TEAMCENTER

Design and BOM Alignment — Usage

Teamcenter 2412

SIEMENS

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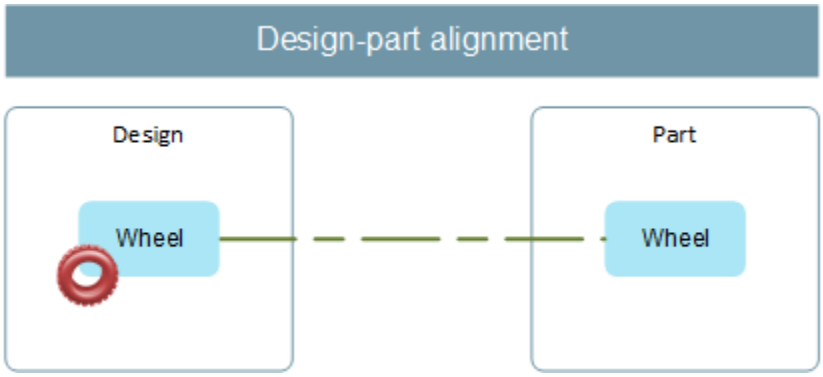
1. About design and engineering BOM alignment

In a PLM system with design-part separation, the design and engineering BOM of a product are managed as separate entities. Designers and BOM engineers manage the design and engineering BOM independently as per their business requirements.

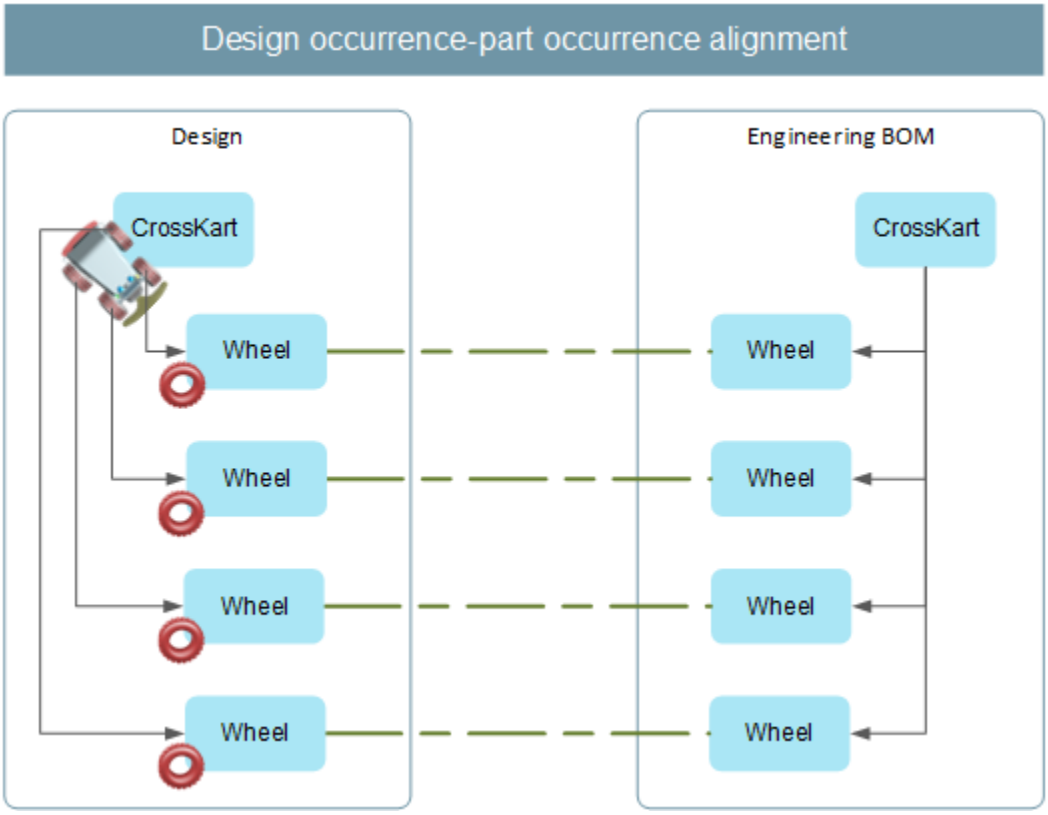
Before manufacturing a physical product, it is conceptualized and developed using a 3D visual representation. By visualizing a product, visual product validations such as clearance checks can be performed. When the design and engineering BOM are managed separately, they must be aligned in order to visualize a product.

Consider that your company manufactures a racing car called *CrossKart*. You want to visualize what the part *Wheel* looks like. For this, you align the part *Wheel* with its design. In Teamcenter, this alignment is known as *design-part alignment*.



Now you know what the wheel looks like in its floor position.

Next, to visualize how the four wheels are placed in *CrossKart*, you must align each instance of the part *Wheel* with the corresponding design occurrence. A design occurrence has the absolute position information of a part. In Teamcenter, this alignment is known as *design occurrence-part occurrence alignment*.



Now you know how the four wheels are placed in *CrossKart*.

Where do I go from here?

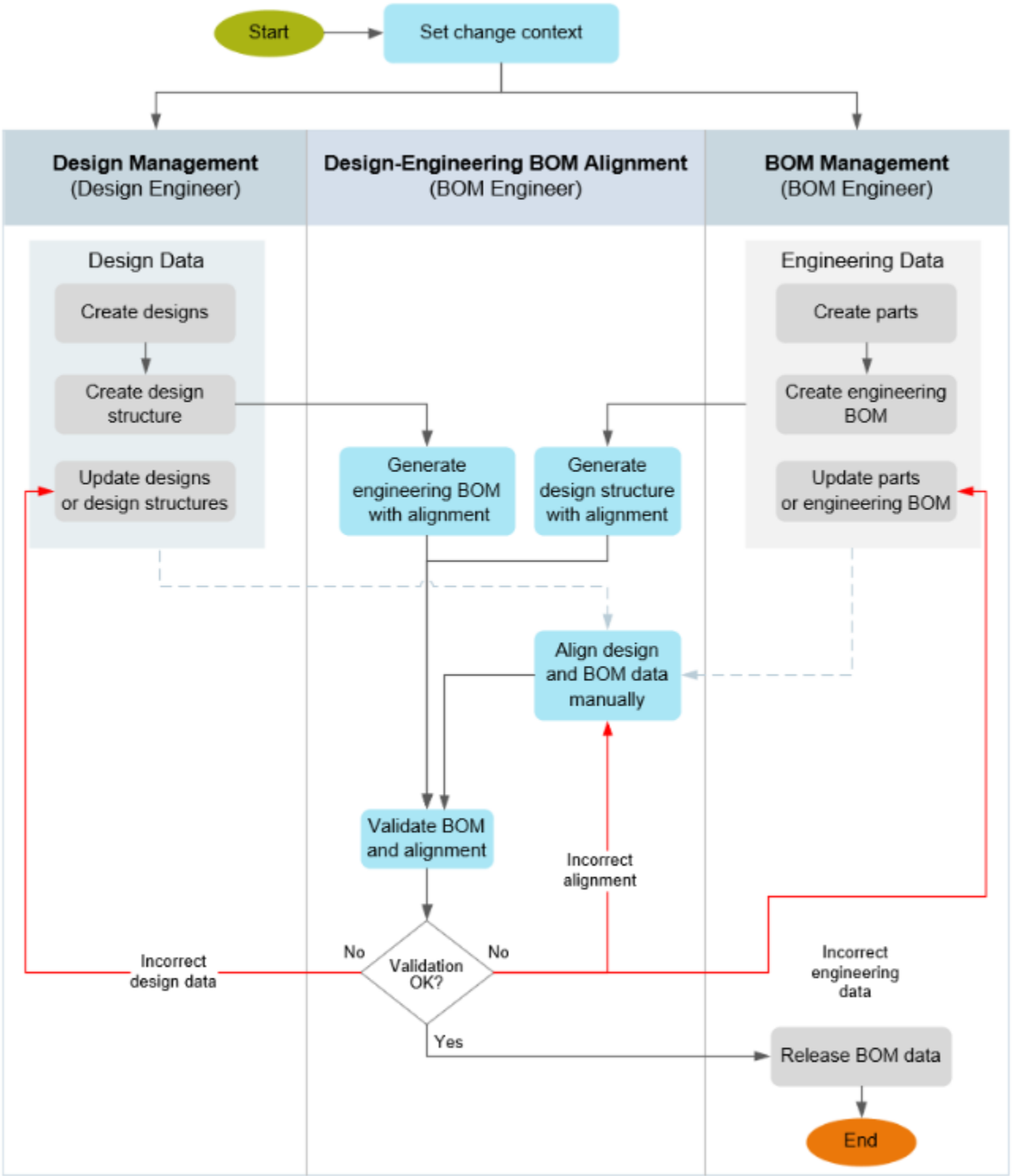
Administrator	See *Design and BOM Alignment — Deployment and Administration*.
Business User	
New user	Familiarize yourself with the design and engineering BOM **terms** used in Teamcenter. You can also look at the **task flow** to align the design and the engineering BOM.
Align the design and engineering BOM automatically	See **how to generate an aligned engineering BOM from a design structure** and **how to generate and aligned design structure from an engineering BOM**
Manually align designs and parts	Learn about **aligning designs and parts**.
Align design occurrences and part occurrences in a flexible part	A flexible part can be represented by different designs or using the same design but with *shape overrides*. Learn how to **align design occurrences and part occurrences** in a flexible part.

Verify if the alignment is performed correctly	See how to **validate the alignment** between designs and parts and between design occurrences and part occurrences.
Update an engineering BOM based on the design changes	Learn about the different ways to **update an aligned engineering BOM**. You can also learn about the different ways to **update a design structure** based on the engineering BOM changes.

2. Design and engineering BOM terms

The term	Refers to
Design	The virtual representation of a part. It represents what a part will look like in its floor position. For example,  represents a wheel. Designs are attached to design revisions in Teamcenter.
Part	The primary component of a product. For example, the product *CrossKart* consists of different parts such as *Wheel*, *Engine*, and *Chassis*. Each part is saved as a part revision in Teamcenter.
Flexible part	A part that can be used in a product in various states. Examples include a coil spring, hose pipe, and wire harness.
Bought out part	A part that is purchased and not manufactured in-house.
Part structure (engineering BOM)	An assembly part that has child parts.
Part occurrence	An instance of a part in a part structure. For example, the wheel assembly contains the part occurrences of *Tire*, *Rim*, and *Valve*.
Design	A virtual representation of a part.
Design structure	A design structure of a product to represent it virtually from a geometrical standpoint. It consists of designs, which contain the design information such as CAD and product manufacturing information (PMI).
Design occurrence	An occurrence of a design in a design structure. A design occurrence contains the position information of a part. For example, the design occurrence of a wheel contains the information related to its placement in *Crosskart*.
Design-part alignment	The alignment between a design and a part. It shows what a part will look like in its floor position.
Design occurrence-part occurrence alignment	The alignment between a design occurrence and a part occurrence. It shows what a part will look like when placed in a product.

3. Task flow to align design and engineering BOM



For a visual BOM experience, you align the design and the engineering BOM. These can be aligned manually or automatically. As a product comprises numerous parts, the manual alignment process is complicated, error-prone, and time-consuming. To reduce this complexity, the alignment process can be automated. If a design structure already exists in Teamcenter, you can **generate the corresponding engineering BOM**. In the generated engineering BOM, the part occurrences are already aligned with the design occurrences. Similarly, if an engineering BOM already exists in Teamcenter, you can **generate the corresponding design structure**. In the design structure that is generated, the design occurrences are already aligned with the part occurrences.

After the design structure, engineering BOM is generated along with the alignment, validate if the generated designs, BOM and alignments are correct. During validation, if you find that an alignment is incorrect, you first unalign the design occurrence and the part occurrence, and then align them again manually. During validation, you may also find that some design occurrences and part occurrences are not aligned at all. In this case as well, you perform the alignment manually.

Incorrect BOM generation and alignment can also be due to incorrect design or engineering BOM data. In this case, you must update the design structure or engineering BOM data accordingly. After the update, you must analyze the impact of the change on the corresponding BOM.

Once you validate that the engineering BOM data and the alignment data are correct, you release the engineering BOM to the manufacturing stage. Here, the engineering BOM is used for creating the manufacturing BOM to author the make or buy decisions.

4. Set a change context to track alignment changes

You can align a design structure and an engineering BOM within the context of an active change notice. Additionally, you can track all information related to the alignment under a specific change notice. Any changes to the alignment can be viewed by accessing the change notice.

To set a change context:

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

5. Generate an aligned engineering BOM from a design structure

About generating an aligned engineering BOM from a design structure

You can generate an engineering BOM automatically from a design structure available in Teamcenter. The engineering BOM is generated with a naming convention set by the administrator. In the generated engineering BOM:

- A (parent) part is created for the (parent) design, and the design is aligned with the part.
- Part occurrences are created below the (parent) part and are automatically aligned with the corresponding design occurrences. For design occurrences that occur multiple times or multiple instances of a bought-out flexible part assembly with different **Id**, the corresponding part occurrences are generated as per the grouping criteria set up by the administrator. Contact the administrator to understand how the engineering BOM is generated in a certain way.

