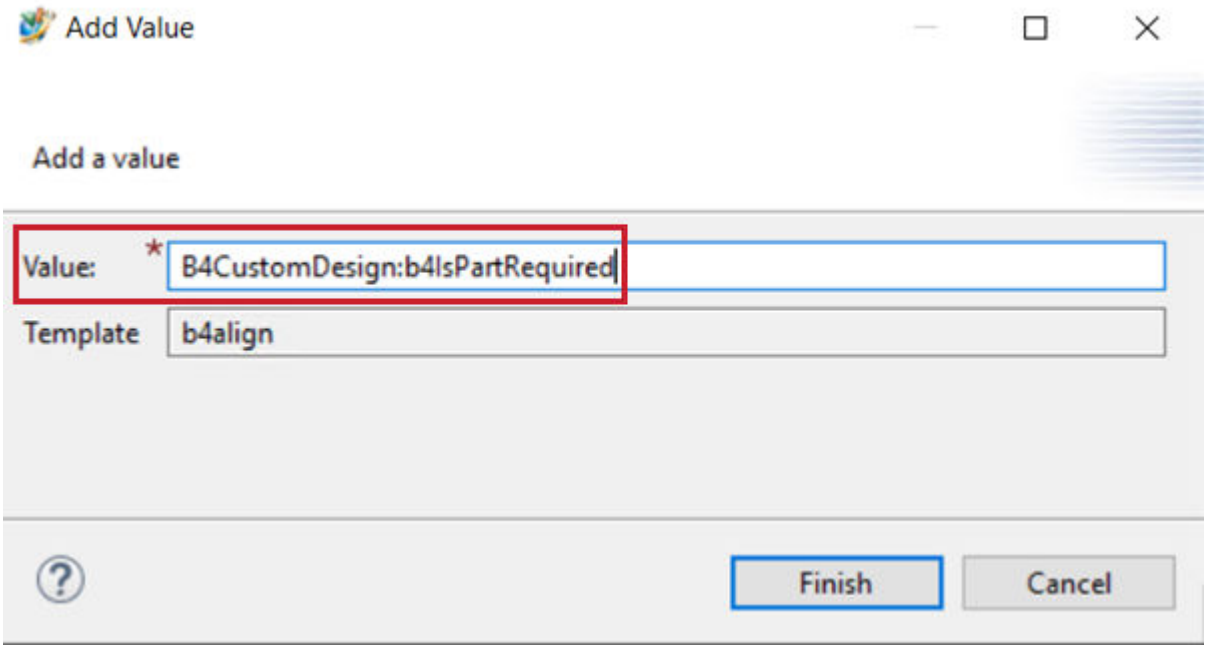
a. Click **Open Global Constant Editor** from the toolbar.

b. In the **Global Constants** tab, select **Pma0PartReqdPropNameOnDesign** and click **Edit**.



c. In the **Modify Global Constant** dialog box, click **Add**.

d. In the **Add a value** dialog box, add a value for the custom design and click **Finish**. For example, enter **B4CustomDesign:b4IsPartRequired**.



e. In the **Modify Global Constant** dialog box, click **Finish**.

Set the automatic creation of a part for a custom design

If a corresponding design is required for a custom part, the **Is Design Required** property of the part is set to **true**. In such a case, you can configure the part to be automatically created and aligned to the custom design.

1. Add a **Create Aligned Part** runtime property to the custom design:

   a. In BMIDE, open the **required BMIDE template project,** for example, **B4**.

   b. Open the custom design, for example, **B4CustomDesign**.

   c. In the **Operation Descriptor** → **CreateInput** tab, click **Add**.

   d. In the **OperationInput Property** dialog box, select **Define and add a new Runtime Property from Business Object** and click **Next**.

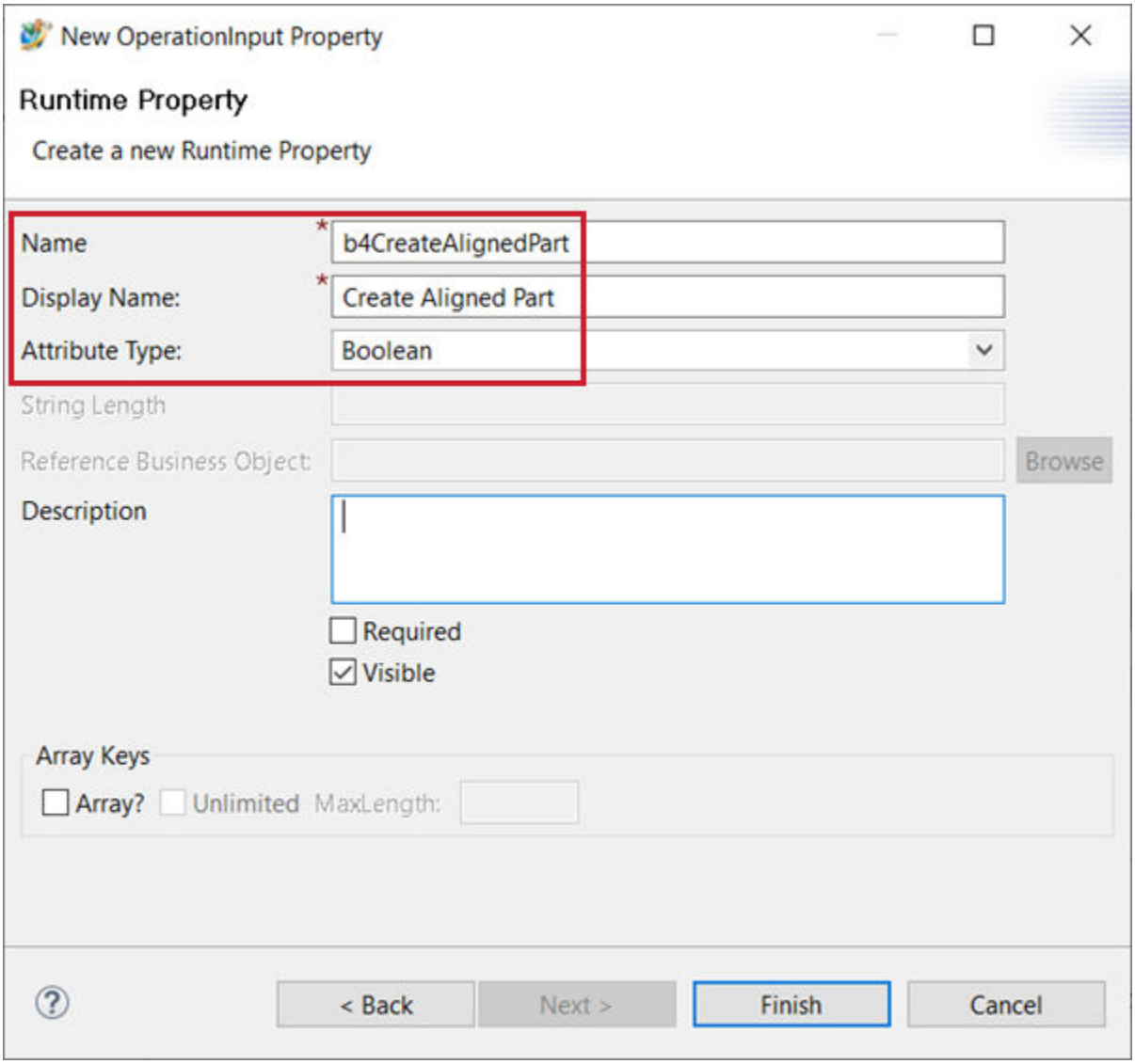
   e. In the **Runtime Property** dialog box:

