TEAMCENTER

Control Plans

Teamcenter 2412

SIEMENS

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Contents

Sharing and reusing Control Plans

1. About Control Plan in Teamcenter

Teamcenter Control Plan is a documented description of the systems used in minimizing process and product variation. It contains all critical and significant quality inspection characteristics (process and product related) that are required in the production process. The goal of a Control Plan is to trim down the inefficiencies in a process by identifying their source and monitoring them. This decreases product development time and reduces overall cycle times and associated costs. When you use a Control Plan to focus on the critical aspects of a process, you can improve the efficiency and increase profitability.

A Control Plan:

- Describes the actions required at each phase of the process to assure that all process outputs are controlled.
- Focuses on the product characteristics that are most important to the customer and the business.
- Reduces scrap, eliminates costly rework, and prevents defective products from reaching customers.
- Improves manufacturing efficiency and drives positive bottom-line returns.
- Sustains product and process improvements over a long period of time by assuring that the process will not revert to the previous state.

Example:

Consider a scenario where you are manufacturing a front plate casing. You want to ensure that the quality is maintained while various operations are performed to create the front plate casing. To ensure the quality, you create a Control Plan that defines which operations are being performed. Additionally, you also define what measurements must be inspected after each operation is performed.

To manufacture a front plate casing, you need to perform the **Punching**, **Alignment of the punching holes**, and **Deburring** operations. When a quality engineer inspects the front plate casing after the **Punching** operation is performed, they must ensure that the diameter of the punched holes is 20 mm. For the **Alignment of the punching holes** operation, the quality engineer must ensure that the punched holes are correctly aligned. Additionally, after the **Deburring** operation is done, the quality engineer must perform a surface check to ensure that the surface does not have any defects.

Using Teamcenter Control Plan, you can do this by creating a Control Plan for the front plate casing. In Teamcenter, add the **Punching**, **Alignment of the punching holes**, and **Deburring** operations to be tracked. For each operation, add an Inspection Definition that defines the characteristics that must be measured while inspecting the part on the shop floor.

Finally, when a quality engineer inspects the front plate casing assembly on the shop floor, the quality engineer checks that the **Punching**, **Alignment of the punching holes**, and

Deburring operations are performed with the correct measurements as defined in their Inspection Definitions.

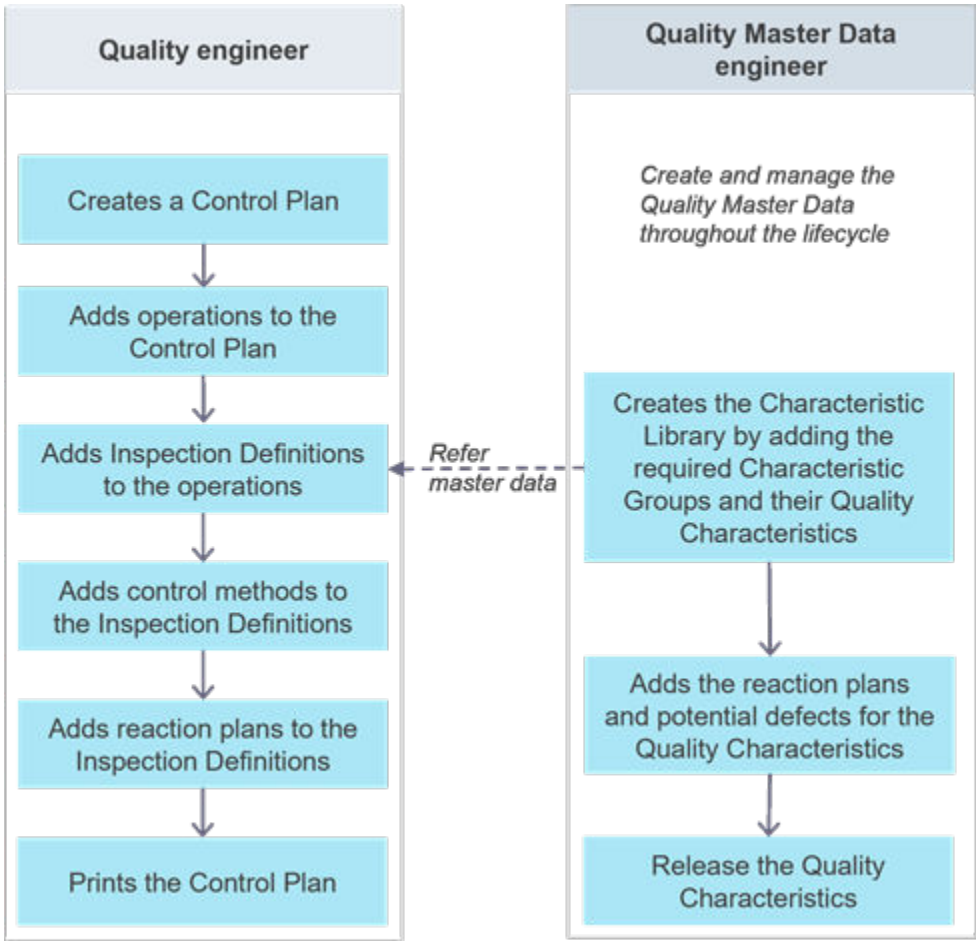
Where do I go from here?

Administrator	To know which features are required to install Control Plan, see the *Install Control Plan* section of *Teamcenter Quality — Deployment and Administration*.
Administrator	To configure Control Plan according to your business requirements, see the *Configure Control Plan* section of *Teamcenter Quality — Deployment and Administration*.
Business User	
What are the first steps in getting started with Control Plan in Teamcenter?	You can start defining the Characteristics Library by **creating the required Characteristic Groups** and **Quality Characteristics**.
After defining the Characteristics Library, what are the next steps in Teamcenter?	You can **create a Control Plan** that describes the actions required at each phase of the process.

After creating the Control Plan, you must define its scope.	You can define which operations must be monitored by the Control Plan by **adding the required operations**.
After defining the scope of the Control Plan, specify what is being measured on the shop floor in each operation.	To do this, add **the Inspection Definitions** that define the measurements and attach the required Quality Characteristics.

2. Control Plan task flow in Teamcenter

The following graphic shows the sequence of tasks required to create and manage a Control Plan:



3. Access the tile for your Quality application in the Quality Management workspace

The **Quality Management** workspace is a workspace dedicated to working with Teamcenter Quality applications. The tile in the **Quality Applications** section in the **Quality Management** workspace lets you work with your application.

In the **Quality Management** workspace, you can do the following:

Section	Description
Quality Applications	You can navigate to the Teamcenter Quality applications through the respective tiles. You can directly access the pinned objects and saved searches here.
Favorites	You can use this section to access and work on frequently-used objects that you have added as favorites.
Report Dashboard	You can add relevant template reports in this section to view data that you want review on a regular basis.
Inbox	You can view the tasks assigned to you through workflows in this section.

When you click the tile for a specific application, you can:

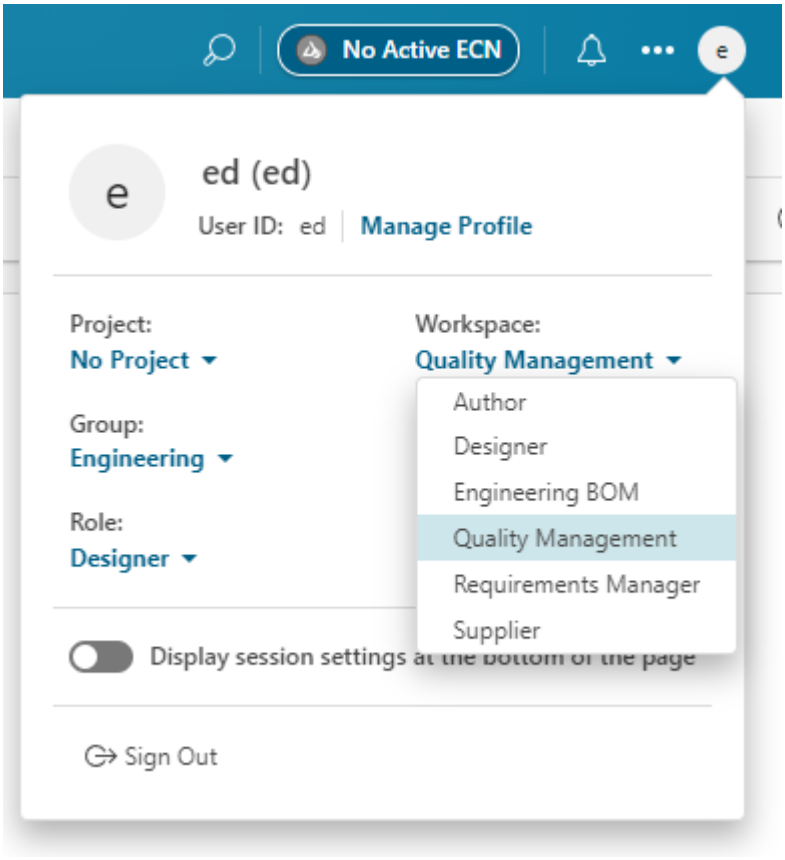
- View the dashboard for the application including the quality master data.
- Search for and filter your search results as required.
- Access other applications, such as Assistant, Discussions, Programs, and Schedules, on the global navigation toolbar.

Your administrator must make the **Quality Management** workspace available for your organization's groups and roles.

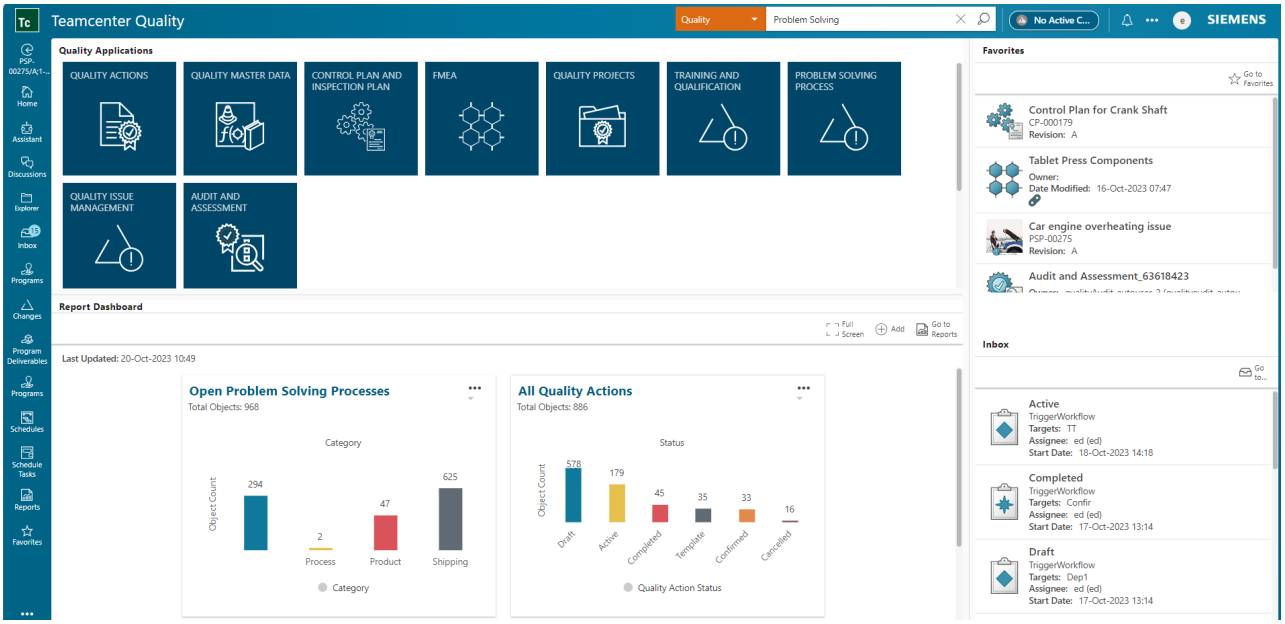
For more information about workspaces, see *Learn about workspaces* in *Active Workspace Customization* of the Teamcenter documentation.

To access the tile for your Quality application in the **Quality Management** workspace:

1. Click your profile icon.
2. From the **Workspace** list, select **Quality Management**.



3. In the **Quality Applications** section, click the tile for the required application.



4. Setting up naming conventions and rules

Create a naming convention to organize the Quality Characteristics generated from imported PMI

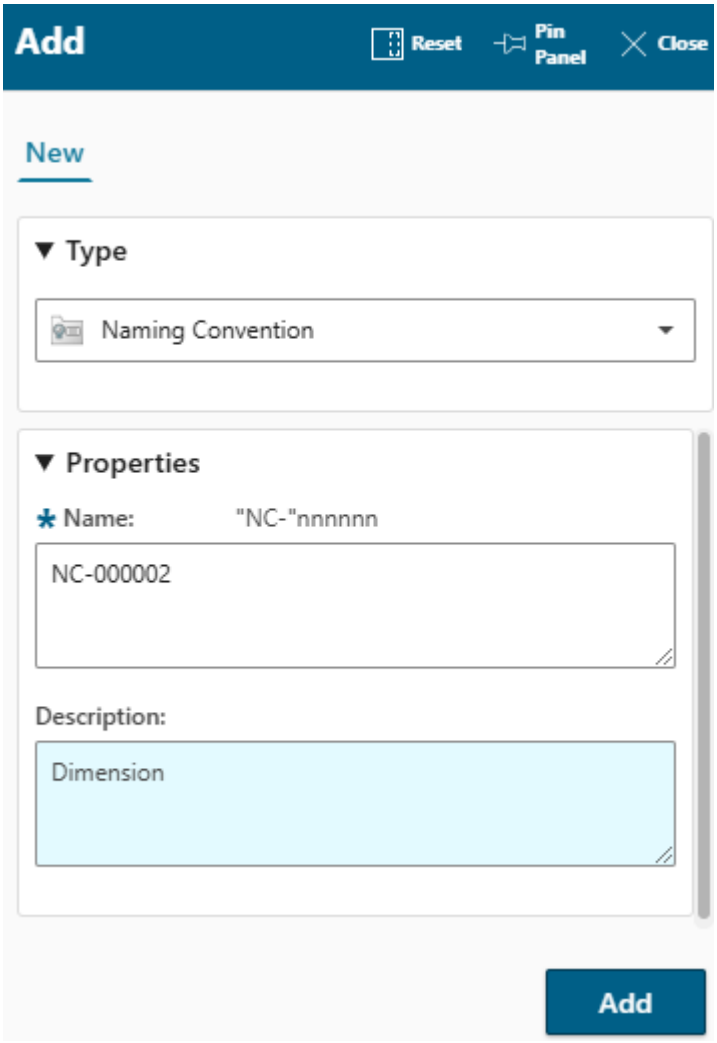
Naming conventions are used to organize the Quality Characteristics and Characteristic Groups that are generated when you import product and manufacturing information (PMI) from a part. The naming pattern in the naming convention is based on the attributes of the Quality Characteristics. These Quality Characteristics are generated and added to a Characteristic Group, whose Characteristic Type and name you define in the naming convention in the **Quality Master Data** library. The name of the Characteristic Group is a combination of the attributes and the delimiter defined in the naming convention.

By default, the following naming conventions are available:

Characteristic Type	Preview of the Characteristic Group name	Preview of the Quality Characteristic name
Variable	{{Dimension Type}}_Group	{{Dimension Type}}_{{Nominal Value}}_{{Upper Tolerance}}_{{Lower Tolerance}}
Attributive	Attributive_Group	Attributive_{{Description}}
Visual	Visual_Group	Visual_{{Description}}

1. On the **HOME** page, click the **QUALITY MASTER DATA** tile.
2. In the **Quality Master Data** location, click the **Characteristics Library** page.
3. In the left pane, click **Characteristics and Rule Engine** in the work area toolbar.

4. In the **Characteristics and Rule Engine** panel, click **Naming Conventions**.
5. Choose **More Commands** ••• > **New** ✳ > **Add Naming Convention**.
6. In the **Name** box, type a name for the naming convention.



7. In the **Description** box, describe the naming convention, and click **Add**.

8. Select the naming convention you have created, and choose **More Commands** ••• > **Edit** > **Start Edit**.

9. In the **Characteristic Group Name Definition** section, select the Characteristic Type and define the name of the Characteristic Group by selecting the appropriate attributes and delimiter.

   a. From the **Characteristic Type** list, select the type of the naming convention's Characteristic Group.

   b. From the **Attributes** list, select the attributes of the naming convention's Characteristic Group.

      You can add multiple attributes and static labels to uniquely identify the naming convention's Characteristic Group. A static label helps you to define a naming convention that is unique to your organization.

> Example:
>
> Use the **Dimension Type** attribute to create a group based on the dimension properties, such as height, length, width, radius, or diameter.

c. To add static text, type the static text and press **Enter**, or click outside the editing box.

d. To rearrange the attributes, do the following:

   A. Choose **More** ••• > **Reorder**.

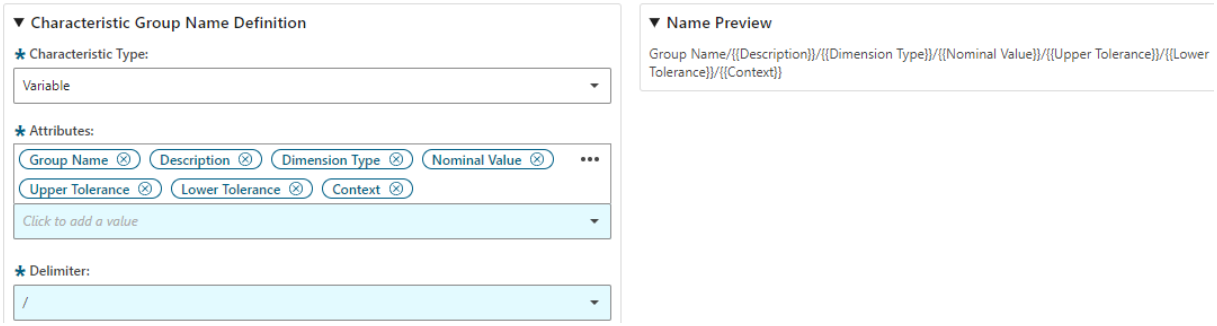
   B. Select an attribute and click **Move Up** or **Move Down**.

   C. When finished rearranging the attributes, click **Done**.

   As you make changes to the attributes, these changes are simultaneously updated and displayed in the **Name Preview** section. When you select attributes from the **Attributes** list, this section displays the attributes in double curly braces, for example, **{{Dimension Type}}**. The added static text appears without the double curly braces, for example, **Group Name**.

e. Click **Remove** ⊗ to remove a selected attribute.

f. From the **Delimiter** list, select the delimiter to be used to separate the attributes of the naming convention's Characteristic Group.



10. In the **Characteristic Name Definition** section, define the Characteristic Name by selecting the appropriate attributes and delimiter.

    a. From the **Attributes** list, select the attributes of the naming convention's Characteristic Name.

       You can add multiple attributes, and also add a static label to uniquely identify the naming convention's Characteristic Name. A static label helps you define a naming convention's Characteristic Name that is unique to your organization.

    b. To add static text, type the static text and press **Enter**, or click outside the editing box.

c. To rearrange the attributes, do the following:

A. Choose **More** ••• > **Reorder**.

B. Select an attribute and click **Move Up** or **Move Down**.

C. After you complete rearranging the attributes, click **Done**.

As you make changes to the attributes, these changes are simultaneously updated and displayed in the **Name Preview** section. When you select attributes from the **Attributes** list, this section displays the attributes in double curly braces, for example, **{{Dimension Type}}**. The added static text appears without the double curly braces, for example, **Characteristic Name**.

d. Click **Remove** to remove a selected attribute.

e. From the **Delimiter** list, select the delimiter to be used to separate the attributes of the naming convention's Characteristic Name.

11. (Optional) In the **Additional Properties** section, update the **Name** and **Description** of the naming convention.

12. Choose **More Commands** ••• > **Edit** > **Save Edits**.

Edit a naming convention

After creating a naming convention, you can edit it to add, rearrange, or remove attributes; change the delimiter; or update its name and description. After you edit and save the naming convention, the updates are reflected in all Quality Characteristics that are created with this naming convention.

1. On the **HOME** page, click the **QUALITY MASTER DATA** tile.

2. In the **Quality Master Data** location, click the **Characteristics Library** page.

3. In the left pane, click **Characteristics and Rule Engine** in the work area toolbar.

4. In the **Characteristics and Rule Engine** panel, click **Naming Convention**.

5. Select the required naming convention, and choose **More Commands** ••• > **Edit** > **Start Edit**.

6. Make the required updates to the naming convention, and choose **More Commands** ••• > **Edit** > **Save Edits**.

Delete a naming convention

You can delete a naming convention only if it is not used in a rule or assigned as a default naming convention.

1. On the **HOME** page, click the **QUALITY MASTER DATA** tile.
2. In the **Quality Master Data** location, click the **Characteristics Library** page.
3. In the left pane, click **Characteristics and Rule Engine** in the work area toolbar.

4. In the **Characteristics and Rule Engine** panel, click **Naming Convention**.
5. Select the required naming convention, and choose **More Commands** ••• > **Edit** > **Delete**.
6. In the confirmation message, click **Delete**.

Create an Import PMI Rule to process the imported PMI

Import PMI Rules process the product and manufacturing information (PMI) from a part's 3D or 2D data to create Quality Characteristics based on naming conventions. In the Import PMI Rule, you can create multiple conditions based on the attributes of the PMI. You must also define a default naming convention for creating Quality Characteristics. The default naming convention is used when any of the Import PMI Rule conditions are not met. By default, you can use the available attributes of PMIs from BCT Inspector to create conditions in the Import PMI Rule.

By default, an active Import PMI Rule is available after installing Control Plan. This Import PMI Rule has a default naming convention for creating **Variable** Quality Characteristics and no conditions are defined for the rule.

1. On the **HOME** page, click the **QUALITY MASTER DATA** tile.
2. In the **Quality Master Data** location, click the **Characteristics Library** page.
3. In the left pane, click **Characteristics and Rule Engine** in the work area toolbar.

4. In the **Characteristics and Rule Engine** panel, click **Import PMI Rules**.
5. Choose **More Commands** ••• > **New** ✳ > **Add Import PMI Rule**.

6. In the **Name** box, type a name for the rule.

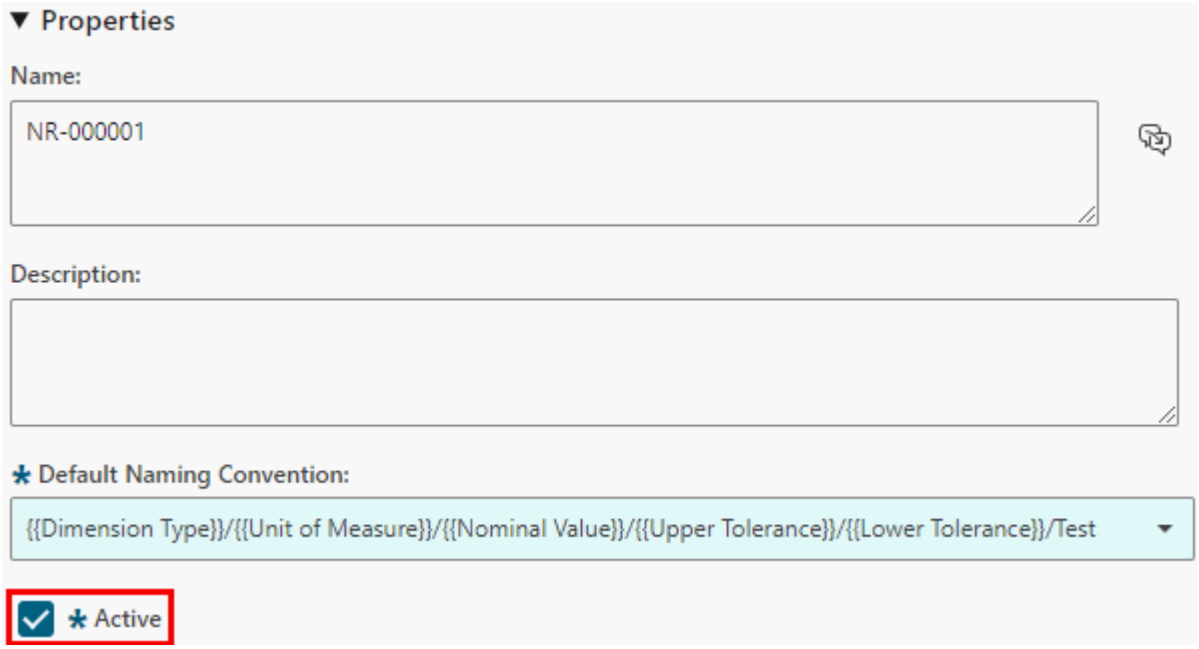
7. In the **Description** box, describe the rule, and click **Add**.

8. Select the required Import PMI Rule, and choose **More Commands** ••• > **Edit** > **Start Edit**.

9. (Optional) In the **Properties** section, update the **Name** and **Description** of the Import PMI Rule.

10. From the **Default Naming Convention** list, select the default naming convention of the Import PMI Rule.

11. To activate an Import PMI Rule, select the **Active** check box.



The active Import PMI Rule moves to the top of the list of Import PMI Rules. A green check mark indicates that the Import PMI Rule is active.

> Note:
>
> - You must specify a **Default Naming Convention** for the Import PMI Rule before activating the Import PMI Rule.
> - You can have only one active rule at a time.

12. Choose **More Commands** ••• > **Edit** > **Save Edits**.

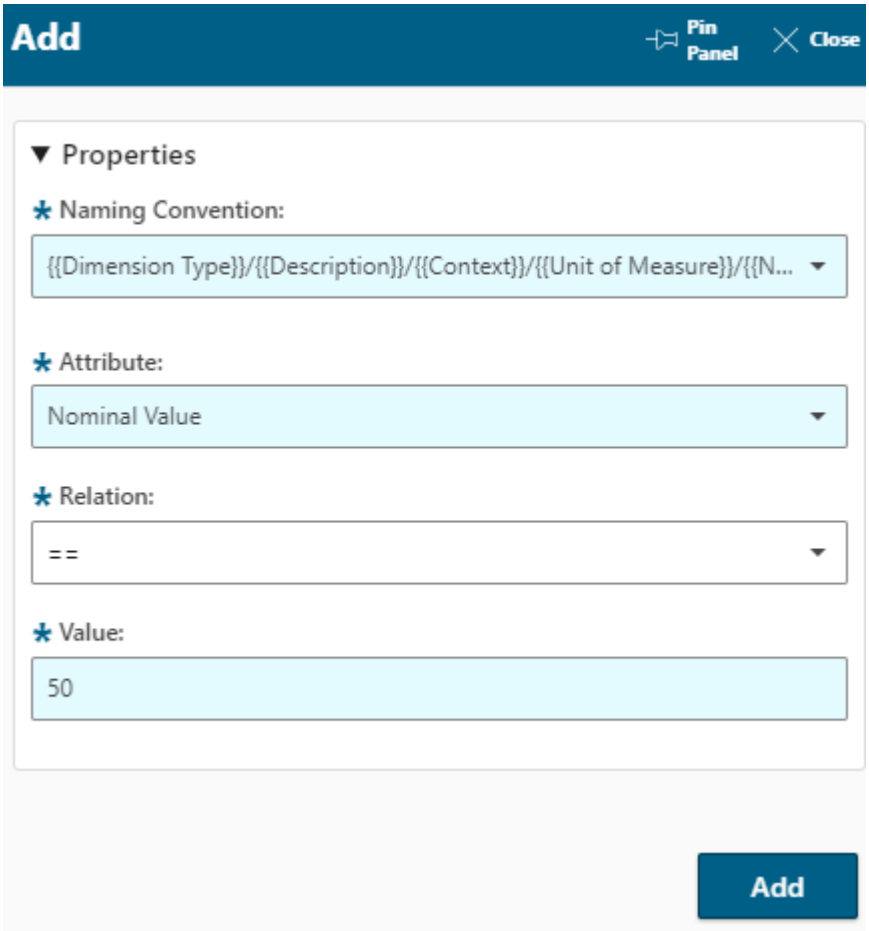
13. In the **Rule Builder** section, define the conditions that evaluate the imported PMI and generate Quality Characteristics for the PMI. Click **Add Expression** and do the following:

a. From the **Naming Convention** list, select the naming convention to be applied to the condition.

b. From the **Attribute** list, select the attribute to be evaluated by the condition.

c. From the **Relation** list, select the operator to be used to evaluate the condition.

d. From the **Value** list, enter the value to be evaluated by the condition.



e. Click **Add**.

f. To add additional attributes to be evaluated by the condition, do the following:

   A. Select the condition and click **Add Expression**.

   B. From the **Operator** list, select one of the following:

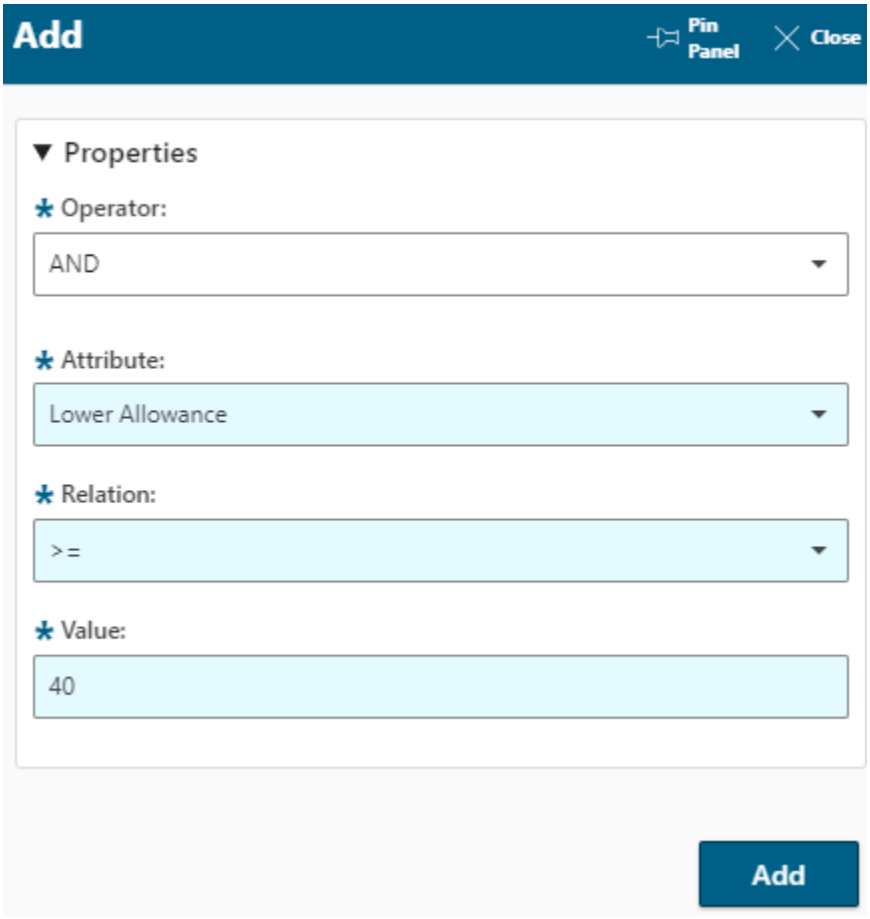
      - **AND**: The imported PMI must match the values specified in both attributes for the condition to be met.