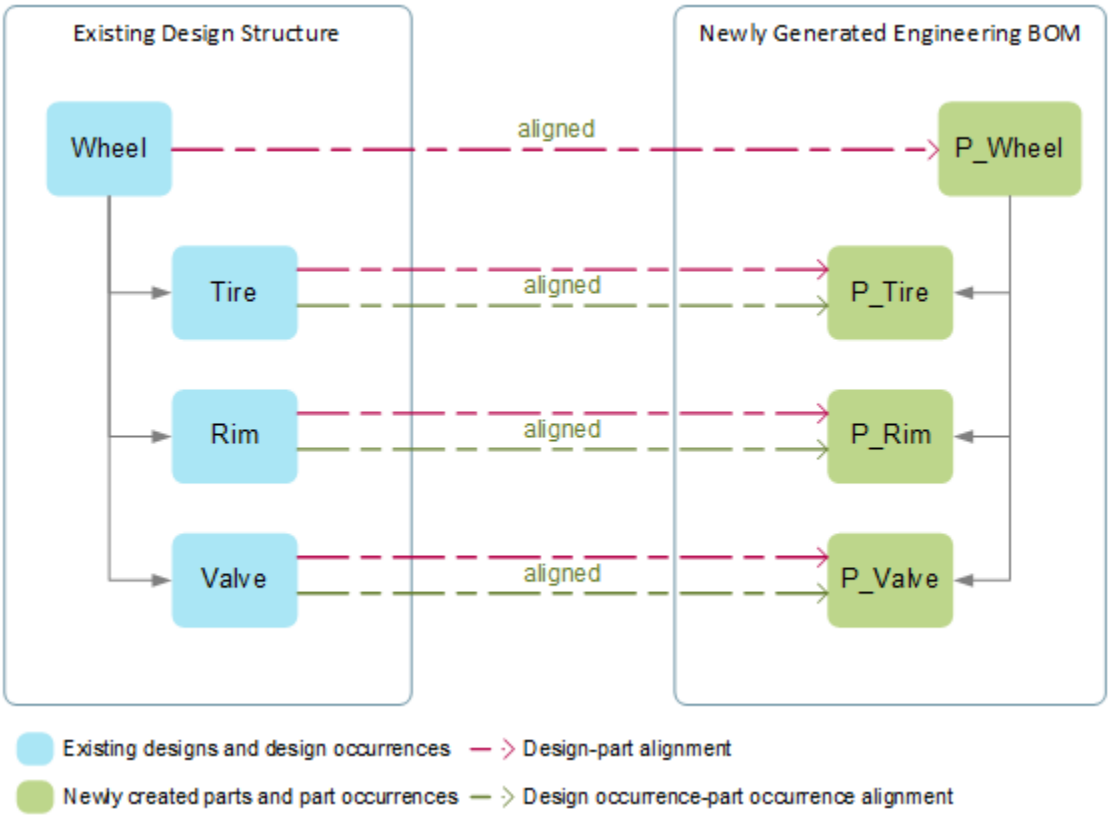
  For each part occurrence, a part is created and aligned with the corresponding design.
- Design occurrences that are marked as dual-intent in the design structure are reused as is. *Dual-intent* here implies that the design qualifies as both design and part.
- For a design having multiple parts (in design-part alignment), only a single part occurrence is created in automation based upon date of its design-part alignment. Part which is aligned first in design-part alignment is given preference for occurrence alignment. Remaining part occurrences needs to be created and aligned manually.
- The following table explains some unique cases of how the quantity of a part occurrence is calculated:

Design occurrence		Part occurrence
Quantity	**UOM**	**Quantity**
Blank	each	1
Blank	non each	0

You can generate an aligned engineering BOM by clicking **Create Engineering BOM** or by **sending the design structure through a workflow**. The administrator can also generate an engineering BOM for you.

Example — Consider that the design structure of *Wheel* consisting of *Tire*, *Rim*, and *Valve* does not have a corresponding engineering BOM. When you generate an engineering BOM for *Wheel*:

- Parts *P_Wheel*, *P_Tire*, *P_Rim*, and *P_Valve* are created.
- The design *Wheel* is aligned with the newly generated part *P_Wheel*.
- The designs (*Tire*, *Rim*, and *Valve*) are aligned with the newly created parts (*P_Tire*, *P_Rim*, and *P_Valve*).
- The design occurrences of the *Wheel* (*Tire*, *Rim*, and *Valve*) are aligned with the corresponding part occurrences (*P_Tire*, *P_Rim*, and *P_Valve*).



Generate an aligned engineering BOM from a design structure

1. **Set an active change**, if required.
2. Open the design structure (design revision) for which you want to generate an aligned engineering BOM.
3. In the structure:
   - For the design occurrences for which you do not want to generate the corresponding part occurrences, set the **Part Required** field to **False**

- For a *bought out* part, set **Part Required** as **True** for the parent design and as **False** for all its design occurrences.

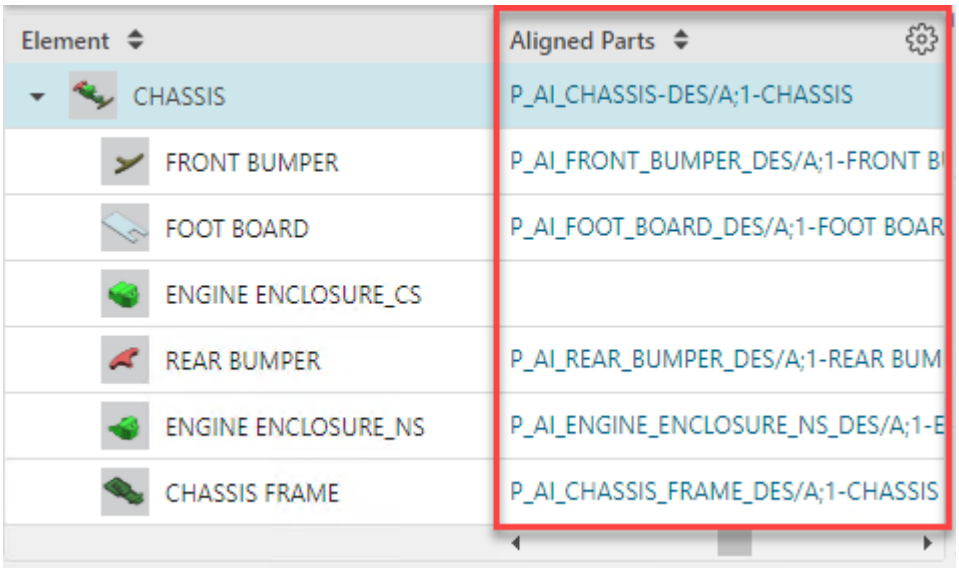
- To mark the corresponding part occurrence as a generic part, set **Align to Generic Part** to **True**.

- For design occurrences representing a *flexible* part or multiple instances of a bought-out flexible part assembly with different **Id**, your administrator must have set the automatic creation and alignment of a flexible part by grouping corresponding designs. However, you can override the automated alignment by first manually **aligning designs with the flexible part**. Next, open the flexible part and select the **Has Multiple Designs** check box.

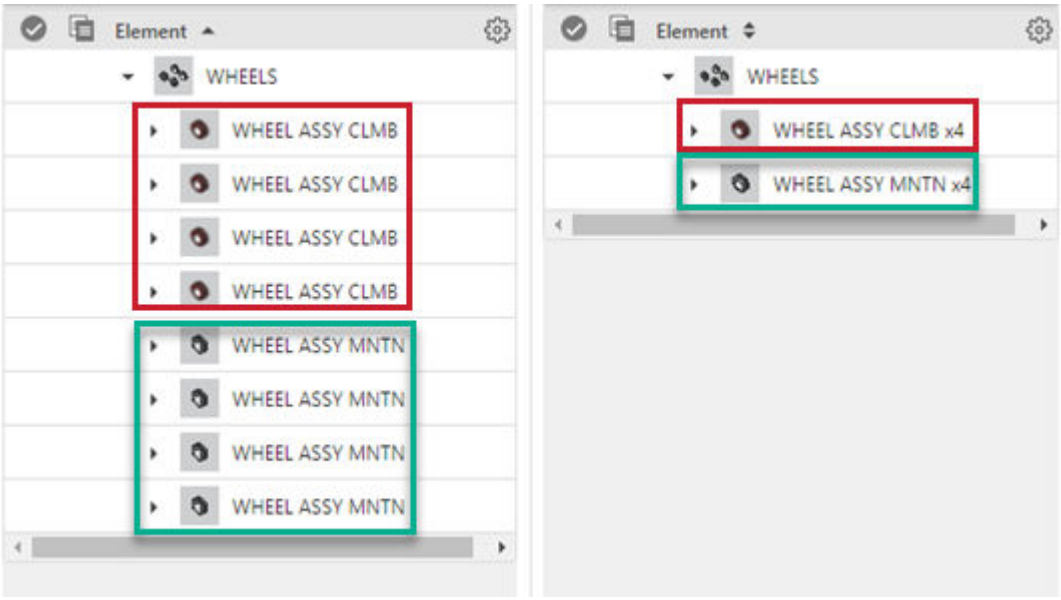
  After aligning designs with the flexible part, if you want to realign the flexible parts with some other designs, you must first remove the alignment between the designs and the flexible part, and perform the alignment again.

4. Go back to the previously opened design structure, select the topmost design, and click **Align** ⊘ > **Create Engineering BOM** ⊕.

   An engineering BOM along with the corresponding alignment is automatically generated, and the aligned parts are listed in **Aligned Parts**.



   For a design that occurs multiple times in the design structure, in the generated engineering BOM, there will be only one corresponding part occurrence with the quantity same as the number of times the design occurs.



A report is generated in the **Newstuff** > **BOMGeneration** folder. You can go through the contents of the report to troubleshoot any BOM creation and alignment issues. You can also perform an alignment check to verify if the design occurrences and part occurrences are aligned correctly. In addition, you can perform a visual compare of the design structure and the generated engineering BOM in **Details** > **3D**.

Generate an aligned engineering BOM through a workflow

1. Set an active change, if required.

2. Open the required design structure (design revision).

3. In the **Tree** view:

   - For the design occurrences for which you do not want to generate the corresponding part occurrences, set the **Part Required** field to **False**

   - For a *bought out* part, set **Part Required** as **True** for the parent design and as **False** for all its design occurrences.

   - To mark the corresponding part occurrence as a generic part, set **Align to Generic Part** to **True**.

   - For design occurrences representing a *flexible* part or multiple instances of a bought-out flexible part assembly with different **Id**, your administrator must have set the automatic creation and alignment of a flexible part by grouping corresponding designs. However, you can override the automated alignment by first manually aligning designs with the flexible part. Next, open the flexible part and select the **Has Multiple Designs** check box.

After aligning designs with the flexible part, if you want to realign the flexible parts with some other designs, you must first remove the alignment between the designs and the flexible part, and perform the alignment again.

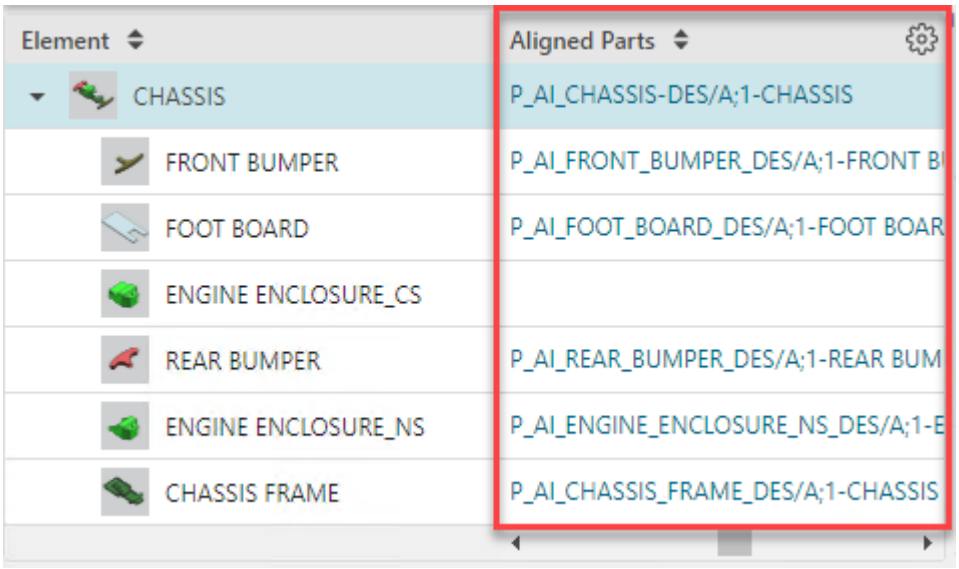
4. Go back to the previously opened design structure, select the topmost design, and click **More Commands** ••• > **Manage** > **Submit to Workflow** on the primary toolbar.