      A. Append **CreateAlignedPart** to the BMIDE template project prefix in **Name**, for example, **b4CreateAlignedPart**.

      B. Enter **Name** and enter **Create Aligned Part** in **Display Name**.

      C. Select **Boolean** in **Attribute Type**.

D. Click **Finish**.



2. Add a BMIDE condition to a create a custom part automatically:

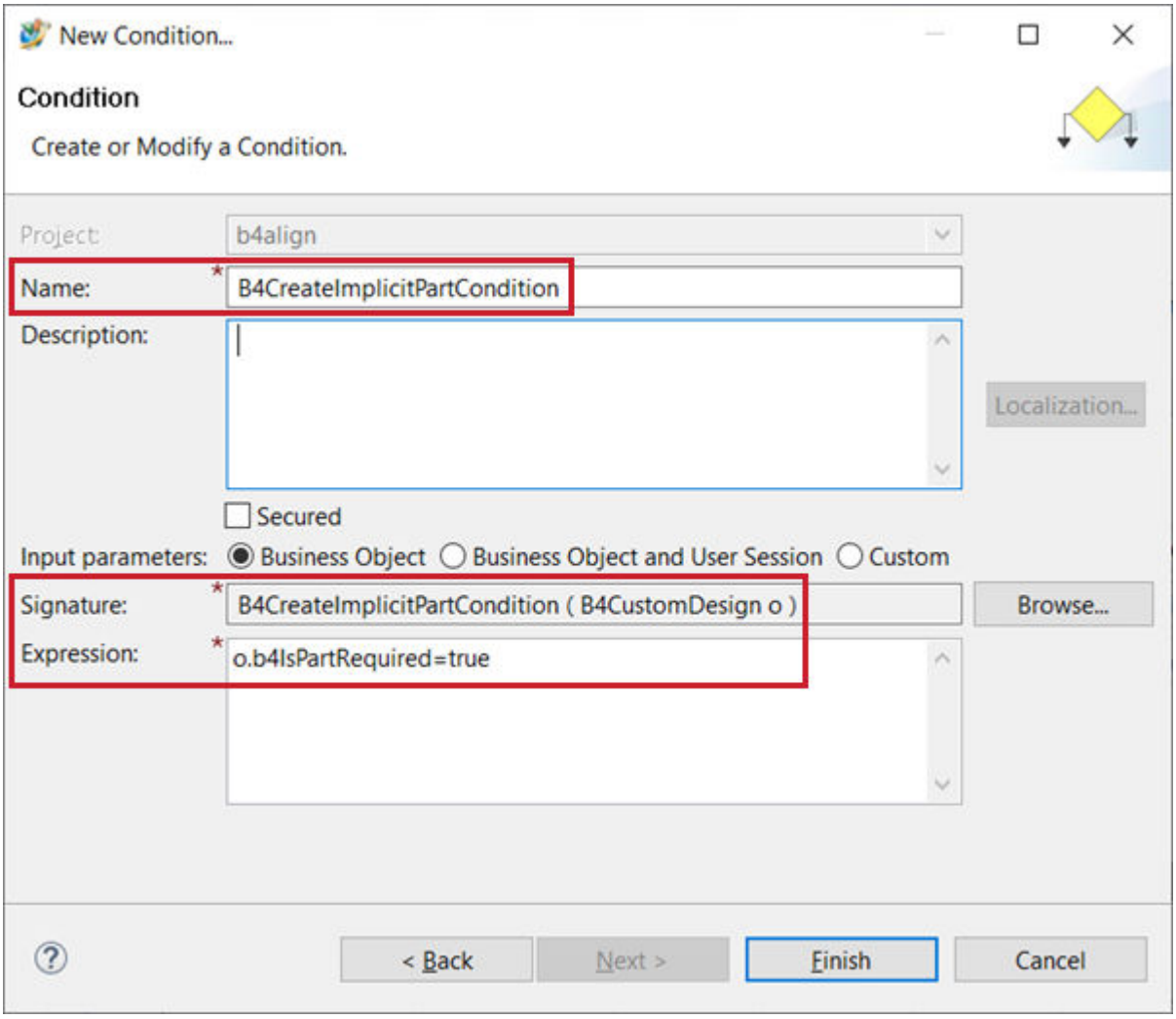
   a. On the menu bar, click **BMIDE** → **New Model Element**.

   b. In the **Model Element Type** dialog box, type **Condition** in **Wizards** and click **Next**.

   c. In the **Condition** dialog box, type **CreateImplicitPartCondition**, for example, **B4CreateImplicitPartCondition**.

   d. Click **Browse** next to **Signature** and select the custom design, for example, **B4CustomDesign**.

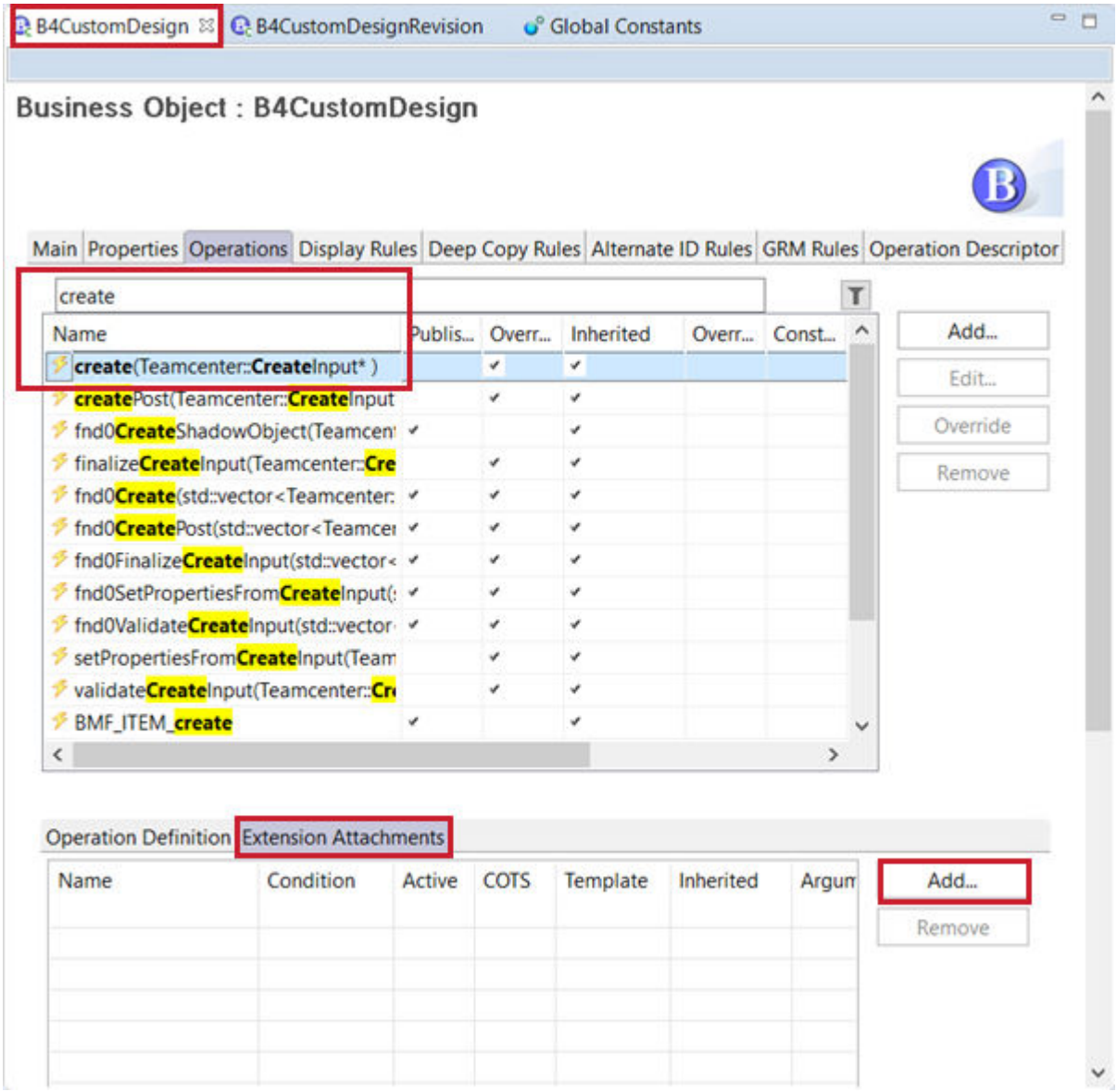
   e. In **Expression**, type **o.b4IsPartRequired=true** and click **Finish**.



3. Attach the **Pma0AutomateAndAlign** extension on the create operation of the custom design so that when ever a corresponding part is created, it is automatically aligned with the custom design:

   a. In the **Operations** tab of the custom design, search for the **create** operation.

   b. In **Extension Attachments**, click **Add**.



c. In the **Extension** dialog box, click **Browse** next to **Extension** and select **Pma0AutomateAndAlign**.

d. Click **Add** next to **Arguments**.

e. In the **Extension Arguments** dialog box, click **Browse** next to **TargetObjectType** and select a custom part, for example, **B4CustomPart**.

f. In **CrelPropNameToEnableExtn**, enter the name of the runtime property that you created for the custom design, for example, **b4CreateAlignedPart** and click **Finish**.