- **OR**: The imported PMI must match the values specified in one of the attributes for the condition to be met.

C. From the **Attribute** list, select the attribute to be evaluated by the condition.

D. From the **Relation** list, select the operator to be used to evaluate the condition.

E. From the **Value** list, enter the value to be evaluated by the condition.

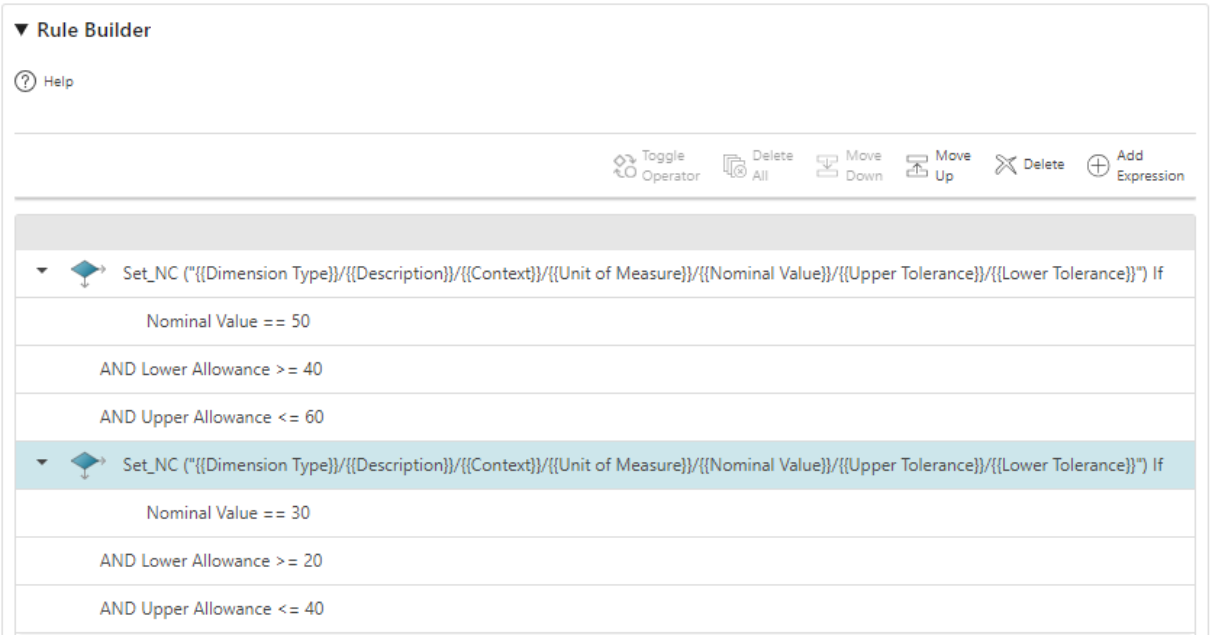


F. Click **Add**.

g. Repeat the above steps until you add all the required conditions.

> Tip:
>
> The conditions are solved sequentially. If you are building a complex condition, break the condition into smaller conditions to avoid errors.

h. To change the **AND** or the **OR** operator for an attribute in a condition, select it and click **Toggle Operator**.



i. To rearrange the attributes in a condition or to rearrange a condition in the list of conditions, select an item and click **Move Up** or **Move Down**.

j. To remove an attribute or a condition, select it and click **Delete**.

14. To delete all conditions in the **Rule Builder** section, click **Delete All**, and click **Delete All** in the confirmation message.

Edit an Import PMI Rule

After creating an Import PMI Rule, you can edit it to change the default naming conventions, and add, rearrange, or remove attributes and conditions in the **RULE BUILDER** section.

1. On the **HOME** page, click the **QUALITY MASTER DATA** tile.

2. In the **Quality Master Data** location, click the **Characteristics Library** page.

3. In the left pane, click **Characteristics and Rule Engine** in the work area toolbar.

4. In the **Characteristics and Rule Engine** panel, click **Import PMI Rules**.

5. Select the required Import PMI Rule, and choose **More Commands** ••• > **Edit** > **Summary**.

6. Make the required updates to the Import PMI Rule, and choose **More Commands** ••• > **Edit** > **Save Edits**.

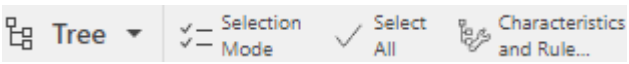
Activate an Import PMI Rule

After creating an Import PMI Rule, you must activate it so it can be used to process the imported PMI. You can have only one active rule at a time. When you activate a new rule, the existing rule is deactivated.

1. On the **HOME** page, click the **QUALITY MASTER DATA** tile.

2. In the **Quality Master Data** location, click the **Characteristics Library** page.

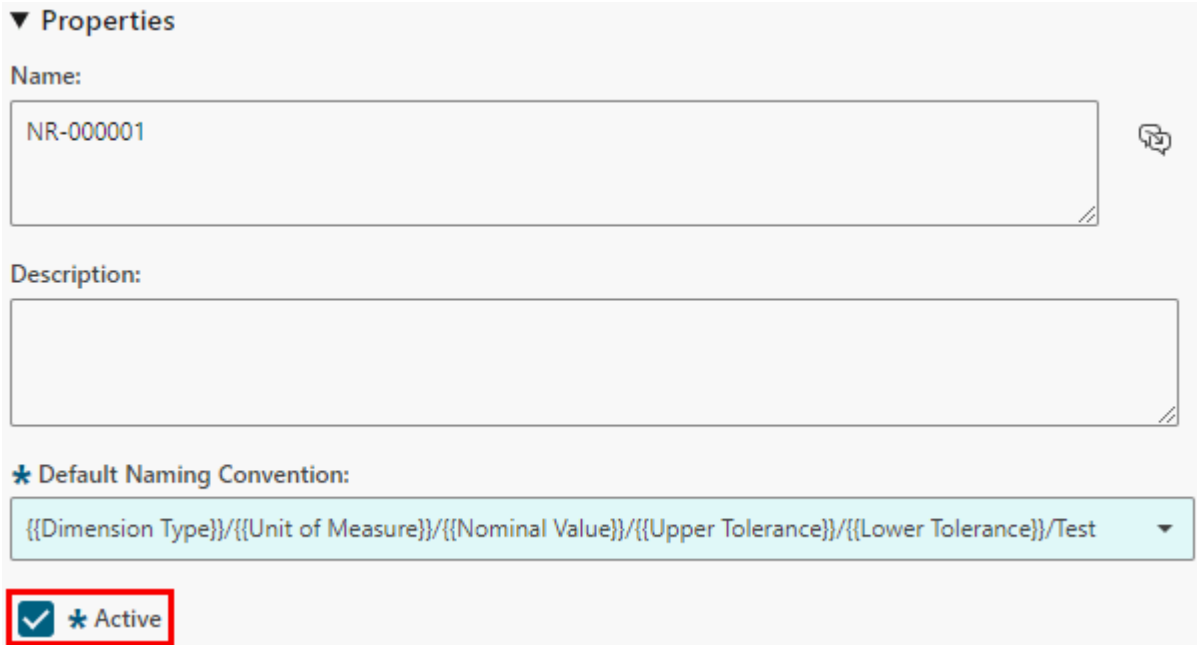
3. In the left pane, click **Characteristics and Rule Engine** in the work area toolbar.



4. In the **Characteristics and Rule Engine** panel, click **Import PMI Rules**.

5. Select the required Import PMI Rule, and choose **More Commands** ••• > **Edit** > **Start Edit**.

6. To activate an Import PMI Rule, select the **Active** check box.



The active Import PMI Rule moves to the top of the list of Import PMI Rules. A green check mark indicates that the Import PMI Rule is active.

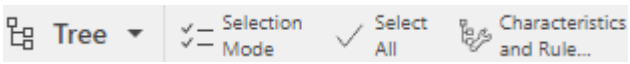
> Note:
>
> - You must specify a **Default Naming Convention** for the Import PMI Rule before activating the Import PMI Rule.
> - You can have only one active rule at a time.
> - To deactivate an Import PMI Rule, clear the **Active** check box.

7. Choose **More Commands** ••• > **Edit** > **Save Edits**.

Delete an Import PMI Rule

You can delete an Import PMI Rule only if it is inactive.

1. On the **HOME** page, click the **QUALITY MASTER DATA** tile.
2. In the **Quality Master Data** location, click the **Characteristics Library** page.
3. In the left pane, click **Characteristics and Rule Engine** in the work area toolbar.



4. In the **Characteristics and Rule Engine** panel, click **Import PMI Rules**.
5. Select the required Import PMI Rule, and choose **More Commands** ••• > **Edit** > **Delete**.

> Note:
>
> You cannot delete an active Import PMI Rule.

6. In the confirmation message, click **Delete**.

5. Creating the Characteristics Library

Overview of the Characteristics Library

The Characteristics Library is a collection of all existing **Characteristic Groups** and their **Quality Characteristics** that you create in the **Quality Master Data** library. You can view, search, and filter the Characteristic Groups to work on the required group. In the group, you can add or modify the required Quality Characteristics.

The Characteristics Library provides the following benefits:

- Common quality standard within a company that can be shared by different products and processes
- Detection of unknown quality dependencies because the Characteristics are shared between different products and processes
- Easy way to structure the data
- Enhancement of the quality data by using versioning. Users can see what has changed and update to the latest version.

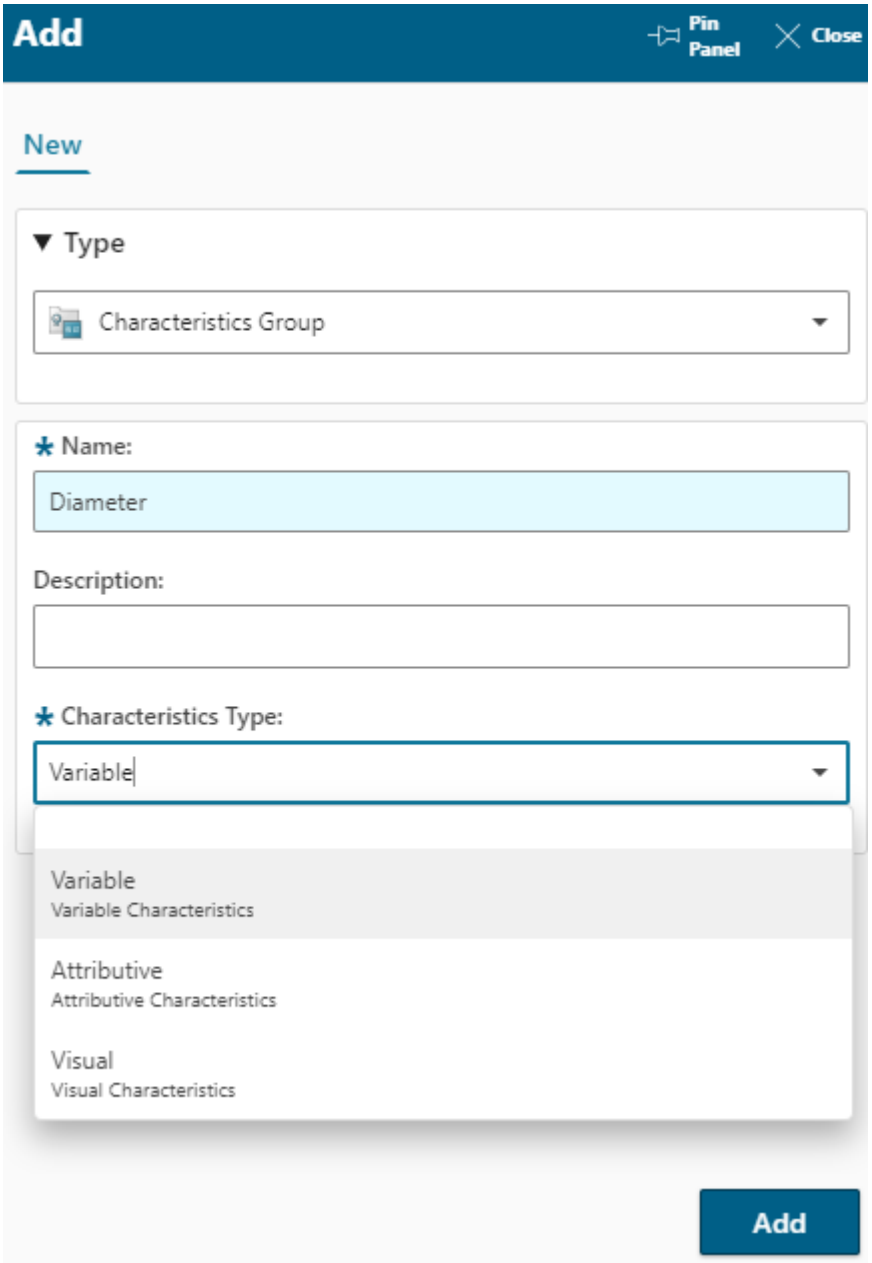
Create a Characteristic Group

In a Characteristic Group, you group multiple characteristics that define the different measurements that must be executed on the shop floor. The quality department uses Characteristic Groups to structure their different quality measurement standards globally.

You can create the following types of Characteristic Groups:

- **Variable**: Used to group **Variable** Quality Characteristics.
- **Attributive**: Used to group **Attributive** Quality Characteristics.
- **Visual**: Used to group **Visual** Quality Characteristics.

1. On the **HOME** page, click the **QUALITY MASTER DATA** tile.
2. In the **Quality Master Data** location, click the **Characteristics Library** page.
3. Choose **More Commands** ••• > **New** ✳ > **Add Characteristics Group** ⊕.
4. In the **Add** panel, from the **Type** list, select the type of group you want to create.
5. Specify a name and description for the group and click **Add**.



Create the Quality Characteristics in a Characteristic Group

Quality Characteristics are the attributes of a Part or Process that must be monitored during manufacturing to deliver a high-quality product.

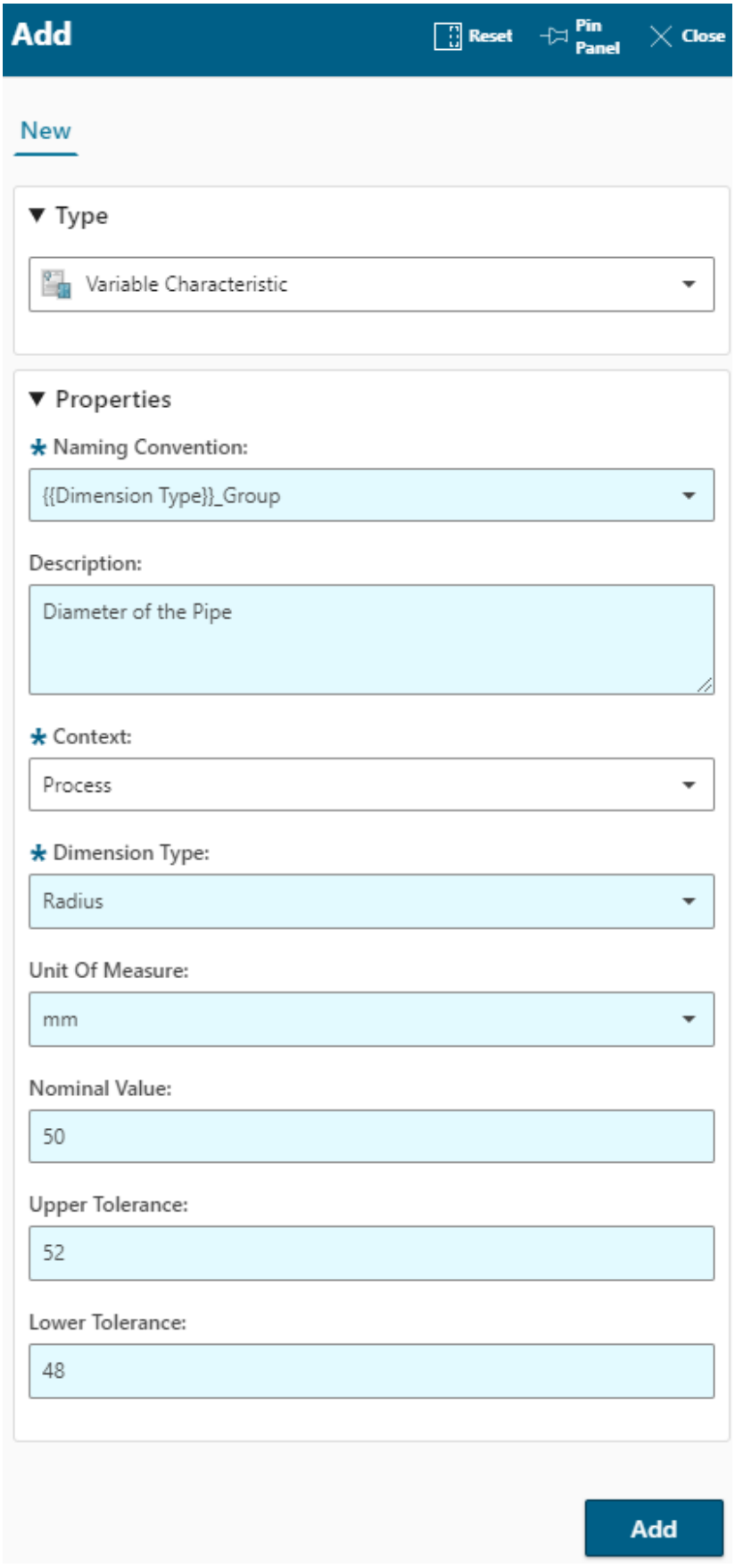
You can create the following types of Quality Characteristics:

- **Variable**: Defines the specific values to be measured, including the nominal values, its tolerance values, and the unit of measure.

- **Attributive**: Defines which attributes are acceptable in the **OK Condition** field and the ones that are unacceptable in the **Not OK Condition** field.
- **Visual**: Specifies the images of the defects that can occur or standard specification images.

1. On the **HOME** page, click the **QUALITY MASTER DATA** tile.
2. In the **Quality Master Data** location, click the **Characteristics Library** page.
3. In the left pane, select the Characteristic Group where you want to add Quality Characteristics.
4. Choose **More Commands** ••• > **New** ✳ > **Add Characteristic** ⊕.
5. To create a **Variable** Quality Characteristic, do the following:
   a. If you have selected a **Variable** Characteristic Group, specify the following information for the Quality Characteristic:

Field	Description
Naming Convention	Select the naming convention of the Quality Characteristic.
Description	Enter a description for the Quality Characteristic.
Context	Select whether the Quality Characteristic is for a product or a process.
Dimension Type	Select the type of dimension being measured by the Quality Characteristic. You can also enter a custom dimension, such as **Density**, by typing the custom dimension, and pressing Enter.
Unit Of Measure	Select the unit of measurement to be used for the Quality Characteristic.
Nominal Value	Enter a nominal value of the Quality Characteristic.
Upper Tolerance	Enter an upper tolerance of the Quality Characteristic.
Lower Tolerance	Enter a lower tolerance of the Quality Characteristic.



b. Click **Add**.

c. After creating the Quality Characteristic, specify its additional properties as follows:

A. Select the Quality Characteristic you have created, and choose **More Commands** ••• > **Edit** > **Start Edit**.

B. Specify its additional properties as follows:

Field	Description
Limitation	**Limitation** defines the boundaries or constraints applicable to a specific attribute or feature of a product or process. Select the type of limitation for the Quality Characteristic: • **Both Sides**: Select this type of limitation to assign a **Tolerance Type** and the corresponding **Upper Tolerance**, **Lower Tolerance**, **Upper Specification Limit**, and **Lower Specification Limit** to the Quality Characteristic.

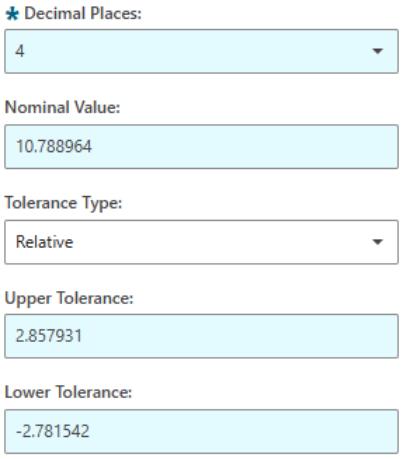
Upper Specification Limit	Maximum acceptable value for a specific quality attribute or measurement of a product or process
Lower Specification Limit	Minimum acceptable value for a specific quality attribute or measurement of a product or process
Upper Tolerance	Maximum allowable deviation from a specified nominal value for a characteristic. It is part of the tolerance range that defines the acceptable limits of variation for a characteristic.
Lower Tolerance	Minimum allowable deviation from a specified nominal value for a characteristic. It is part of the tolerance range that defines the acceptable limits of variation for a characteristic.

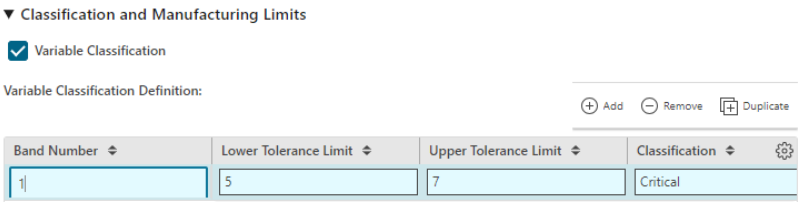
Note:

- When the **Tolerance Type** is **Relative**, **Upper Specification Limit** is calculated as a sum of **Nominal Value** and **Upper Tolerance**, and **Lower Specification Limit** is calculated as a sum of **Nominal Value** and **Lower Tolerance**.

Field	Description
	• When the **Tolerance Type** is **Absolute**, **Upper Tolerance** is calculated as the difference of **Upper Specification Limit** and **Nominal Value**, and **Lower Tolerance** is calculated as the difference of **Lower Specification Limit** and **Nominal Value**. Specify **Absolute** as the **Tolerance Type** to enter values for **Upper Specification Limit** and **Lower Specification Limit**. When you enter these values, the corresponding values are updated in **Upper Tolerance** and **Lower Tolerance**. Specify **Relative** as the **Tolerance Type** to enter values for **Upper Tolerance** and **Lower Tolerance**. When you enter these values, the corresponding values are updated in **Upper Specification Limit** and **Lower Specification Limit**. **Both Sides** is the default value. • **Up**: Select this type of limitation to assign a **Tolerance Type** and the corresponding **Lower Tolerance** and **Lower Specification Limit** to the Quality Characteristic. For example, the tensile strength is a one-side Quality Characteristic that has an upper limit and a lower tolerance. Specify **Absolute** as the **Tolerance Type** to enter a value for **Lower Specification Limit**. The corresponding value is updated in **Lower Tolerance**. Specify **Relative** as the **Tolerance Type** to enter a value for **Lower Tolerance**. The corresponding value is updated in **Lower Specification Limit**. • **Down**: Select this type of limitation to assign a **Tolerance Type** and the corresponding **Upper Tolerance** and **Upper Specification Limit** to the Quality Characteristic. Specify **Absolute** as the **Tolerance Type** to enter a value for **Upper Specification Limit**. The corresponding value is updated in **Upper Tolerance**. Specify **Relative** as the **Tolerance Type** to enter a value for **Upper Tolerance**. The corresponding value is updated in **Upper Specification Limit**

Field	Description
	• **Zero**: Select this type of limitation to assign a **Tolerance Type** and the corresponding **Upper Tolerance** and **Upper Specification Limit** to the Quality Characteristic. Since zero-limited Quality Characteristics have only an **Upper Tolerance** limit, they are limited to one side only. Specify **Absolute** as the **Tolerance Type** to enter a value for **Upper Specification Limit**. The corresponding value is updated in **Upper Tolerance**. Specify **Relative** as the **Tolerance Type** to enter a value for **Upper Tolerance**. The corresponding value is updated in **Upper Specification Limit** • **Single Limit Tolerance**: Select this type of limitation to assign a **Maximum** or **Minimum** tolerance limit to the Quality Characteristic. You can select **Maximum** or **Minimum** from the **Single Limit** list that appears when you select **Single Limit Tolerance** as the type of limitation. You can also enter a value in the **Single Limit** list instead of using the default values of **Maximum** or **Minimum**. **Single Limit Tolerance** refers to a tolerance specification that defines the highest or lowest acceptable value for the Quality Characteristic. A measurement that exceeds this limit is considered out of tolerance and unacceptable.
Decimal Places	Specify the number of decimal places displayed in **Nominal Value**, **Upper Tolerance**, **Lower Tolerance**, **Upper Specification Limit**, **Lower Specification Limit**, **Upper Control Limit**, **Lower Control Limit**, **Upper Warning Limit**, and **Lower Warning Limit** of the Quality Characteristic. The values are calculated based on the maximum number of decimal places used in these fields while creating the Quality Characteristic or while importing PMI. If the value in these fields is greater than the maximum number specified in **Decimal Places**, the value is truncated to the maximum number while creating the Quality Characteristic. Depending on the selected value in **Decimal Places**, trailing zeros are added or trimmed to the values of these fields. **Decimal Places** is used to define what is displayed in the user interface, but it does not change the value in the database.

Field	Description
	Example: You have selected **4** as the number of decimal places in **Decimal Places** while editing the Quality Characteristic.  After you save the Quality Characteristic, the following is displayed in **Nominal Value**, **Upper Tolerance**, **Lower Tolerance**, **Upper Specification Limit**, and **Lower Specification Limit**: 
Classification	Select the classification that you want to assign to the Quality Characteristic. If you define a **Variable Classification** for the Quality Characteristic, this field is hidden.
Variable Classification	Select **Variable Classification** to define a range of continuous values for the classification of the Quality Characteristic. You can define the **Upper Tolerance Limit** and **Lower Tolerance Limit** for a type of classification. To add a range of values, do the following: i. Select **Variable Classification** and save the Quality Characteristic.

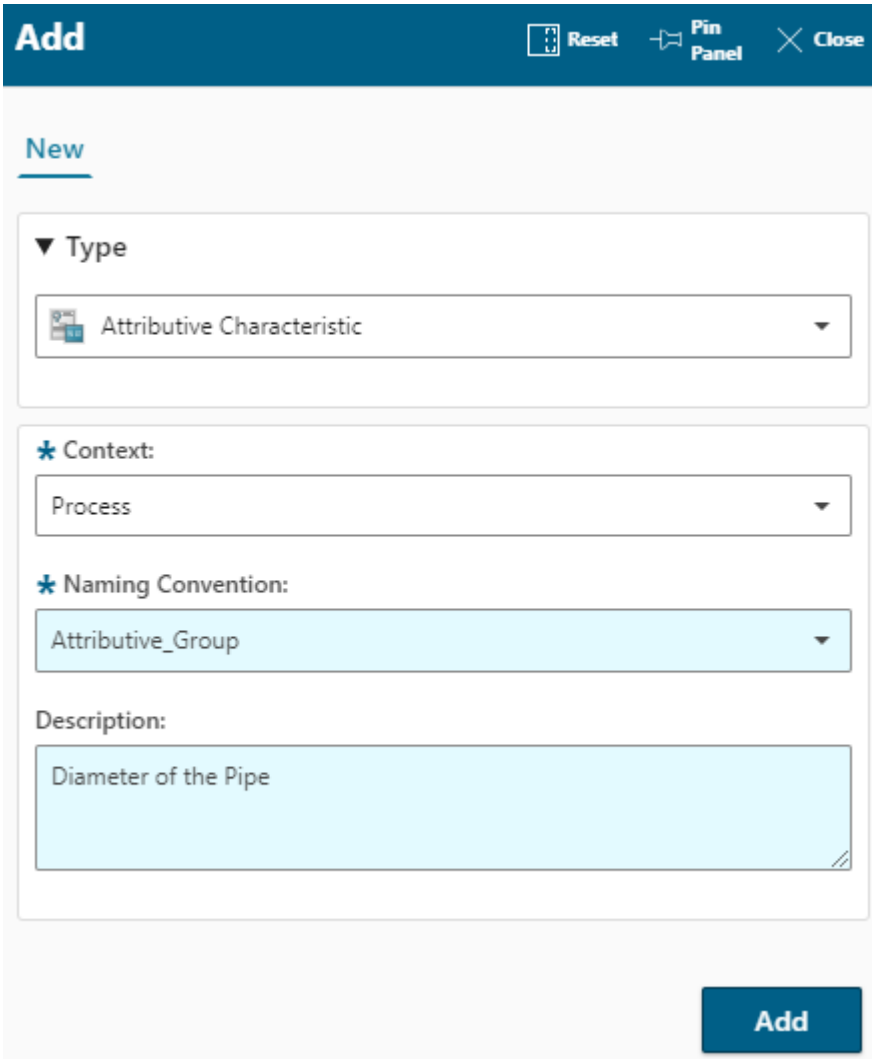
Field	Description
	ii. Click **Edit** to open the Quality Characteristic for updates. iii. In the **Variable Classification Definition** section, click **Add** ⊕. iv. Specify the **Band Number**, **Upper Tolerance Limit**, and **Lower Tolerance Limit**. v. Select the type of classification to assign to the Quality Characteristic from the **Classification** list. vi. Click **Duplicate** to create a new row with the same values of the selected row. You can update the values in the duplicated row as required. vii. Click **Remove** ⊖ to remove the selected row. viii. Repeat the above steps until you add all the required ranges of continuous values for the classification of the Quality Characteristic. ix. Click **Save**. 
Control Limits	Control limits help identify the range of acceptable variation in the product or process. Specify the highest and lowest values that a product or process variable can reach before it is considered out of control in **Upper Control Limit** and **Lower Control Limit** respectively.
Warning Limits	Warning limits provide an early indication of potential issues. They allow for proactive measures to be taken before the process goes out of control. Specify the highest and lowest values that a product or process variable can reach before it indicates potential issues might occur in **Upper Warning Limit** and **Lower Warning Limit** respectively.