5. In the **Submit to Workflow** panel:

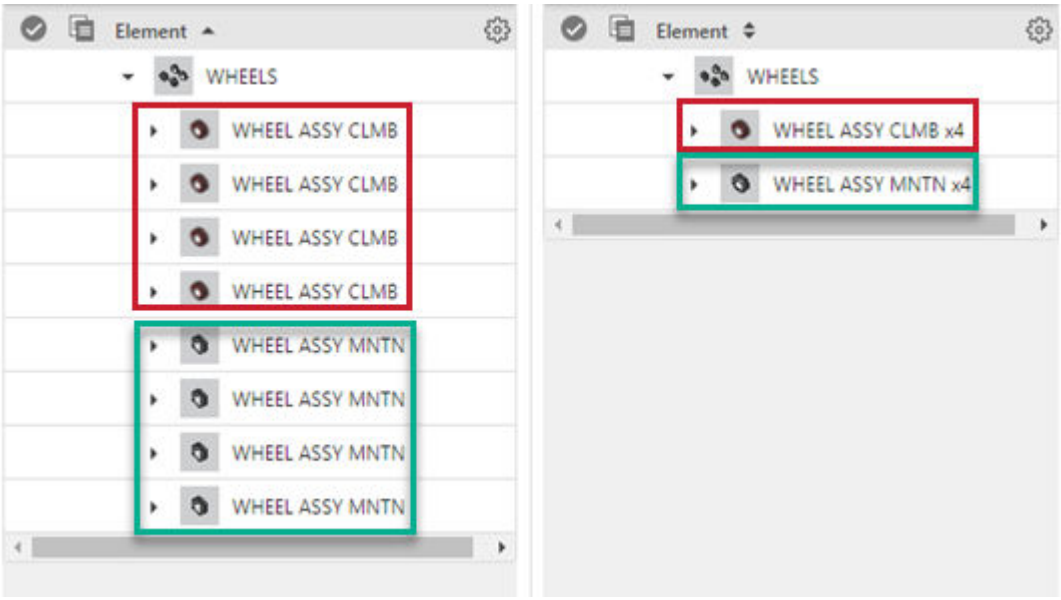
   a. Click **All**.

   b. Select **Template** as **Generate Part EBOM** and click **Submit**.

   An engineering BOM is automatically generated for the selected design structure, and the design occurrences and part occurrences are aligned. The aligned parts are listed in **Aligned Parts**.



For a design that occurs multiple times in the design structure, in the generated engineering BOM, there will be only one corresponding part occurrence with the quantity same as the number of times the design occurs.



A report is generated in the **Newstuff** > **BOMGeneration** folder. You can go through the contents of the report to troubleshoot any BOM creation and alignment issues. You can also **perform an alignment check** to verify if the design occurrences and part occurrences are aligned correctly. You can also perform a visual compare of the design structure and the generated engineering BOM in **Details** > **3D**.

6. Generate an aligned design structure from an engineering BOM

About generating an aligned design structure from an engineering BOM

If your site administrator has set up the **Product Master Automation** feature, you can generate a design structure automatically from an engineering BOM available in Teamcenter. The design structure is generated with a naming convention set by the administrator. In the generated design structure:

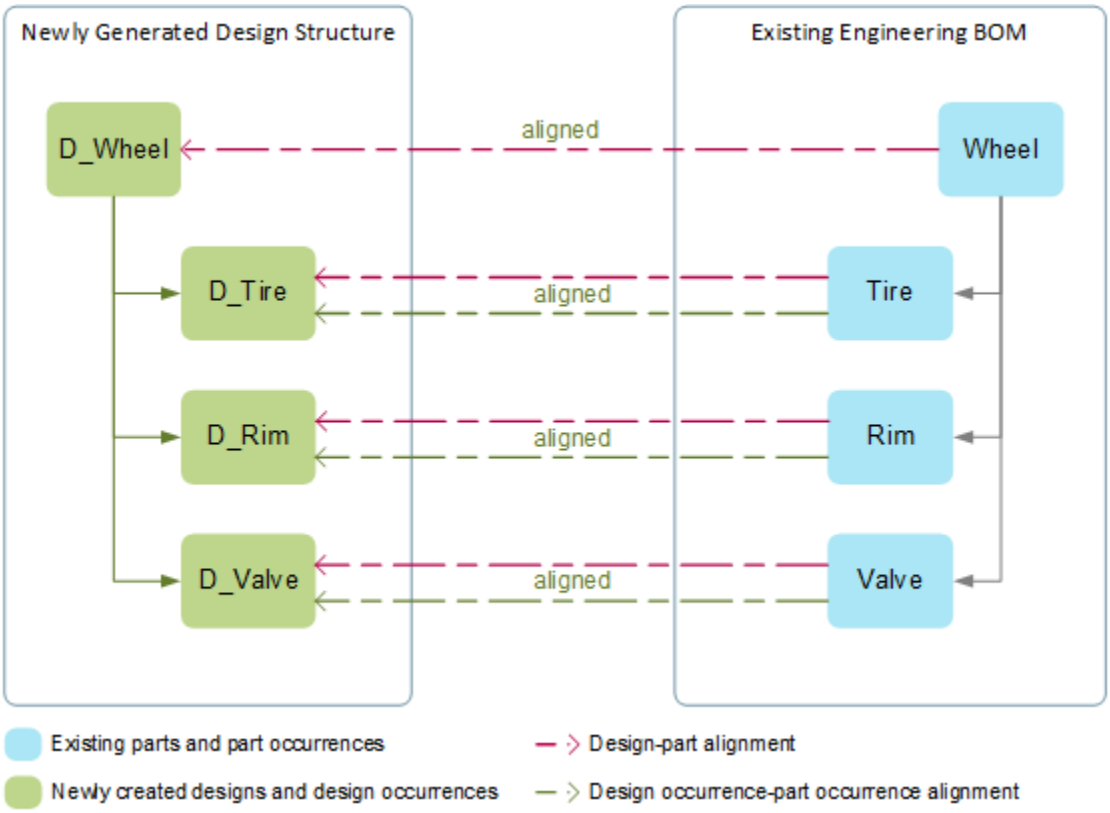
- A (parent) design is created for the (parent) part, and the design is aligned with the part.
- Design occurrences are created below the (parent) design, and are automatically aligned with the corresponding part occurrences.

  For each design occurrence, a design is created, and is aligned with the corresponding part.

You can generate an aligned design structure by **clicking Create Design BOM** or by **sending the engineering BOM through a workflow**.

Example — Consider that the engineering BOM of *Wheel* consisting of *Tire*, *Rim*, and *Valve* does not have a corresponding design structure. When you generate a design structure for *Wheel*:

- Designs named *D_Wheel*, *D_Tire*, *D_Rim*, and *D_Valve* are created.
- The part *Wheel* is aligned with the newly generated design *D_Wheel*.
- The parts (*Tire*, *Rim*, and *Valve*) are aligned with the newly created designs (*D_Tire*, *D_Rim*, and *D_Valve*).
- The part occurrences of the *Wheel* (*Tire*, *Rim*, and *Valve*) are aligned with the corresponding design occurrences (*D_Tire*, *D_Rim*, and *D_Valve*).

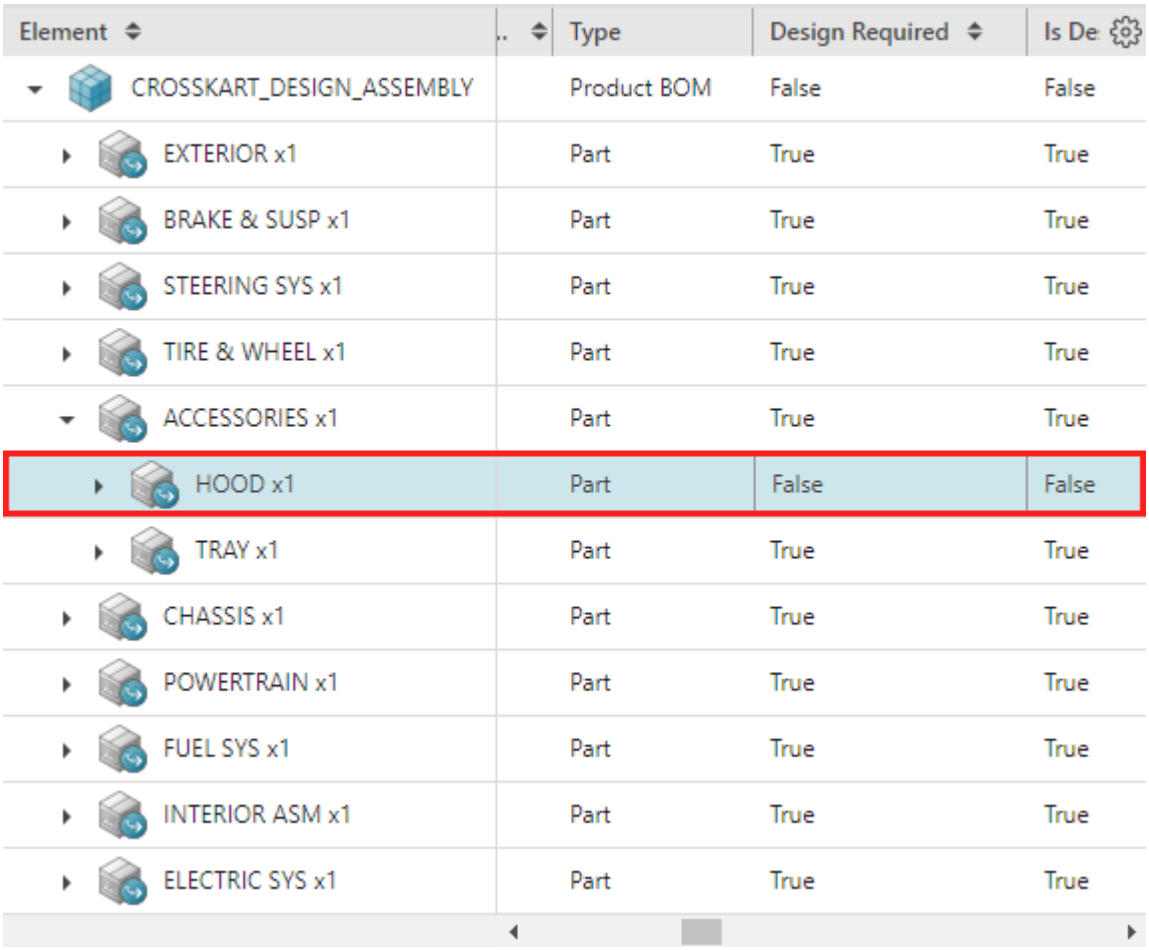


Generate an aligned design structure from an engineering BOM

1. **Set an active change**, if required.

2. Open the BOM for which you want to generate an aligned design structure.

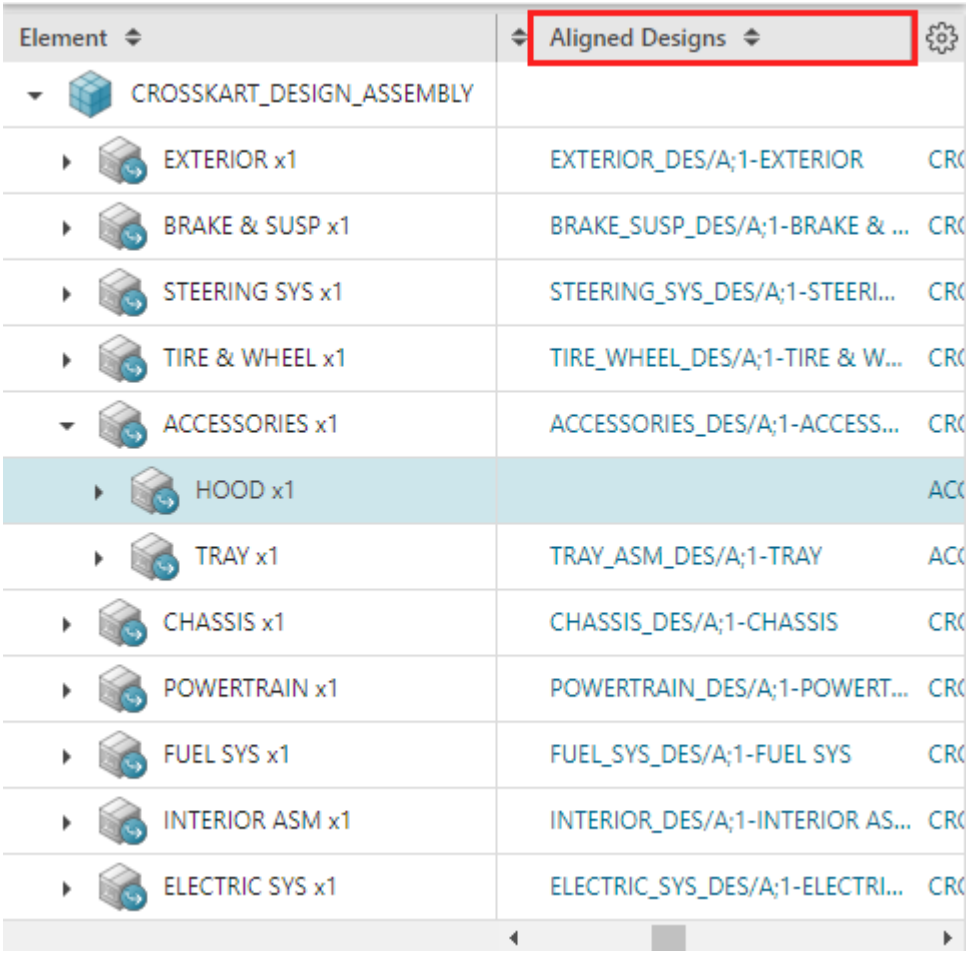
3. In the structure, you can choose the part occurrences for which you want to generate the corresponding design occurrences. Set the **Design Required** field to **False** for the part occurrences for which you do not want to generate design occurrences.