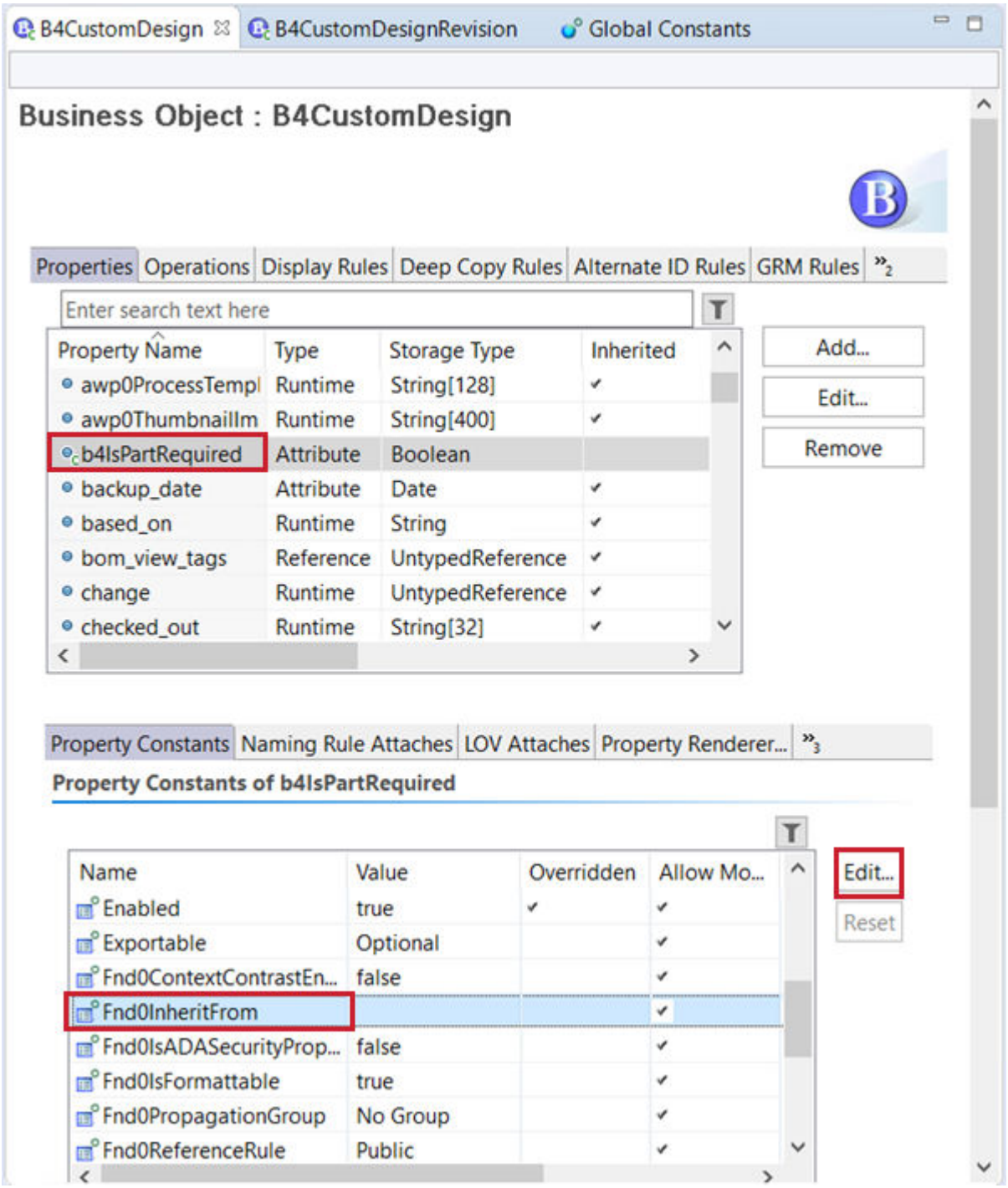
g. In **Condition**, enter **B4CreateImplicitPartCondition** and click **Finish**.

4. Set the properties to be copied from the custom design to the corresponding custom part:

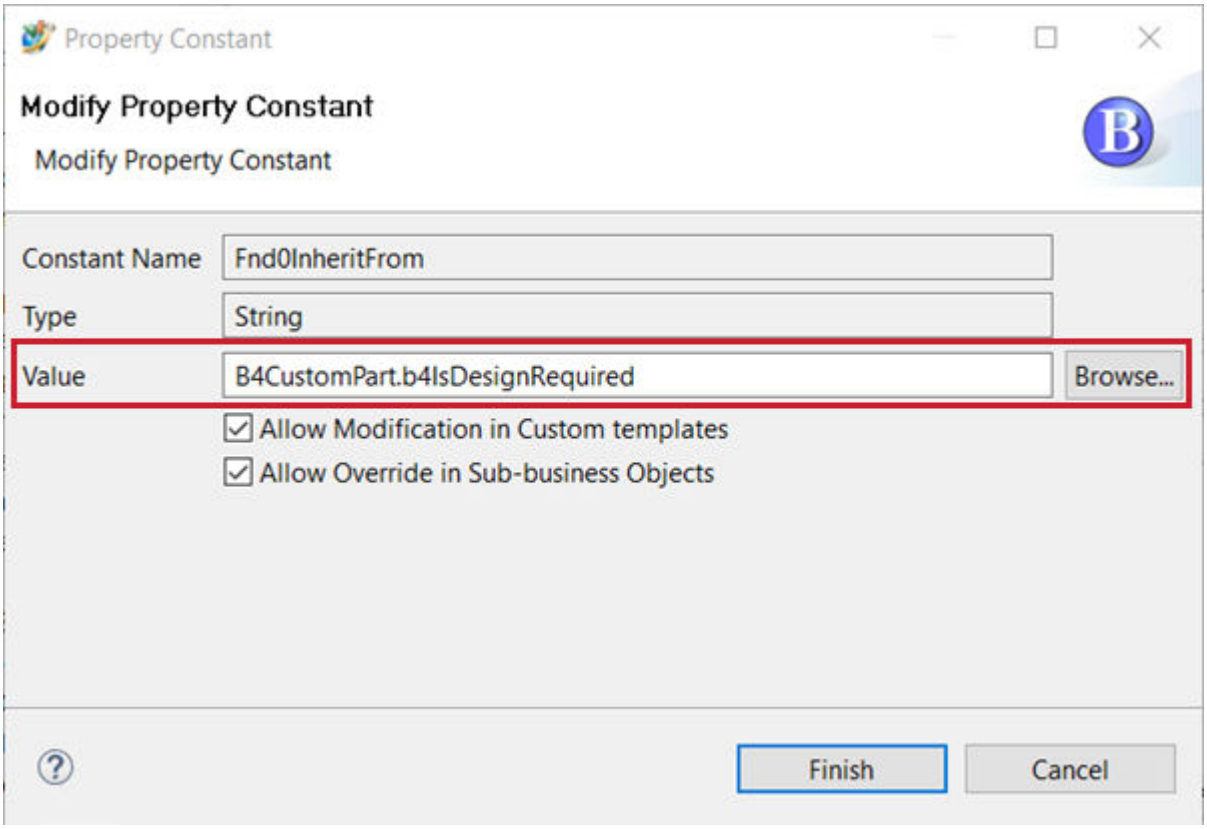
a. Create a custom part (for example, **B4CustomPart**) and add a **Is Design Required** persistent property to it.

b. In the **Properties** tab of the custom design, search for the property to be copied (for example, **b4IsPartRequired** property).

c. Edit the **Fnd0InheritFrom** property constant.



d. In the **Modify Property Constant** dialog box, browse for the **custom part** (**B4CustomPart**), select **b4IsDesignRequired**, and click **Finish**.



Enable the display of properties required to create and align a corresponding part to a custom design

While **configuring a custom design for alignment**, you created a persistent property to specify if a corresponding part is required and a runtime property to set the automatic creation and alignment of the corresponding part. You must now enable the display of these properties in the **Add** panel. You must also enable the display of the persistent property in the **Summary** tab of the custom design.

1. Include the custom design in the **Awb0AssociatedElement** business object constant:

   a. In BMIDE, open the **required BMIDE template project,** for example, **B4**.

   b. Open the custom design business object, for example, **B4CustomDesignRevision**.

   c. In the **Business Object Constants** tab, select **Awb0AssociatedElement** and click **Edit**.

   d. In the **Modify Business Object** dialog box, add **Awb0DesignElement** in **Value**, and click **Finish**.