C. Choose **More Commands** ••• > **Edit** > **Save Edits**.

6. To create an **Attributive** Quality Characteristic, do the following:

   a. If you have selected an **Attributive** Characteristic Group, specify the following information for the Quality Characteristic:

Field	Description
Context	Select whether the Quality Characteristic is for a product or a process.
Naming Convention	Select the naming convention of the Quality Characteristic.
Description	Enter a description for the Quality Characteristic.



   b. Click **Add**.

c. After creating the Quality Characteristic, specify its **Classification**, **OK Condition**, and **Not OK Condition** as follows:

A. Select the Quality Characteristic you have created, and choose **More Commands** ••• > **Edit** > **Start Edit**.

B. Specify its **Classification**, **OK Condition**, and **Not OK Condition**.

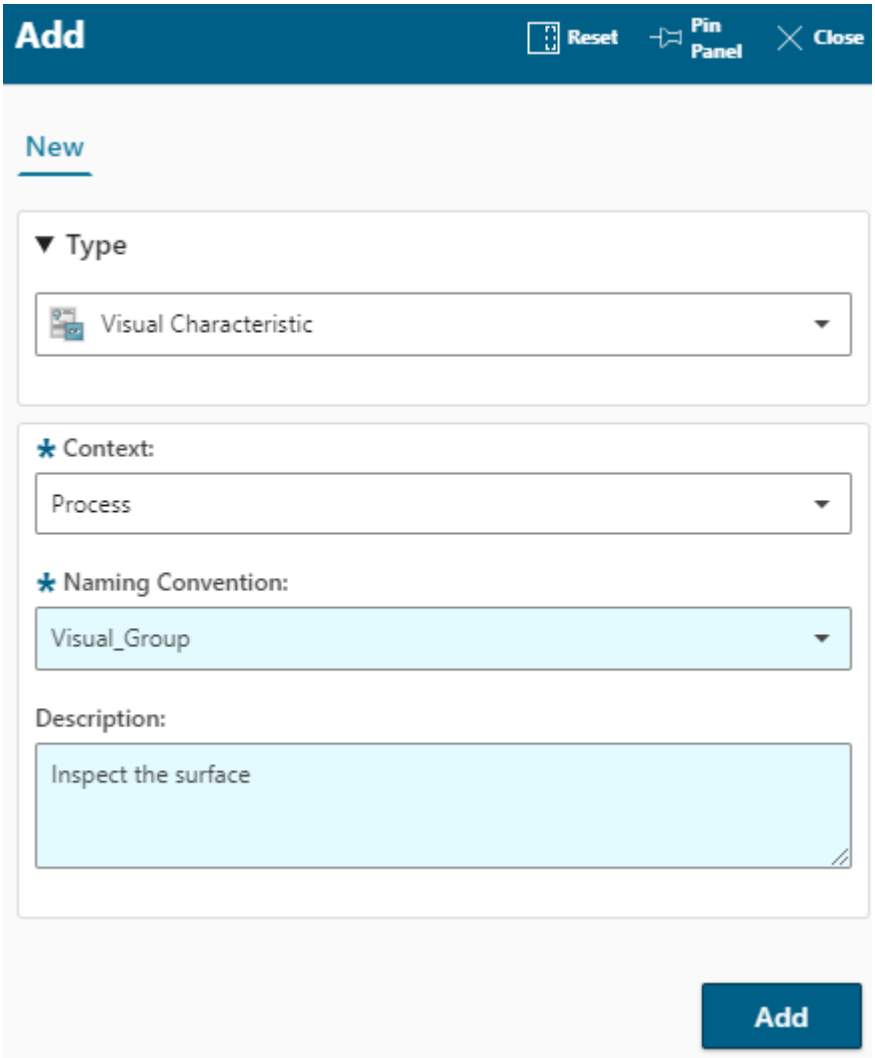
Field	Description
Classification	Select the classification that you want to assign to the Quality Characteristic.
OK Condition	Enter the values that define whether the Quality Characteristic is acceptable.
Not OK Condition	Enter the values that define whether the Quality Characteristic is not acceptable.

C. Choose **More Commands** ••• > **Edit** > **Save Edits**.

7. To create a **Visual** Quality Characteristic, do the following:

a. If you have selected a **Visual** Characteristic Group, specify the following information for the Quality Characteristic:

Field	Description
Context	Select whether the Quality Characteristic is for a product or a process.
Naming Convention	Select the naming convention of the Quality Characteristic.
Description	Enter a description for the Quality Characteristic.



b. Click **Add**.

c. After creating the Quality Characteristic, specify its **Classification**, **Grid Rows**, and **Grid Columns** as follows:

   A. Select the Quality Characteristic you have created, and choose **More Commands** ••• > **Edit** > **Start Edit**.

   B. Specify its **Classification**, **Grid Rows**, and **Grid Columns**.

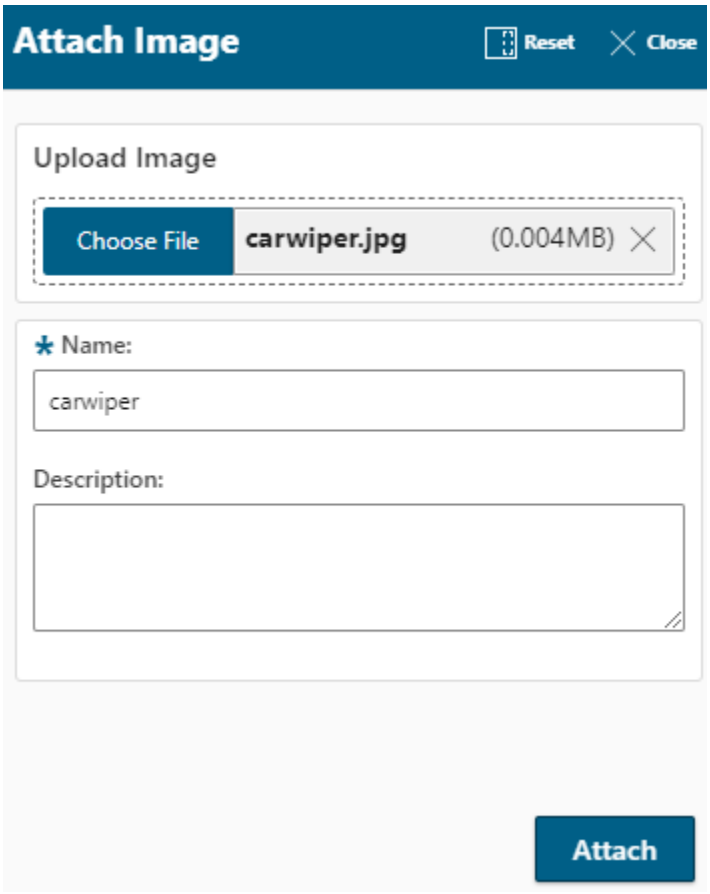
Field	Description
Classification	Select the classification that you want to assign to the Quality Characteristic.
Grid Rows	Enter the number of grid rows for the Quality Characteristic.
Grid Columns	Enter the number of grid columns for the Quality Characteristic.

C. Choose **More Commands** ••• > **Edit** > **Save Edits**.

d. For a **Visual** Quality Characteristic, select the Quality Characteristic in the left pane and attach an image as follows:

A. In the **Image Preview** section, click **Attach Image** ⊕.

B. In the **Attach Image** panel, click **Choose File** to browse to the folder that contains the required image, select the image, and click **Open**.



> Note:
>
> The image must meet the size and resolution limits that the administrator has defined for you.

C. Specify a name and description for the image, and click **Attach**.

8. To add attachments to a Quality Characteristic as **Files**, do the following:

   a. Select the required Quality Characteristic and click **Attachments**.

   b. In the **Files** section, click **Add** ⊕.

   c. In the **Add** panel, select the type of attachment and specify the required information to create the attachment.

      You can also use the **Palette** area or the **Search** area to locate attachments.

   d. Click **Add**.

Create Quality Characteristics from parts with product and manufacturing information

To create Quality Characteristics from parts with product and manufacturing information (PMI), you must submit the part to the **Import PMIs As Characteristics** workflow. This workflow imports the balloons with PMI from this part and creates Quality Characteristics for each balloon. The Quality Characteristics are attached to the part, which allows you to maintain the link between the Quality Characteristics and their source parts. The workflow also ensures that an active Import PMI Rule is available, and it displays an error if there is no active Import PMI Rule.

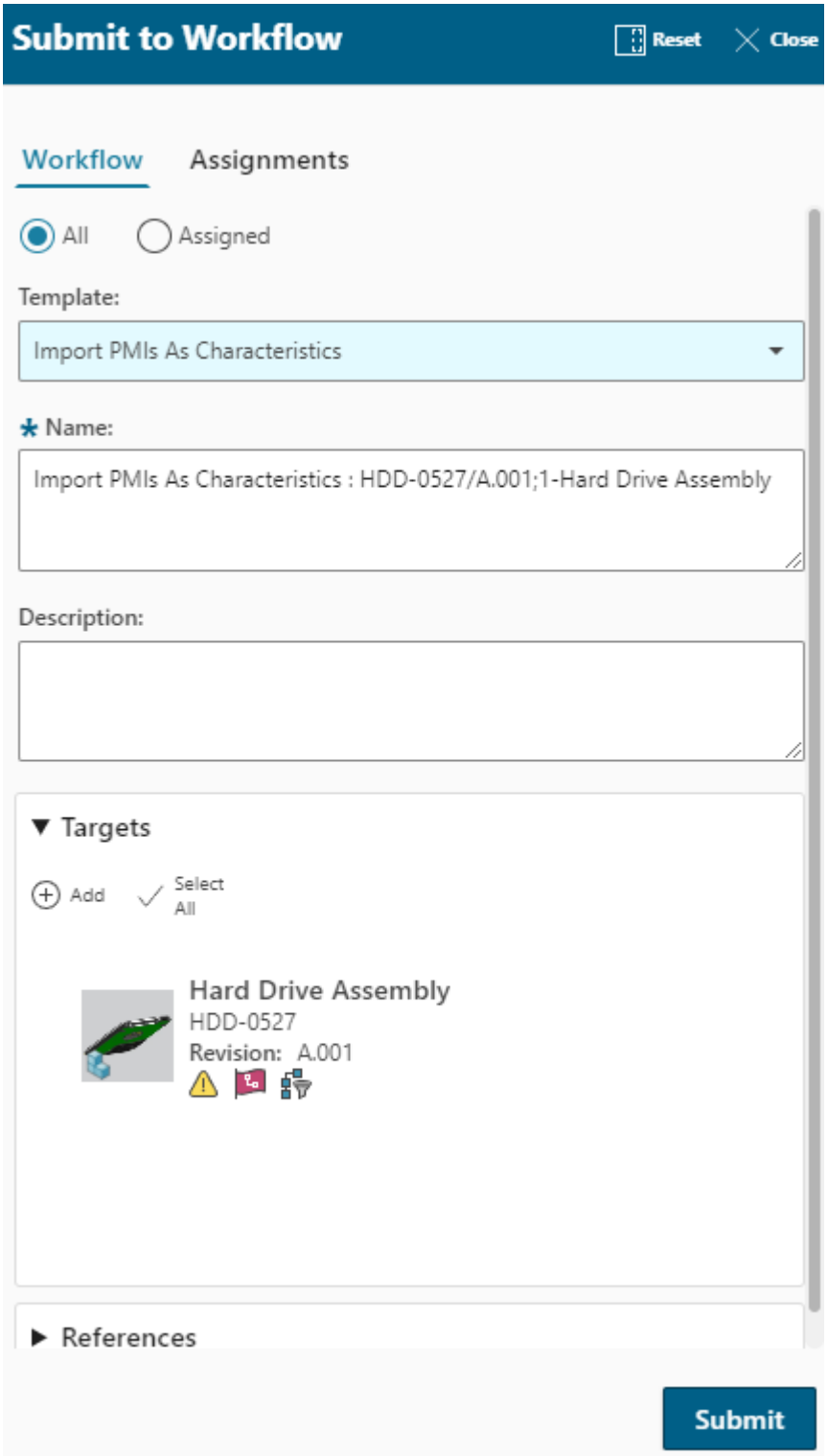
This workflow imports the balloons and creates the Characteristic Groups and their Quality Characteristics in the **Quality Master Data** location. This process is done in the asynchronous mode, and a notification is displayed in the **Alerts** panel when the import is complete. In the **Quality Master Data** location, when you open the Quality Characteristic and select its **Where Used** tab, the source part is displayed in the **Used in Structures** section.

In a Control Plan or its operation, when you **import the same balloons with PMI from the same part**, Control Plan generates Inspection Definitions, and attaches the already imported Quality Characteristics to the generated Inspection Definitions. Due to this, the time taken for the import process is reduced.

> Note:
>
> You can create Quality Characteristics from parts with PMI only if the administrator has enabled this for you.

Procedure

1. Open the part with PMI.
2. Choose **More Commands** ••• > **Manage** > **Submit to Workflow**.
3. In the **Submit to Workflow** panel:
    a. From the **Template** list, select the **Import PMIs As Characteristics** workflow.
    b. Accept the default workflow **Name** or type your own.
    c. Enter a **Description** for the new workflow.



d. Click **Submit**.

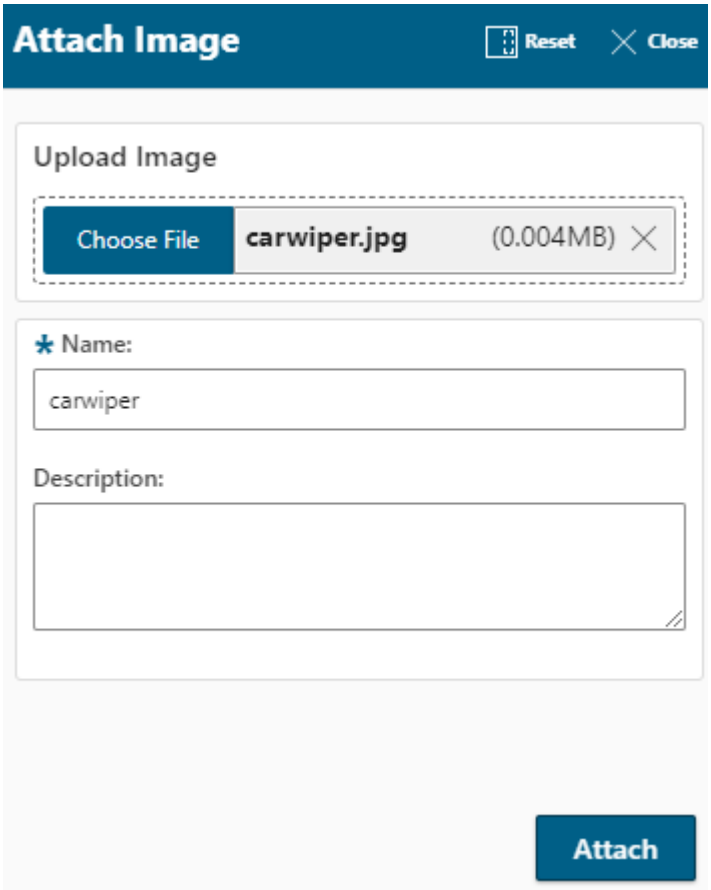
This workflow imports the balloons with PMI from this part, and creates Quality Characteristics for each balloon.

If the part is revised, and some of the balloons are added or modified, then you must run the workflow again. When the modified balloons are imported, the existing Quality Characteristics are revised and updated with new values, and then released. For new balloons, new Quality Characteristics are created and released.

Update the image in a Visual Quality Characteristic

You might need to replace the existing image of a Visual Quality Characteristic with a new or an updated image.

1. On the **HOME** page, click the **QUALITY MASTER DATA** tile.
2. In the **Quality Master Data** location, click the **Characteristics Library** page.
3. In the left pane, select and open the required Characteristic Group.
4. In the **Characteristics** pane, select and open the required Quality Characteristic.
5. In the **Image Preview** section, click **Attach Image** ⊕.
6. Click **Choose File** to browse to the location of the required file.



7. Specify a name and description for the image.

8. Click **Attach**.

Create a new Quality Characteristic from an existing one

Consider a scenario where you want to add a copy of an existing Quality Characteristic to another Characteristic Group of the same type. In such a case, you can create a new Quality Characteristic from the existing one.

> Note:
>
> You can also drag an existing Quality Characteristic to another Characteristic Group of the same type.

1. On the **HOME** page, click the **QUALITY MASTER DATA** tile.

2. In the **Quality Master Data** location, click the **Characteristics Library** page.

3. In the left pane, select and open the required Characteristic Group whose Quality Characteristic you want to add to another group.

4. In the **Characteristics** pane, select the required Quality Characteristic.

5. Choose **More Commands** ••• > **New** ✳ > **Save As Characteristic**.

6. From the **Group** list, select the group where you want to save the Quality Characteristic, and specify the other required Quality Characteristic information.

7. If you have selected a **Variable** Quality Characteristic, specify the following information:

Field	Description
Context	Select whether the Quality Characteristic is for a product or a process.
Description	Enter a description for the Quality Characteristic.
Dimension Type	Select the type of dimension being measured by the Quality Characteristic. You can also enter a custom dimension, such as **Density**.
Nominal Value	Enter a nominal value of the Quality Characteristic.
Upper Tolerance	Enter an upper tolerance of the Quality Characteristic.
Lower Tolerance	Enter a lower tolerance of the Quality Characteristic.

8. If you have selected an **Attributive** Quality Characteristic, specify the following information:

Field	Description
Description	Enter a description for the Quality Characteristic.
Context	Select whether the Quality Characteristic is for a product or a process.

9. If you have selected a **Visual** Quality Characteristic, specify the following information:

Field	Description
Description	Enter a description for the Quality Characteristic.
Context	Select whether the Quality Characteristic is for a product or a process.

10. Click **Save**.

Add a Reaction Plan to a Quality Characteristic

A *Reaction Plan* is the list of actions required to be done for a potential defect to prevent nonconformance in the process or product.

The actions should include the following:

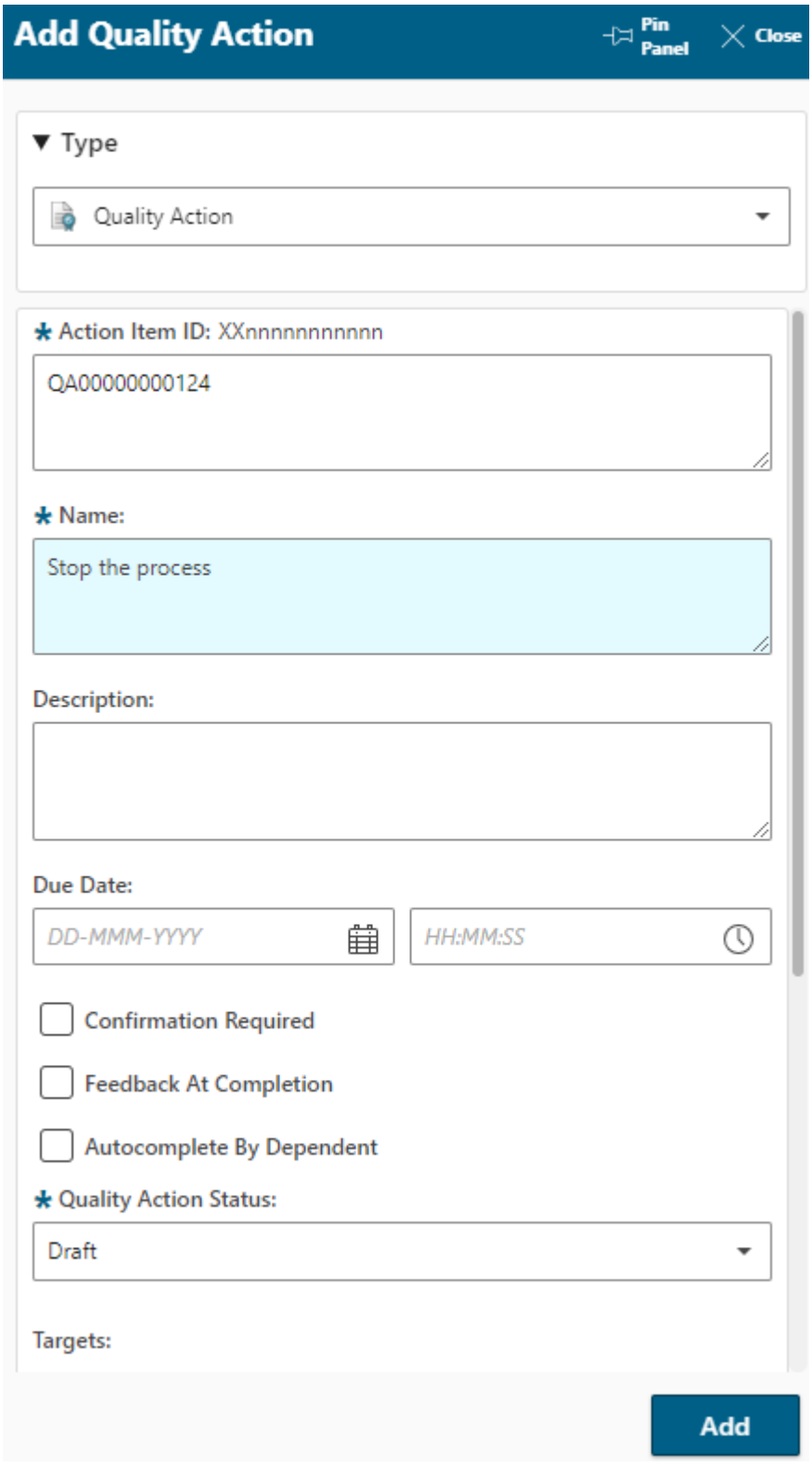
- How to label and quarantine suspect material, parts, or assemblies
- How to properly dispose suspect material, parts, or assemblies
- How to document and notify the non-conformance

> Note:
>
> When a Quality Characteristic is added to an Inspection Definition, the added Reaction Plans are displayed in the **Characteristic** tab of the Inspection Definition.

1. On the **HOME** page, click the **QUALITY MASTER DATA** tile.
2. In the **Quality Master Data** location, click the **Characteristics Library** page.
3. In the left pane, select and open the required Characteristic Group that contains the Quality Characteristic where you want to add a Reaction Plan.
4. In the **Characteristics** pane, select the required Quality Characteristic.

5. In the **Reaction Plans** section, click **Add** ⊕.

6. Specify a name and description for the Reaction Plan.



7. Enter the remaining properties, and then click **Add**.

8. To remove a Reaction Plan, select it and click **Remove** ⊖.

Add potential defects from the Failure Catalog to a Quality Characteristic

If the measurements defined in the Quality Characteristics are not met, certain potential defects might occur. You must add these potential defects to the Quality Characteristic.

> Note:
>
> When a Quality Characteristic is added to an Inspection Definition, the added potential defects are displayed in the **Characteristic** tab of the Inspection Definition.

1. On the **HOME** page, click the **QUALITY MASTER DATA** tile.

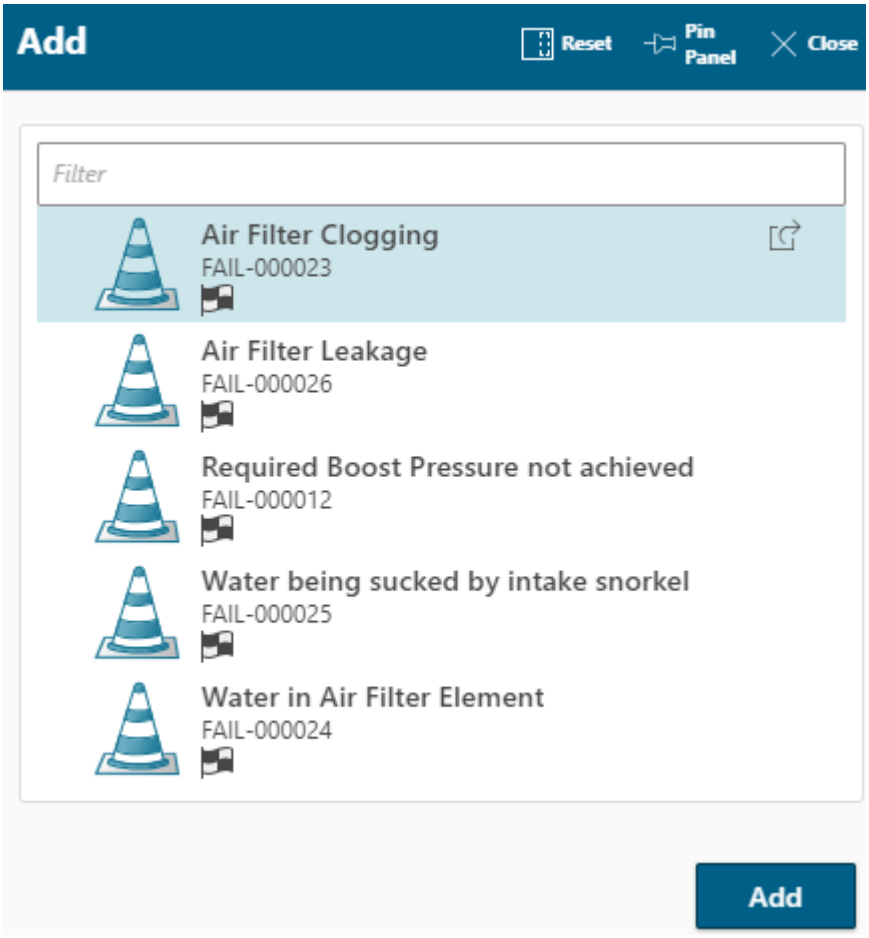
2. In the **Quality Master Data** location, click the **Characteristics Library** page.

3. In the left pane, select and open the required Characteristic Group that contains the Quality Characteristic where you want to add a potential defect.

4. In the **Characteristics** pane, select the required Quality Characteristic.

5. In the **Potential Defects** section, click **Add** ⊕.

6. In the **Add** panel, select the required defects and click **Add**.



You can select multiple defects simultaneously and add them to the Quality Characteristic.

If you select a defect that is already added in the **Potential Defects** section, an error message is displayed. Select only new defects to add to the Quality Characteristic.

7. To remove a potential defect, select it and click **Remove** ⊖.

Update the potential defect to the latest version from the Failure Catalog

1. On the **HOME** page, click the **QUALITY MASTER DATA** tile.

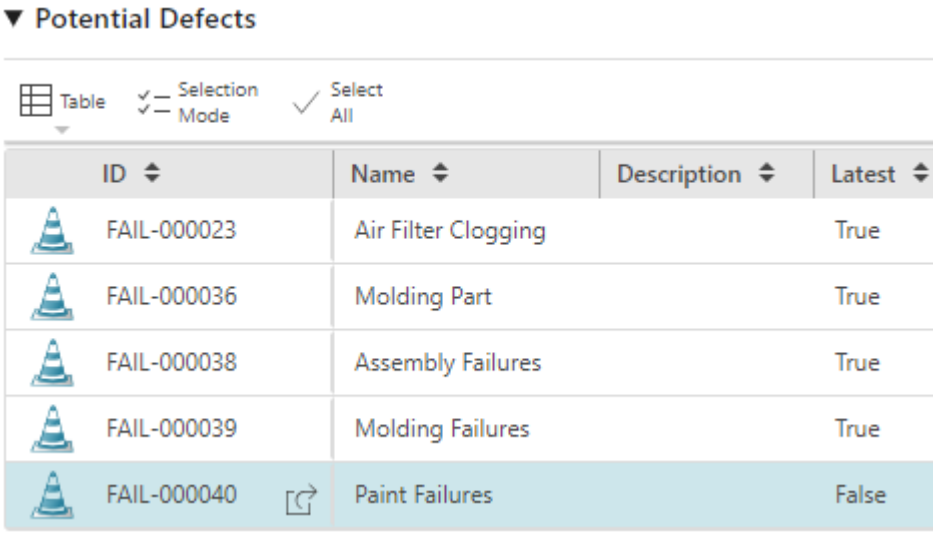
2. In the **Quality Master Data** location, click the **Characteristics Library** page.

3. In the left pane, select and open the required Characteristic Group that contains the Quality Characteristic where you want to verify the version of the potential defect.

4. In the **Characteristics** pane, select the required Quality Characteristic.

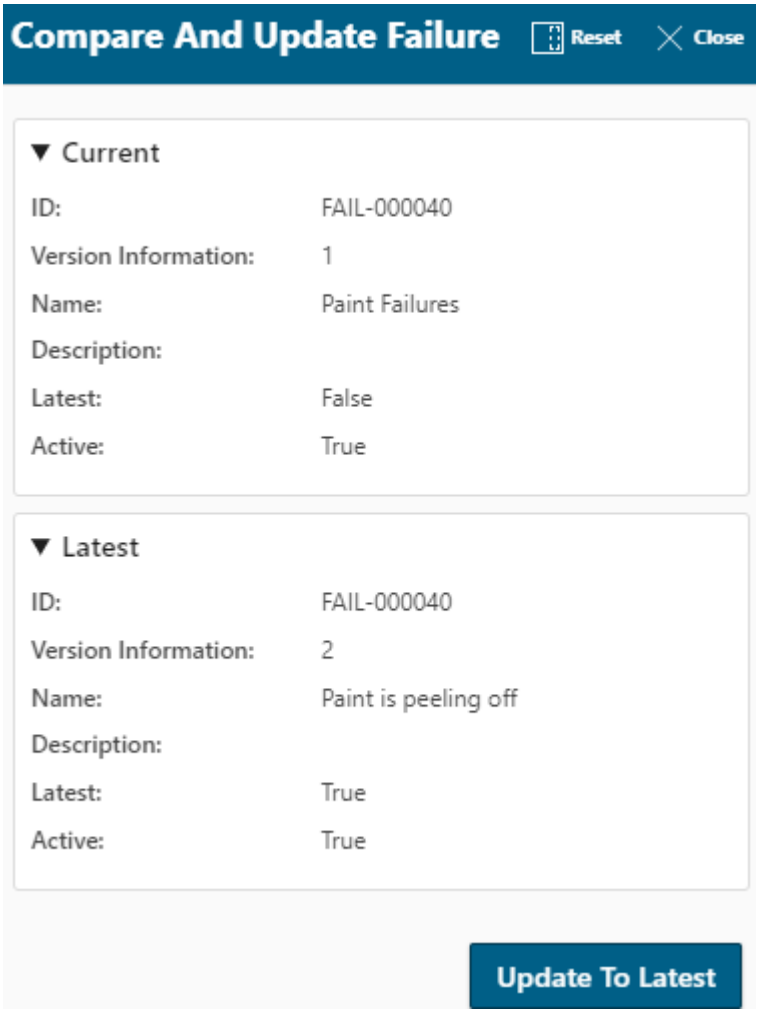
5. In the **Potential Defects** section, verify the value of the **Latest** column for the potential defects.

   This column displays **False** for those defects that are updated in the **Failure Catalog**, and their updated values are not being used in the current Quality Characteristic.



6. In the **Potential Defects** section, select the defect that has **False** in the **Latest** column, and click **Compare And Update Failure** to review the current values and the latest values from the **Failure Catalog**.

7. In the **Compare And Update Failure** panel, click **Update To Latest** to use the latest values from the **Failure Catalog**.



Compare the Quality Characteristics

1. On the **HOME** page, click the **QUALITY MASTER DATA** tile.

2. In the **Quality Master Data** location, click the **Characteristics Library** page.

3. In the left pane, select and open the required Characteristic Group that contains the Quality Characteristics you want to compare.

4. In the **Characteristics** pane, select the required Quality Characteristics to be compared.

4 Selected

	20/25	Distance_164.3_0.0_0.0	Perpendicularity_0.0_0.2_0.0	Parallelism_0.0_0.2_0.0
Classification	Minor	Minor	Minor	Minor
Context	Process	Product	Product	Product
Characteristics Gro...	Distance_Group	Distance_Group	Perpendicularity_Group	Perpendicularity_Group
Version Information	1	1	2	1
Latest	True	True	True	True
Active	True	True	True	True

In the right pane, the properties of the selected Quality Characteristics are displayed for comparison.

Release a Quality Characteristic

After you create and complete all necessary edits to a Quality Characteristic, you must release it to make it available for use in an Inspection Definition.

After releasing the Quality Characteristic, you can create a new version of it.

1. On the **HOME** page, click the **QUALITY MASTER DATA** tile.
2. In the **Quality Master Data** location, click the **Characteristics Library** page.
3. In the left pane, select and open the required Characteristic Group.
4. In the **Characteristics** pane, select the required Quality Characteristic.
5. Choose **More Commands** ••• > **Manage** > **Submit to Workflow**.
6. In the **Submit to Workflow** panel:
   a. From the **Template** list, select the **TCM Release Process** workflow.
   b. Accept the default workflow **Name** or type your own.
   c. Enter a **Description** for the new workflow.

d. Click **Submit**.