Element	..	Type	Design Required	Is De
CROSSKART_DESIGN_ASSEMBLY		Product BOM	False	False
EXTERIOR x1		Part	True	True
BRAKE & SUSP x1		Part	True	True
STEERING SYS x1		Part	True	True
TIRE & WHEEL x1		Part	True	True
ACCESSORIES x1		Part	True	True
HOOD x1		Part	False	False
TRAY x1		Part	True	True
CHASSIS x1		Part	True	True
POWERTRAIN x1		Part	True	True
FUEL SYS x1		Part	True	True
INTERIOR ASM x1		Part	True	True
ELECTRIC SYS x1		Part	True	True

4. Click **Align** ✓ > **Create Design BOM**.

   A design structure along with the corresponding alignment is automatically generated, and the aligned designs are listed in **Aligned Designs**.



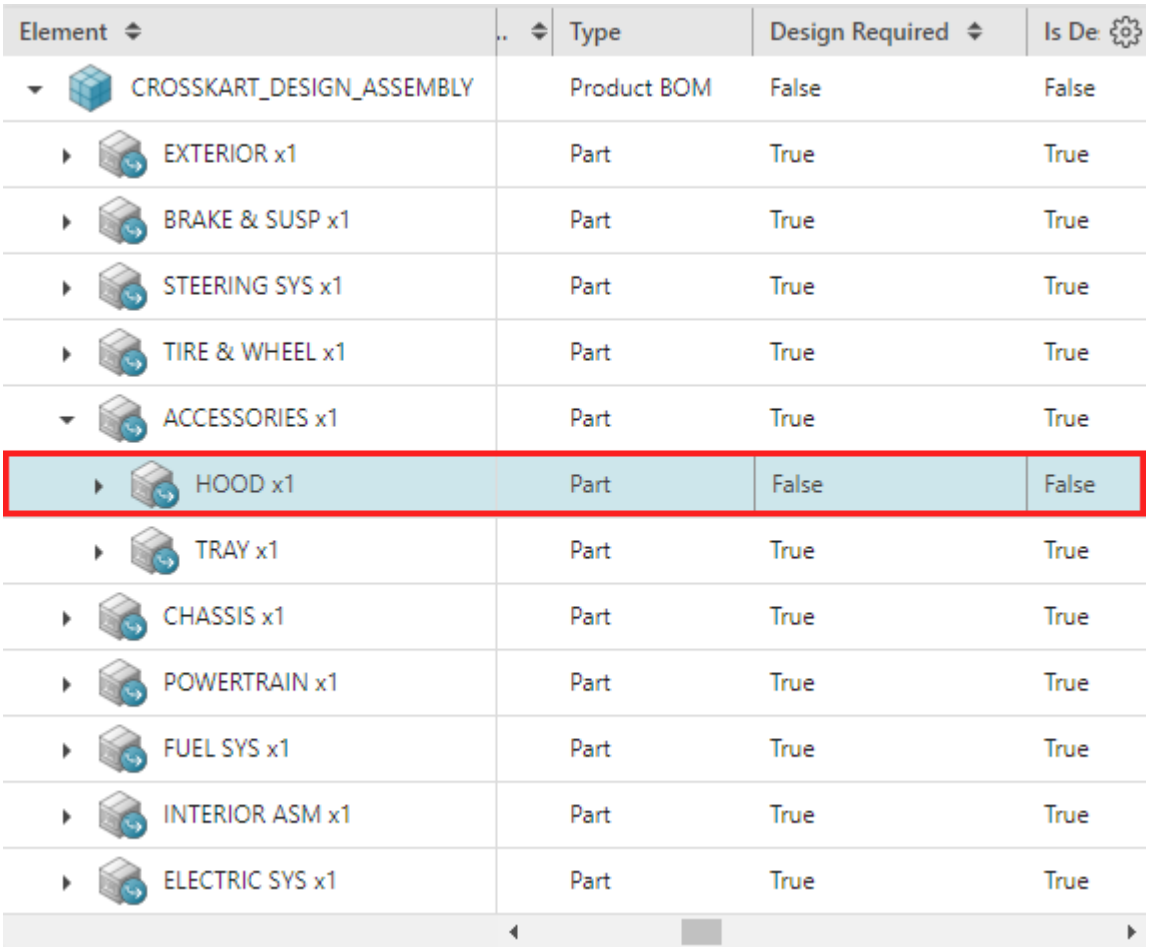
A report is generated in the **Newstuff** > **BOMGeneration** folder. You can go through the contents of the report to troubleshoot any BOM creation and alignment issues. You can also perform an alignment check to verify if the design occurrences and part occurrences are aligned correctly. In addition, you can perform a visual compare of the BOM and the generated design structure in **Details** > **3D**.

Generate an aligned design structure through a workflow

1. Set an active change, if required.

2. Open the BOM for which you want to generate the corresponding design structure.

3. In the structure, you can choose the part occurrences for which you want to generate the corresponding design occurrences. Set the **Design Required** field to **False** for the part occurrences for which you do not want to generate design occurrences.



Element	..	Type	Design Required	Is De
CROSSKART_DESIGN_ASSEMBLY		Product BOM	False	False
EXTERIOR x1		Part	True	True
BRAKE & SUSP x1		Part	True	True
STEERING SYS x1		Part	True	True
TIRE & WHEEL x1		Part	True	True
ACCESSORIES x1		Part	True	True
HOOD x1		Part	False	False
TRAY x1		Part	True	True
CHASSIS x1		Part	True	True
POWERTRAIN x1		Part	True	True
FUEL SYS x1		Part	True	True
INTERIOR ASM x1		Part	True	True
ELECTRIC SYS x1		Part	True	True

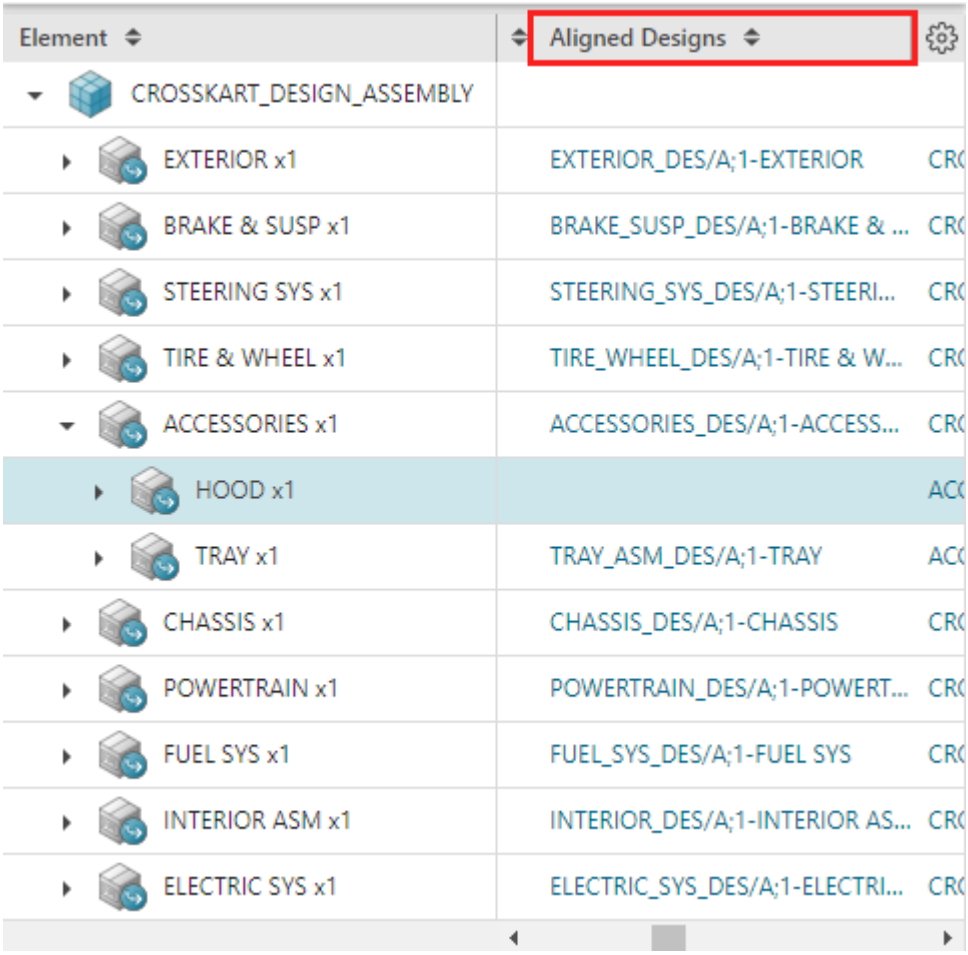
4. Click **More Commands** ••• > **Manage** > **Submit to Workflow** on the primary toolbar.

5. In the **Submit to Workflow** panel:

   a. Click **All**.

   b. Select **Template** as **Generate Design BOM** and click **Submit**.

   A design structure is automatically generated for the selected BOM, and the parts and designs are aligned. The aligned designs are listed in the **Aligned Designs** field.



A report is generated in the **Newstuff** > **BOMGeneration** folder. You can go through the contents of the report to troubleshoot any BOM creation and alignment issues. You can also **perform an alignment check** to verify if the design occurrences and part occurrences are aligned correctly. You can also perform a visual compare of the BOM and the generated design structure in **Details** > **3D**.

7. Update an aligned engineering BOM based on design changes

The different ways to update an aligned engineering BOM

After an aligned engineering BOM is generated from a design structure, if any changes are made to the design structure, you must update the engineering BOM. The different ways to update the aligned engineering BOM are:

- Automated update – Update the engineering BOM automatically either **in a change context** or **without setting a change**.
- Guided update – Get guidance on updating the engineering BOM based on the design changes either **in a change context** or **without setting a change**.
- Drag and Drop – **Drag a design occurrence** to a part occurrence.

For a design occurrence aligned to multiple part occurrences, updation process takes care of all the aligned part occurrences.

Based on the grouping criteria set by your administrator, multiple design occurrences are logically grouped together into a single part occurrence. Additionally, during the guided update and automated update, along with the engineering BOM, the solution variants that are associated with it are also updated.

Example — Consider that the design structure of *Wheel* consisting of *Tire*, *Rim*, and *Valve* has the corresponding engineering BOM *P_Wheel* with *P_Tire*, *P_Rim*, and *P_Valve*.