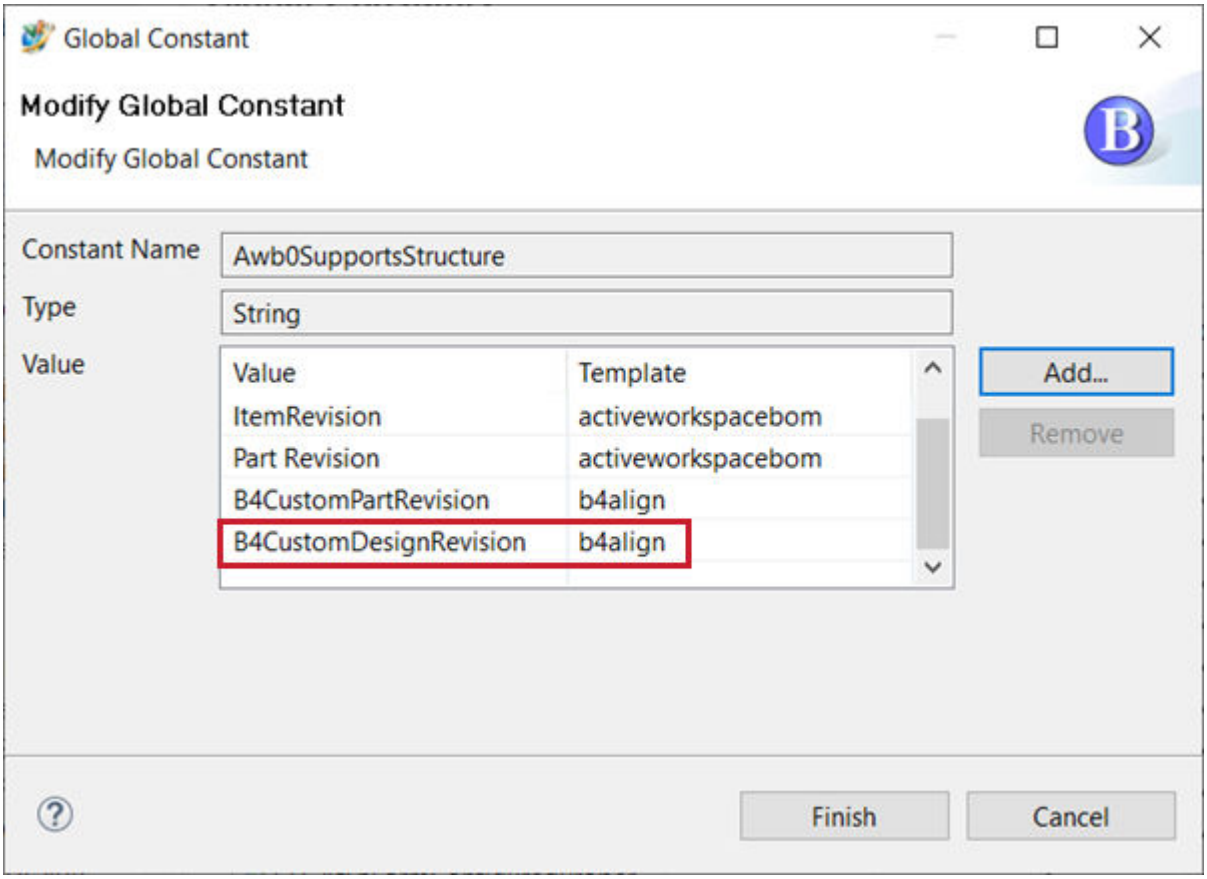
2. Include the custom design in the **Awb0SupportsStructure** global constant:

   a. Click **Open Global Constant Editor** and select **Awb0SupportsStructure**.

   b. Click **Edit**.

   c. In the **Modify Global Constant** dialog box, click **Add** next to **Value**.

   d. In the **Add Value** dialog box, enter the custom design revision, for example, **B4CustomDesignRevision**, and click **Finish**.



3. Create the following site preferences:

Preferences	Details
AWC_B4CustomDesign.CREATERENDERING	Protection Scope: **Site** Category: **Product Structure.CAD BOM Alignment** Value: **Pma0AutomationDesignCreate**
AWC_B4CustomDesignRevision.SUMMARYRENDERING	Protection Scope: **Site** Category: **Product Structure.CAD BOM Alignment**

Preferences	Details
	Value: **Awp0DesignRevSummary**
AWC_B4CustomDesignRevision.INFORENDERING	Protection Scope: **Site** Category: **Product Structure.CAD BOM Alignment** Value: **Pma1DesignRevInfoSummary**
AWC_B4CustomDesignRevision.REVISERENDERING	Protection Scope: **Site** Category: **Product Structure.CAD BOM Alignment** Value: **Awb0DesignRevise**
AWC_B4CustomDesignRevision.showObjectLocation.SUMMARYRENDERING	Protection Scope: **Site** Category: **Product Structure.CAD BOM Alignment** Value: **Awb0DesignRevSummaryForShowObjectLocation**

Here, **B4CustomDesignRevision** is the revision of the custom design that you created.

4. Using XRT Editor, open the following style sheets and and the corresponding entries and save it.

Name of the style sheet	Entry to append	Description
Pma0AutomationDesignCreate.xml	`<property name="b4IsPartRequired"/>` `<property name="b4CreateAlignedPart" />`	You add these entries so that the **Is Part Required** and **Create Aligned Part** properties are displayed on the **Add** panel.

Pma1DesignRevSummary.xml	`<content visibleWhen="object_type==B4CustomDesignRevision">`
	`  <property name="REF(items_tag,B4CustomDesign).b4IsPartRequired"/>`
	`</content>`
		These are the entries for the sample **B4CustomDesign** and **B4CustomDesignRevision**. You must make similar entries for the custom design and custom design revision that you created. You add these entries so that the **Is Part Required** and **Create Aligned Part** properties are displayed in the **Summary** tab.

Awb0DesignElementSummary.xml	`<content visibleWhen="awb0UnderlyingObjectType==B4CustomDesignRevision">` `  <inject type="dataset" src="Fnd0AlignedPartsProvi`	These entries are for the sample **B4CustomDesign**. You must make a similar entry for the custom design that you created.

Name of the style sheet	Entry to append	Description
	`der" />` `</content>`	

Fnd0AlignedPartsProvider.xml	`<content visibleWhen="object_type==B4CustomDesignRevision">`
	`  <content visibleWhen="REF(items_tag,B4CustomDesign).b4IsPartRequired==true">`
	`  <inject src="AlignedParts" type="dataset"/>`
	`  </content>`
	`</content>`
	
	`<content visibleWhen="REF(awb0Archetype,B4CustomDesignRevision).object_type==B4CustomDesignRevision">`
	`  <content visibleWhen="pma1IsPartRequired==true">`
	`  <inject src="AlignedParts" type="dataset"/>`
	`  </content>`
	`</content>`
		These are the entries for the sample **B4CustomDesign** and **B4CustomDesignRevision**. You must make similar entries for the custom design and custom design revision that you created.

5. Deploy the BMIDE template.

11. Configure the engineering BOM generation

About configuring the engineering BOM generation

Users can generate a design structure from an engineering BOM that is already available in Teamcenter. By default, Teamcenter is configured to generate the engineering BOM in a certain way. You can change this default behavior to meet your business requirements. For example, you can change the naming convention of the generated engineering BOM or you can choose to skip certain designs so that the corresponding parts are not created.

After the engineering BOM is generated, if some updates are made to the design structure, users must update the aligned engineering BOM. By default, the engineering BOM is updated based on certain BMIDE conditions that are already set for the **TCM Released** release status and for parts that are not yet released. If you are using any custom release status, the parts with such release status are not updated. You can use the default BMIDE conditions to define how the parts with custom release status must be updated.

Map parts and designs for alignment

Users can generate an engineering BOM from a design structure that already exists in Teamcenter. Similarly, users can generate a design structure from an existing engineering BOM. In the generated BOM, the parts and designs, and their occurrences are automatically aligned with each other. This is because, by default, the parts and designs belonging to the **Part** and **Design** business objects are mapped with each other in the **Pma0_Part_Design_Type** preference.

The default value of this preference is:

PartType:*Part***,DesignType:***Design*

Here, *Part* and *Design* are the internal names of the business objects.

You can change the default mapping and can map additional business objects for alignment.

For example, to map parts and designs belonging to **CustomPart** and **CustomDesign** business objects, you add the following value to the **Pma0_Part_Design_Type** preference:

PartType:*CustomPart***,DesignType:***CustomDesign*

A part can be mapped to more than one type of design. Similarly, a design can be mapped to more than one type of part.

For example, your business requirement is that for both **Design** and **CustomDesign** types, the generated engineering BOM must be of the type **Part**. For this requirement, you include the following values in the preference:

PartType:*Part***,DesignType:***Design*

PartType:*Part***,DesignType:***CustomDesign*

When users generate an engineering BOM from a design structure of type **Design** or **CustomDesign**, the generated engineering BOM is of the type **Part**. Whereas, if the users generate a design structure from an engineering BOM, the first value of the design is considered. In the above example, when users generate a design structure from an engineering BOM of type **Part**, the generated design structure is of the type **Design**.

Set a naming convention for the generated engineering BOM

Users can generate an engineering BOM from a design structure already available in Teamcenter. By default, a naming convention is defined for the generated engineering BOM. You can change the default naming convention by choosing to:

- Keep the name and ID of the generated engineering BOM the same as that of the design structure.

  OR

- Specify a prefix, a suffix, or both for the name and ID of the generated engineering BOM.

Set the name and ID of the generated engineering BOM the same as that of the corresponding design structure

1. In Teamcenter, clear the value of the **Pma0_EBOM_Prefix_Suffix** preference.

2. In BMIDE, open the part business object, for example, **Part**.

3. In the **Business Object Constants** tab, select **MultiFieldKey**, and click **Edit**.

4. Add **item_id** and **object_type** to the list of selected applications, and click **Finish**.

5. Verify that the value of **MultiFieldKey** is changed to **Part{item_id,object_type}**.

6. Save and deploy the changes.

Specify a prefix, a suffix, or both for the name and ID of the generated engineering BOM

Specify a prefix, a suffix, or both in the **Pma0_EBOM_Prefix_Suffix** preference. By default, the prefix **P_** is set as the value of this preference. You can change this default value.

For example, consider that design structure of *Wheel* consists of *Rim*, *Valve*, and *Tire*. If you set the prefix as **Part_**, the engineering BOM is generated as *Part_Wheel* with parts as *Part_Rim*, *Part_Valve*, and *Part_Tire*.