The **Release Status** of the Quality Characteristic is updated to **TCM Released**.

Review the usage of Quality Characteristics

After you release a Quality Characteristic, you can review where it is used in the **Where Used** tab. You can view the hierarchy of the parent Inspection Definitions, operations, and Control Plans that use the Quality Characteristic. You can also view the parent FMEAs and FMEA functions where the Inspection Definitions are added with the Quality Characteristic.

Procedure

1. On the **HOME** page, click the **QUALITY MASTER DATA** tile.

2. In the **Quality Master Data** location, click the **Characteristics Library** page.

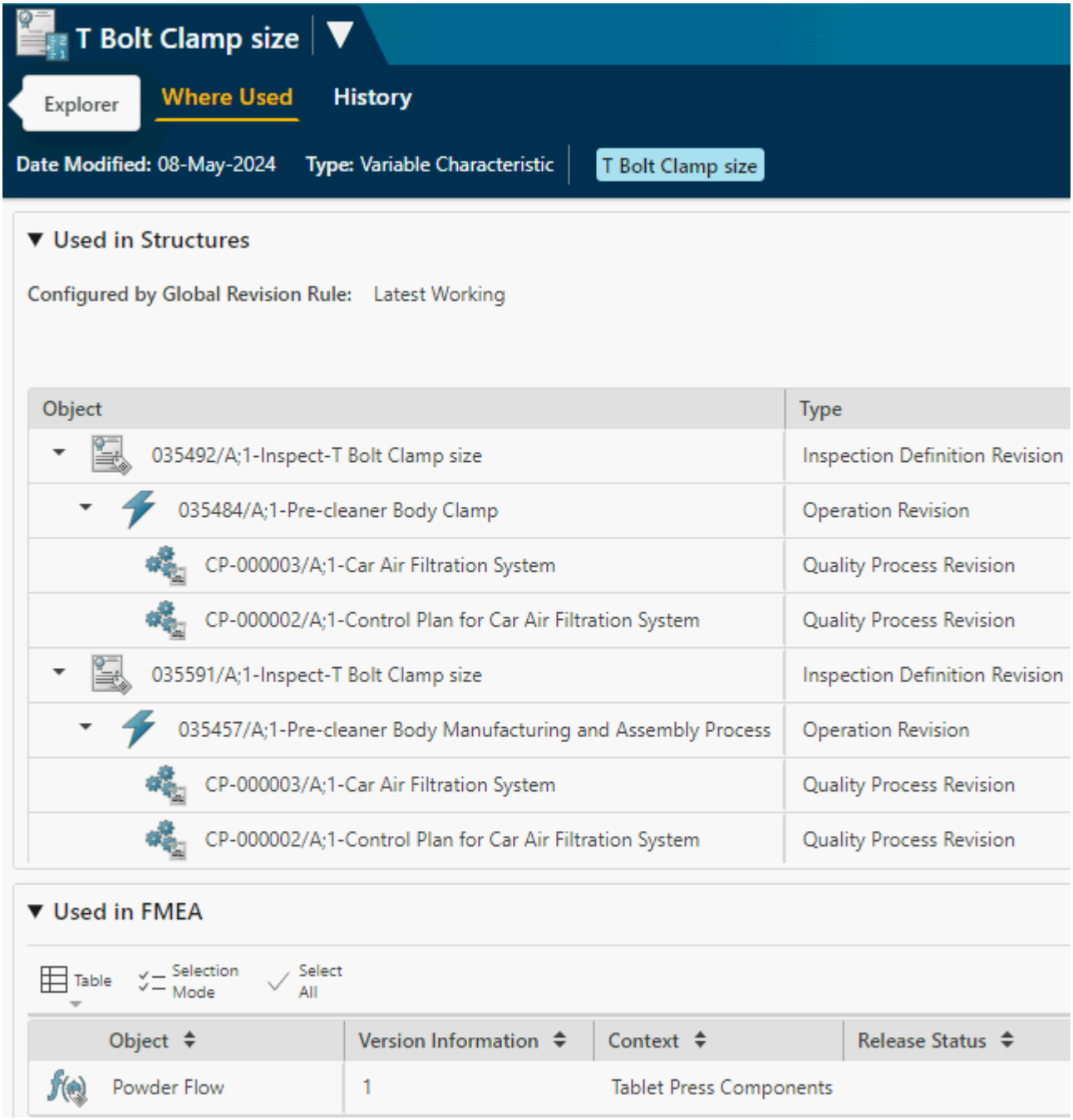
3. In the left pane, select and open the required Characteristic Group that contains the Quality Characteristic to be reviewed.

4. In the **Characteristics** pane, select and open the required Quality Characteristic, and click the **Where Used** tab.

   The **Used in Structures** section displays the parent Inspection Definitions of the current Quality Characteristic. The **Used in FMEA** section displays the parent FMEAs and FMEA functions where the Inspection Definitions are added with the current Quality Characteristic.

   > Note:
   >
   > If you create a new version of the Quality Characteristic, then no Inspection Definitions are using the new version. In the Inspection Definition, when you update to the latest version of the Quality Characteristic, the Inspection Definition reappears in the **Where Used** tab.

5. Expand the parent Inspection Definition view the hierarchy of the parent Inspection Definitions, operations, and Control Plans of the current Quality Characteristic.



6. By default, the **Used in Structures** section displays the revision rule you have selected for your profile. Choose **Off** to switch to view all revisions in this section. Choose **On** to switch back to viewing a single revision.

Create a new version of a Quality Characteristic

When you want to reuse some of the existing values in a new Quality Characteristic, you can create a new version.

Note:

You can create a new version only after you release the existing Quality Characteristic.

1. On the **HOME** page, click the **QUALITY MASTER DATA** tile.
2. In the **Quality Master Data** location, click the **Characteristics Library** page.
3. In the left pane, select and open the Characteristic Group where you want to create a version of the required Quality Characteristic.
4. In the **Characteristics** pane, select the required Quality Characteristic.
5. Choose **More Commands** ••• > **New** > **Version**.

   A new version of the Quality Characteristic is created. You can edit the Quality Characteristic with the new values as required.

View a history of the Quality Characteristic versions

1. On the **HOME** page, click the **QUALITY MASTER DATA** tile.
2. In the **Quality Master Data** location, click the **Characteristics Library** page.
3. In the left pane, select and open the required Characteristic Group that contains the Quality Characteristic where you want to view the history of the version updates.
4. In the **Characteristics** pane, select the required Quality Characteristic.
5. In the right pane, click the **History** tab.

   In this tab, you can view the various Quality Characteristic versions that have been created.

6. Managing the Control Plan

Create a Control Plan

You typically create a Control Plan during the planning and development stages of the production process before full-scale production begins. The Control Plan systematically outlines the necessary steps, inspections, and measures required to ensure product quality and compliance throughout the production process. A well-defined Control Plan helps in identifying potential issues early, standardizing processes, reducing variability, and ensuring that all quality requirements are consistently met.

You can create the following types of Control Plans:

- A **First Article Inspection (FAI)** Control Plan is used in manufacturing and engineering to ensure that a new or revised product meets the specified requirements before full-scale production begins. It is a detailed verification process for the first unit produced under specified conditions, often including a new production run or a change in design, materials, or manufacturing methods. The purpose of the FAI is to validate that product specifications and tolerances are being met and that the manufacturing process is capable of consistently producing parts that adhere to these requirements.

- A **Prelaunch** Control Plan is used in the manufacturing industry during the phase between the completion of the prototype stage and the start of full-scale production. This plan is critical for ensuring that the manufacturing process is capable of producing the new product at the required volumes. This must be done while maintaining quality standards before the product is officially launched in the market.

- A **Production** Control Plan is used to record detailed information about the manufacturing process, and outlines the methods used to control and maintain product quality.

- A **Prototype** Control Plan is used to evaluate and mitigate risks associated with the design and manufacturing of a new product. It is implemented during the prototyping phase, where initial versions of a product, known as prototypes, are created to test various aspects of design, functionality, ability to manufacture, and performance. It outlines the methods and measures that will be used to ensure the prototype meets the intended design specifications and requirements, before proceeding to full-scale production.

- A **Safe Launch** Control Plan is used to ensure that the product meets all quality standards and specifications before full-scale production begins. This plan involves heightened monitoring, increased inspection, and additional controls to identify and address any potential issues early in the production process. It helps to minimize the risk of costly recalls, rework, and customer dissatisfaction by addressing issues during the initial production phase.

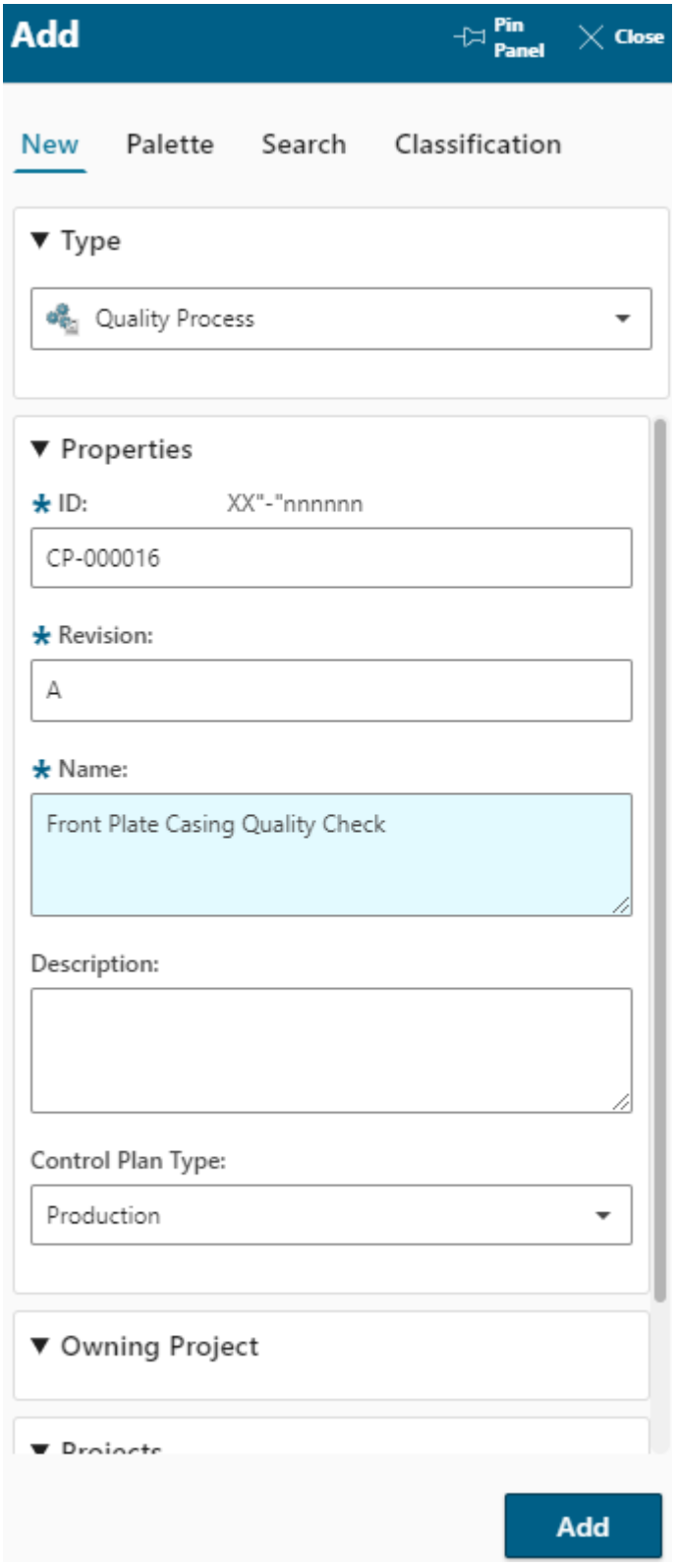
1. On the **HOME** page, click the **EXPLORER** tile, and navigate to the folder where you want to create the Control Plan.

2. Choose **More Commands** ••• > **New** ✳ > **Add**.

3. In the **Add** panel, from the **Type** list, select **Quality Process**.

4. In the **Name** box, type the name of the Control Plan.

5. In the **Description** box, describe the Control Plan.



6. From the **Control Plan Type** list, select the type of the Control Plan you want to create.

7. Click **Add**.

   After creating the Control Plan, you must **add the operations** to be performed in the Control Plan.

   > Note:
   >
   > You can view the objects that reference the Control Plan in the **Where Used** tab. For example, if a checklist references the Control Plan, the checklist is displayed in this tab.

8. To add attachments to a Control Plan as **Files**, **Documents**, **Described by Document**, and **Drawing Source For**, do the following:

   a. Select the Control Plan, and click the **Attachments** tab.

   b. In the required section, click **Add** ⊕.

   c. In the **Add** panel, select the type of attachment and specify the required information to create the attachment.

      You can also use the **Palette** area or the **Search** area to locate attachments.

   d. Click **Add**.

9. To add **Remote Links** to the Control Plan, do the following:

   a. In the **Remote Links** section, click **Create Remote Link** ⊕.

      You can create a remote link to view the external element within Teamcenter. For example, you can create a link from a Control Plan in Teamcenter to a software defect in the external application. Once this is done, you can view the software defect from Teamcenter.

      > Caution:
      >
      > The administrator must install Linked Data Framework in the Teamcenter environment for you to be able to create a remote link.

   b. From the **Project** list, select the required project.

   c. Click the **Existing** option to link to an existing external application, or click **New** to link to a new external application.

   d. To select a resource in the external application, click **Add** ⊕ next to the **Remote Reference** label.

      Log on to the external application if prompted, and select an existing resource in that application. This action takes you back to the **Add** panel.

e. From the **Relation** list, select the relation you want to create between Teamcenter and the external element.

> Note:
>
> If only one relation is applicable, this relation is used automatically. Manual selection is not required.

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

10. To add the reference parts of the Control Plan, do the following:

a. Click the **Reference Part** tab.

b. Click **Add To** ⊕, select **Item**, and enter the other properties as required.

You can also use the **Palette** tab or the **Search** tab to locate the required reference parts.

Create a duplicate of an existing Control Plan

You can create a duplicate of an existing Control Plan to maintain consistency, reduce the risk of errors or omissions in the new plan, incorporate best practices and lessons learned from previous Control Plans. Duplicating an existing Control Plan saves time and effort compared to creating a new one from scratch, especially when dealing with similar projects or products.

Prerequisites

You must have an existing Control Plan before you can duplicate it.

Procedure

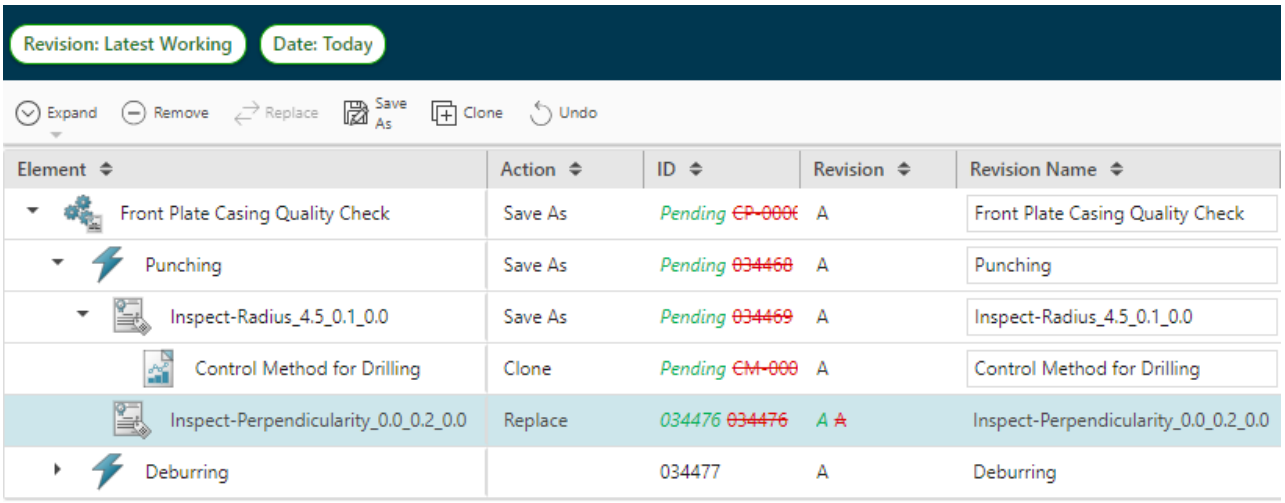
1. Navigate to the folder containing the source Control Plan, and open the Control Plan.

2. Click **Duplicate** ⧉. If you are in the **Tree** view, click **More** ••• to get the **Duplicate** option.

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

Action	Description
Remove	The child object is not included in the new Control Plan.
Replace	The child object is replaced with the replacement child object that you specified in the **Replace** panel.
Save As	A copy of the child object is added to the new Control Plan.

Action	Description
	You can edit the **Revision Name** and **Description** of the child object.
Clone	A copy of the child object is added to the new Control Plan. You can edit the **Revision Name** and **Description** of each child object.



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

5. To create the duplicate Control Plan, click **Duplicate**.

Add operations to a Control Plan

An operation groups the multiple Inspection Definitions that define the different measurements that must be executed on the shop floor. For each set of Inspection Definitions, you must create an operation, which is being controlled by inspection.

You can add the following types of Manufacturing and Dimensional Planning and Validation (DPV) operations:

- **Operation**
- **DPV Inspection**
- **DPV Visual Inspection**
- **DPV Handheld Inspection**

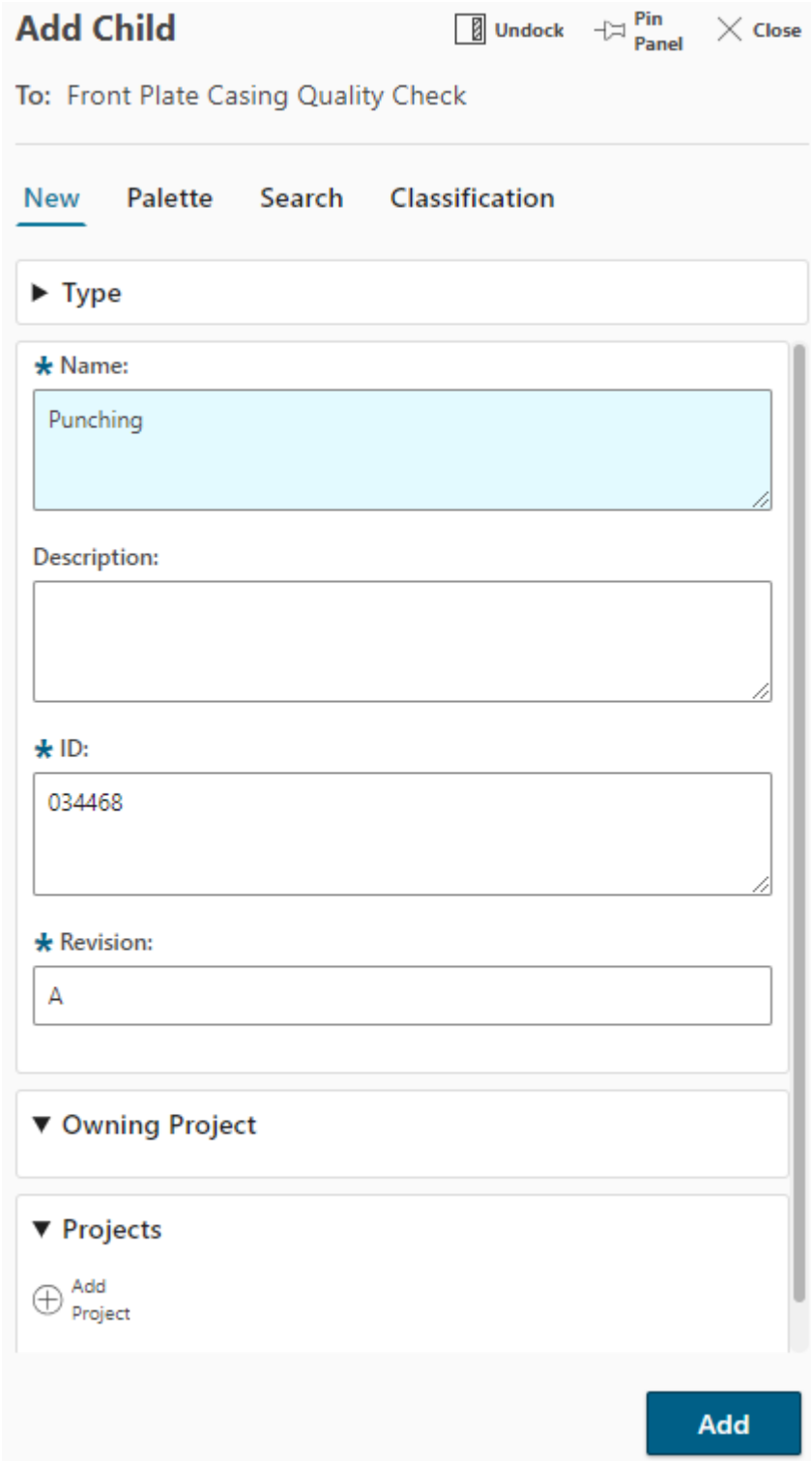
- **DPV Coordinate Measuring Machine Inspection**

1. In the folder where you created the Control Plan, select and open the Control Plan that you want to edit.

2. From the work area toolbar, click **Add** > **Child**.

3. In the **Add** panel, from the **Type** list, select the type of operation to be added.

4. In the **Name** box, type the name of the operation.



5. In the **Description** box, describe the operation, and enter the other properties as required.

6. Click **Add**.

7. Repeat the above steps until you complete adding the required operations.

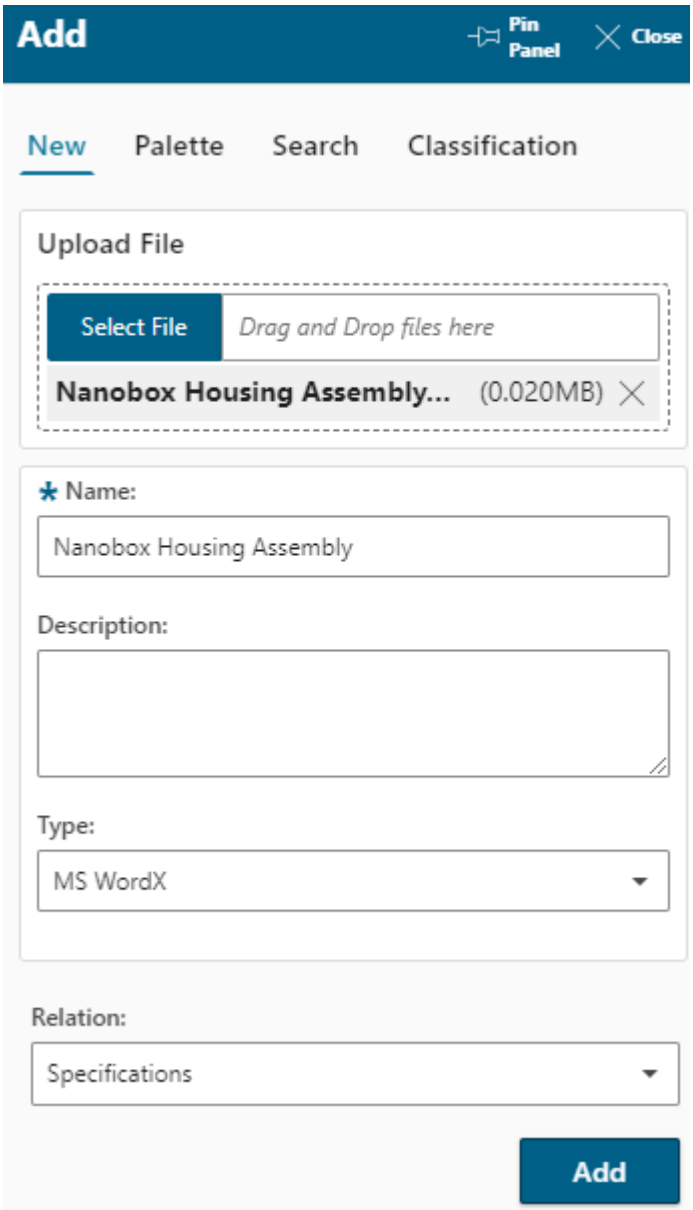
   After creating the operation, you must **add the Inspection Definitions**.

8. To add attachments to an operation as files, do the following:

   a. Select the required operation, and click the **Attachments** tab.

   b. In the **Files** section, click **Add to** ⊕.

   c. In the **Add** panel, click **Select File** to browse to and select the required file, and click **Add**.



9. To add attachments to an operation as **Documents**, **Targets**, and **Work Areas**, do the following:

   a. Select the required operation and click **Attachments**.

   b. In the required **Documents**, **Targets**, or **Work Areas** sections, click **Add to** ⊕.

      Work areas describe the locations existing in a plant where operations are performed.

      A *target*, or product target, is a specific, measurable outcome that is allocated to the product and can be decomposed onto subsystems. A target identifies a requirement of a program or product that establishes the need for technical measurements. The target is usually created as the result of business strategy, market analysis, or government regulation.

   c. In the **Add** panel, select the type of attachment and enter the required information to create the attachment.

      You can also use the **Palette** area or the **Search** area to locate attachments.

   d. Click **Add**.

Add Inspection Definitions to an operation

For each operation, you must define what needs to be inspected and add the characteristics that specify what is being measured on the shop floor. For this, you add an Inspection Definition that contains the required Quality Characteristic.

1. In the folder where you created the Control Plan, select and open the Control Plan that you want to edit.

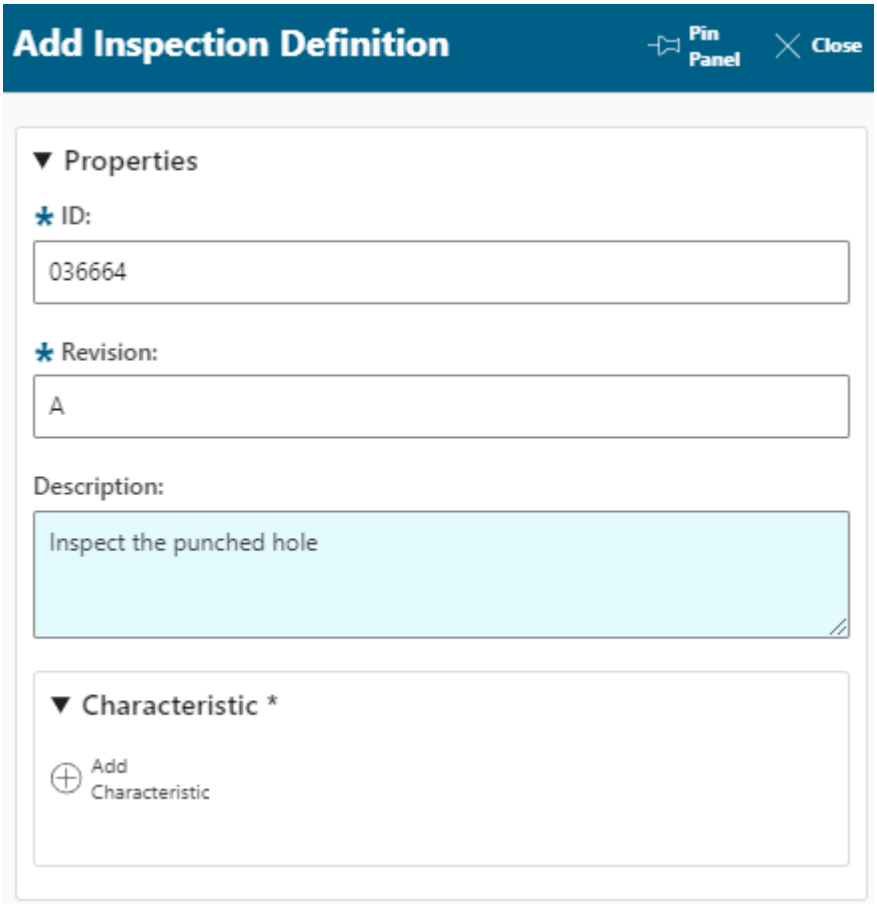
2. In the Control Plan, select the operation where you want to add Inspection Definitions.

   You can also copy and paste or drag-and-drop an existing Inspection Definition to the operation. The existing Inspection Definition can be from the current Control Plan or another Control Plan. When you paste the existing Inspection Definition, in the confirmation message, click **New** to create a new Inspection Definition or click **Reference** to create a reference to the existing Inspection Definition. If you create a reference, then updates to the source Inspection Definition are reflected in the reference Inspection Definition.

3. From the work area toolbar, click **Add** > **Inspection Definition**.

4. In the **Description** box, describe the Inspection Definition.

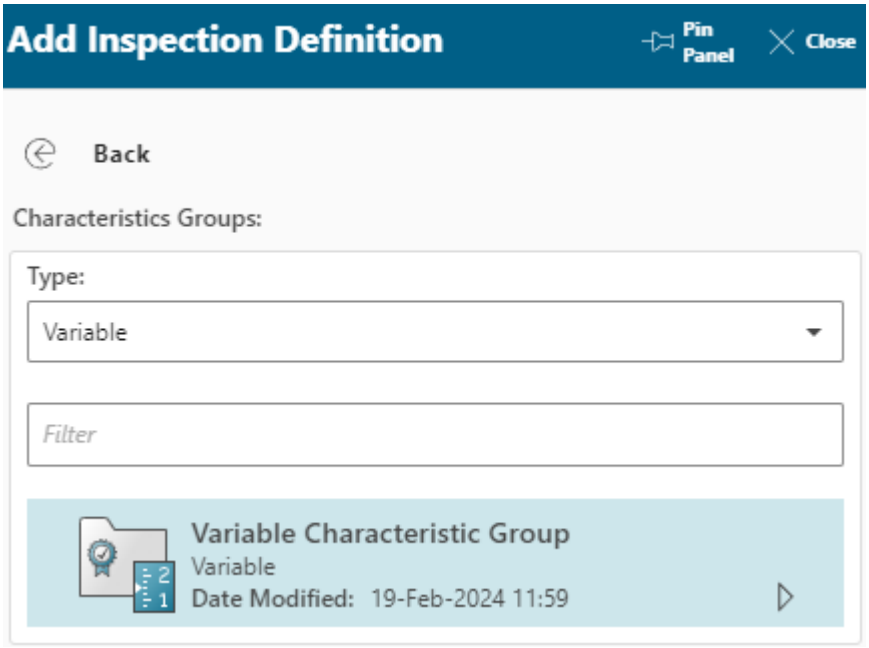
5. In the **Characteristic** section, click **Add Characteristic** ⊕.



6. To add a Quality Characteristic to the Inspection Definition, do the following:

   a. From the **Type** list in the **Characteristic Groups** section, select the type of Characteristic Group.