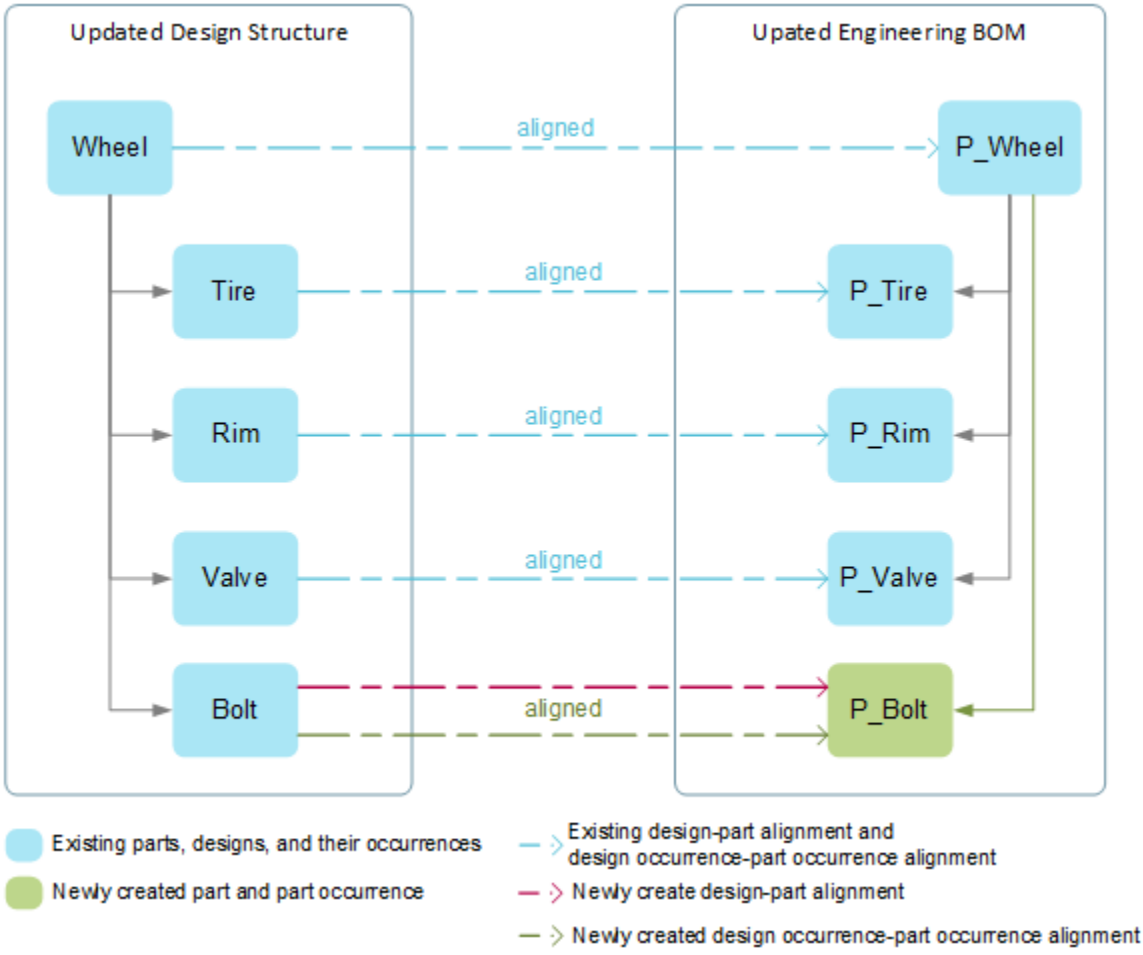
The design structure of *Wheel* is updated to include a new design occurrences, *Bolt*. The engineering BOM of *Wheel* does not have the corresponding part occurrence, *Bolt*, yet. On performing an automated or guided update:

- A new part occurrence *P_Bolt* along with its alignment is created under *P_Wheel*. The quantity of *P_Bolt* is set to 2.

  The following table explains some unique cases of how the quantity of a part occurrence is calculated:

Design occurrence		Part occurrence
Quantity	**UOM**	**Quantity**
Blank	each	1
Blank	non each	0

- A new part *P_Bolt* is also created, and is aligned with the design *Bolt*.



Automatically update an aligned engineering BOM for a change context

If any changes are made to a design structure, you can automatically update the aligned engineering BOM. To do so:

1. From **Inbox** or **Changes**, open the active change notice.

2. From **Change Summary**, select the required design assembly and click **Update Alignment** ⓥ > **Automated Update** ⟳.

   All the children of selected assembly are updated.

Perform an alignment check to verify if the engineering BOM is updated and aligned as per the design changes.

Automatically update an aligned engineering BOM without setting a change context

If any changes are made to a design structure, you can automatically update the aligned engineering BOM. To do so:

1. Open the design structure (design revision) and select topmost design node.

2. Click **Align** > **Automated Update**.

   If you select a child design node, all of its children (entire structure below) are updated.

Perform an alignment check to verify if the engineering BOM is updated and aligned as per the design changes.

Get guidance on updating an aligned engineering BOM for a change context

When a design structure is updated, you must analyze the impact of the design changes on the corresponding engineering BOM. Subsequently, you must update the engineering BOM so that the part occurrences are correctly aligned with the design occurrences.

1. From **Inbox** or **Changes**, open the active change.

2. It is recommended to take bottom-up approach while updating corresponding engineering BOM and perform level by level updates till you reach the top product.

   From **Change Summary**, select the innermost modified design assembly and click **Update Alignment** > **Guided Update**.

3. In the **Guided Update** panel, all the required changes are listed. At selected level only its first level modified occurrences are shown in the panel.

   The design structure and its aligned engineering BOM are displayed side by side.

   You can view the current alignment status by enabling **Show Alignment Status** and view the changes in the structure by enabling **Show Redlines**.

   You can also filter the tiles based on operations suggested in filter tags in the panel. This will only filter the tiles and it does not impact update operation.

4. Select the **Run in Background** check box if you want the updates to be performed in the background while you proceed to do other tasks. Once the update is complete, a notification appears in **Alerts**.

5. After analyzing the changes and performing the required actions, click **Update** to update the corresponding engineering BOM along with its alignment.

After updating the aligned engineering BOM, first perform an alignment check to verify if the engineering BOM is updated and aligned correctly. Next, release the active change notice.

To release the active change notice:

1. Go to the Change tile and open the required change notice.

2. Click Release Change.

Get guidance on updating an aligned engineering BOM without setting a change context

When a design structure is updated, you must analyze the impact of the design changes on the corresponding engineering BOM. Subsequently, you must update the engineering BOM so that the part occurrences are correctly aligned with the design occurrences. To do so:

1. Open the design structure (design revision) in the alignment view.

2. It is recommended to take bottom-up approach while updating corresponding engineering BOM and perform level by level updates till you reach the top product.

3. Select the innermost modified design assembly and click **Align** > **Guided Update**.

   The design structure and its aligned engineering BOM are displayed side by side.

4. In the **Guided Update** panel, all the required changes are listed. At selected level only its first level modified occurrences are shown in the panel.

   You can view the current alignment status by enabling **Show Alignment Status**.

   You can also filter the tiles based on operations suggested in filter tags in the panel. This will only filter the tiles and it does not impact update operation.

5. Select the **Run in Background** check box if you want the updates to be performed in the background while you proceed to do other tasks. Once the update is complete, a notification appears in **Alerts**.

6. After analyzing the changes and performing the required actions, click **Update** to update the corresponding engineering BOM along with its alignment.

Perform an alignment check to verify if the engineering BOM is updated and aligned correctly.

Update an engineering BOM by dragging a design occurrence to a part occurrence

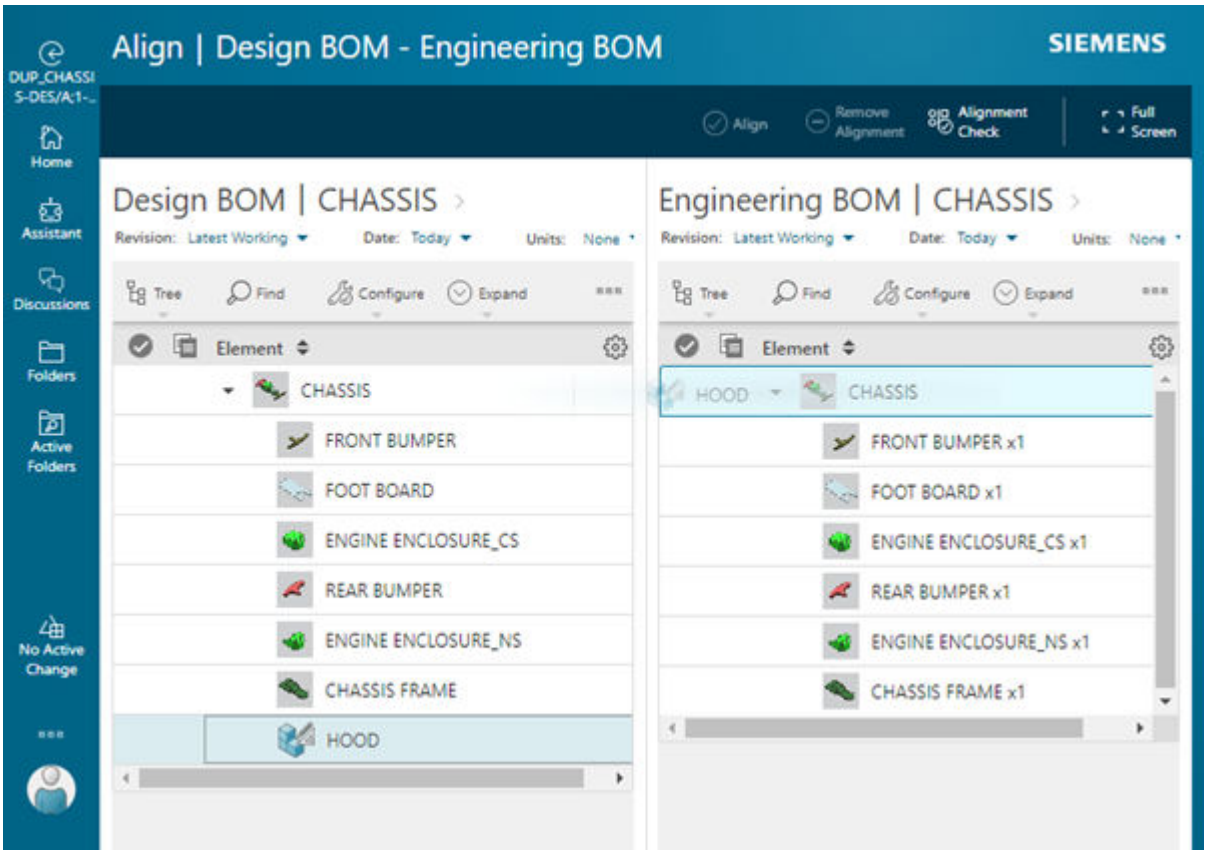
1. Set an active change, if required.

2. Search for the required design structure (design revision) and open it.

3. Click **Align** > **Open Alignment View**.

   The design structure and the engineering BOM are now displayed side by side.

4. Drag a design occurrence to a part occurrence.



In the displayed dialog box:

a. Select the **Run in Background** check box if you want to move on to other tasks while the engineering BOM is updated. You will be notified in **Alerts** once the engineering BOM is updated.

b. Click **Generate**.

An aligned part occurrence is created under the part where you dragged the design occurrence to.

A report is generated in the **Newstuff** > **BOMGeneration** folder. You can go through the contents of the report to troubleshoot any part occurrence creation and alignment issues. You can also **perform an alignment check** to verify if the design occurrences and part occurrences are aligned correctly.

8. Update an aligned design structure based on engineering BOM changes

The different ways to update an aligned design structure

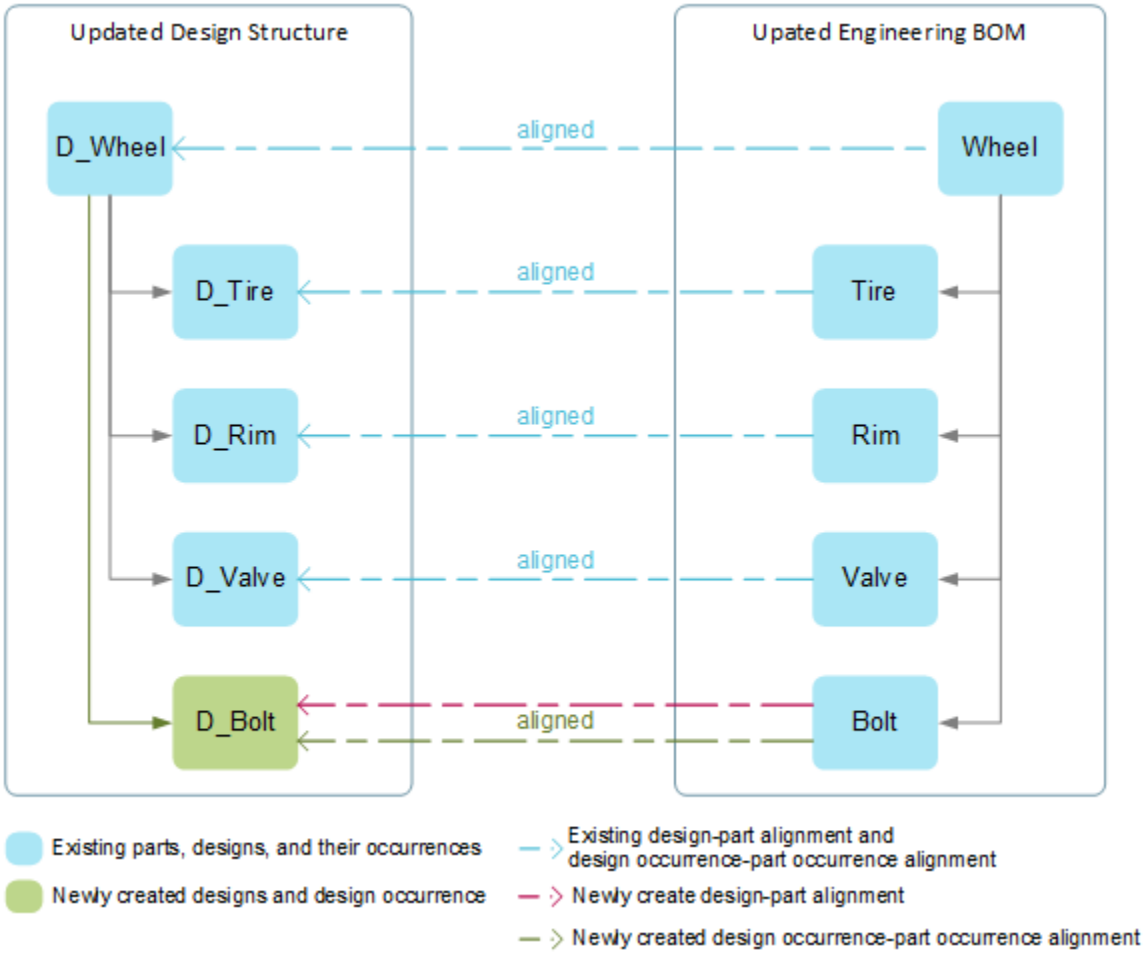
After an aligned design structure is generated from an engineering BOM, if any changes are made to the engineering BOM, you must update the design structure. The different ways to update the aligned design structure are:

- Automated update – Update the design structure automatically either **in a change context** or **without setting a change**.
- Guided update – Get guidance on updating the design structure based on the engineering BOM changes either **in a change context** or **without setting a change**.
- Drag and Drop – **Drag a part occurrence** to a design occurrence.