The prefix and suffix are attached to the **item_id** property of **PartType** specified in the **Pma0_Part_Design_Type** preference.

If you do not want a prefix or suffix in the item ID, and want to use the ID generated using a naming rule, set the value of **Pma0_EBOM_Prefix_Suffix** as **IGNORE**.

Skip design occurrences while generating an engineering BOM

When an engineering BOM is automatically generated from a design structure, part occurrences are created for all design occurrences, by default. Additionally, standalone parts are created for each design. However, you can choose to skip certain design occurrences along with their children so that the corresponding parts and parts occurrences are not created.

To control the creation of parts and part occurrences, you set specific actions in the **Pma0_DBOM_skip_node_conditions** preference. The default action for each design occurrence is **TraverseNode, TraverseStructure**, which means both parts and part occurrences are created. The **TraverseNode** action creates a part and part occurrence for the design occurrence itself while the **TraverseStructure** actions navigates the structure of the design occurrence to create parts and part occurrences for its children.

For example, consider the design structure of a *Car*. *Wheel* is one of the design occurrences in the car. *Wheel*, in turn, has *Tire*, *Rim*, and *Valve* as its child design occurrences. Here, *Wheel* is the node. And, by default, parts and part occurrences are created for *Wheel* and its children.

Depending on how you want the engineering BOM of the car to be generated, you can set one of the following actions for *Wheel*:

Requirement	Action
Do not require parts and part occurrences for *Wheel* and its children.	**SkipNode, SkipStructure**
Do not require part and part occurrence for *Wheel* but require parts and part occurrences for its children.	**SkipNode, TraverseStructure**
Require part and part occurrence for *Wheel* but do not require parts and part occurrences for its children.	**TraverseNode, SkipStructure**

Now, consider that you want parts and part occurrences for *Wheel* and its children except for *Rim*. By default, the action set on *Wheel* and its children is **TraverseNode, TraverseStructure**. To prevent the creation of part and part occurrence for *Rim*, you change the action set on *Rim* to **SkipNode, SkipStructure**.

If, however, you want a standalone part for *Rim* but do not want it to be included as a part occurrence in the engineering BOM, you can set the action for *Rim* as **TraverseNode, TraverseStructure**. And, additionally set the **Pma0_EBOM_skip_occurrence_conditions** preference to **true** for *Rim*. This configuration ensures that a part is created for *Rim* but it is not included as a part occurrence of *Wheel* in the engineering BOM.

Set properties and relations to be copied to a part in an engineering BOM

You can specify additional properties and relations, including custom properties, to be copied while generating or updating the engineering BOM. Ensure you map properties on the **BOMLine** object before BOM generation or update.

To copy properties and relations while generating or updating an engineering BOM, specify the following values in the **PMA0_COPY_PROP_DESIGN_TO_PART_GENERATE** or **PMA0_COPY_PROP_DESIGN_TO_PART_UPDATE** preference respectively.

- For property copy, use the property internal names.

  For example, to copy name, specify *bl_rev_object_name*:*bl_rev_object_name* in the preference.

- For relation copy, use the corresponding **BOMLine** property internal name which represents that relation.

  For example, to copy a material relation, specify *bl_rev_Mat1UsesMaterial*:*bl_rev_Mat1UsesMaterial* in the preference.

You can specify multiple values. If a value is invalid, the property is not copied to the part, but the design is aligned with the generated part. The design properties are not copied to the corresponding parts during a manual alignment.

Copy of the Quantity, Variant Formula and UOM properties:

Quantity and **Variant Formula** are copied even if they are not specified in preference.

Summarization on	Action	Quantity (On screen value can be a logical combination of input values)	Variant Formula (On screen value can be a logical combination of input values)	UOM
Design to Part (occurrence alignment)	Generate	Summarized and copied	Summarized and copied	Copied during the creation of a new part occurrence even if not specified in the preference value.
	Update	Summarized and copied Even though it is specified for copy, you can skip it.	Summarized and copied Even though it is specified for copy, you can skip it.	Copied during the creation of a new part occurrence even if not specified in the preference value.

Summarization off	Performed action	Quantity (On screen value can be a logical combination of input values)	Variant Formula (On screen value can be a logical combination of input values)	UOM
Design to Part (occurrence alignment)	Generate	Copied	Copied	Copied during the creation of a new part occurrence even if not specified in the preference value.
	Update	Copied Even though it is specified for copy, you can skip it.	Copied Even though it is specified for copy, you can skip it.	Copied during the creation of a new part occurrence even if not specified in the preference value.

Copy of the Reference Designator property:

To copy the combined **Reference Designator** property values on summarized line, you need to enable the preference **BOM_Enable_Ref_Designator_Value_Packing** and specify **Reference Designator** property in the copy preferences for both generate and update cases.

After the copy, the reference designator values are displayed on the summarized part as shown below, depending on the configuration of the display of the reference designator values.

Design	Part
D_Capacitor (Ref Designator = R1)	P_Capacitor*3 (Ref Designator = R1, R2, R3)
D_Capacitor (Ref Designator = R2)	
D_Capacitor (Ref Designator = R3)	

Set the criteria to group design occurrences

You can set a criteria to group design occurrences into a single part occurrence in the generated engineering BOM. You set this criteria in the **Pma0_Summarized_EBOM_Grouping_Criteria** preference by specifying the properties to be considered for grouping the design occurrences. By default, the design occurrences are grouped using the sequence number and variant properties. Consider that you use the *bl_grouping_indicator* property instead to set the grouping criteria. All the design occurrences that match this criteria are grouped together.

Scenario 1: Same design, different variant conditions, and same grouping indicator

Design structure:

Design	Position	Variant condition	Grouping indicator
Fuel Tank, 30 Gallon	P1	2.0 Ton GVW	Y
Fuel Tank, 30 Gallon	P2	3.5 Ton GVW	Y
Fuel Tank, 30 Gallon	P3	5.0 Ton GVW	Y

Generated engineering BOM:

Part	Quantity	Variant condition
Fuel Tank, 30 Gallon	1	2.0 Ton GVW OR 3.5 Ton GVW OR 5.0 Ton GVW

Scenario 2: Same design, different variant conditions, and different grouping indicator

Design structure:

Design	Position	Variant condition	Grouping indicator
Fuel Tank, 30 Gallon	P1	2.0 Ton GVW	Y
Fuel Tank, 30 Gallon	P2	3.5 Ton GVW	Y
Fuel Tank, 30 Gallon	P3	5.0 Ton GVW	N

Generated engineering BOM:

Part	Quantity	Variant condition
Fuel Tank, 30 Gallon	1	2.0 Ton GVW OR 3.5 Ton GVW
Fuel Tank, 30 Gallon	1	5.0 Ton GVW

If one of the **Quantity** is **As Required**, and other is **non-as required**(some tangible value) then summarization is skipped.

Similarly, for non-matching **UOM** values, summarization is skipped.

Scenario 3: Same design, same variant condition, and same grouping indicator but with different quantity

Design structure:

Design	Position	Variant condition	Grouping indicator
Fuel Tank, 30 Gallon	P1	2.0 Ton GVW	Y Quantity = 3
Fuel Tank, 30 Gallon	P2	3.5 Ton GVW	Y
Fuel Tank, 30 Gallon	P3	3.5 Ton GVW	Y
Fuel Tank, 30 Gallon	P4	5.0 Ton GVW	Y Quantity = 3

Generated engineering BOM:

Part	Quantity	Variant condition
Fuel Tank, 30 Gallon	3	2.0 Ton GVW OR 5.0 Ton GVW
Fuel Tank, 30 Gallon	2	3.5 Ton GVW

Scenario 4: Same design and overlapping variant conditions

Design structure:

Design	Position	Variant condition	Grouping indicator
Fuel Tank, 30 Gallon	P1	2.0 Ton GVW OR 5.0 Ton GVW or 10 Ton GVW	Y
Fuel Tank, 30 Gallon	P2	5.0 Ton GVW or 10 Ton GVW	Y
Fuel Tank, 30 Gallon	P3	10 Ton GVW	Y

Generated engineering BOM:

Part	Quantity	Variant condition
Fuel Tank, 30 Gallon	1	2.0 Ton GVW OR 5.0 Ton GVW or 10 Ton GVW
Fuel Tank, 30 Gallon	1	5.0 Ton GVW or 10 Ton GVW
Fuel Tank, 30 Gallon	1	10 Ton GVW

Even though the grouping indicator is the same for all designs, if the variant conditions of the designs overlap, three distinct part occurrences are created. In this example, the variant conditions of the three positions of the fuel tank are not distinct and there is an overlap with 5.0 Ton GVW and 10 Ton GVW appearing in more than one condition.