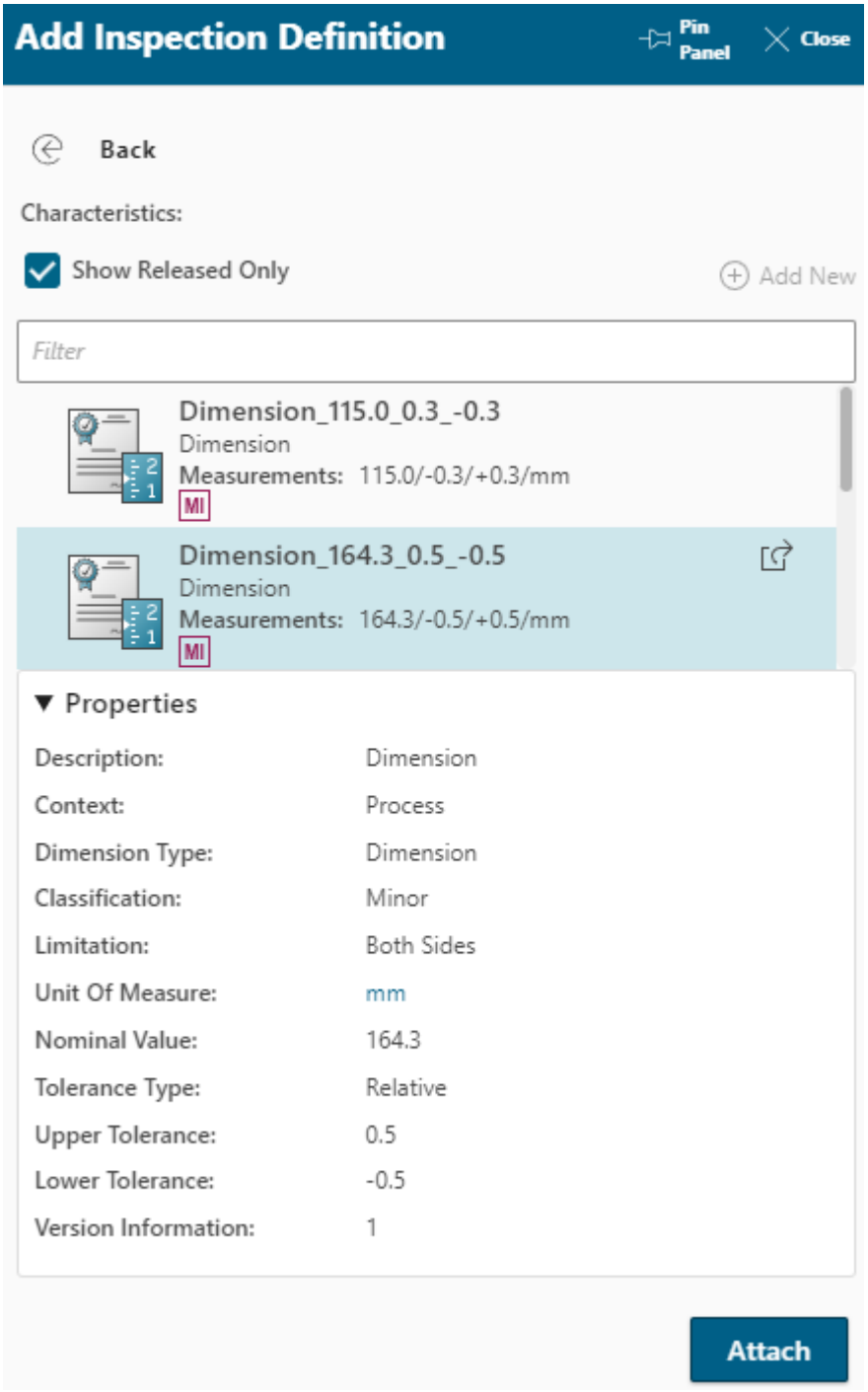
   b. From the list displayed, select and open the required Characteristic Group.



A message is displayed if released Quality Characteristics are not available.

c. (Optional) To select and attach only released Quality Characteristics, ensure that **Show Released Only** is selected.

d. Type a name to filter the available Quality Characteristics, select the required Quality Characteristic, and click **Attach**.



e. If you do not find a relevant Quality Characteristic, you can add a new one. Click **Add New** and do the following:

   A. From the **Naming Convention** list, select the naming convention of the Quality Characteristic.

By default, the type of the Quality Characteristic is set to the value selected earlier in the **Characteristic Group Type** list.

B. In the **Description** box, enter a description for the Quality Characteristic.

C. From the **Context** list, select whether the Quality Characteristic is for a product or a process.

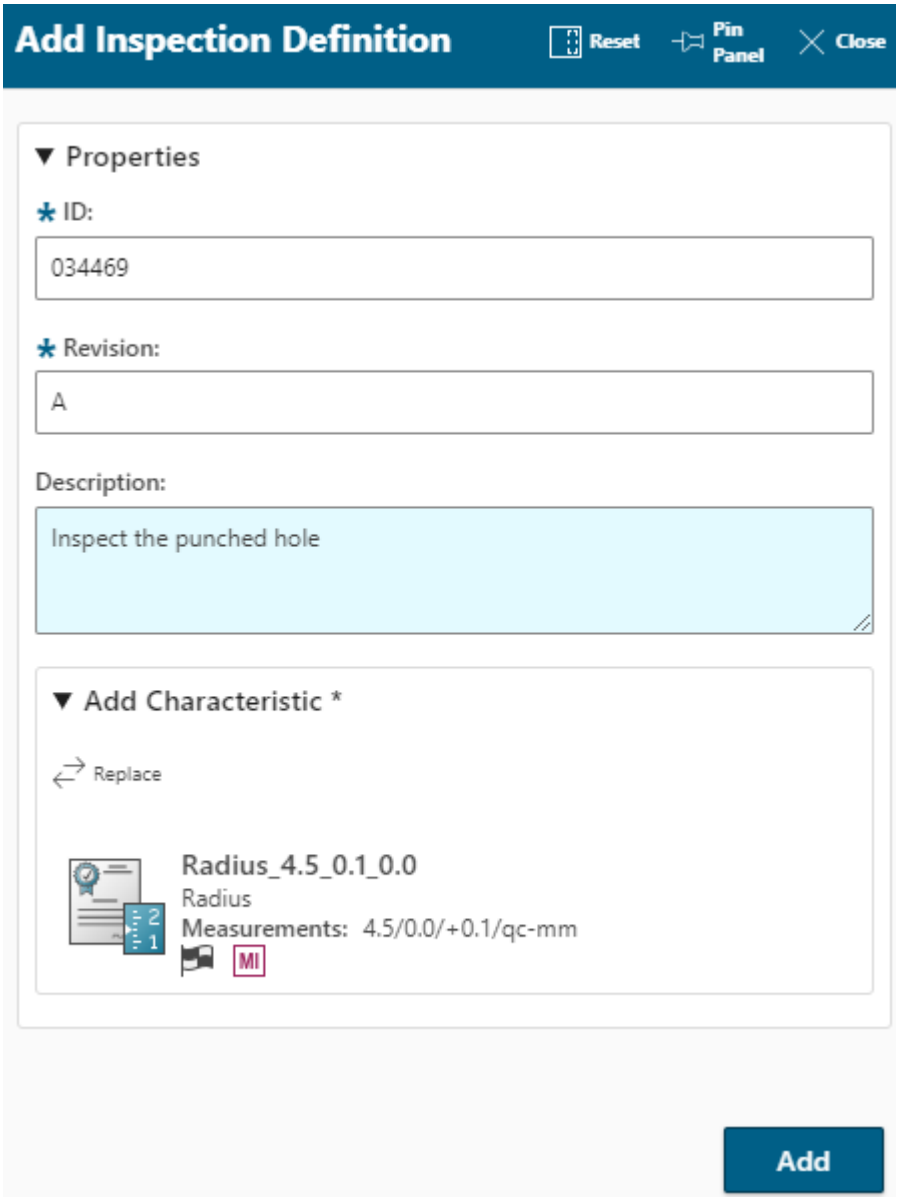
D. If you are adding a **Variable** Quality Characteristic, specify these additional properties:

Field	Description
Dimension Type	Select the type of dimension being measured by the Quality Characteristic. You can also enter a custom dimension, such as **Density**, by typing the custom dimension, and pressing Enter.
Unit Of Measure	Select the unit of measurement to be used for the Quality Characteristic.
Nominal Value	Enter a nominal value of the Quality Characteristic.
Upper Tolerance	Enter an upper tolerance of the Quality Characteristic.
Lower Tolerance	Enter a lower tolerance of the Quality Characteristic.

E. Click **Add**.

The Quality Characteristic is created in an unreleased state. You must release all new Quality Characteristics before sharing the Control Plan with other Quality applications.

f. To replace the Quality Characteristic that you have added, click **Replace** in the **Add Characteristic** section and select an existing Quality Characteristic or create a new one.



7. Click **Add**.

   The name of the Inspection Definition is based on the name of the associated Quality Characteristic. The administrator can configure the name pattern for you.

8. To specify the type of inspection for the Inspection Definition, in the **Overview** tab of the of the Inspection Definition, click **Edit**, and select one or many of the following options from the **Inspection Types** list:

   - **First Inspection**: To verify that the initial production setup and the first few units produced meet the required quality standards and specifications.

- **Running Inspection**: To monitor and control the quality of products during the ongoing production process.

- **Review Inspection**: To conduct a thorough examination and assessment of the production process and product quality at specific checkpoints.

- **Final Inspection**: To perform a comprehensive inspection of the finished products before they are released for shipment or delivery to customers.

9. To specify the order and method by which inspections are conducted, in the **Overview** tab of the of the Inspection Definition, click **Edit**, and select one of the following from the **Inspection Sequence** list:

   - **Part Oriented**: To inspect each part or component individually, ensuring that each one meets the required quality standards and specifications. The inspection process is organized around the parts themselves, with each part being inspected for all relevant characteristics.

   - **Characteristic Oriented**: To inspect specific characteristics or attributes across multiple parts or components. The inspection process is organized around the characteristics, with each characteristic being inspected across all relevant parts.

   - **Part & Characteristic Oriented**: To combine both part-oriented and characteristic-oriented approaches, ensuring a comprehensive inspection of both individual parts and specific characteristics. The inspection process is organized to address both the parts and their characteristics, providing a thorough quality assessment.

10. To specify that the inspection process involves the automated collection and recording of inspection data, in the **Overview** tab of the of the Inspection Definition, click **Edit**, and select **Automatic Data Acquisition**.

11. To create a new quality action as a Reaction Plan for an Inspection Definition, do the following:

    a. In the **Reaction Plans - Inspection Definition** section, click **Add to** ⊕ and select **Add Quality Action**.

    b. Specify a name and description for the quality action.

    c. Enter the remaining properties and then click **Add**.

    d. To remove a Reaction Plan, select it and click **Remove** ⊖.

    When you print the Control Plan, the Control Plan norm document displays only those Reaction Plans that are added to an Inspection Definition.

12. To create a quality action from a template, and assign it as a Reaction Plan for an Inspection Definition, do the following:

a. In the **Reaction Plans - Inspection Definition** section, click **Add to** ⊕ and select **Add Quality Action from Template**.

b. In the **Add Quality Action From Template** panel, specify the filter criteria in the **Filters** box.

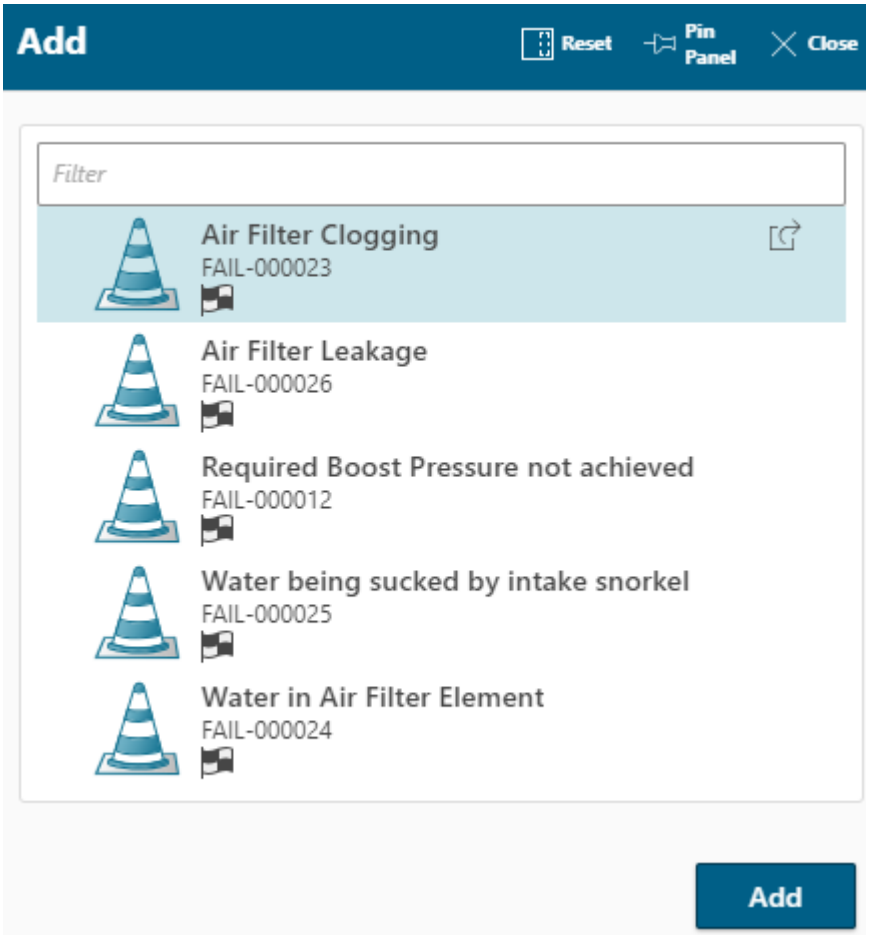
c. Select the required template in the **Results** section, and click **Select** to specify the details.

d. In the **Add Quality Action From Template** panel, specify the required information to create the quality action, and then click **Add**.

13. Add potential defects from the Failure Catalog to an Inspection Definition as follows:

a. In the **Potential Defects - Inspection Definition** section, click **Add** ⊕.

b. In the **Add** panel, select the required defects and click **Add**.



You can select multiple defects simultaneously and add them to the Inspection Definition. Only released defects are available for selection. If you select a defect that is already added in the **Potential Defects - Inspection Definition** section, an error message is displayed. Select only new defects to add to the Inspection Definition.

c. To remove a potential defect, select it and click **Remove** ⊖.

14. To add multiple operations, parts, manufacturing devices, and inspection systems as reference objects for an Inspection Definition, do the following:

    a. Select the required Inspection Definition, and click the **Reference** tab.

    b. In the **Operation** section, click **Add To** ⊕, select the required Manufacturing or Dimensional Planning and Validation (DPV) operations, and enter the other properties as required.

       You can also use the **Palette** tab or the **Search** tab to locate the required reference objects.

    c. In the **Part Reference** section, click **Add To** ⊕, select **Item**, and enter the other properties as required.

       You can also use the **Palette** tab or the **Search** tab to locate the required reference objects.

    d. In the **Manufacturing Device** section, click **Add To** ⊕, select **Item**, and enter the other properties as required.

       You can also use the **Palette** tab or the **Search** tab to locate the required reference objects.

    e. In the **Inspection System** section, click **Add To** ⊕, select **Item**, and enter the other properties as required.

       You can also use the **Palette** tab or the **Search** tab to locate the required reference objects.

15. To add attachments to an Inspection Definition as **Files**, **Documents**, and **Described by Document**, do the following:

    a. Select the required Inspection Definition and click **Attachments**.

    b. In the required section, click **Add** ⊕.

    c. In the **Add** panel, select the type of attachment and specify the required information to create the attachment.

       You can also use the **Palette** area or the **Search** area to locate attachments.

    d. Click **Add**.

16. To add **Remote Links** to an Inspection Definition, do the following:

    a. In the **Remote Links** section, click **Create Remote Link** ⊕.

You can create a remote link to view the external element within Teamcenter. For example, you can create a link from a Control Plan in Teamcenter to a software defect in the external application. Once this is done, you can view the software defect from Teamcenter.

> Caution:
>
> The administrator must install Linked Data Framework in the Teamcenter environment for you to be able to create a remote link.

b. From the **Project** list, select the required project.

c. Click the **Existing** option to link to an existing external application, or click **New** to link to a new external application.

d. To select a resource in the external application, click **Add** ⊕ next to the **Remote Reference** label.

Log on to the external application if prompted, and select an existing resource in that application. This action takes you back to the **Add** panel.

e. From the **Relation** list, select the relation you want to create between Teamcenter and the external element.

> Note:
>
> If only one relation is applicable, this relation is used automatically. Manual selection is not required.

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

17. Repeat the above steps until you add all the required Inspection Definitions.

Define the Dynamic Sampling Size for an Inspection Definition

Dynamic Sampling Size for an Inspection Definition is used to adjust the number of units inspected based on real-time quality performance and production conditions. In cases where the quality performance deteriorates or during critical production phases, you can *tighten*, that is, increase the number of units inspected. If the quality performance is stable and within acceptable limits, you can continue with a normal sampling size. If the quality performance is consistently high, the process is stable, and the risk of defects is low, you can *reduce* the sampling size, that is, decrease the number of units inspected.

Dynamic Sampling Guideline defines the sample size to be used for different inspection scenarios of **Normal**, **Tightened**, and **Reduced** inspections. **Switching Rules Guideline** defines the rules that must be followed during the inspection for switching between the different inspection scenarios. You can assign these guidelines to an entire Control Plan or to an individual Inspection Definition. When you

assign **Dynamic Sampling Guideline** and **Switching Rules Guideline** to a Control Plan, and submit the Control Plan to the **Assign Guidelines to the Control Plan structure** workflow, the same guideline is set for each individual Inspection Definition of the Control Plan. You can also define **Dynamic Sampling Guideline** and **Switching Rules Guideline** for each Inspection Definition separately.

Generally, the lot size is defined for a part during the actual production, and it varies while executing the production. If you define a lot size value for a Control Plan, and the Inspection Definition is assigned **Dynamic Sampling Guideline** and **Switching Rules Guideline**, then the **Dynamic Sample Size** values are automatically calculated and displayed in the **Overview** tab of the Inspection Definition.

Note:

By default, the following guidelines are available:

- **Dynamic Sampling Guideline**: Inspection Sampling: ISO 2859-1
- **Switching Rules Guideline**: Switching Rule: ISO 2859-1

Procedure

1. To create a **Dynamic Sampling Guideline**, do the following:

    a. On the **HOME** page, click the **EXPLORER** tile, and navigate to the folder where you want to create the **Dynamic Sampling Guideline**.

    b. Choose **More Commands** ••• > **New** > **Add**.

    c. In the **Add** panel, from the **Type** list, select **Dynamic Sampling Guideline**.

    d. Specify a name and description for **Dynamic Sampling Guideline**, and click **Add**.

    e. Choose **More Commands** ••• > **Edit** > **Start Edit**.

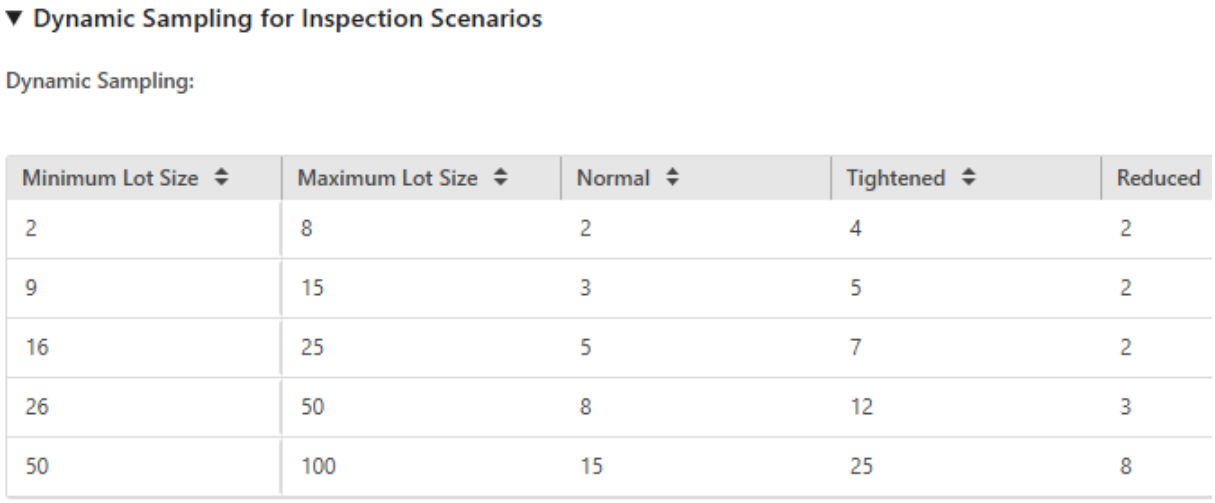
    f. In the **Dynamic Sampling for Inspection Scenarios** section, click **Add** ⊕.

    g. Create a row with values for **Minimum Lot Size**, **Maximum Lot Size**, **Normal**, **Tightened**, and **Reduced**.

    You can define the minimum and maximum lot size, and the sample size for a normal, tightened, and reduced inspection.

> Example:
>
> If you have a lot size of 75, it comes in the range of 50 as the minimum lot size and 100 as the maximum lot size. So, for a lot size of 75, the sample size can be 20 for a normal inspection, 25 for a tightened inspection, and 8 for a reduced inspection.

h. Click **Add** ⊕ to create additional rows and complete the **Dynamic Sampling Guideline**.



i. Choose **More Commands** ••• > **Edit** ✎ > **Save Edits** 🖫.

2. To create a **Switching Rules Guideline**, do the following:

   a. On the **HOME** page, click the **EXPLORER** tile, and navigate to the folder where you want to create the **Switching Rules Guideline**.

   b. Choose **More Commands** ••• > **New** ✳ > **Add**.

   c. In the **Add** panel, from the **Type** list, select **Switching Rules Guideline**.

   d. Specify a name and description for **Switching Rules Guideline**, and click **Add**.

   e. Choose **More Commands** ••• > **Edit** ✎ > **Start Edit** ✎.

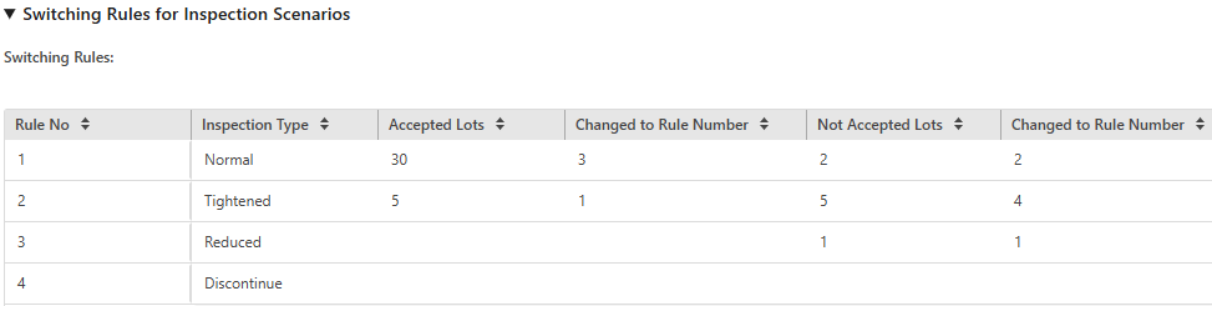
   f. In the **Switching Rules for Inspection Scenarios** section, click **Add** ⊕.

   g. Create a row with values for **Rule No**, **Inspection Type**, **Accepted Lots**, **Changed to Rule Number**, **Not Accepted Lots**, and **Changed to Rule Number**.

      You can define which rule must be applied when you find acceptable and unacceptable lots in the inspection process.

> Example:
>
> For a normal inspection, if you find 30 acceptable lots, then switch to rule 3: **Reduced** inspection. If you find 2 rejected lots, then switch to rule 2: **Tightened** inspection.
>
> For a tightened inspection, if you find 5 acceptable lots, then switch to rule 1: **Normal** inspection. If you find 5 rejected lots, then switch to rule 4: **Discontinue** inspection.

h. Click **Add** ⊕ to create additional rows and complete the **Switching Rules Guideline**.



i. Choose **More Commands** ••• > **Edit** ✎ > **Save Edits** 🖫.

3. To assign **Dynamic Sampling Size** to all Inspection Definitions of the Control Plan, do the following:

   a. In the folder where you created the Control Plan, select and open the Control Plan that you want to edit.

   b. Click **Edit** ✎, and select a dynamic sampling guideline from the **Dynamic Sampling Guideline** list.

   c. From the **Switching Rules Guideline** list, select a switching rule guideline.

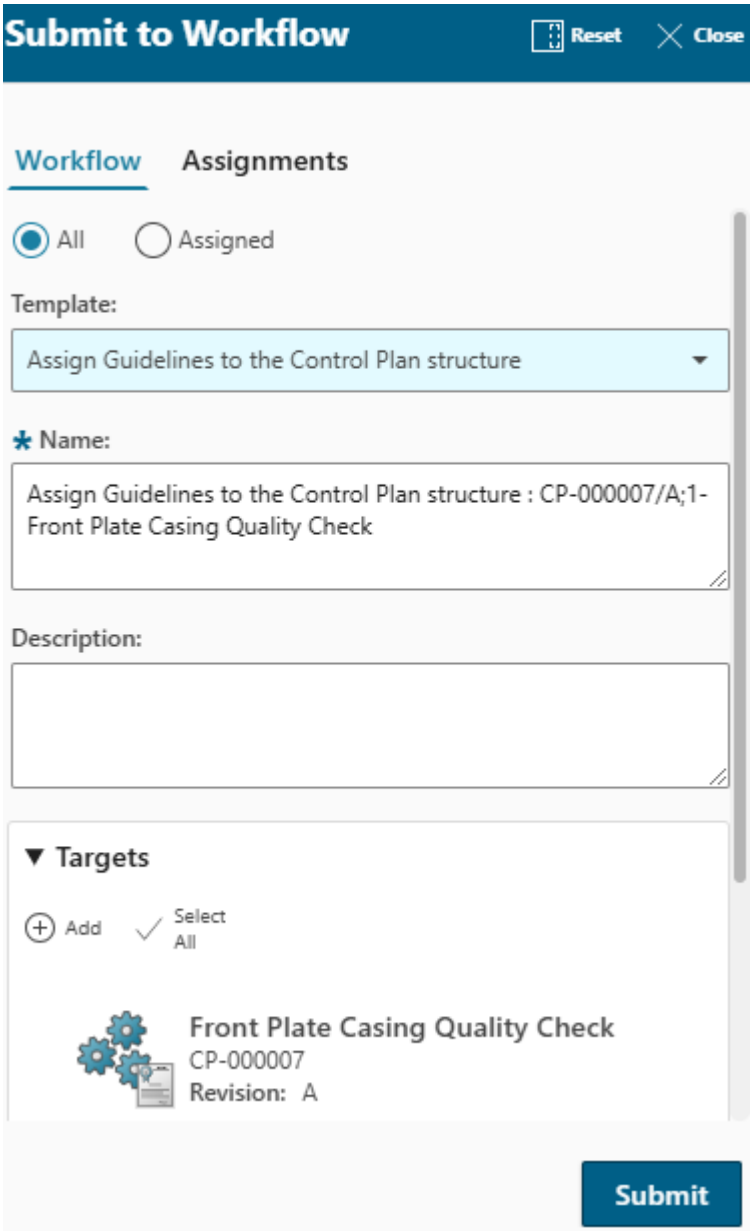
   d. Type the lot size for the Control Plan in the **Lot Size** box, and click **Save** 🖫.

   e. Choose **More Commands** ••• > **Manage** > **Submit to Workflow**.

   f. In the **Submit to Workflow** panel, from the **Template** list, select the **Assign Guidelines to the Control Plan structure** workflow.

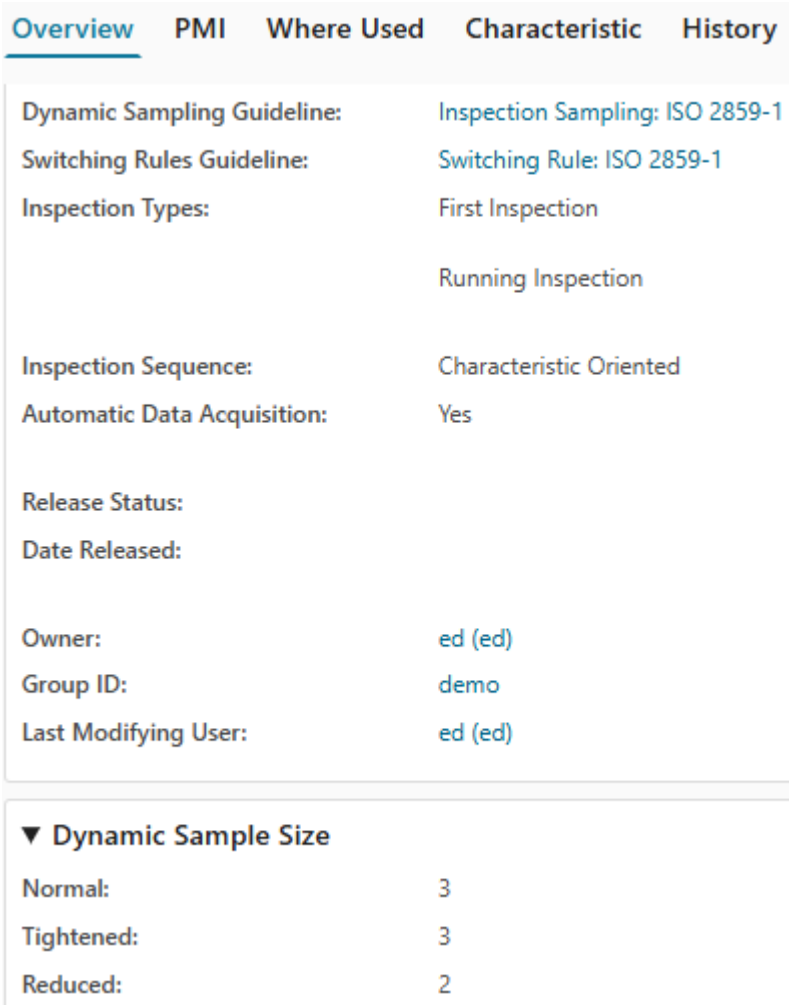
   g. Accept the default workflow **Name** or type your own.

   h. Enter a **Description** for the new workflow.



i. Click **Submit**.

A notification is displayed in the **Alerts** panel when **Dynamic Sampling Size** is calculated and assigned to all Inspection Definitions in the Control Plan. You can also edit the individual Inspection Definitions to use different values for **Dynamic Sampling Guideline** and **Switching Rules Guideline**, and calculate the **Dynamic Sampling Size** for the new values.



Update to the latest version of a Quality Characteristic in an Inspection Definition

When a new version of a Quality Characteristic is available, the new and existing versions are displayed in the **Characteristic** tab of the Inspection Definition. You can compare the values and choose to update to the latest version.

> Note:
>
> You can view a new version of a Quality Characteristic even if it is not released.