Example — Consider that the engineering BOM of *Wheel* consisting of *Tire*, *Rim*, and *Valve* has a corresponding design structure, *D_Wheel* with *D_Tire*, *D_Rim*, and *D_Valve*.

The engineering BOM of *Wheel* is updated to include a new part occurrence, *Bolt*. The design structure of *Wheel* does not yet have the corresponding design occurrence for *Bolt*. On performing an automated or guided update, or when you drag *Bolt* to *D_Wheel*:

- A new design occurrence *D_Bolt* along with its alignment is created under *D_Wheel*.
- A new design *D_Bolt* is also created, and is aligned with the part *Bolt*.



Automatically update an aligned design structure for a change context

If any changes are made to an engineering BOM, you can automatically update the aligned design structure. To do so:

1. From **Inbox** or **Changes**, open the active change notice.

2. From **Change Summary**, select the required part and click **Update Alignment** ✓ > **Automated Update** ↻.

   All the children of selected part are updated.

Perform an alignment check to verify if the design structure is updated and aligned as per the engineering BOM changes.

Automatically update an aligned design structure without setting a change context

If any changes are made to an engineering BOM, you can automatically update the aligned design structure. To do so:

1. Open the required engineering BOM (part revision) and select topmost product node.

2. Click **Align** > **Automated Update**.

   If you select a child part node, all of its children (entire structure below) are updated.

Perform an alignment check to verify if the design structure is updated and aligned as per the engineering BOM changes.

Get guidance on updating an aligned design structure for a change context

When an engineering BOM is updated, you must analyze the impact of its changes on the corresponding design structure. Subsequently, you must update the design structure so that the design occurrences are correctly aligned with the part occurrences. To do so:

1. From **Inbox** or **Changes**, open the active change.

2. It is recommended to take bottom-up approach while updating corresponding design structure and perform level by level updates till you reach the top node.

   From **Change Summary**, select the innermost modified part assembly and click **Update Alignment** > **Guided Update**.

3. In the **Guided Update** panel, all the required changes are listed. At selected level only its first level modified occurrences are shown in the panel.

   The design structure and its aligned engineering BOM are displayed side by side.

   You can view the current alignment status by enabling **Show Alignment Status** and view the changes in the structure by enabling **Show Redlines**.

   You can also filter the tiles based on operations suggested in filter tags in the panel. This will only filter the tiles and it does not impact update operation.

4. Select the **Run in Background** check box if you want the updates to be performed in the background while you proceed to do other tasks. Once the update is complete, a notification appears in **Alerts**.

5. After analyzing the changes and performing the required actions, click **Update** to update the corresponding design structure along with its alignment.

After updating the aligned design structure, first **perform an alignment check** to verify if the engineering BOM is updated and aligned correctly. Next, release the active change notice.

To release the active change notice:

1. Go to the Change tile and open the required change notice.

2. Click Release Change.

Get guidance on updating an aligned design structure without setting a change context

When an engineering BOM is updated, you must analyze the impact of its changes on the corresponding design structure. Subsequently, you must update the design structure so that the design occurrences are correctly aligned with the part occurrences. To do so:

1. Open the engineering BOM (part revision) in the alignment view.

2. It is recommended to take bottom-up approach while updating corresponding design structure and perform level by level updates till you reach the top node.

3. Select the innermost modified part assembly and click **Align** > **Guided Update**.

   The engineering BOM and its aligned design structure are displayed side by side.

4. In the **Guided Update** panel, all the required changes are listed. At selected level only its first level modified occurrences are shown in the panel.

   You can view the current alignment status by enabling **Show Alignment Status**.

   You can also filter the tiles based on operations suggested in filter tags in the panel. This will only filter the tiles and it does not impact update operation.

5. Select the **Run in Background** check box if you want the updates to be performed in the background while you proceed to do other tasks. Once the update is complete, a notification appears in **Alerts**.

6. After analyzing the changes and performing the required actions, click **Update** to update the corresponding design structure along with its alignment.

Perform an alignment check to verify if the design structure is updated and aligned correctly.

Update a design structure by dragging a part to a design occurrence

1. Set an active change, if required.

2. Open the required engineering BOM (part revision).

   OR

   Open an engineering BOM first and then open its solution variant from the **Solution Variants** tab.

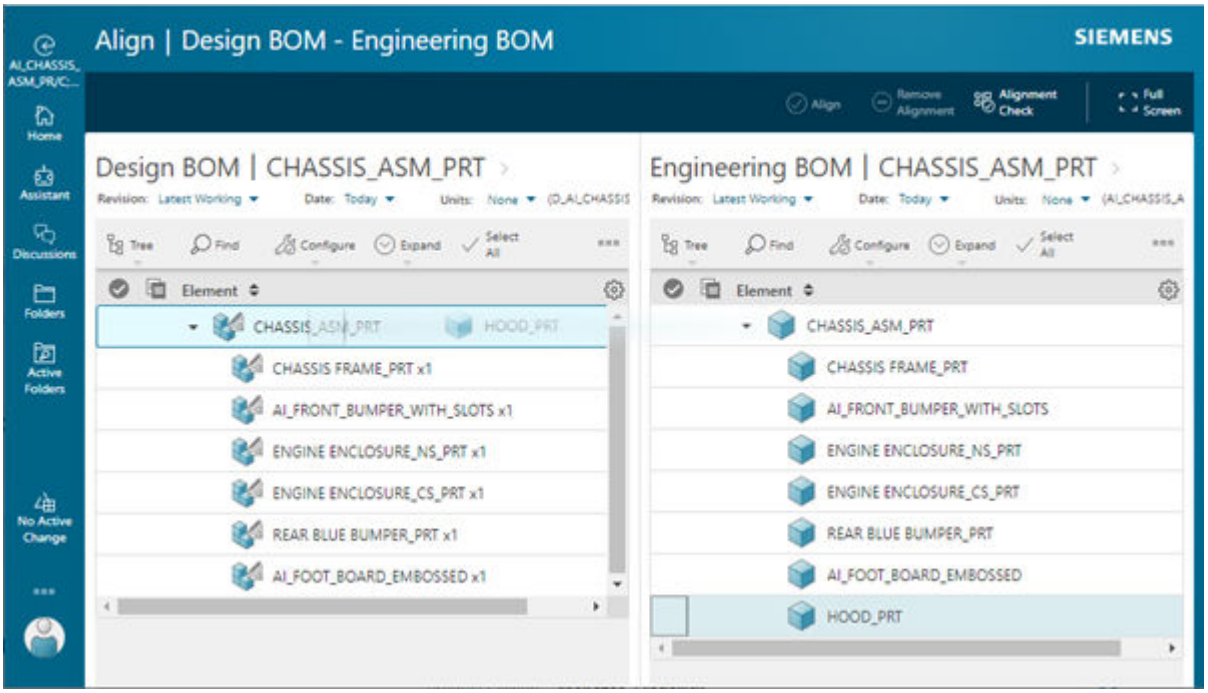
3. Click **Align** > **Open Alignment View**.

   The design structure and the engineering BOM are now displayed side by side.

4. Drag a part occurrence to a design occurrence and click **Generate**.

   OR

   If you opened a solution variant, first verify if a primary design is set for the selected part in the **Aligned Designs** section in the **Overview** tab. The primary design is represented as . After setting a primary design, drag the selected part to a design occurrence and click **Generate**.



In the displayed dialog box:

a. Select the **Run in Background** check box if you want to move on to other tasks while the design structure is updated. You will be notified in **Alerts** 🔔 once the design structure is updated.

b. Click **Generate**.

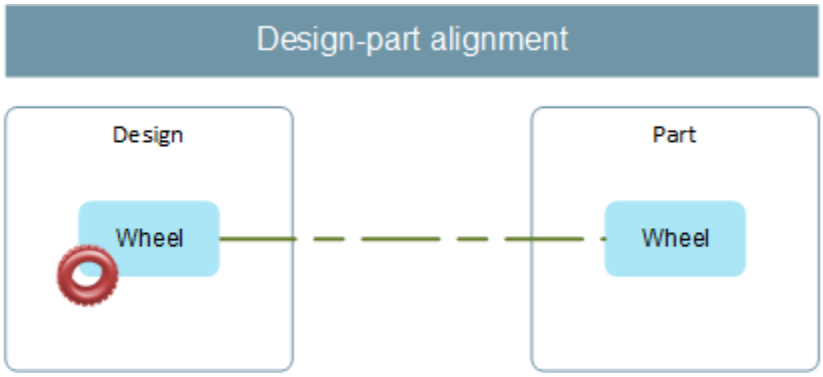
An aligned design occurrence is created under the design where you dragged the part occurrence to. If the quantity of the part is more than one, multiple design occurrences are created. The number of the design occurrences is same as the quantity of the aligned part occurrence.

A report is generated in the **Newstuff** > **BOMGeneration** folder. You can go through the contents of the report to troubleshoot any design occurrence creation and alignment issues. You can also **perform an alignment check** to verify if the design occurrences and part occurrences are aligned correctly.

9. Align designs and parts manually

About aligning designs and parts

To visualize what a part looks like in the floor position, you align it with its corresponding design. This type of alignment is called the *design-part alignment*. For example, you align a part *Wheel* with its design to know what it looks like in its floor position.

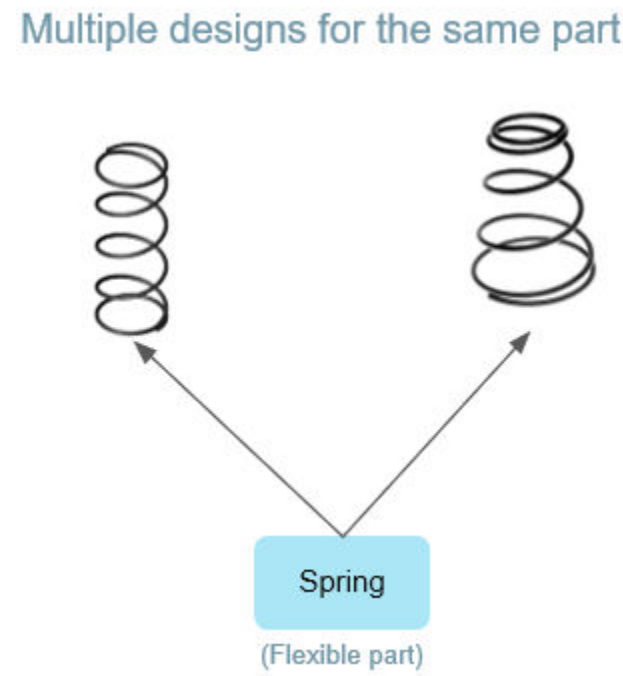


While visualizing the part or while validating if the part is aligned correctly, if any issues are found, you can first **remove the alignment between the design and part**, and then realign the part with the correct design.

The different ways to align designs and parts are:

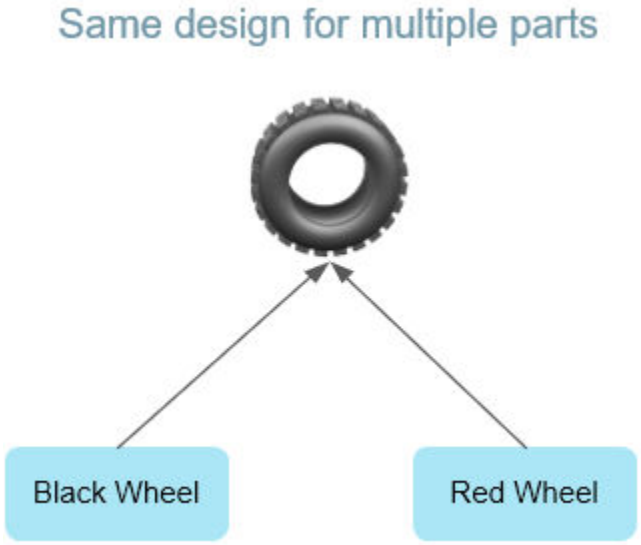
- **Add a design revision to a part revision**

  For a flexible part, you can add multiple design revisions to the part revision to represent the flexibility and orientation of the part. You can set one of the design revisions as the primary representation of the part revision.



- **Add a part revision to a design revision**

  To the same design revision, you can add multiple part revisions to show variations in characteristics such as color, finish, material, and supplier.