Scenario 5: Same design with same count of different variant conditions

Design structure:

Design	Position	Variant condition	Grouping indicator
Bolt	P1	Base	Y
Bolt	P2	Base	Y
Bolt	P3	Base	Y
Bolt	P4	Base	Y
Bolt	P5	Base	Y
Bolt	...P32	Base	Y
Bolt	P110	Deluxe	Y
Bolt	P111	Deluxe	Y
Bolt	P112	Deluxe	Y
Bolt	P113	Deluxe	Y
Bolt	P114	Deluxe	Y
Bolt	P115	Deluxe	Y
Bolt	...P142	Deluxe	Y

Generated engineering BOM:

Part	Quantity	Variant condition
Bolt	32	Base or Deluxe

Scenario 6: Same design with different count of different variant conditions

Design structure:

Design	Position	Variant condition	Grouping indicator
Bolt	P1	Base	Y
Bolt	P2	Base	Y
Bolt	P3	Base	Y
Bolt	P4	Base	Y
Bolt	P5	Base	Y
Bolt	...P32	Base	Y
Bolt	P110	Deluxe	Y
Bolt	P111	Deluxe	Y
Bolt	P112	Deluxe	Y
Bolt	P113	Deluxe	Y
Bolt	P114	Deluxe	Y
Bolt	P115	Deluxe	Y
Bolt	...P150	Deluxe	Y

Generated engineering BOM:

Part	Quantity	Variant condition
Bolt	32	Base
Bolt	40	Deluxe

Set the grouping of designs to generate flexible parts

A flexible part is represented by multiple designs. You can group the designs so that when an engineering BOM is generated from the design structure, an aligned flexible part is automatically included in the engineering BOM.

To group the designs, you can use any default property of the **BOMLine** business object. If you want to use the property of a custom business object, you must first map that property with a property of **BOMLine**.

You specify the property that you have identified for grouping designs in the **Pma0_Flexible_Design_Revision_Group_Property** preference.

Also ensure that you have **set the criteria to group design occurrences** if you want to generate summarized flexible part.

Example — Consider that the design structure of *Routing Assembly* has four designs with a matching **Find Number** that represent the flexible part *Pipe*. You choose to use the reference designator

(**bl_ref_designator**) property to group the designs. Make sure you have specified **bl_sequence_no** property in the preference **Pma0_Summarized_EBOM_Grouping_Criteria**.

Design	Reference Designator
Routing Assembly	
Pipe Design 1	Group1
Pipe Design 2	Group1
Pipe Design 3	Group1
Pipe Design 4	Group1
Pump Design	

When an engineering BOM is automatically generated from the design structure, a single part *Pipe* is created and all four designs of *Pipe* are aligned to it. The **Has Multiple Designs** property of the flexible part *Pipe* is automatically set. Additionally, in the engineering BOM, all four design occurrences of *Pipe* are aligned with a single part occurrence and the quantity of the part occurrence is set as 4. If you do not specify **bl_sequence_no** property in the preference **Pma0_Summarized_EBOM_Grouping_Criteria** then it will generate 4 pipe in the engineering BOM. The part is same, but it is displayed 4 times (non-summarized) mode.

Design	Engineering BOM
Routing Assembly	
Pipe Design 1	Pipe x 4
Pipe Design 2	
Pipe Design 3	
Pipe Design 4	
Pump Design	Pump

If you change the reference designators of *Pipe Design 3* and *Pipe Design 4* to *Group2*, two flexible parts, one each for *Pipe Design 1* and *Pipe Design 2*, and for *Pipe Design 3* and *Pipe Design 4* are created.

Design	Engineering BOM
Routing Assembly	
Pipe Design 1	Pipe1 x 2
Pipe Design 2	
Pipe Design 3	Pipe2 x 2
Pipe Design 4	
Pump Design	Pump

Business users can also manually set a part as a flexible part by first aligning the part with its corresponding designs, then selecting the **Has Multiple Designs** check box, and finally performing automated update. These actions by the users will override the grouping that you have set for generating flexible parts, and the designs manually aligned to the part are considered to create and align the flexible part.

Enable the one to one mapping of each design occurrence to a separate part occurrence

By default, a design occurring multiple times in a design structure is aligned to a single part occurrence with the quantity same as the number of times the design occurs in the design structure. If you want each design occurrences to map to a separate part occurrence, set the **FND0_ENABLE_MULTIPLE_ALIGNMENT_CRITERIA** preference to **False**.

Set up workflows to generate and update an aligned engineering BOM

By default, **Generate Part EBOM** and **Update Engineering BOM** workflows are set up to generate and to update an aligned BOM. These workflows use the following action handlers:

Handler	Description
PMA0_generate_part_ebom_handler	Generates an engineering BOM from a design structure.
PMA0_update_ebom_handler	Updates the engineering BOM aligned to a design structure with the design changes.

Based on your business requirements, you can use these default workflows to set up your own workflows.

In the above handlers, you can use the preference **TC_config_rule_name** for stating the revision rule used for source structure configuration.

If you update the source structure in an active change notice having a date or unit effectivity set, then the same is set on the target structure.

For the target structure, revision rule has a non-configurable value set to **Working; Any Status**.

Generate an engineering BOM through a utility

You can generate an engineering BOM automatically from a design structure already available in Teamcenter by running the **generate_ebom_from_dbom** utility. In the generated engineering BOM, the newly created part occurrences are automatically aligned with the corresponding design occurrences.

Use the following syntax to run the utility at the Teamcenter command prompt:

generate_ebom_from_dbom -u=*Teamcenter_username* **-p=***Teamcenter_password* **-g=***group* **-dbomroot=***dbom_root_item_id* **-structure_type=***part_ebom*

For detailed information about this utility and its arguments, run the utility as follows:

generate_ebom_from_dbom -h

The **-h** argument displays the help that describes each argument in detail.

Define how to update the aligned design structure and engineering BOM

When users open a design structure to perform an automated or a guided update, the design structure is considered as the source structure, and its aligned engineering BOM is considered as the target structure, and vice versa. You can define how an aligned engineering BOM or design structure must be updated during an automated or guided update by setting the certain values in the **Pma0_Define_Update_Automation_Behavior** preference, for example, **Skip_Addition_Of_New_Occurrences**, **Skip_Removal_Of_Unaligned_Occurrences**, and **Skip_Quantity_And_Variant_Formula_Update**.

> Example:
>
> If you add the value **Skip_Addition_Of_New_Occurrences** in the **Pma0_Define_Update_Automation_Behavior** preference, when users add a new design occurrence in the design structure and perform automated or guided update, the corresponding part occurrence is not added in the engineering BOM.

Additionally, during the automated or guided update, only the source structure is checked, by default. During this check, the entire source structure is not traversed and only those occurrences for which the last modified date has changed are considered. This improves the performance of automated and guided updates. However, if you want both source and target structures to be checked, you must set the value of the **Pma0_use_struct_mod_date** preference to **False**.

Define update actions for parts with custom release status

If some updates are made to an already aligned design structure, the corresponding engineering BOM must also be updated. By default, the following conditions are set in BMIDE to define how to update the engineering BOM:

- **Pma0EnablePartChangeActionsOnDesign**
- **Pma0EnableRevisePartActionDesign**
- **Pma0EnableReusePartActionOnDesign**

These conditions are already set for the default highest maturity status, **TCM Released**, of a part. For example, the **Pma0EnablePartChangeActionsOnDesign** condition is set as:

```
Function::INLIST("TCM Released", o.pma0AlignedPrtReleaseStatus, "name")
```

If you have defined custom release status, you must update these conditions to include that status. For example, if you want to use **Approved** instead of **TCM Released**, you must update the **Pma0EnablePartChangeActionsOnDesign** condition to include the **Approved** release status:

```
Function::INLIST("TCM Released", o.pma0AlignedPrtReleaseStatus,
"name")OR Function::INLIST("Approved",o.pma0AlignedPrtReleaseStatus,
"name")
```

Similarly, if you want to use **In Progress** to indicate an unreleased part, you must update the **Pma0EnableReusePartActionOnDesign** condition:

```
Function::INLIST("In Progress", o.pma0AlignedPrtReleaseStatus, "name")
```

In case you have defined a release status, **In Review**, which is in between **In Progress** and **Approved**, you must update the **Pma0EnableRevisePartActionDesign** condition.

These conditions, in turn, invoke a predefined list of values (LOVs) so that appropriate actions can be performed to update the engineering BOM accordingly. To determine which condition must be carried out, Teamcenter checks for certain criteria, such as, if the design is revised, if a part is required, if the part is aligned, and the assembly indicator of the part. Depending on which LOV is invoked, there may be more than one recommended update action (for example, **Revise** or **Reuse**). One of these actions is set as the default action. During the automated update, the engineering BOM is updated based on the default action. During the guided update, users get to choose from one of the recommended actions.

The following table shows the sequence in which these criteria are checked for the default release status. You may study this table to see what actions will be performed for the custom release statuses.