1. In the folder where you created the Control Plan, select and open the Control Plan that you want to edit.

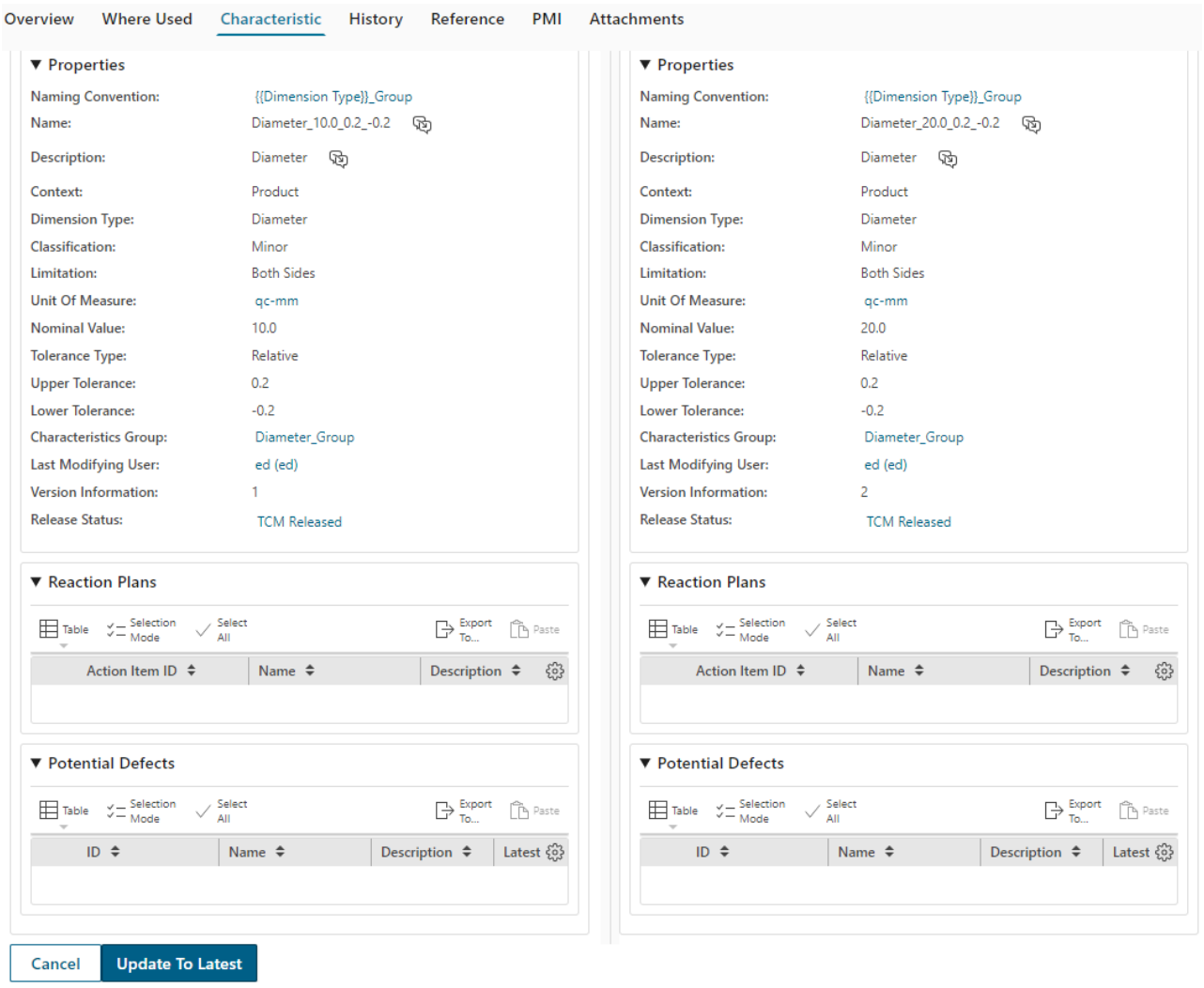
2. In the Control Plan, select and expand the required operation.

3. In the operation, select the required Inspection Definition.

4. In the right pane, click the **Characteristic** tab.

5. Compare the existing and the latest Quality Characteristics and do one of the following:

   - Click **Update To Latest** to use the latest version of the Quality Characteristic.
   - Click **Cancel** to continue using the existing version of the Quality Characteristic.



Add a control method

Control method statistics and charts are used to measure and control the quality of your manufacturing processes. A control method defines how control method statistics and charts can be used on the shop floor for a specific Control Plan, operation, or Inspection Definition. When you add a control method, you can specify the type of Quality Characteristic, industry rules, type of chart, and the size of the subgroup.

1. In the folder where you created the Control Plan, select and open the Control Plan that you want to edit.

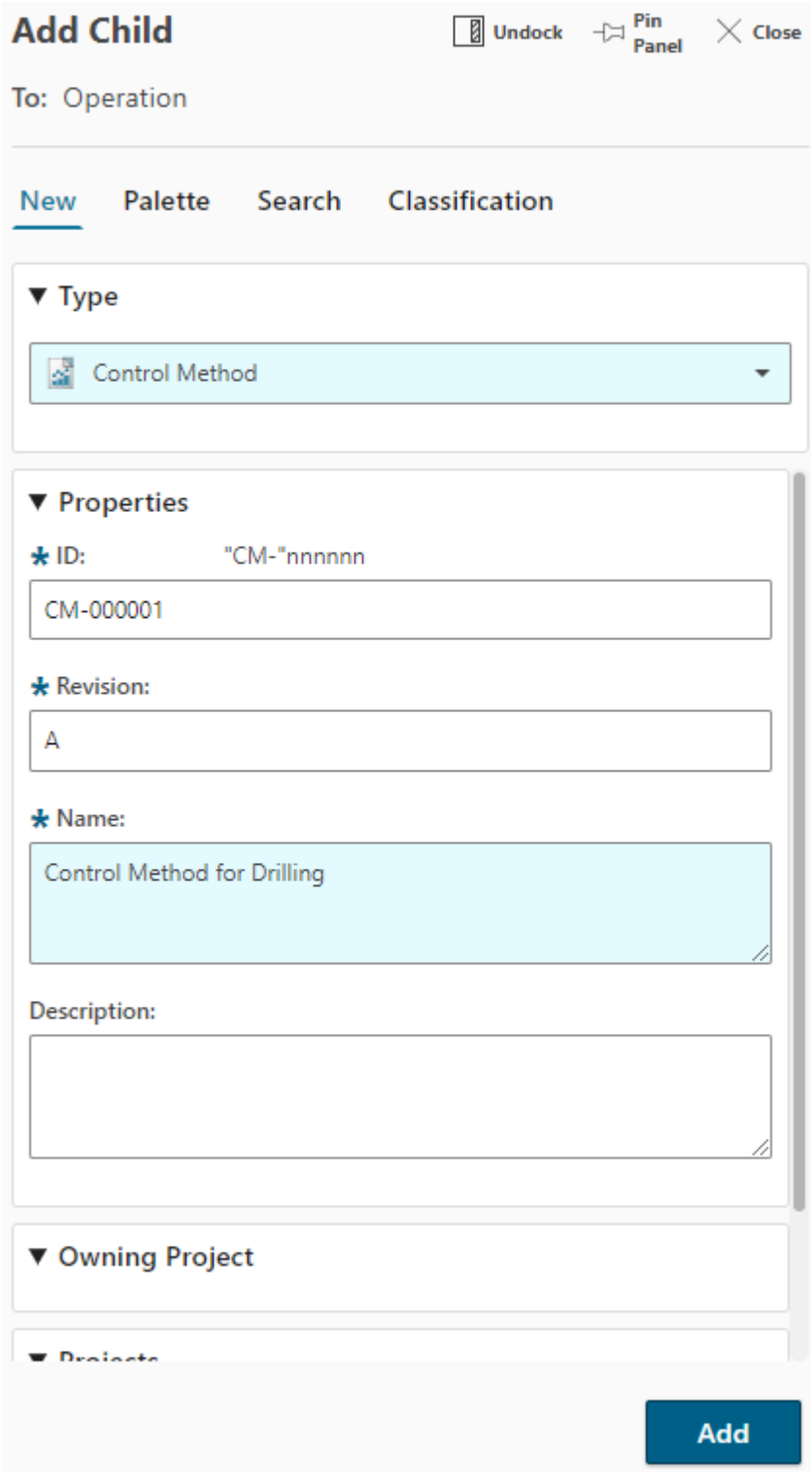
2. To add a control method to a Control Plan, operation, or Inspection Definition, do the following:

   a. Select the Control Plan, operation, or Inspection Definition where you want to add a control method.

   b. From the work area toolbar, click **Add** > **Child**.

   c. In the **New** section of the **Add** panel, select **Control Method**.

   d. In the **Name** box, type the name of the control method.



e. In the **Description** box, describe the control method, and enter the other properties as required.

f. Click **Add**.

3. To define which SPC rule must be applied to the control method, do the following:

   a. In the right pane, click the **SPC Rule** tab.

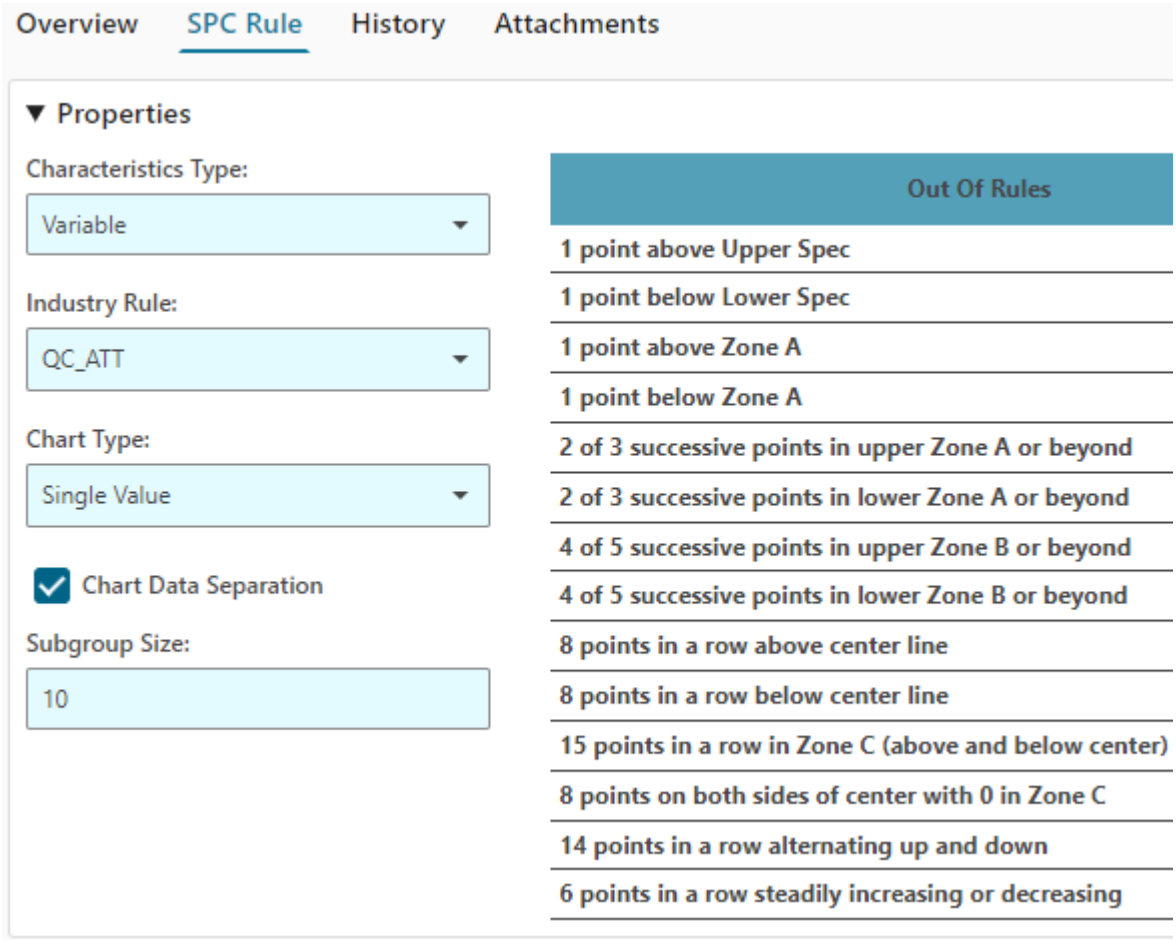
   b. Choose **More Commands** ••• > **Edit** > **Summary**.

   c. From the **Characteristics Type** list, select the required type for the Characteristic.

   d. From the **Industry Rule** list, select the industry rule to be applied.

   e. From the **Chart Type** list, select the required types for the charts to be used.

   f. In the **Subgroup Size** box, specify the number of subgroups to be used.



   g. Choose **More Commands** ••• > **Edit** > **Save Edits**.

4. To add a custom industry rule to a control method, do the following:

   a. Choose **More Commands** ••• > **Edit** > **Summary**.

b. From the **Characteristics Type** list, select the required type for the Characteristic.

c. From the **Industry Rule** list, select **Custom**.

d. From the **Chart Type** list, select the required types for the charts to be used.

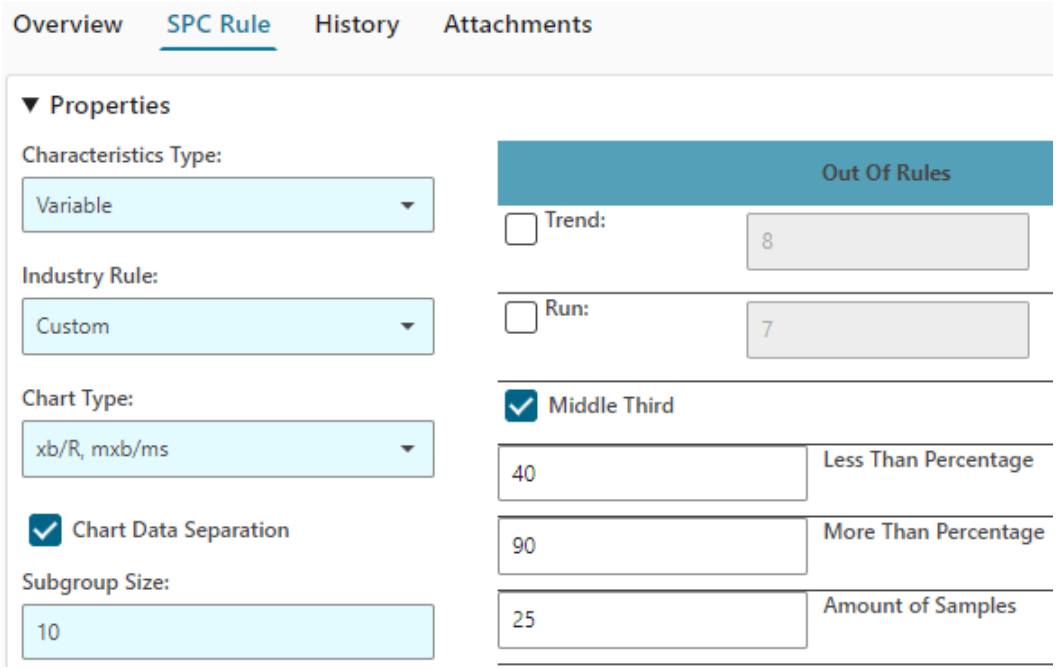
e. In the **Subgroup Size** box, specify the number of subgroups to be used.

f. In the **Out Of Rules** section, define the Out Of Rules to be applied to the control method.

Example:

If you are creating a custom rule for a **Variable** Characteristic, and you select the **Middle Third** rule, you can specify the following properties for the rule:

- **Less Than Percentage**: The default value is 40.
- **More Than Percentage**: The default value is 90.
- **Amount of Samples**: The default value is 25.



g. Choose **More Commands** ••• > **Edit** > **Save Edits**.

5. To add attachments to a control method as **Files**, **Documents**, **Described by Document**, and **Drawing Source For**, do the following:

a. Select the required control method and click **Attachments**.

b. In the required sections, click **Add** ⊕.

c. In the **Add** panel, select the type of attachment and specify the required information to create the attachment.

You can also use the **Palette** area or the **Search** area to locate attachments.

d. Click **Add**.

6. To add **Remote Links** to a control method, do the following:

a. In the **Remote Links** section, click **Create Remote Link** ⊕.

You can create a remote link to view the external element within Teamcenter. For example, you can create a link from a Control Plan in Teamcenter to a software defect in the external application. Once this is done, you can view the software defect from Teamcenter.

> Caution:
>
> The administrator must install Linked Data Framework in the Teamcenter environment for you to be able to create a remote link.

b. From the **Project** list, select the required project.

c. Click the **Existing** option to link to an existing external application or click new to ink to a new external application.

d. To select a resource in the external application, click **Add** ⊕ next to the **Remote Reference** label.

Log on to the external application if prompted and select an existing resource in that application. This action takes you back to the **Add** panel.

e. From the **Relation** list, select the relation you want to create between Teamcenter and the external element.

> Note:
>
> If only one relation is applicable, this relation is used automatically. Manual selection is not required.

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

7. To remove a control method, do the following:

a. Select the Control Plan, operation, or Inspection Definition with the control method.

b. From the work area toolbar, click **Edit Structure** > **Remove**.

c. In the confirmation message, click **Remove**.

Import product and manufacturing information from parts with associated JT data

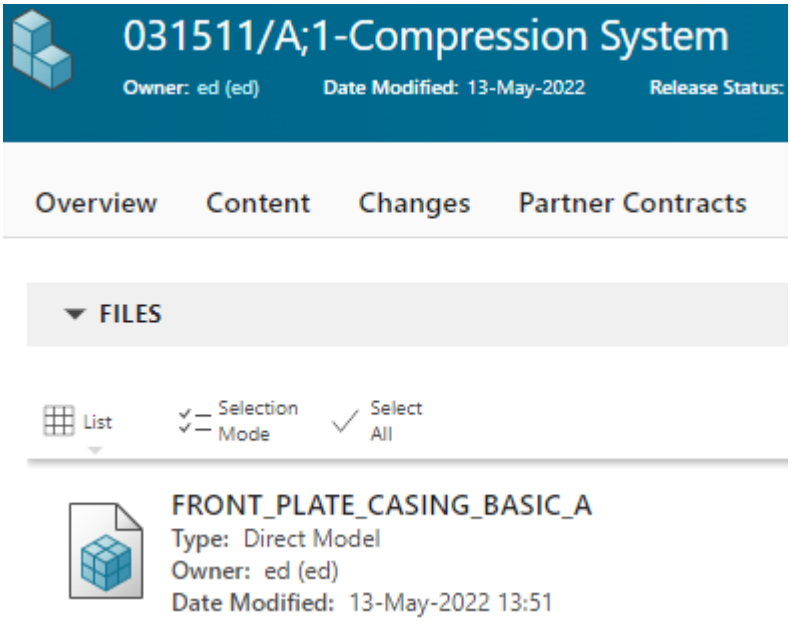
To import product and manufacturing information (PMI) from parts with associated JT data, you must convert this data to the IPXML format. When you submit the part to the **Ballooning of 2D/3D Drawings or Models** workflow, the associated JT data is converted to the IPXML format. You can then import the PMI from this part into the Inspection Definitions of a Control Plan or its operations.

You can also directly attach these types of JT and IPXML files to the part and import the PMI:

- **3D data (JT)** with the **Direct Model** type and a relation of **Rendering**
- **IPXML** dataset with the **PMI XML** type and a relation of **PMI XMLRelation**

Procedure

1. Open the item that contains the associated JT data.



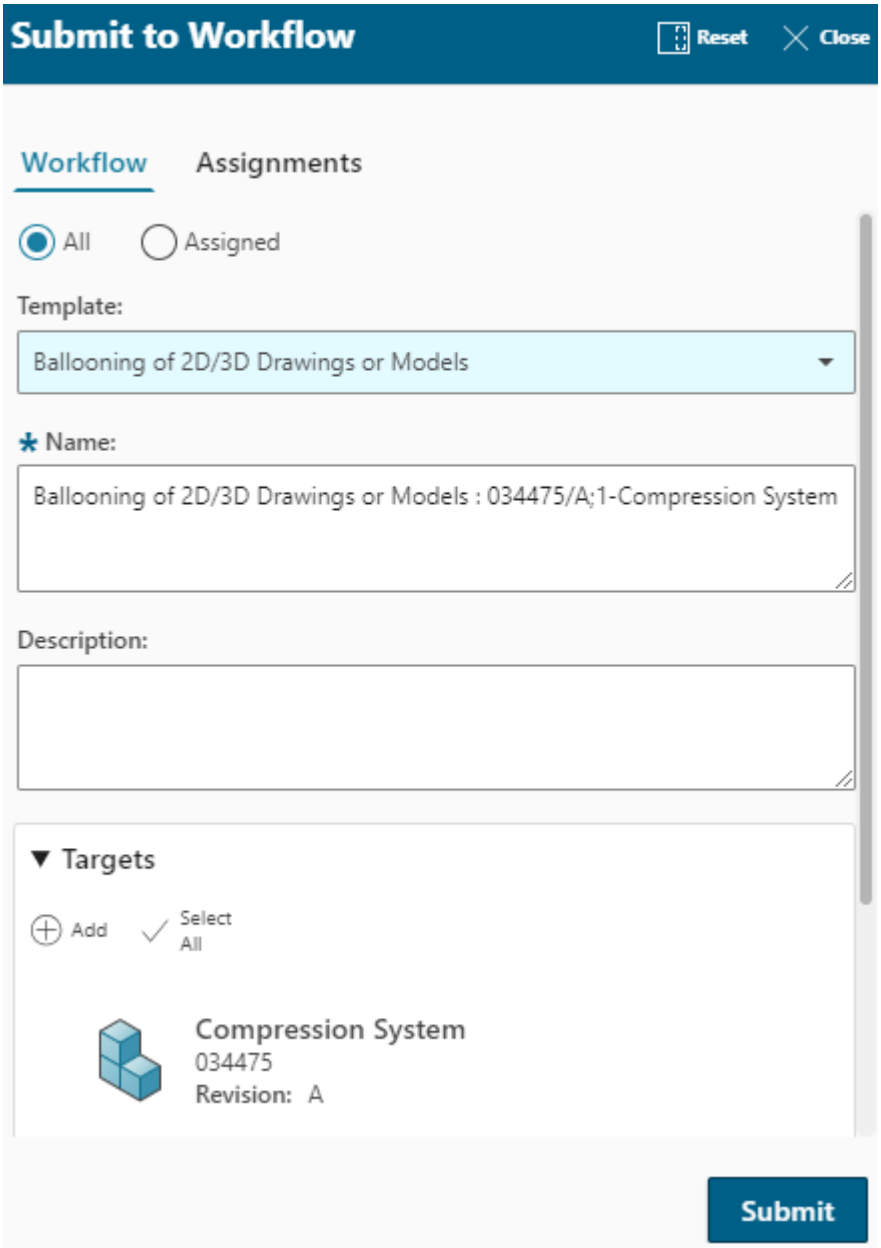
2. Choose **More Commands** ••• > **Manage** > **Submit to Workflow**.

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

   a. From the **Template** list, select the **Ballooning of 2D/3D Drawings or Models** workflow.

b. Accept the default workflow **Name** or type your own.

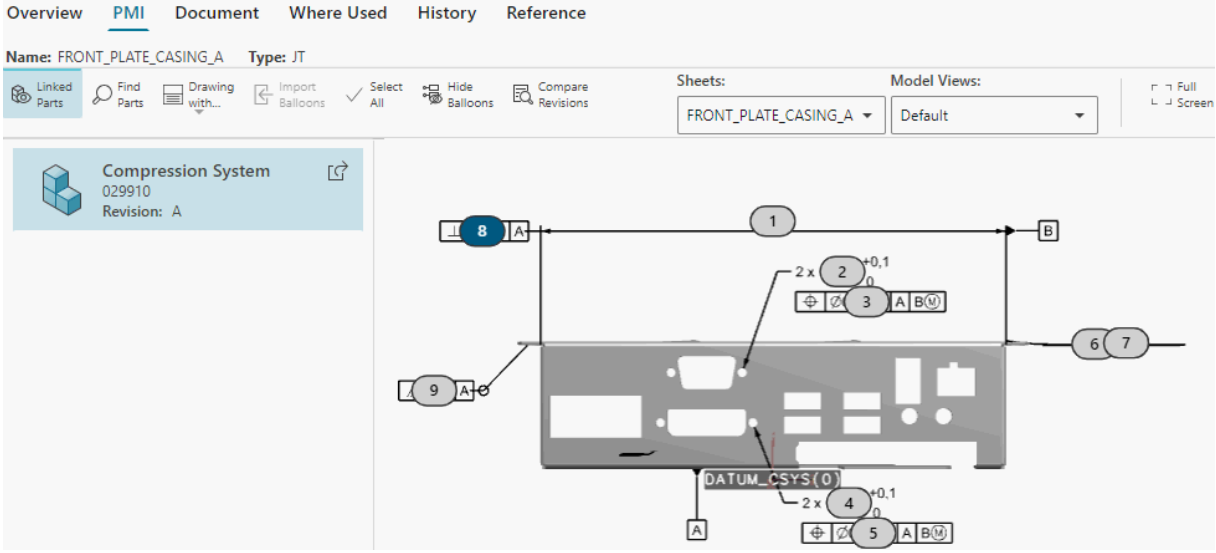
c. Enter a **Description** for the new workflow.



d. Click **Submit**.

The workflow converts the associated JT data to the IPXML format. The generated IPXML file is attached to the item with the **Relation** defined for you by the administrator.

In a Control Plan or the operation of the Control Plan, in the **Linked Parts** panel of the **PMI** tab, when you search for this part to **import its PMI**, this part becomes available.



Generate Inspection Definitions from a part with product and manufacturing information

For a Control Plan or an operation in the Control Plan, you can generate Inspection Definitions from a part that contains product and manufacturing information (PMI). This type of part is available when the system administrator integrates your Teamcenter environment with **BCT Inspector** and imports the PMI objects into the appropriate parts.

For more information, see the *Managing product and manufacturing information (PMI)* section of *Manufacturing Process Planning — Usage* in the Teamcenter documentation.

> Note:
>
> Before importing the PMI, ensure that you have installed the **DPV Inspection Process Author** license (**dpv_process_auth**).

1. In the folder where you created the Control Plan, select and open the Control Plan that you want to edit.

2. Select the Control Plan or the operation where you want to generate Inspection Definitions.

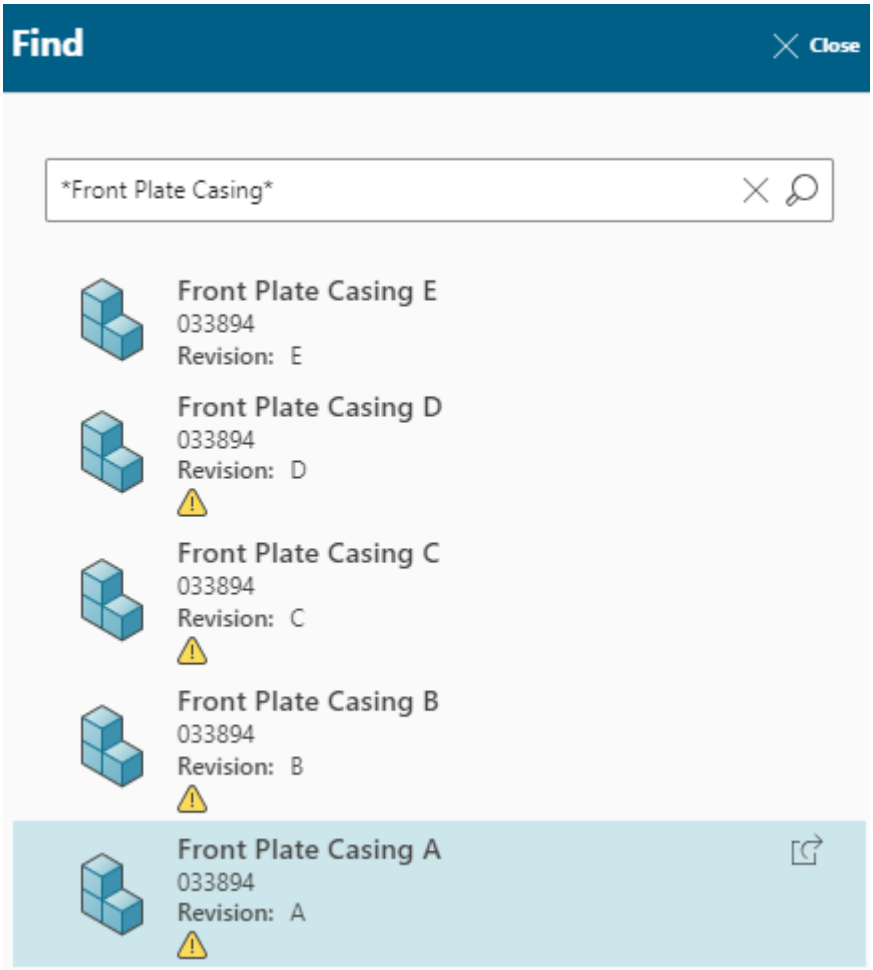
3. In the right pane, click the **PMI** tab.

4. To search for and preview the parts with PMI, click **Find Parts** in the work area toolbar, and specify the search criteria.

   When you select a part in the **Find** panel, the drawing is rendered in the **PMI** tab. The **Find** panel remains open for you select other parts and view their drawings.

The **Find** panel displays only the following types of parts:

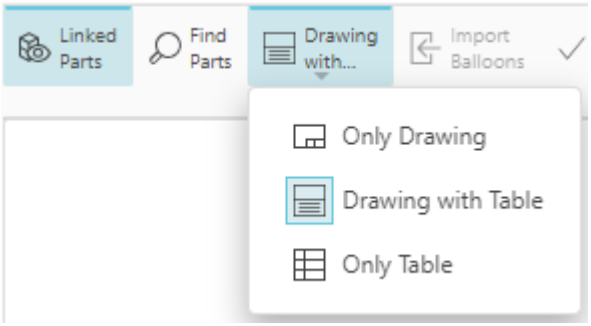
- Parts with 3D data (JT) with the **Direct Model** type and a relation of **Rendering**
- Parts with the **IPXML** dataset with the **PMI XML** type and a relation of **PMI XMLRelation**



5. After you select the required part, close the **Find** panel, and review the drawing.

To improve visibility in the work area, you can use the following options:

- Preview all the matching parts before importing the required part's PMI. You can choose to preview a part with one of the following options:
  - **Only Drawing**: Displays a part's PMI in a drawing view.
  - **Only Table**: Displays a part's PMI in a table view.
  - **Drawing with Table**: Displays a part's PMI in a drawing with table view.

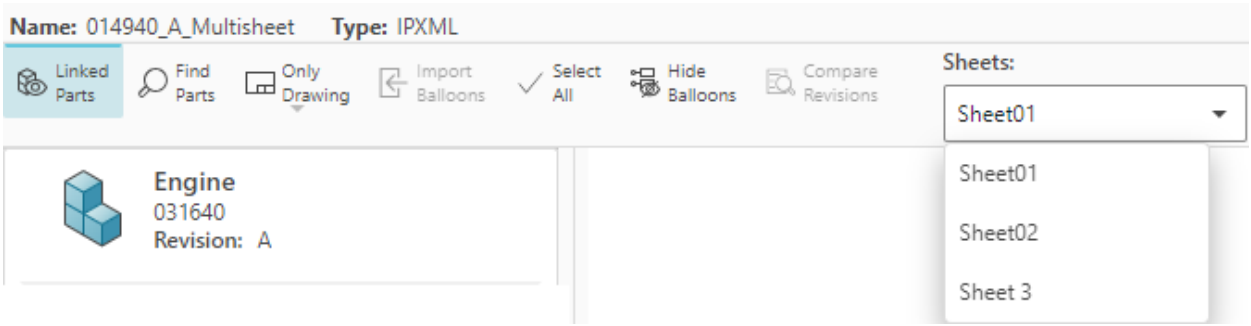


- Increase the work area by hiding the **Linked Parts** panel. To hide the panel, click **Linked Parts** in the pane's toolbar.