Add design revisions to a part revision

1. **Set an active change**, if required.

2. In the **Overview** tab, under the **Aligned Designs** section, click **Add** ⊕.

3. In the **Add** panel: either add a new design or locate an existing design from **Palette** or **Search** and click **Add**.

   By default, this design revision is set as the primary design.

   You can add multiple designs to the part revision and choose one of the design as the primary design. To set a design as the primary representation of the part, select the design and click **Set Primary**. An icon, , next to a design indicates that it is the primary design.

Add part revisions to a design revision

1. Set an active change, if required.

2. Search for a design revision and open it.

3. In the **Overview** tab, under the **Aligned Parts** section, click **Add** ⊕.

4. In the **Add** panel, either add a new part or locate an existing part from **Palette** or **Search** and click **Add**. You can add multiple parts to a design revision.

Remove the alignment between parts and designs

1. Open a part revision or a design revision.

2. In the **Overview** tab, select the required design revisions or part revisions from **Aligned Designs** or **Aligned Parts** and click **Remove**.

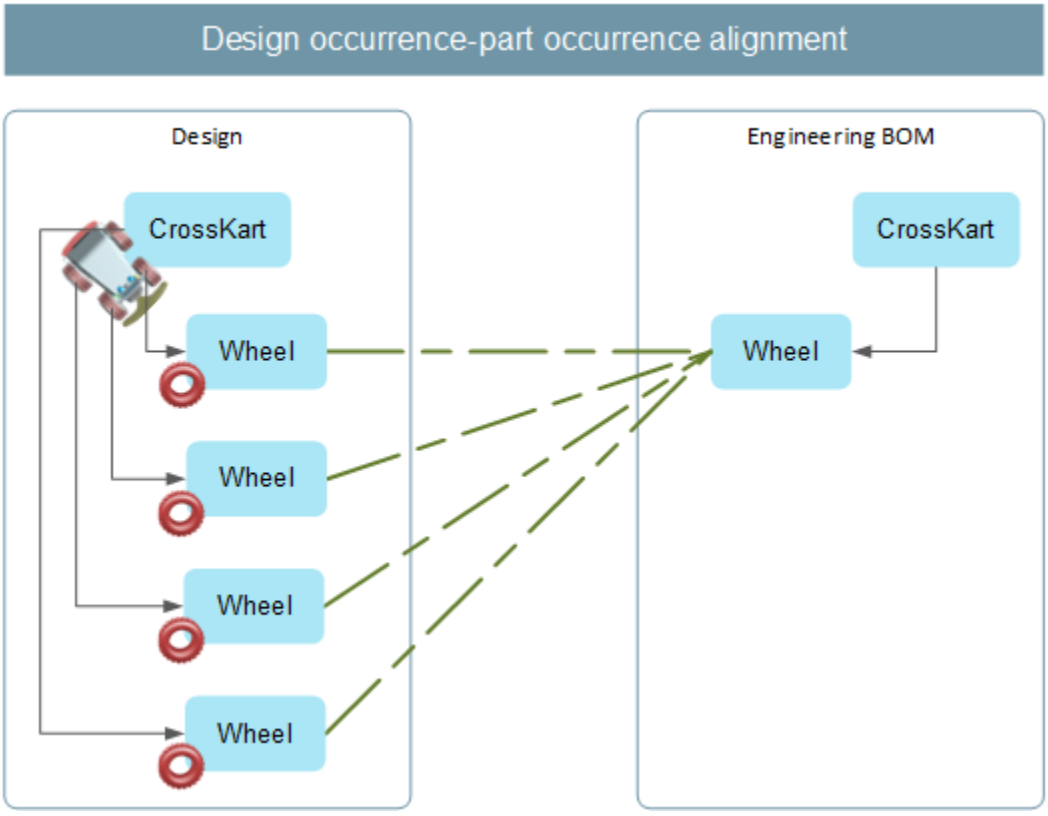
   You cannot remove a design aligned to a released part.

10. Align design occurrences and part occurrences manually

About aligning design occurrences and part occurrences

You align design occurrences and part occurrences to visualize how different parts are assembled together to make up an assembly part. You also align a design occurrence and a part occurrence to visualize what a part looks like when mounted on to a product. This alignment is called the *design occurrence-part occurrence alignment*. A design occurrence has the absolute position information of a part.

For example, you align the different parts of a wheel, such as *Tire*, *Rim*, and *Valve* with their corresponding designs to see how they are assembled to form the wheel structure. You can also align all four wheels of a car with their corresponding design occurrences to visualize how they are placed in the car. The design occurrence of the wheel is aligned to a single part occurrence of the wheel in the car with the quantity of the part occurrence is set as 4.



For a design having multiple parts (in design-part alignment), only a single part occurrence is created in automation based upon date of its design-part alignment. Part which is aligned first in design-part alignment is given preference for occurrence alignment. Remaining part occurrences needs to be created and aligned manually.

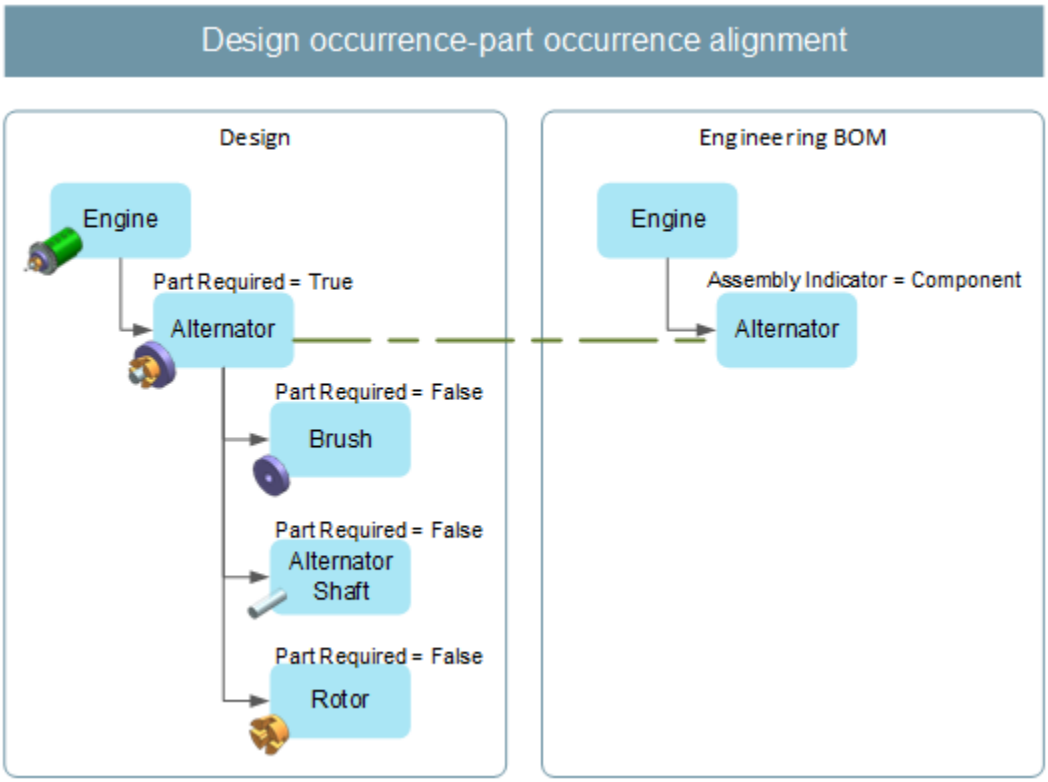
While visualizing a part structure or while validating if the part occurrences in the part structure are aligned correctly, if any issues are found, you can first **remove the alignment** between the part occurrence and the design occurrence and then **align the part occurrence** again correctly.

To understand how alignment is done for bought out parts and flexible parts, see **Aligning design occurrences and part occurrences in a bought out part** and **Aligning design occurrences and part occurrences in a flexible part**.

Aligning design occurrences and part occurrences in a bought out part

Sometimes, instead of manufacturing a part in-house, it is purchased as a single *piece*. Such parts are called as *Bought Out* parts. For example. consider that the *Alternator* used in the engine of *CrossKart* is a bought out part. The design structure of *Alternator* contains *Brush*, *Alternator Shaft*, and *Rotor*. However, the corresponding engineering BOM of *Alternator* will be a single part with no part occurrences.

Before aligning, the *Alternator* part must be set as **Component** or **Generic Part**. In addition, in the *Alternator* design structure, the value of **Part Required** for *Brush*, *Alternator ShaftRotor* must be set as **False**.



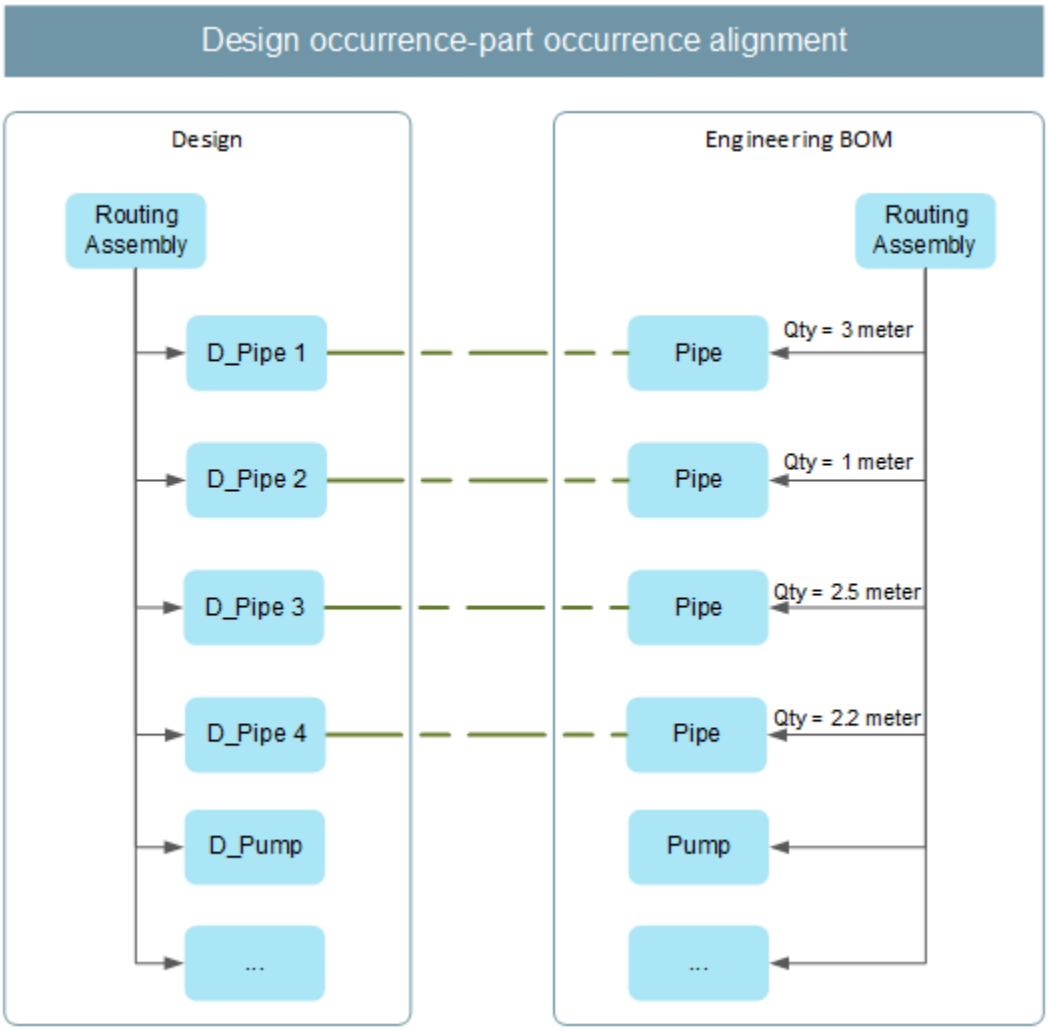
Aligning design occurrences and part occurrences in a flexible part

Some parts can be used in a product in various states. Examples include a spring, pipe, and wire harness. Such parts are called as *flexible parts*. A flexible part can be represented by different designs (pipe or

wire harness) or by the same design (spring) with different *shape overrides*. In the case of a spring, shape overrides shows the compression state of a part when installed at different positions in a product.

Scenario 1: Different designs for a flexible part — Consider a *Routing Assembly* containing four different lengths of the part *Pipe*. The design structure of *Routing Assembly* consists of four different design occurrences of *Pipe*, one occurrence for each length. The engineering BOM of same *Routing Assembly* consists of four occurrences of the same part, *Pipe*.

To view *Pipe* in the context of *Routing Assembly*, you must align each design occurrence of *Pipe* in the design structure with the corresponding part occurrence in the engineering BOM.