	Criteria						
Sequence	**Design revised?**	**Part required?**	**Part aligned?**	**Part maturity**	**Assembly indicator**	**Condition**	**Update actions**
1	No This is the grandparent design and its skipped child is revised.	Yes	Yes	**TCM Released**	NA	**StructureChangeOnSkipChild && (Pma0EnableRevisePartActionDesign || Pma0EnablePartChangeActionsOnDesign)**	**Revise** (Default) or **Reuse**
2	No	Yes	No	NA	NA	None	**New**

	Criteria						
Sequence	**Design revised?**	**Part required?**	**Part aligned?**	**Part maturity**	**Assembly indicator**	**Condition**	**Update actions**
3	Yes	Yes	No	**TCM Released**	**Fixed Assembly** or **Component**	**Pma0EnablePartChangeActionsOnDesign**	**Revise** (Default) or **New**
4	Yes	Yes	No	**TCM Released**	**Configurable Assembly** or **Generic Part**	**Pma0EnablePartChangeActionsOnDesign**	**Revise**
5	Yes	Yes	No	Not released	NA	**Pma0EnableReusePartActionOnDesign**	**Reuse**

Set a revision rule to visualize aligned occurrences

The engineering BOM and design structure are displayed side by side in the alignment view. Users can visualize the aligned occurrences in the **3D** tab. If the revision rules of the engineering BOM and design structure are different, the revision rule of the engineering BOM is considered to show the aligned occurrences in the **3D** tab. You can change this default behavior so that a different but valid revision rule is considered to display the aligned occurrences in the **3D** tab. For this, you set the revision rule in the **FND0_ALIGNED_DESIGN_CONFIGURATION_RULE** preference.

Define when to create the BOM generation report

Users can generate a design structure from an engineering BOM, and vice versa. By default, a report is created only when the design structure or engineering BOM generation fails. This is because the default value of the **Pma0_Report_Generation_Options** preference is **only_on_error**.

If you want the report to be created even when the design structure or engineering BOM generation is successful, change the value of this preference to **yes**.

12. Configure the design structure generation

About configuring the design structure generation

If an engineering BOM exists in Teamcenter, users can generate the corresponding design structure. You, as an administrator, can configure the design structure generation by:

- Specifying which **part type and design type** can be aligned to each other.
- **Setting a naming convention** for the generated design occurrences.
- Setting conditions to **skip a part or part occurrence** in an engineering BOM while generating the corresponding design occurrences.
- **Specifying additional properties to be copied** from a part occurrence to a design occurrence while generating the design structure.

After the design structure is generated, some updates can be made to the engineering BOM. In such a case, users must update the design structure. One of the methods to update is the guided update wherein users can update the design structure based on the proposed changes. By default, certain BMIDE conditions are already set to propose the required updates depending on the release status of a part in the engineering BOM. You can use these conditions to **define the proposed updates for parts with customized release status**.

Map parts and designs for alignment

Users can generate an engineering BOM from a design structure that already exists in Teamcenter. Similarly, users can generate a design structure from an existing engineering BOM. In the generated BOM, the parts and designs, and their occurrences are automatically aligned with each other. This is because, by default, the parts and designs belonging to the **Part** and **Design** business objects are mapped with each other in the **Pma0_Part_Design_Type** preference.

The default value of this preference is:

PartType:*Part***,DesignType:***Design*

Here, *Part* and *Design* are the internal names of the business objects.

You can change the default mapping and can map additional business objects for alignment.

For example, to map parts and designs belonging to **CustomPart** and **CustomDesign** business objects, you add the following value to the **Pma0_Part_Design_Type** preference:

PartType:*CustomPart***,DesignType:***CustomDesign*

A part can be mapped to more than one type of design. Similarly, a design can be mapped to more than one type of part.

For example, your business requirement is that for both **Design** and **CustomDesign** types, the generated engineering BOM must be of the type **Part**. For this requirement, you include the following values in the preference:

PartType:*Part***,DesignType:***Design*

PartType:*Part***,DesignType:***CustomDesign*

When users generate an engineering BOM from a design structure of type **Design** or **CustomDesign**, the generated engineering BOM is of the type **Part**. Whereas, if the users generate a design structure from an engineering BOM, the first value of the design is considered. In the above example, when users generate a design structure from an engineering BOM of type **Part**, the generated design structure is of the type **Design**.

Set a naming convention for the generated design structure

BOM engineers can generate a design structure from an engineering BOM already available in Teamcenter. You can set a naming convention for the automatically generated design structure. You can choose to:

- Keep the name and ID of the generated design structure the same as that of the engineering BOM.

  OR

- Specify a prefix, a suffix, or both for the name and ID of the generated design structure.

Set the name and ID of the generated design structure the same as that of the corresponding engineering BOM

1. In Teamcenter, clear the value of the **Pma0_DBOM_Prefix_Suffix** preference.

2. In BMIDE, open the design business object, for example, **Design** or *B4CustomDesign*.

3. In the **Business Object Constants** tab, select **MultiFieldKey**, and click **Edit**.

4. Add **item_id** to the list of selected applications, and click **Finish**.

5. Verify that the value of **MultiFieldKey** is changed to either **Design{item_id}** or *B4CustomDesign***{item_id}**.

6. Save and deploy the changes.

Specify a prefix, a suffix, or both for the name and ID of the generated engineering BOM

Specify a prefix, a suffix, or both in the **Pma0_DBOM_Prefix_Suffix** preference.

Example — A design structure generated from an engineering BOM of *Wheel* consisting of *Rim*, *Valve*, and *Tire* is named as *D_Wheel* with designs *D_Tire*, *D_Rim*, and *D_Valve* if the prefix is set as **D_**.

The prefix and suffix are attached to the **item_id** property of **Design Type** specified in the **Pma0_Part_Design_Type** preference.

If you do not want a prefix or suffix in the item ID, and want to use the ID generated using a naming rule, set the value of **Pma0_DBOM_Prefix_Suffix** as **IGNORE**.

Skip parts or part occurrences while generating a design structure

While generating a design structure from an engineering BOM, you can choose to skip certain parts so that their corresponding designs are not created. For a skipped part, you can further choose to skip its structure or traverse it. If you choose to skip the structure, corresponding designs for the child parts are not created either. You set the conditions to skip certain parts in the **Pma0_EBOM_skip_node_conditions** preference. In the **ACTION** field of the preference, you specify whether to skip or traverse the part and whether to skip or traverse its structure.

Example — In the engineering BOM of a car, one of the parts is *Wheel*, with the child parts *Tire*, *Rim*, and *Valve*. Depending on the values set in the **ACTION** field for the wheel, corresponding designs are created.

ACTION	Result
SkipNode, SkipStructure	• The corresponding designs for *Wheel* and all of its child parts (*Tire*, *Rim*, and *Valve*) are not created.
SkipNode, TraverseStructure	• The corresponding design for *Wheel* is not created.

ACTION	Result
	• The structure of the wheel is traversed and corresponding designs for *Tire*, *Rim*, and *Valve* are created.
TraverseNode, SkipStructure	• The corresponding design for *Wheel* is created. • The structure of the wheel is not traversed and therefore, the corresponding designs for its child parts (*Tire*, *Rim*, and *Valve*) are not created.

After setting the **Pma0_EBOM_skip_node_conditions** preference, you set the **Pma0_EBOM_skip_occurrence_conditions** preference to specify whether to skip the design occurrence creation for certain parts. For example, if **Pma0_EBOM_skip_node_conditions** returns **true** for *Wheel* and **Pma0_EBOM_skip_occurrence_conditions** returns **false** for *Rim*, the corresponding design occurrence, *D_Rim*, is created but is not added in the design structure, *D_Wheel*.

Set properties and relations to be copied to a design in the design structure

You can specify additional properties and relations, including custom properties, to be copied while generating or updating a design structure. Ensure you map these properties on the **BOMLine** object before design structure generation or update.

To copy properties and relations while generating or updating a design structure, specify the following values in the **PMA0_COPY_PROP_PART_TO_DESIGN_GENERATE** or **PMA0_COPY_PROP_PART_TO_DESIGN_UPDATE** preference respectively.

- For property copy, use the property internal names.

  For example, to copy name, specify *bl_rev_object_name*:*bl_rev_object_name* in the preference.

- For relation copy, use the corresponding **BOMLine** property internal name which represents that relation.

  For example, to copy a material coating relation, specify *bl_rev_Mat1UsesMaterialForCoating*:*bl_rev_Mat1UsesMaterialForCoating* in the preference.

You can specify multiple values. If a value is invalid, the property is not copied to the design, but the part is aligned with the generated design. The part properties are not copied to the corresponding design during a manual alignment.

Copy of the Quantity and Variant Formula properties:

Summarization on	Action	Quantity	Variant Formula
Part to Design (occurrence alignment)	Generate	Not copied but multiple occurrences are created	Copied
	Update	Not copied but multiple occurrences are created	Copied

Summarization off	Action	Quantity	Variant Formula
Part to Design (occurrence alignment)	Generate	Copied	Copied
	Update	Copied	Copied

Copy of the Reference Designator property:

To copy the combined **Reference Designator** property values on summarized line, you need to enable the preference **BOM_Enable_Ref_Designator_Value_Packing** and specify **Reference Designator** property in the copy preferences for both generate and update cases.