- Hide the balloons if a part has multiple balloons that cover the geometry of the part. To do this, click **Hide Balloons** in the pane's toolbar. To view the balloons again, click **Show Balloons**. This allows you to view which balloon belongs to a particular characteristic on the part.

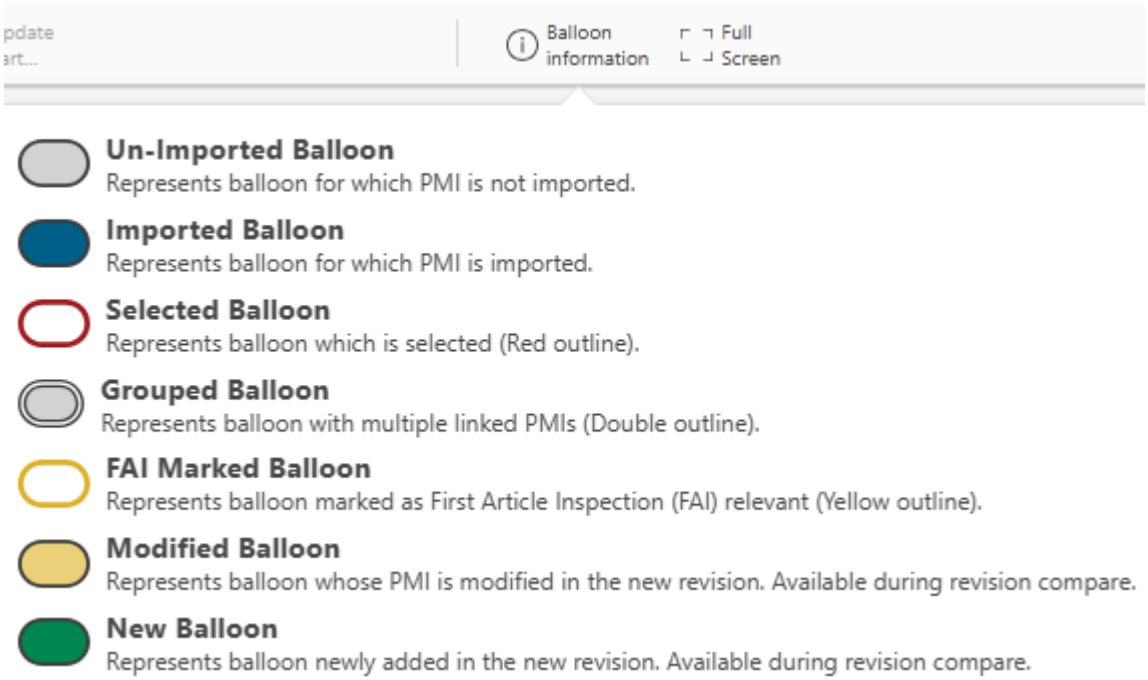
- Drag the table view up and down to increase the image work area.

- Select the required sheet from the list of sheets if the part has multiple sheets.



- Select the type of view for the part from the **Model Views** list. The view of the part is positioned to the selected view. The different views allow you to easily identify which section of the part is associated with a specific balloon. This is helpful when the part has multiple balloons that cover the geometry of the part, and you need to view only a specific section. To select multiple balloons in different views, hold the **Ctrl** key as you select them to retain the selections from the previous view. You can also add your own custom views.

- View a legend for the types of balloons by clicking **Balloon Information** ⓘ.

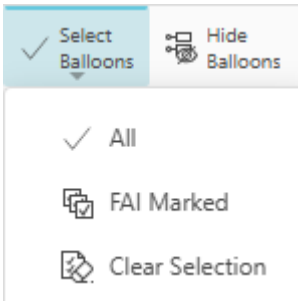


- Use the roller on your mouse to zoom in and out of the part drawing. Hold the **Ctrl** key and drag with the left mouse button to move the drawing in the work area.

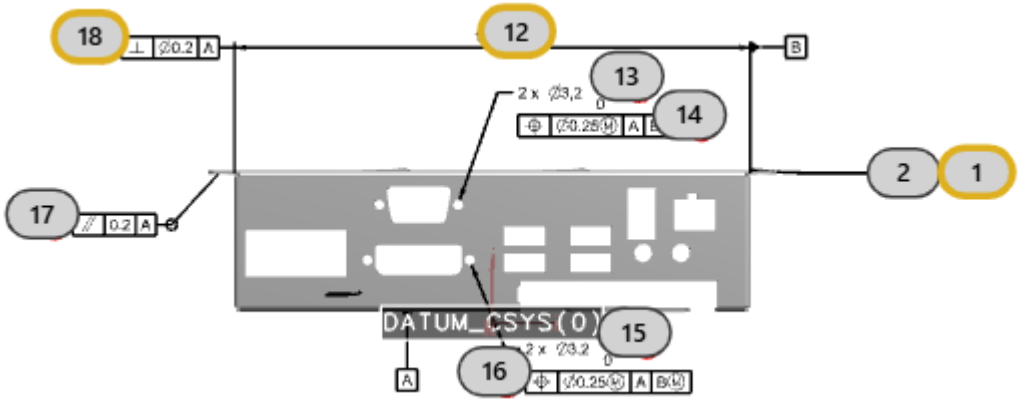
6. In the rendered part drawing, select the balloons that contain the PMI to be imported.

You can select multiple balloons using any of the following options:

- Click **Select Balloons** > **Select All** to select all balloons.

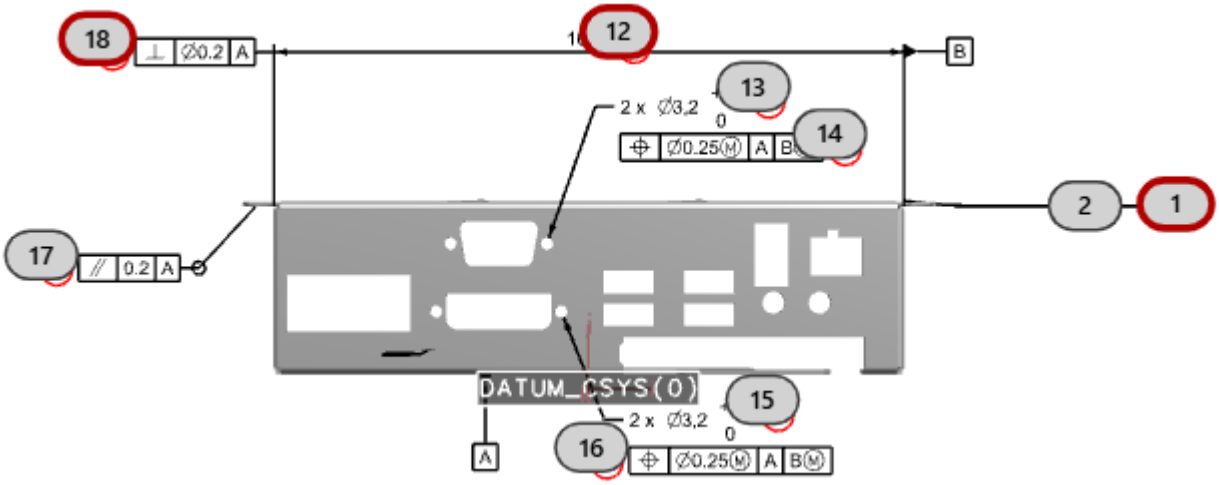


- Click **Select Balloons** > **FAI Marked** to select only **FAI Marked** balloons. These balloons have a yellow border. It indicates that these balloons are marked for First Article Inspection (FAI). If you import **FAI Marked** balloons, then the **FAI Required** property is set to **True** in the generated Inspection Definitions.

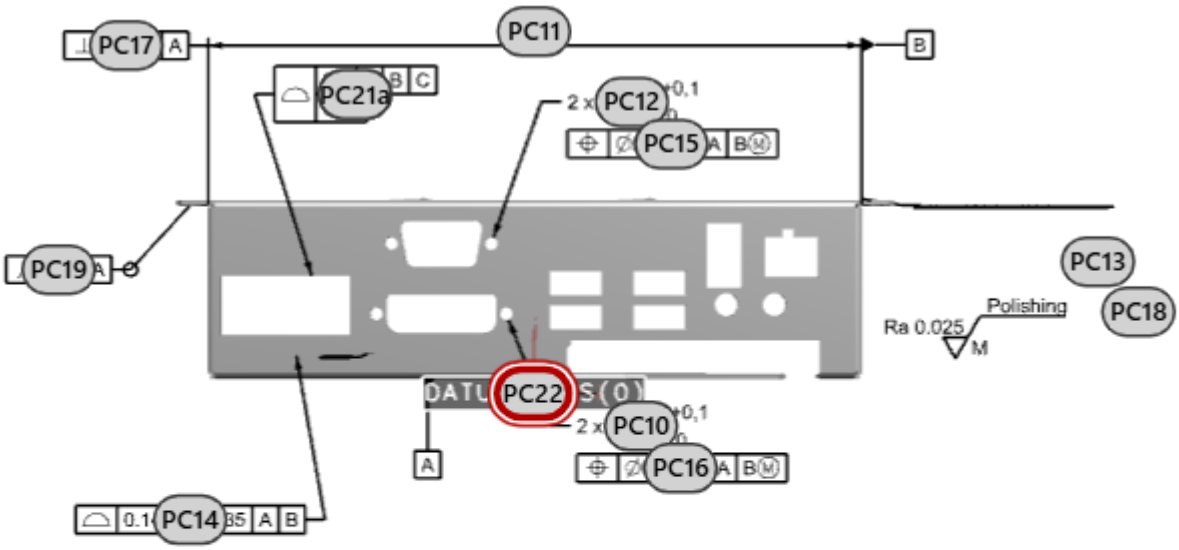


- Click **Select Balloons** > **Clear Selection** to clear any selections you have made.

When you select a balloon in the drawing, a red border appears on the balloon to indicate that the balloon is selected. Additionally, the corresponding characteristic is also selected in the table below the drawing. If you select a row in the table, the corresponding balloon is selected in the drawing. Subsequently, **Import Balloons** is displayed in the pane's toolbar.



7. Select a **Grouped Balloon** to select all instances of the Group Characteristics in the table view.



	FirstArticleInspectionRequired	Characteristic Number	Characteristic Description	Measuring Size	Measuring Size Text	Nominal Value	Upper Specification Limit	Lower Specification Limit	Upper Allowance
☑		16	PC22c	350	Symbol				
☑		15	PC22b	350	Symbol				
☑		14	PC22a	350	Symbol				

Group Characteristics are a collection of related attributes or features that are inspected or measured together as a group. They are often associated with specific geometric dimensions, tolerances, surface finishes, or other critical features of a part or assembly. An example of Group Characteristics is a group of dimensions related to the hole pattern on a flange, including hole diameter, spacing, and position.

> Note:
>
> A **Grouped Balloon** is indicated by a double outline. When you select a **Grouped Balloon**, a red border appears on the balloon to indicate that the balloon is selected. The balloon remains selected until you clear the selection of all characteristics in the group.

8. Click **Import Balloons** in the pane's toolbar.

> Note:
>
> If you select less than 20 balloons, Control Plan imports the balloons in the synchronous mode. If you select more than 20 balloons, Control Plan imports the balloons in the asynchronous mode, and a notification is displayed in the **Alerts** panel when the import is complete. The administrator can configure the number of balloons to be used for the synchronous mode.

For each selected balloon, the following is generated for the selected Control Plan or operation:

- Inspection Definition

  If you select the generated Inspection Definition, you can view additional information about the Inspection Definition in the following tabs:

  - In the **Overview** tab, you can view Inspection Definition details, such as the **Characteristic Number** property that displays the number of the imported balloon and the **Remark** property that displays the remarks of the imported balloon.

    After you import the balloon, the **Preview** section displays a Geometric Dimensioning and Tolerancing (GD&T) control frame image that is imported from the balloon. The image is in the SVG format, and it is added as an attachment to the Inspection Definition in the **Attachments** tab. If the source balloon is updated, and you import the updated PMI, the image is updated in the **Preview** section.

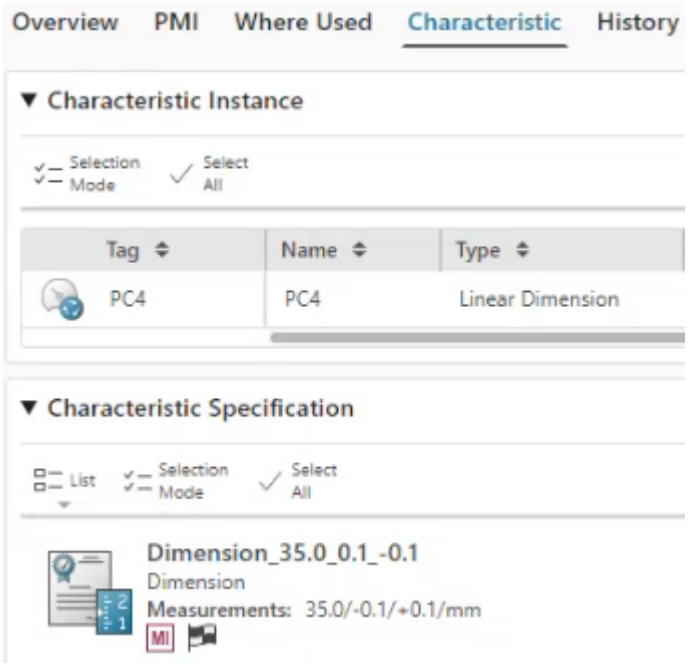
    > Note:
    >
    > The SVG file is attached to the Inspection Definition only if it is available in IPXML as an embedded file. NX can generate control frame SVG files that can be embedded while generating IPXML files.

    The GD&T control frame is a rectangular box that contains specific GD&T information for controlling a particular feature of a part. The control frame is divided into compartments that convey the following information:

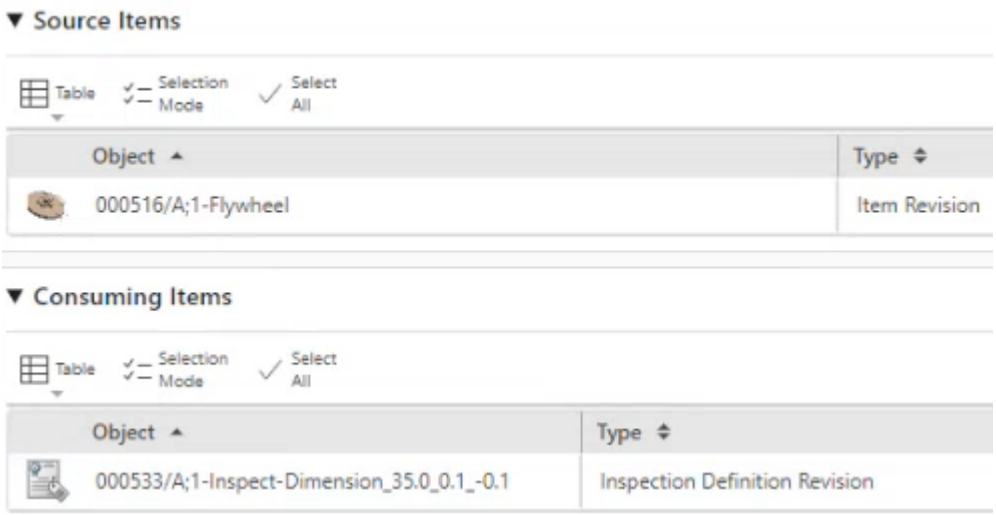
- **Geometric Characteristic Symbol:** This is the first compartment and contains a symbol that represents the type of geometric control being specified, such as flatness, concentricity, or positional tolerance.
- **Tolerance Value:** The second compartment specifies the numerical tolerance associated with the geometric characteristic. This defines the allowable variation for the feature.
- **Datum Reference (if applicable):** Subsequent compartments may include letters that refer to datum features on the part. Datums are reference points, lines, or planes used to establish the origin for dimensional measurement, and to define the part's orientation and location.
- **Material Condition Modifiers (if applicable):** These are symbols such as MMC (Maximum Material Condition) or LMC (Least Material Condition) that may be included to specify how the tolerance varies with the size of the feature.
- **Additional Requirements:** Any other requirements, such as the tolerance zone shape or specific instructions for inspection, can also be included in the control frame.

- In the **PMI** tab, you can view the PMI details. The drawing is rendered in the **PMI** tab, and the selected balloons are displayed in the dark blue color.
- In the **Where Used** tab, you can view the details about where the Inspection Definition is used, such as the parent Control Plan or operation.
- In the **Characteristic** tab, you can view the details of the Quality Characteristic generated from the source balloon in the part drawing.

  For a part in NX, when you publish the part’s Characteristics from NX to Teamcenter, the Characteristics are populated in the **Characteristics** tab of the part. If you have imported a balloon from this part, the source Characteristic of the part is displayed in the **Characteristic Instance** section.



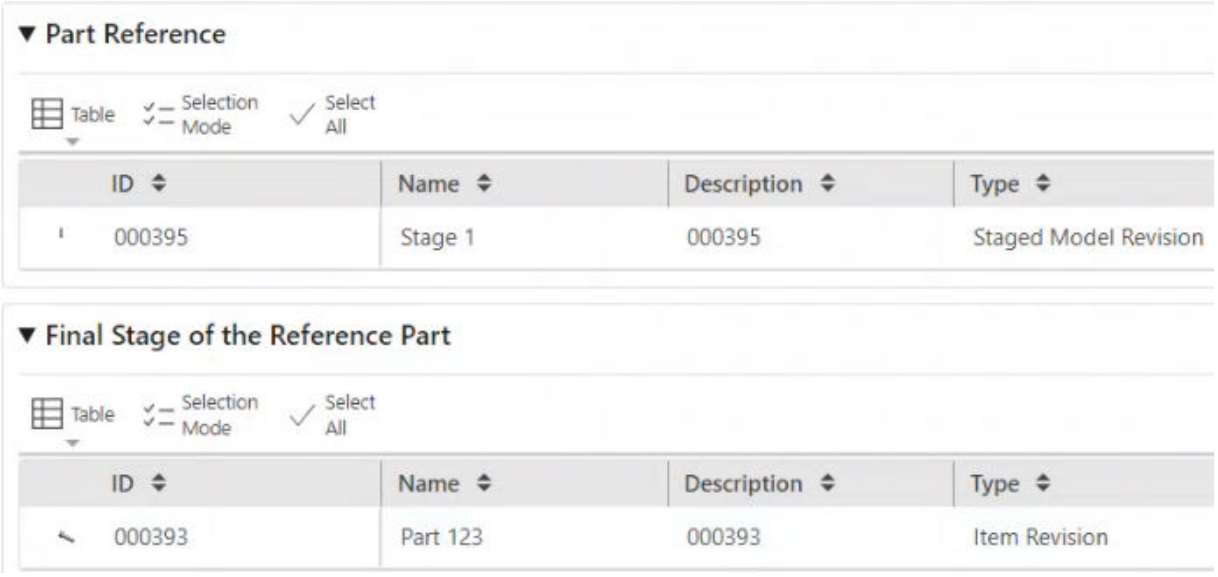
If you open the part's Characteristic from the **Characteristic Instance** section, in the **Where Used** tab, you can view the source part and the Inspection Definitions where the Characteristic is used.



In this tab, you can also add **Reaction Plans** and **potential defects from the Failure Catalog** to an Inspection Definition.

- In the **Reference** tab, you can view the part that is added to the **Part Reference** section. If you have imported balloons from a stage of a staged model set created in NX, the PMI is imported

and the final part of the staged model set is displayed in the **Final Stage of the Reference Part** section of this tab. This helps you identify the final part of the staged model set.



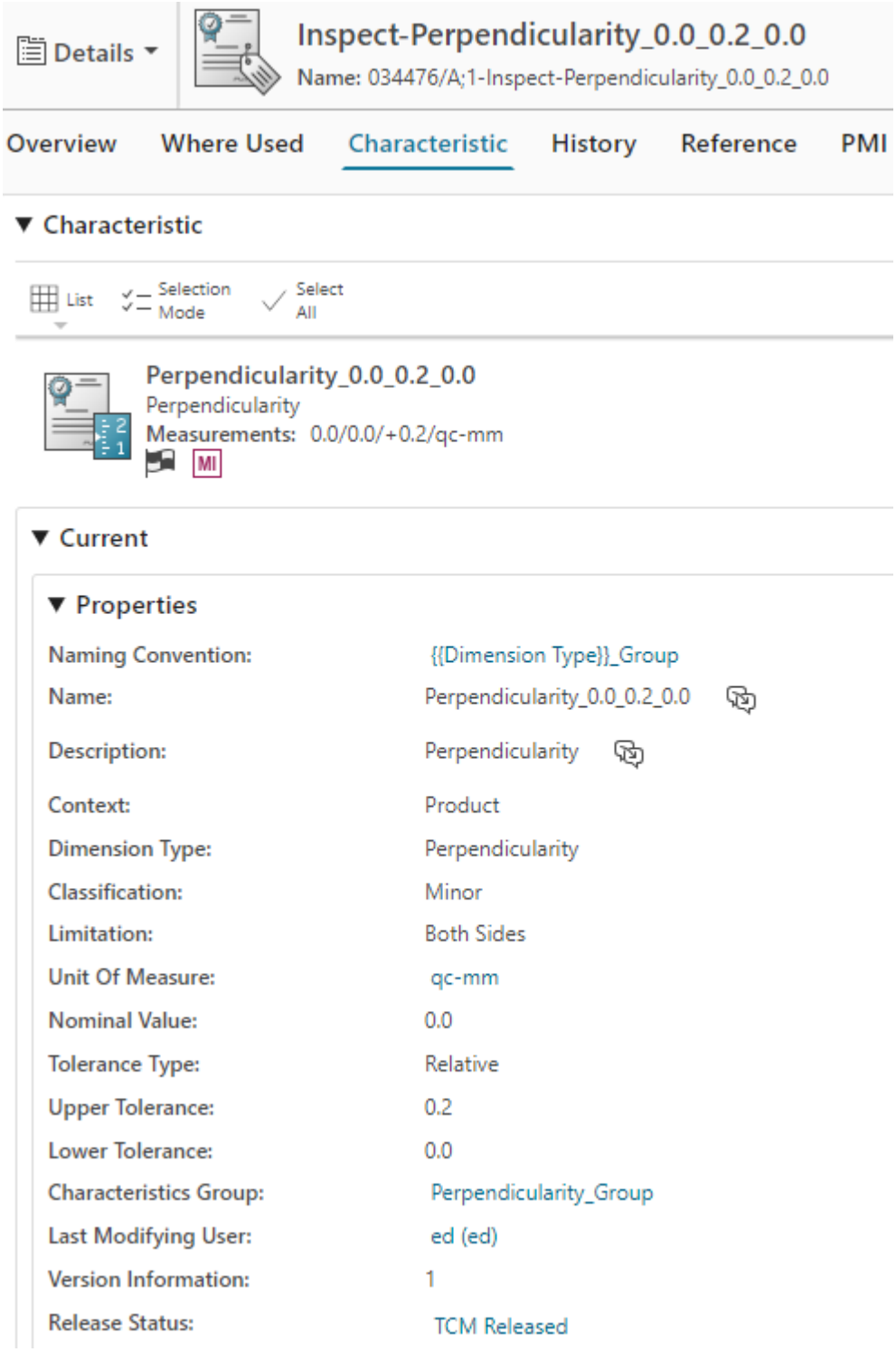
- In the **Attachments** tab, you can add supporting files, documents, and links for the Inspection Definition.

The administrator defines the mapping between the Inspection Definition properties and the balloon properties, and can also define the mapping for any custom properties added to Inspection Definitions.

> Note:
>
> - If you copy this Inspection Definition and paste it on another operation, the Inspection Definition and its part and PMI are copied to the operation.
> - When you select an Inspection Definition, its corresponding **Model View** is displayed in the **PMI** tab, and its associated balloon is highlighted in the drawing.

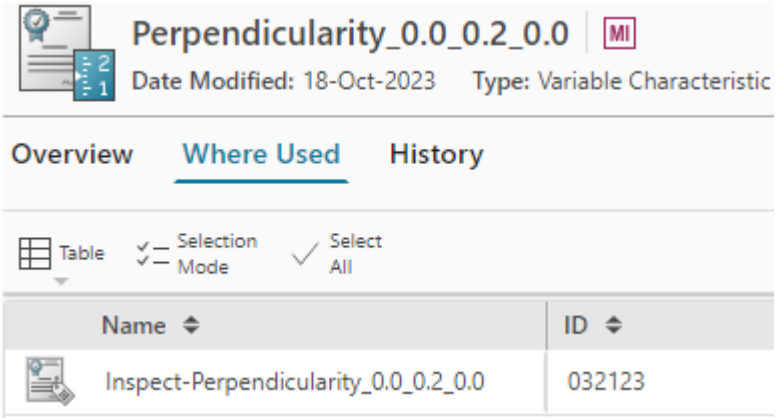
- Quality Characteristic in the associated Inspection Definition and Characteristics Group

  If the selected PMI matches one of the conditions defined in the active Import PMI Rule, a Characteristics Group is created by using the naming convention specified in active Import PMI Rule. The name and type of the Characteristics Group is assigned from the naming convention. In this Characteristics Group, Quality Characteristics are generated for each balloon that matches the conditions defined in the active Import PMI Rule. The name of the Quality Characteristics is generated from the values specified in the **Characteristic Name Definition** section of the naming convention. To view the source naming convention, click it in the **Naming Convention** field of the Quality Characteristic.



If the imported PMI does not match any of the conditions defined in the active Import PMI Rule, the Characteristics Group and Quality Characteristics are generated by using the **Default Naming Convention** specified for the active Import PMI Rule.

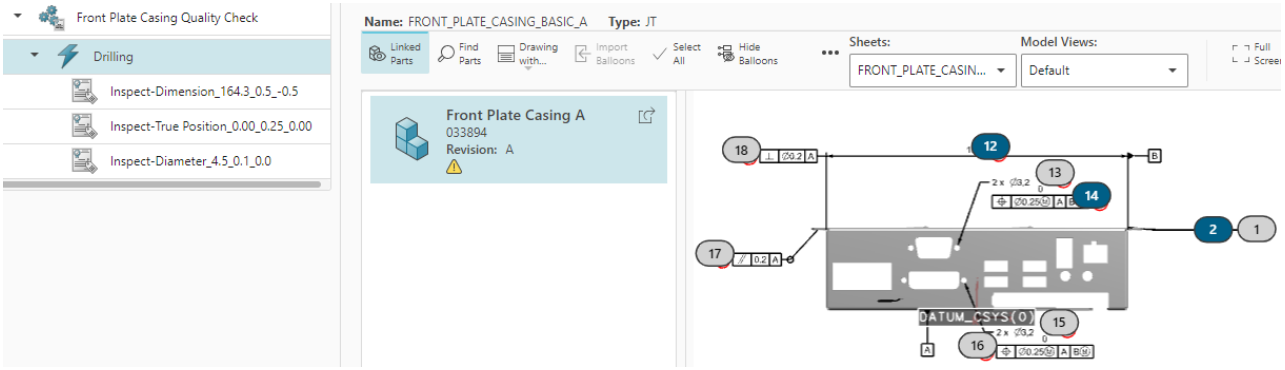
In the **Where Used** tab of the Quality Characteristic, you can view the details of the Inspection Definition that is using the Quality Characteristic.



While importing PMI, in some cases, the Quality Characteristics already exist in the Quality Master Data. In such cases, Control Plan does not create new Quality Characteristics, but uses the existing Quality Characteristics, and attaches them to the generated Inspection Definitions. The Quality Characteristic is created in the **TCM Released** status.

For more information, see **Create a naming convention to organize the Quality Characteristics generated from imported PMI** and **Create an Import PMI Rule to process the imported PMI**.

Additionally, the part is added to the **Linked Parts** panel of the **PMI** tab. The imported balloons are displayed in dark blue.



Note:

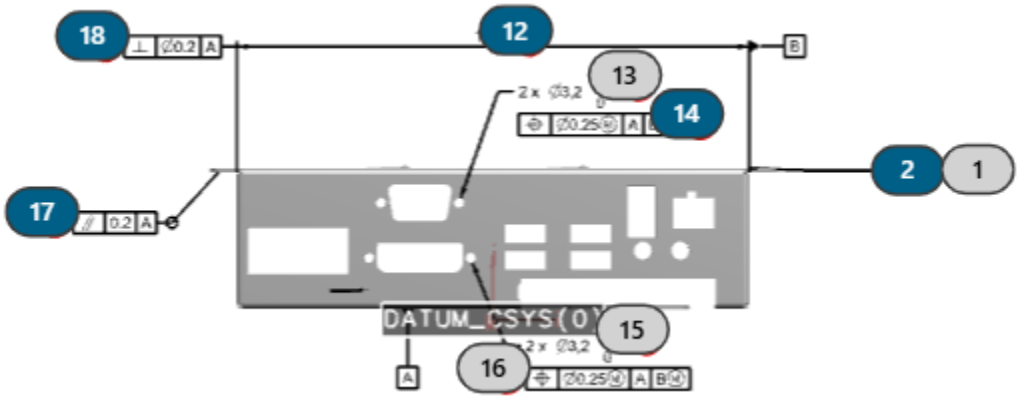
If the base Teamcenter version is 12.*x*, the parts are added to the **Drawings** section.

Compare revisions and import modified product and manufacturing information

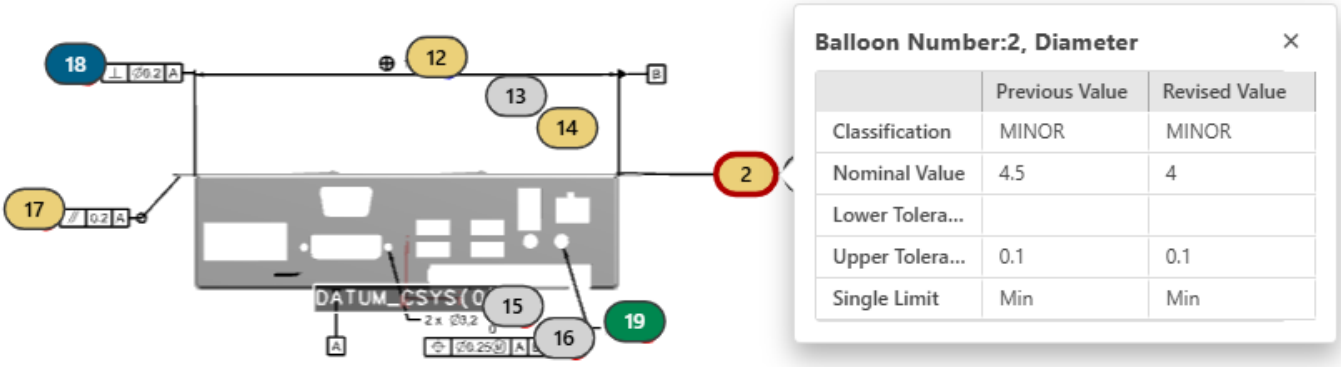
After generating Inspection Definitions from a part that contains product and manufacturing information (PMI), the part might be revised, and its PMI is modified. You can compare the PMI in the revisions to the original imported PMI and choose to import the modified PMI into the existing generated Inspection Definitions. In a rendered part drawing, the existing imported PMI is indicated using dark blue balloons. When you compare the revisions and select another revision, the modified PMI is indicated using orange balloons. When you select the orange balloons and import them, these balloons change from orange to dark blue. Additionally, the Quality Characteristic in the associated Inspection Definition is updated with the new PMI data.