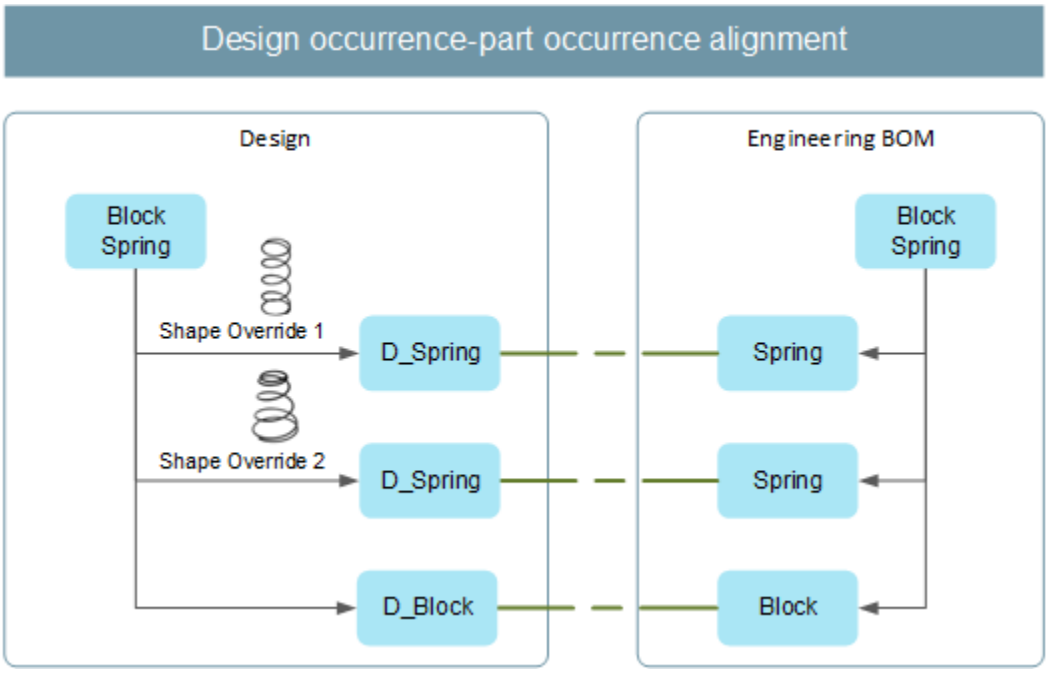


To view what *Pipe* looks like in the floor position, add the four different design representations to the part, and mark one design as the primary representation.

Scenario 2: Same design for a flexible part — Consider a *Block Spring* assembly that contains a part, *Spring*. When *Spring* is installed in two different positions in *Block Spring*, it is compressed differently. It is relaxed in one position and tightly compressed in the other. The design structure of *Block Spring*

contains two occurrences of the same design with different shape overrides. The engineering BOM of *Block Spring* contains two occurrences of the same part *Spring*.

To view *Spring* in the context of *Block Spring*, you must align each design occurrence of *Spring* in the design structure with the corresponding part occurrence in the engineering BOM.



Align design occurrences and part occurrences manually

You can generate an engineering BOM from a design structure, and vice versa. On generating the engineering BOM or design structure, the two BOMs are automatically aligned with each other. If you want to update any alignment, you can again align design occurrences and part occurrences manually.

If a design is revised to make some design changes and you have not revised the corresponding part, it is recommended that you revise the corresponding part before aligning the design occurrence and part occurrence. If you do not revise the part, an error stating that the design occurrence and part occurrences are already aligned will be displayed. In such a case, first, remove the alignment and then align the part occurrence and design occurrence again.

1. **Set an active change**, if required.

2. Search for a design structure (design revision) or an engineering BOM (part revision) and select it. Click **More Commands** ••• > **View** > **Align**.

   OR

   Open the design structure or engineering BOM. Click **Align** > **Open Alignment View**.

The design structure and the engineering BOM are displayed side by side.

Before clicking **Open Alignment View**, if you had applied any variant and configuration criteria to the engineering BOM, the aligned design structure is displayed based on the applied variant and configuration criteria. If you had set a specific partition scheme on the engineering BOM, only the engineering BOM loads with that scheme in the alignment view. The partition scheme is not applied to the design structure.

3. For a *bought out* part:

   a. Verify if the **Assembly Indicator** is set as **Component**.

      If it is not set as **Component**, first check if the part occurrence is aligned by click the **Intermediate** status. If the part occurrence is aligned, remove the alignment by clicking **Remove Alignment**.

   b. Set **Assembly Indicator** as **Component** or **Generic Part**.

   c. In the corresponding design structure of the part, set **Part Required** as **True**, and set **Part Required** as **False** for all the child design occurrences.

4. From the design structure, select a design occurrence. And, from the engineering, select a part occurrence.

   You can align multiple design occurrences to a singe part occurrence. For example, you can align the design *Wheel* that appears four times in the design structure with the part *Wheel* that occurs only once in the engineering BOM. However, the quantity is not set as 4 for the part *Wheel*. To update the quantity, perform an automated or guided update.

   To select multiple occurrences, click CTRL and select each occurrence. To deselect an occurrence, click CTRL and select the occurrence again.

   > Note:
   >
   > If a design occurrence or a part occurrence is not available in the design structure or engineering BOM, you can add the occurrences in the alignment view itself. You can also remove or replace design occurrences and part occurrence. You can view the changes by enabling **Show Redlines**. After editing the structures, perform the manual alignment.

5. In the work area toolbar, click **Align**.

   The indicator next to the part occurrence and design occurrence shows that the two are aligned.

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

In your system, you may have an existing design structure and an existing engineering BOM that are not aligned. This is a common scenario when importing 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.

Prerequisites

Ensure that your system is set up for alignment using property matching.

Procedure

1. **Set an active change**, if required.

2. Open the design structure or engineering BOM that you want to align and select the top product or item.

3. Click **More Commands** ••• > **Manage** > **Submit to Workflow** on the primary toolbar.

4. In the **Submit to Workflow** panel:

   a. Click **All**.

   b. Select **Template** as **Align DBOM and EBOM** and click **Submit**.

   Alignment is generated for the selected occurrences based on the previously set matching property criteria.

   The alignment report is generated in the **AlignBOMReports** sub-folder inside the **NewStuff** folder.

Remove the alignment between design occurrences and part occurrences

1. Open the required structure.

2. Click **Align** > **Open Alignment View**.

   The design structure and the part structure are displayed in a split view.

3. From the design structure, select a design occurrence. From the part structure, select a part occurrence.

To deselect an occurrence, click CTRL and select the occurrence again.

4. Click **Remove Alignment** ⊖.

If you see any error while alignment is getting removed, contact your administrator.

The indicator ◯ shows that the design occurrence and part occurrence are no longer aligned with each other.

A design occurrence may be aligned to more than one part occurrence. Similarly, a part occurrence may be aligned to more than one design occurrence.

- To remove all the part occurrences aligned to a design occurrence, select the design occurrence from the design structure and click **Remove Alignment** ⊖.

- To remove all the design occurrences aligned to a part occurrence, select the part occurrence from the part structure and click **Remove Alignment** ⊖.

For a bought out part, you must also **remove the alignment** between the part and design. On not doing so, you can still visualize the bought out part on its floor position.

11. Align BOM in a multisite setup

When aligning a BOM and its corresponding design structure, the two can be in different Teamcenter sites. Typically, the BOM is authored in a central site, and the design is distributed across different sites. To align the structures in such a setup, do the following:

Procedure

1. In the central site, author your data, including BOM, configurator data, and partitions and optionally, release the data.

   (Optional) Create designs and design-part alignment (not occurrence alignment).

2. Share the BOM with the design site.

3. Perform the (**part occurrence and design occurrence**) alignment.

   > Note:
   >
   > You cannot author or edit this shared BOM at the design site.
   >
   > You can align multiple design occurrences to a single part occurrence.
   >
   > You can visualize structures at the design site.

4. Share the alignment information back to the central site.

   Transfer the ownership of the design data if no further changes are needed. Otherwise, export the design data, along with alignment data, to the BOM site. Use the **CBAMultiSiteExpOptSet** option set to share the design data. This allows the concurrent engineering process to utilize the data during development on the design site.

12. Validate design and engineering BOM alignment

About validating alignment

After generating a design structure, you must validate if the corresponding BOM is created correctly with proper alignment. You must also validate the alignment after aligning design occurrences and part occurrences manually. To verify if the alignment is performed correctly, you can view the:

- **Aligned designs and parts**.
- **Aligned design occurrences and part occurrences**.

  You can also **view the product manufacturing information** available in an aligned engineering BOM.

View aligned parts and design

To visualize what a part looks like in the floor position, you align it with its corresponding design.

1. Open the part revision or the design revision for which you want to view the aligned designs or parts.

2. For a part, the corresponding designs are listed in the **Aligned Designs** section of the **Overview** tab.

   For a design, the corresponding parts are listed in the **Aligned Parts** section of the **Overview** tab.

   These sections also list additional details such as which design is set as the primary representation of a part or if there is some alignment mismatch.

View the product manufacturing information

Product manufacturing information (PMI) includes information, such as geometric dimensions, tolerances, 3D annotation, and surface finish specifications, required for manufacturing a product. PMI is available in a design structure. You can view PMI in the context of an aligned engineering BOM.

To view PMI:

1. Log on to the Teamcenter rich client.

2. Search for part revisions and open the required engineering BOM.

3. Click **Start/Open in Lifecycle Visualization**.

   Currently, you can view PMI only in the standalone viewer.

4. In the standalone Lifecycle Visualization viewer, from the **3D Load Options** dialog box, select **Open document** and click **OK**.

5. Right-click the aligned engineering BOM and select **Show PMI**.

View aligned part occurrences and design occurrences

You view the aligned part occurrences and design occurrences in order to validate the alignment.

1. Open the required structure.

2. Click **Align** > **Open Alignment View**.

   The design structure and the engineering BOM are now displayed side by side. If you had applied any variant and configuration criteria to the engineering BOM, the aligned design structure is displayed based on the applied variant and configuration criteria. If you had set a specific partition scheme on the engineering BOM, only the engineering BOM loads with that scheme in the alignment view. The partition scheme is not applied to the design structure.

   By default, **Alignment Status** shows an **Intermediate** status. This status is not set for the topmost BOM line and for occurrences for which the **Design Required** or **Part Required** is set as **False**.

3. You can view the alignment between specific design and part occurrences or for all aligned design and part occurrences.

   - To view specific aligned design and part occurrences, you can either click the **Intermediate** indicator icon or right-click the icon to choose **Show Alignment**.

     For a design that occurs multiple times in the design structure, the aligned part occurrence is summarized as a single instance. The quantity of the part occurrence is set as the number of times the design occurs. The part is summarized based on the grouping criteria set by the administrator.

     > Note:
     >
     > You cannot unpack the part occurrence in Active Workspace to view its separate instances. To view the separate instances, open the part in a Rich Client application such as Structure Manager or Manufacturing Process Planner.

   - To view all the aligned part and design occurrences, enable the **Show Alignment Status** option. It is recommended that you select this option if your structure is not very large.

For larger structures, click **Alignment Report** to generate a report containing the alignment details. You will be notified in **Alerts** when the report is generated.

The icons in **Alignment Status** indicate the alignment status of the design occurrences and part occurrences. And, the icons in **Advance Status** indicate the alignment status of the corresponding design revisions and part revisions.

Alignment Status		Advance Status	
Indicator	**Description**	**Indicator**	**Description**
	Indicates that the design occurrence and part occurrence are not aligned with each other.		
	Indicates that the design occurrence and part occurrence are aligned with each other. And, the corresponding design revision and part revision are aligned correctly.		
	Indicates that the design occurrence and part occurrence are aligned with each other.		Indicates that the corresponding design revision and part revision are not aligned with each other.
			Indicates that the corresponding design and part are not aligned with the latest revisions.
	Indicates that the parent design occurrence and part occurrence are not aligned with each other. Note: This indicator is displayed only when you enable the **Show Alignment Status** option. It is not displayed in the report that is generated when you click **Alignment Report**.		

If you choose to run the alignment report, the following additional indicators are displayed in the report:

Alignment Status		Advance Status	
Indicator	**Description**	**Indicator**	**Description**
	Indicates that the design occurrence and part occurrence are aligned with each other		The corresponding design revision and part revision are not aligned with each other. Also, indicates that the one or more of the child design occurrences are not aligned with the corresponding part occurrences.
			Indicates that the corresponding design and part are not aligned with the latest revisions. It also indicates that: • One or more child design occurrences and part occurrences are not aligned. • One or more child designs and parts are not aligned. • One or more child designs and parts too are not aligned with the latest revisions.
			Indicates that the design and part are not aligned with the latest revisions.
	Indicates that the design occurrence and part occurrence are not aligned with each other.		Indicates that the design and part are not aligned with the latest revisions.

Based on the indicators, you can take appropriate actions such as aligning part occurrences and design occurrences, aligning parts and designs, and revising a structure to fix the missing or mismatched alignments.

You can visualize the aligned design occurrences and part occurrences in **3D**. If the revision rules of the design structure and engineering BOM are different, the designs that you visualize are based on the revision rule of the engineering BOM, by default. However, your administrator can change this default behavior so that the designs seen are based on a different but valid revision rule.