After the copy, the reference designator values are displayed on the design as shown below in the case of an unpacked design structure.

Part	Design
P_Capacitor*3 (Ref Designator = R1, R2, R3)	D_Capacitor (Ref Designator = R1)
	D_Capacitor (Ref Designator = R2)
	D_Capacitor (Ref Designator = R3)

Set up workflows to generate and update an aligned design structure

You can set up workflow tasks to generate and update an aligned design structure by using the following handlers:

Handler	Description
PMA0_generate_dbom_handler	Generates a design structure from an engineering BOM.
PMA0_update_dbom_handler	Updates the design structure aligned to an engineering BOM with the engineering BOM changes.

In the above handlers, you can use the preference **TC_config_rule_name** for stating the revision rule used for source structure configuration.

If you update the source structure in an active change notice having a date or unit effectivity set, then the same is set on the target structure.

For the target structure, revision rule has a non-configurable value set to **Working; Any Status**.

Define how to update the aligned design structure and engineering BOM

When users open a design structure to perform an automated or a guided update, the design structure is considered as the source structure, and its aligned engineering BOM is considered as the target structure, and vice versa. You can define how an aligned engineering BOM or design structure must be updated during an automated or guided update by setting the certain values in the **Pma0_Define_Update_Automation_Behavior** preference, for example, **Skip_Addition_Of_New_Occurrences**, **Skip_Removal_Of_Unaligned_Occurrences**, and **Skip_Quantity_And_Variant_Formula_Update**.

> Example:
>
> If you add the value **Skip_Addition_Of_New_Occurrences** in the **Pma0_Define_Update_Automation_Behavior** preference, when users add a new design occurrence in the design structure and perform automated or guided update, the corresponding part occurrence is not added in the engineering BOM.

Additionally, during the automated or guided update, only the source structure is checked, by default. During this check, the entire source structure is not traversed and only those occurrences for which the last modified date has changed are considered. This improves the performance of automated and guided updates. However, if you want both source and target structures to be checked, you must set the value of the **Pma0_use_struct_mod_date** preference to **False**.

Define update actions for designs with custom release status

After a design structure is generated from an engineering BOM, some updates can be made to the engineering BOM. In such a case, the aligned design structure must also be updated. By default, certain BMIDE conditions are set to define how the design structure must be updated. These conditions are defined for the default release status, such as **TCM Released** or an empty release status indicating that the design is not yet released.

Release status	Engineering BOM change type	Default BMIDE Condition	List of Values (LOV)	Update actions
Not released	Nonstructural or Structural	none	none	none
TCM Released	Nonstructural	none	none	none
	Structural	**Pma0EnableReviseDesignActionOnPart** or **Pma0EnableDsgnChangeActionsOnPart**	**Pma0DsgnChangeActionsLOV**	**Revise** or **Reuse** The default action is set to **Revise**.

You can update the expressions of the default BMIDE conditions to include any custom release status defined.

Example 1 — Consider that you have defined a custom release status named **Approved** for designs. You can update the expression of the **Pma0EnableDsgnChangeActionsOnPart** condition to include the custom release status.

```
Function::INLIST("TCM Released", o.Pma0DsgnChangeActionsLOV, "name")OR
Function::INLIST("Approved",o.Pma0DsgnChangeActionsLOV, "name")
```

According to the updated condition, if the structure of the aligned part of a design with the release status **Approved** is changed, the design is revised.

Example 2 — Consider that you have defined a custom release status named **Frozen** for parts. In this case, you use the **Pma0EnableReviseDesignActionOnPart** condition and update its expression to include this release status.

```
Function::INLIST("Frozen", o.pma0AlignedPrtReleaseStatus, "name")
```

According to expression of the **Pma0EnableReviseDesignActionOnPart** condition, if the structure of the aligned part of a design with the release status **Frozen** is updated, the design is revised when the design structure is generated.

13. Configure the alignment of an existing engineering BOM and design structure

Set the property matching preference for automatic alignment of design and part occurrences

In your system, your existing design structure and existing engineering BOM may not be aligned. This is a common scenario when importing a BOM from an external system. In this case, instead of identifying and selecting occurrences for alignment manually, you can perform the alignment automatically by matching the values of their properties using the multivalued preference **Pma0_Align_DBOM_EBOM_Criteria**.

Restrictions and limitations

This preference is not used by automated update and guided update.

If the preference value is empty, design-part alignment is used for occurrence alignment.

Procedure

This preference is used by:

- Command line utility: **pma0_align_dbom_and_ebom**
- Workflow handler: **PMA0_align_dbom_and_ebom_handler**

1. Edit the preference value for **Pma0_Align_DBOM_EBOM_Criteria** to specify the BOMLine property names that need to be matched for occurrence as well as design-part alignment.

   Use the following format:

   ```
   D_prop_1:E_prop_1,D_prop_2:E_prop_2
   D_prop_3:E_prop_3
   ```

   Here, *D_prop* is a design property, and *E_prop* is a part property.

   In this case, two sets of properties are specified.

   - Property set 1 = D_prop_1:E_prop_1,D_prop_2:E_prop_2
   - Property set 2 = D_prop_3:E_prop_3

Within property set 1, for successful alignment, all the specified property values must match and be unique across both the design and the part.

You can also include custom properties with types such as **int**, **string**, **typed reference**, and **double**.

Results

Occurrence alignment is performed according to the order specified in the preference. The maximum possible alignments are achieved using the `D_prop_1:E_prop_1` *AND* `D_prop_2:E_prop_2` property set before moving to the next set of properties.

Once aligned using a previous property set, the occurrence alignment is not removed, even if the occurrences match for alignment in a subsequent set of properties. This means that the first alignment performed using any set is the final alignment for that occurrence.

For the **Reference Designator** property, occurrences are aligned if the values on the design side fall within the range specified on the part side.

Example:

For example, the following three design occurrences are aligned with a single part occurrence since all the **Reference Designator** values on the design are present in the **Reference Designator** of the part.

You can control the display of the reference designator property values.

Design	Part
D_Capacitor (Ref Designator = R1)	P_Capacitor*3 (Ref Designator = R1, R2, R3)
D_Capacitor (Ref Designator = R2)	
D_Capacitor (Ref Designator = R3)	

Set up a workflow to align a design structure and engineering BOM by matching the properties

In your system, your existing design structure and existing engineering BOM may not be aligned. This is a common scenario when importing a BOM from an external system. In this case, instead of identifying and selecting occurrences for alignment manually, you can perform the alignment automatically by using the following workflow.

1. Choose one of the following options:

   - **Set the property matching preference** for automatic alignment.

- Ensure that design-part alignment is already complete. This is the default option if the previously mentioned preference value is empty.

2. Configure a workflow to align an existing design structure and engineering BOM by using the following handler.

Handler	Description
PMA0_align_dbom_and_ebom_handler	Aligns an existing design structure and engineering BOM. This handler takes one engineering BOM and one design structure as input.

Align a design structure and engineering BOM by matching the properties using a utility

In your system, your existing design structure and existing engineering BOM may not be aligned. This scenario is common when importing a BOM from an external system. Instead of manually identifying and selecting occurrences for alignment, you can automate the alignment process using a utility.

Prerequisites

Choose one of the following options:

- **Set the property matching preference** for automatic alignment.

- Ensure that design-part alignment is already complete. This is the default option if the previously mentioned preference value is empty.

Procedure

1. Use the following syntax to run the utility in the Teamcenter command prompt:

   pma0_align_dbom_and_ebom -u=*Teamcenter_username* **-p=***Teamcenter_password*
   or **-pf=***Teamcenter_password_file* **-g=***group* **-dbomrootId=***dbom_root_item_id*
   -ebomrootId=*ebom_root_item_id*

2. (Optional) Specify a revision rule for configuration.

A detailed report is generated upon the successful completion of the utility.

> Tip:
>
> For detailed information about this utility and its arguments, run the utility as follows:

pma0_align_dbom_and_ebom -h

The **-h** argument displays the help that describes each argument in detail.

Results

The following results can occur, depending on the situation.

If there is a conflict, the utility does not create any alignment, and failures are added to the report.

If the engineering BOM is in the released state, the utility bypasses access restrictions and creates the alignment.

If any subassembly is not aligned, the alignment of its children is also skipped and reported.

If the utility encounters multiple candidates for a design, the alignment is skipped and reported.

The scope of alignment is determined based on the immediate parent and the item provided as input. BOM occurrences that are out of scope are not aligned.

14. Customize engineering BOM and design structure generation

You can customize the engineering BOM and design structure generation by using certain API functions that are provided to you by default. For detailed information about these functions:

1. Open the documentation of the current Teamcenter release on **Support Center** and click **1st Stop: Teamcenter Documentation Home**.

2. Open the **ITK Function Reference** listed under the **Customization** section.

3. Go to the **Modules** tab.

4. Use the functions listed in the following modules to customize the BOM generation as per your site requirement:

   - **Product Master Automation**
   - **Bill of Materials (BOM)**
   - **Part**
   - **Design**