Example:

Consider a scenario where you have imported balloons, **2**, **12**, **14**, **17**, and **18**. These imported balloons are indicated in dark blue.



When you compare the revisions, the modified PMI is indicated in orange balloons, **2**, **12**, **14**, and **17**. You can view a table of the previous and revised values when you click a single modified balloon or select a single row in the table. The **18** balloon is still indicated in dark blue because the PMI in this balloon is not modified in the new revision. The **19** balloon is indicated in green because it is a new balloon in the latest revision.



Note:

You can compare revisions only for parts created in the following:

- **BCT Inspector for NX and Solid Edge**
- **BCT Inspector for Neutral Formats**

Procedure

1. In the folder where you created the Control Plan, select and open the Control Plan that you want to edit.

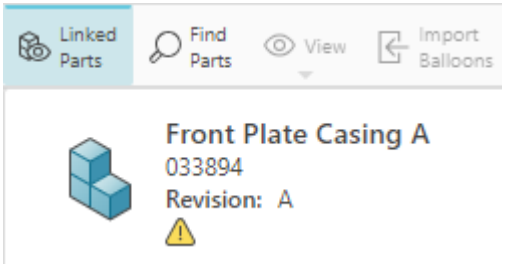
2. Select the Control Plan or the operation where you have **generated Inspection Definitions**.

3. In the right pane, click the **PMI** tab.

   The **Linked Parts** panel displays the parts where you have imported PMI. If a part is revised, a visual indicator appears below the part.

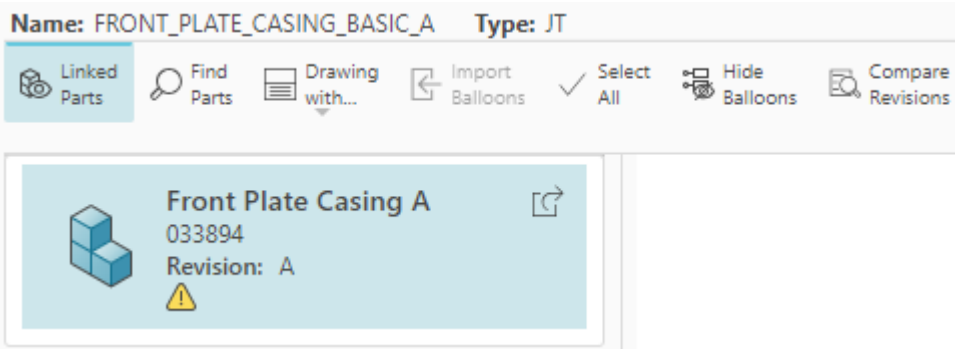
   Example:

   You have imported PMI from the **Front Plate Casing** part. This part appears in the **Linked Parts** panel.



4. In the **Linked Parts** panel, select the part where you want to compare revisions.

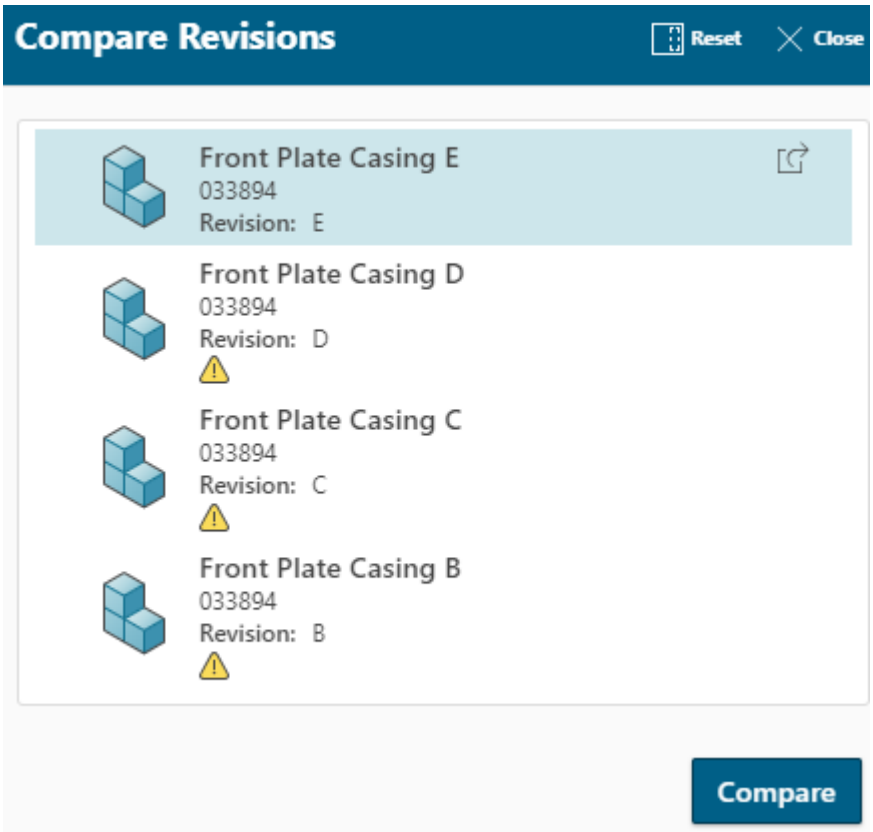
   The **Compare Revisions** option appears if the part is revised.



5. Click **Compare Revisions** to view the available revisions.

   Example:

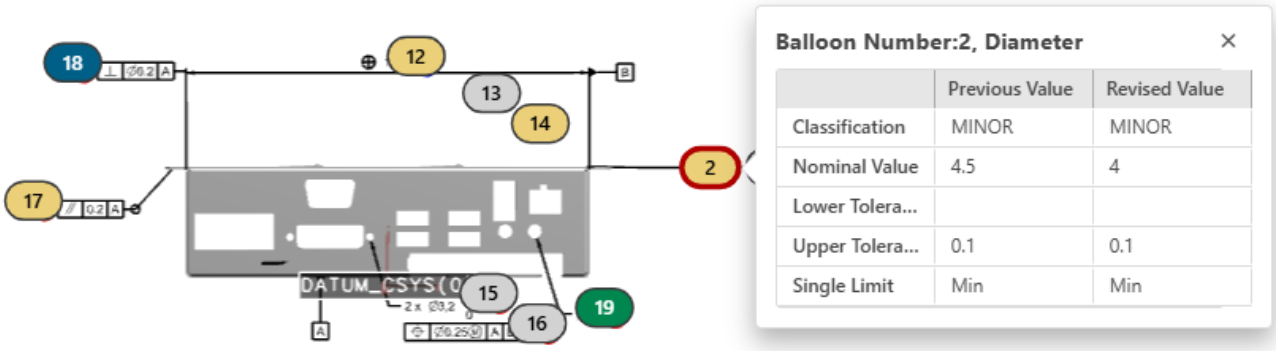
   The **Compare Revisions** panel displays the available revisions from **Front Plate Casing Revision A** to **Front Plate Casing Revision E**.



6. In the **Compare Revisions** panel, select the required revision.

   Example:

Select **Front Plate Casing Revision E**. The modified PMI is indicated in orange balloons, **2**, **12**, **14**, and **17**. When you click a single modified balloon or a row in the table, a table appears displaying the previous and revised values.

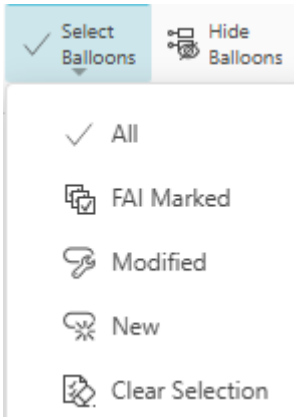


The **18** balloon is still indicated in dark blue because the PMI in this balloon is not modified in the new revision. The **19** balloon is indicated in green because it is a new balloon in the latest revision.

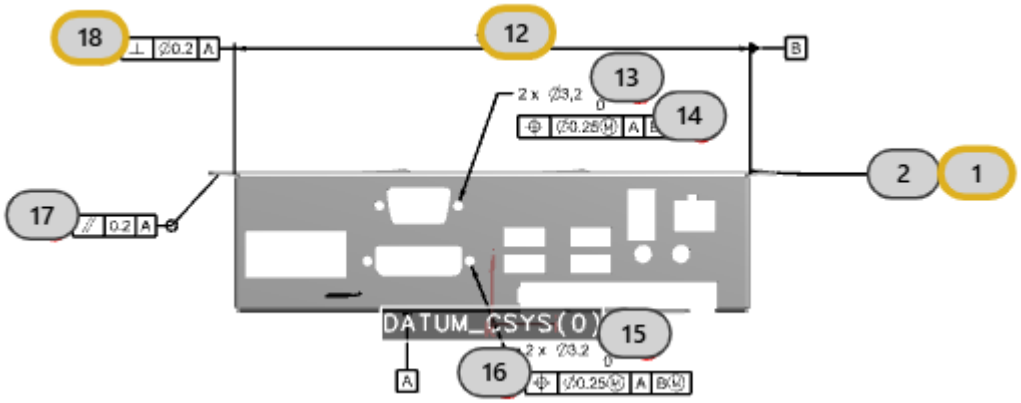
7. To import the modified PMI, select the required modified balloons.

   You can select multiple balloons using any of the following options:

   - Click **Select Balloons** > **Select All** to select all balloons.

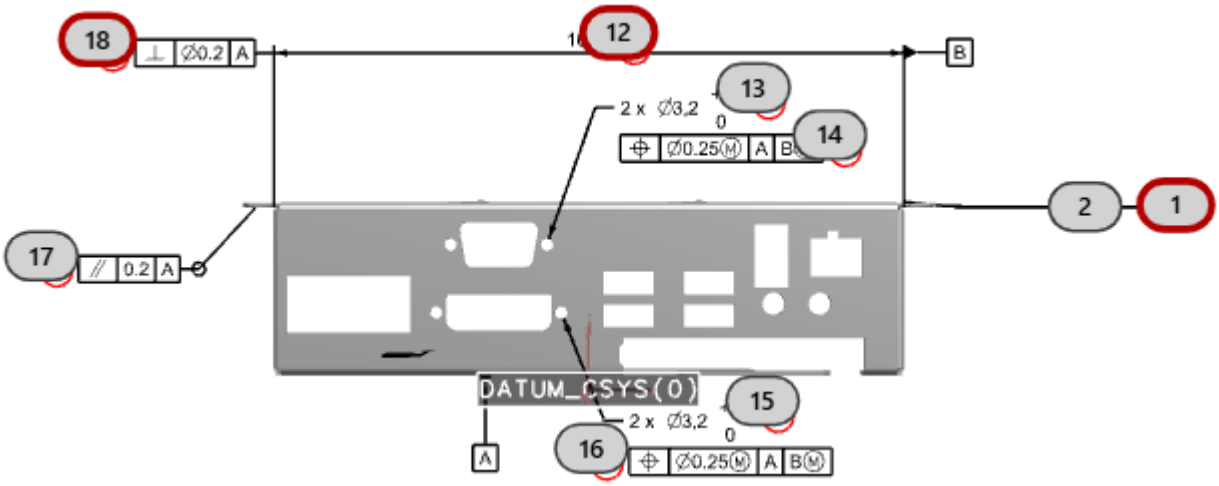


   - Click **Select Balloons** > **FAI Marked** to select only **FAI Marked** balloons. These balloons have a yellow border. It indicates that these balloons are marked for First Article Inspection (FAI). If you import **FAI Marked** balloons, then the **FAI Required** property is set to **True** in the generated Inspection Definitions.



- Click **Select Balloons** > **Modified** to select only modified balloons.
- Click **Select Balloons** > **New** to select only new balloons.
- Click **Select Balloons** > **Clear Selection** to clear any selections you have made.

When you select a balloon in the drawing, a red border appears on the balloon to indicate that the balloon is selected. Additionally, the corresponding characteristic is also selected in the table below the drawing. If you select a row in the table, the corresponding balloon is selected in the drawing. Subsequently, **Import Balloons** is displayed in the pane's toolbar.



8. Click **Import Balloons** in the pane's toolbar.

   A confirmation message appears with the following options:

   - Click **Update All** to update the referenced part revisions in the Inspection Definitions of non-modified balloons. The referenced part is updated to the selected target part revision. You can do this only for existing imported balloons that are not modified. Then, a notification message appears stating that the balloon was imported successfully.

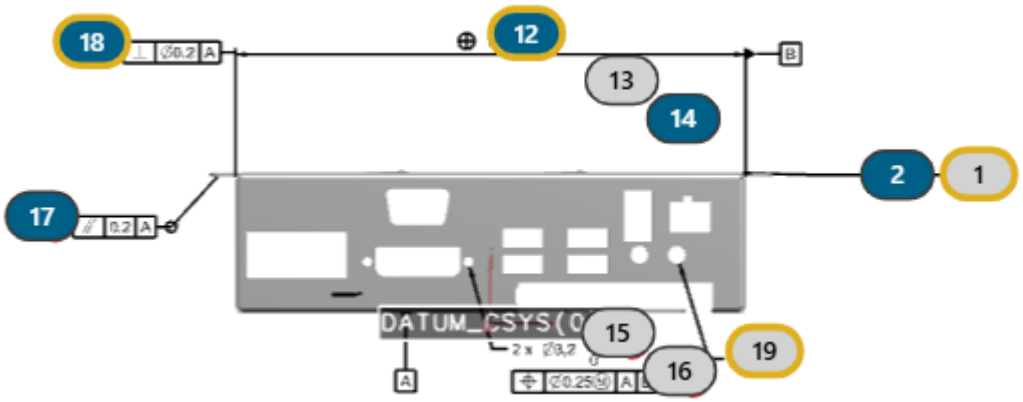
- Click **Cancel** to update the referenced part revisions in the Inspection Definitions of only the selected modified balloons.

> Note:
>
> If you select existing imported balloons and import them, a confirmation message appears with the following options:
>
> - Click **Re-import** to create new Inspection Definitions for the existing imported balloons. If you click **Re-import**, a notification message appears stating that the balloon was imported successfully.
> - Click **Skip** to create Inspection Definitions only for new balloons.

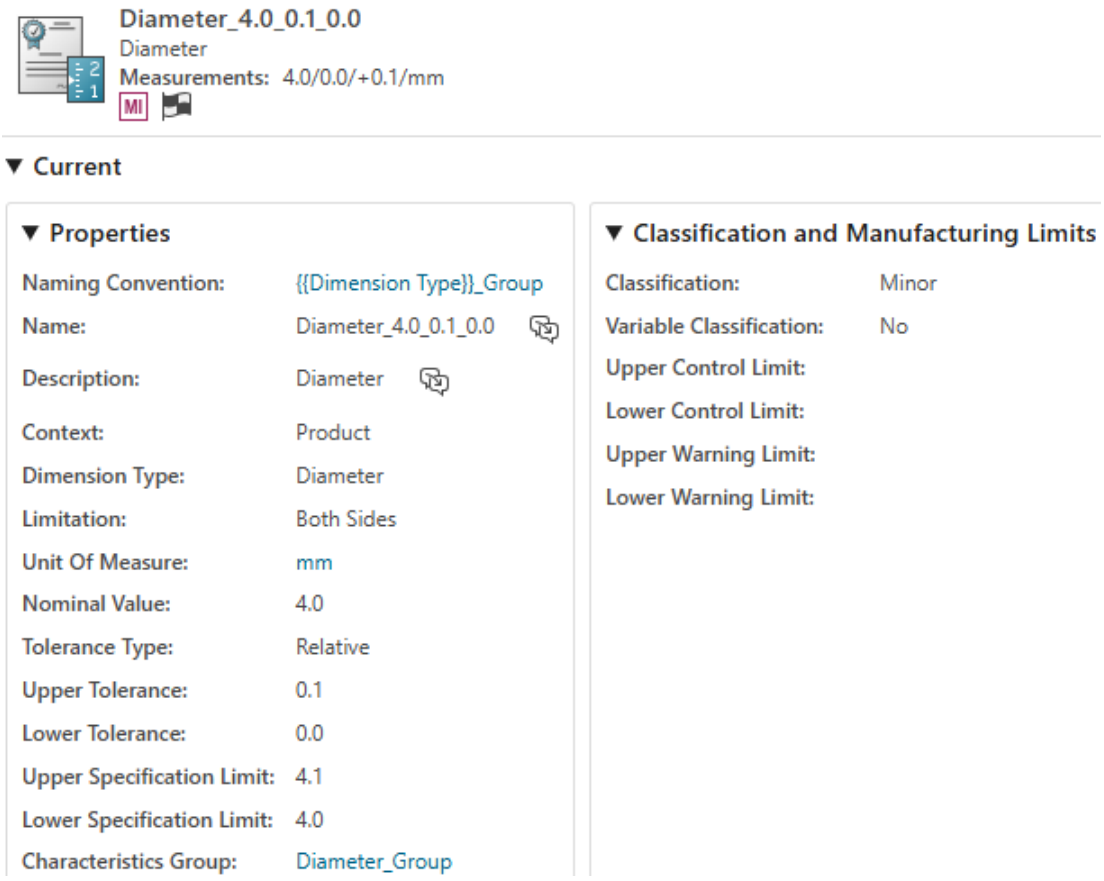
After the import is completed, the orange balloons are converted to dark blue balloons. In the existing Inspection Definitions, the Characteristic is updated with the values from the imported PMI. Additionally, the **Part Reference** section within the **Reference** area is updated to the latest revision of the part where you have imported PMI.

Example:

The PMI is imported from balloons **2**, and the color of the balloon changes to dark blue.



The Characteristics in the Inspection Definitions are updated with the values from the imported PMI:

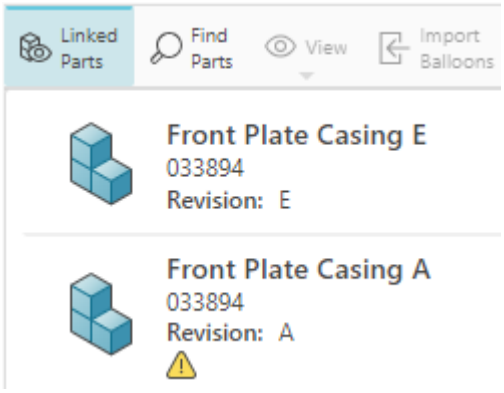


The **Part Reference** section within the **Reference** area is updated to the latest revision **E**.

9. To update the referenced part revisions in the Inspection Definitions of non-modified balloons, click **Update Part Reference** in the pane's toolbar.

   The referenced part is updated to the selected target part revision. You can do this only for existing imported balloons that are not modified.

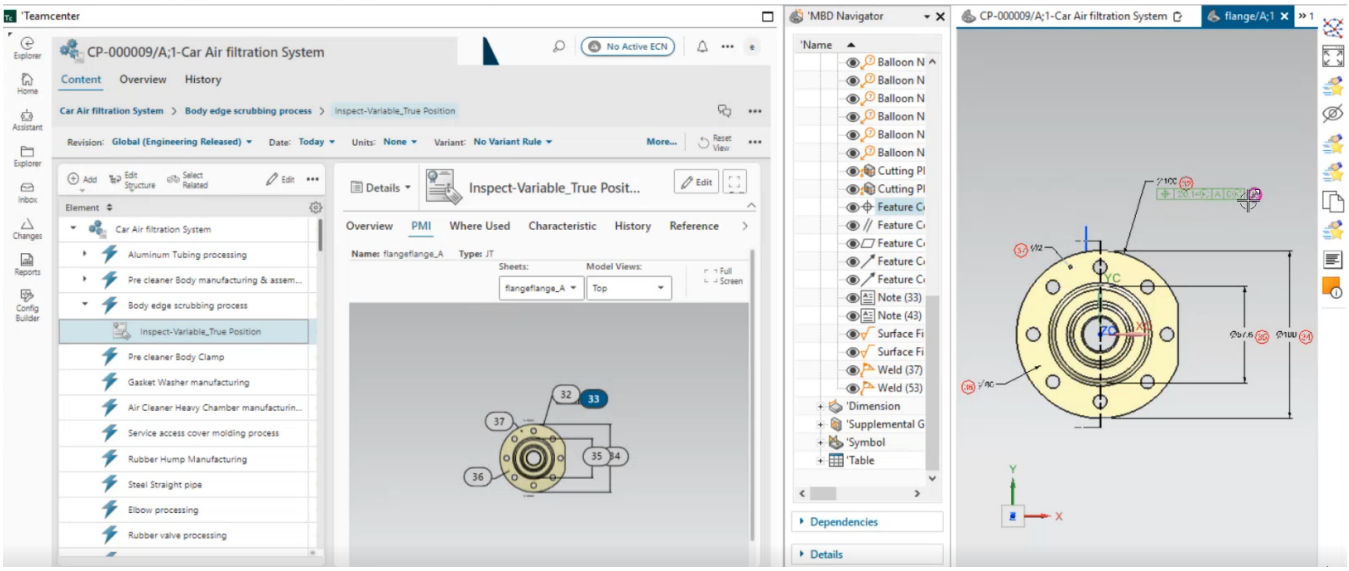
   After you click **Close Comparison** in the work area toolbar, the **Linked Parts** panel appears, and you can view the original part and the revised part.



Cross-probing of Control Plan PMI in Active Workspace embedded in NX

When working on a Control Plan in **Active Workspace** embedded in NX, you can cross-probe between the PMI in the graphics window in NX, the **Model-Based Definition (MBD) Navigator** in NX, and the Inspection Definitions of the Control Plan. With cross-probing, you can select an object in one application, resulting in the corresponding object being selected in other applications. When you select an Inspection Definition, its corresponding dimension is highlighted in the graphics window, which allows you to identify the dimension related to the Inspection Definition.

If you select a single or multiple Inspection Definitions in the Control Plan, the corresponding PMI objects are highlighted in the graphics window and the **MBD Navigator**. Also, if you select a single or multiple PMI objects in the graphics window or **MBD Navigator**, the Control Plan expands to the corresponding Inspection Definitions, which become highlighted in the Control Plan. If you clear any selections, the corresponding selections are also cleared.

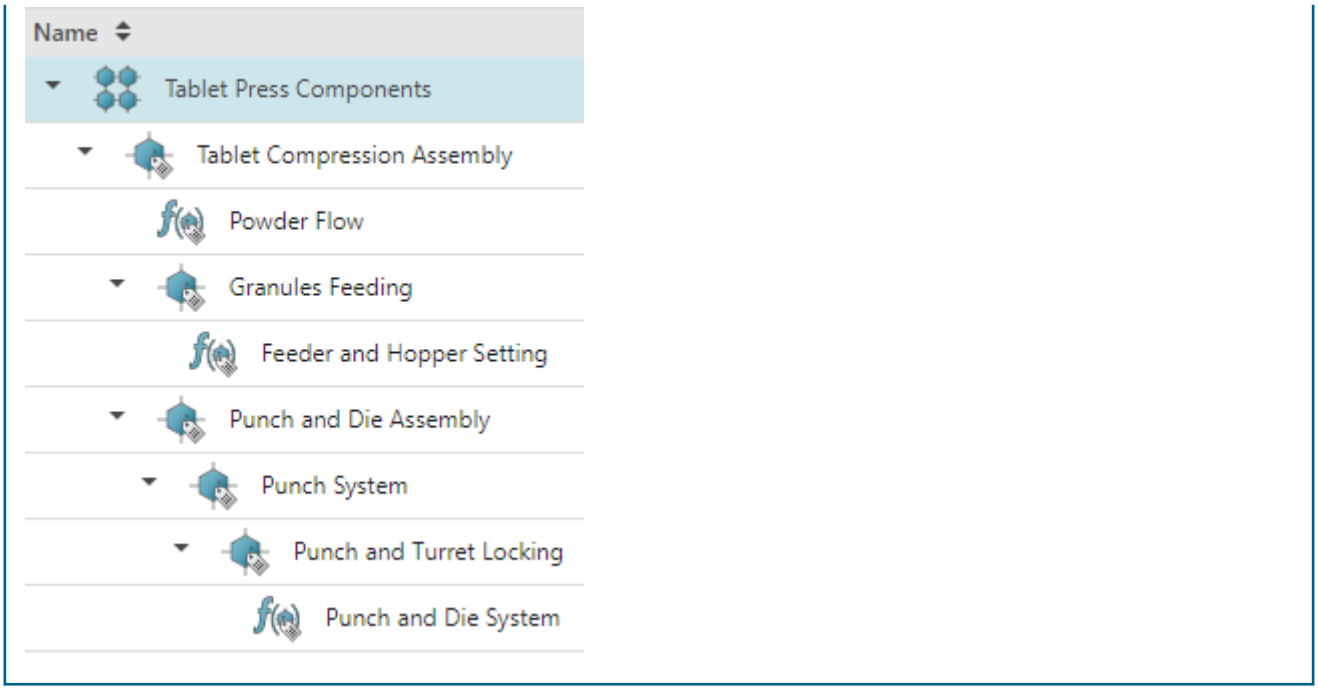


Generate a Control Plan from an FMEA

You can use an existing FMEA as the source for a Control Plan. Ideally, use an FMEA that has system element representations with function representations. The function representations can contain Inspection Definitions with the Quality Characteristics. When you generate a Control Plan, the top-level system element representations are generated as operations. In these operations, the Inspection Definitions from the function representations are generated as Inspection Definitions of the operations. Even though the function representations might be at different levels in the FMEA, their Inspection Definitions are attached to the operation generated from the top-level system element representations.

Example:

Consider a scenario where you want to generate a Control Plan from the following FMEA:



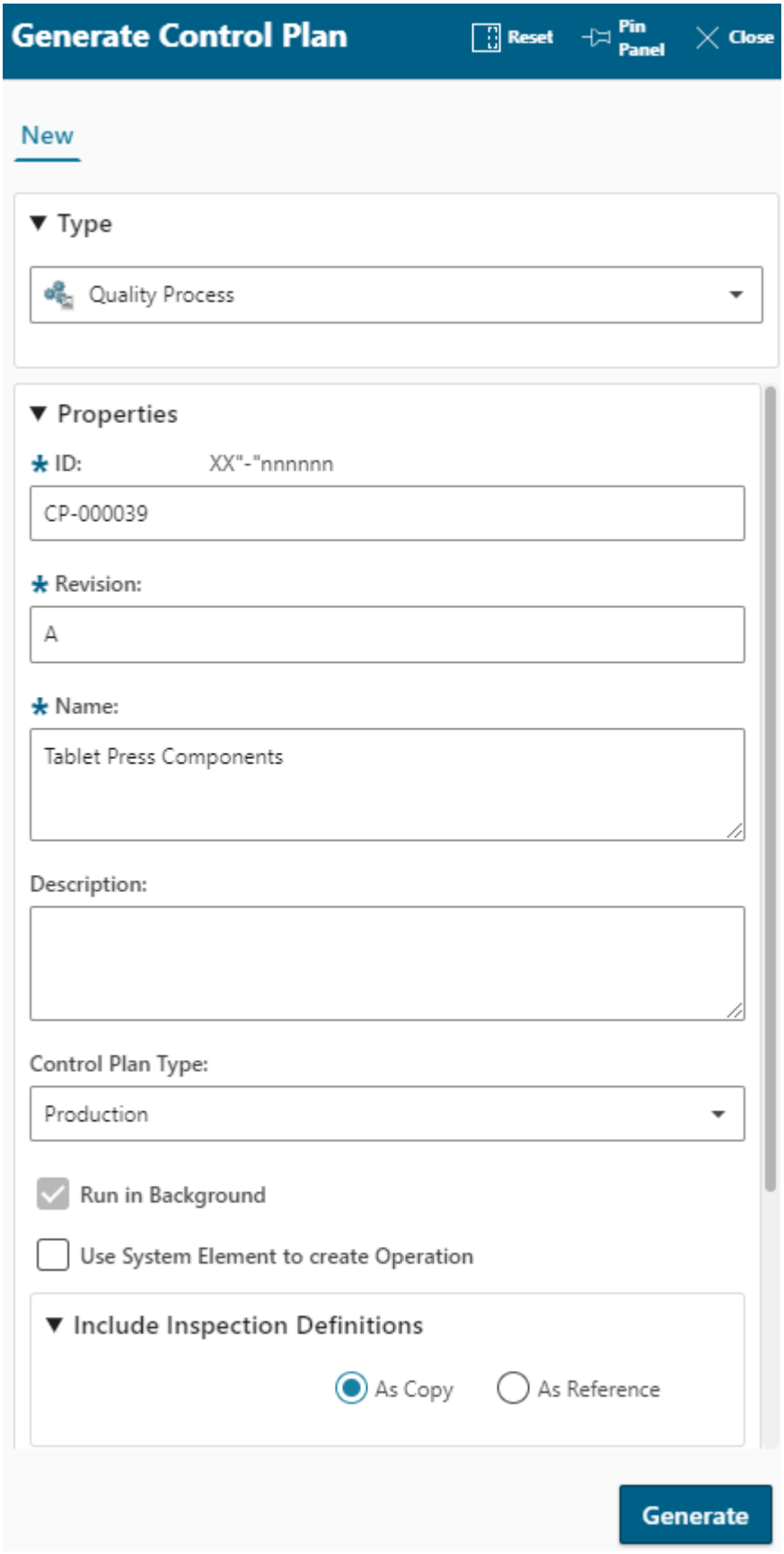
Procedure

1. Open the FMEA that you want to use as the source of a Control Plan.

   You can also generate a Control Plan from a system element representation.

2. Choose **More Commands** ••• > **New** ✳ > **Generate Control Plan**.

3. In the **Generate Control Plan** panel, type the name of the Control Plan.



4. In the **Description** box, describe the Control Plan.

5. From the **Control Plan Type** list, select the type of the Control Plan you want to create.

6. Select **Use System Element to create Operation** to generate operations from the top-level system element representations of the FMEA.

   The generated Inspection Definitions are attached to the operations.

Control Plan generated from an FMEA	Control Plan generated from a system element
If you do not select this check box, the generated Inspection Definitions are attached directly to the Control Plan generated from the FMEA. If no Inspection Definitions are attached to the functions, then the generated Inspection Definitions are added to the Control Plan directly.	If you are generating a control plan from a system element, and no Inspection Definitions are attached to the functions, then the generated Inspection Definitions are added to the top-level element of the FMEA.

7. In the **Include Inspection Definitions** section, to specify how the Inspection Definitions are linked between the FMEA and the Control Plan, select one of the following:

   - Select **As Copy** to create a copy of the FMEA's Inspection Definitions in the Control Plan. If you edit the Inspection Definitions in the FMEA, the updates do not impact the Control Plan's Inspection Definitions.

   - Select **As Reference** to use the same Inspection Definitions in the FMEA and the Control Plan. If you edit the Inspection Definitions in the FMEA, the updates are reflected in the Control Plan's Inspection Definitions as well.

8. Click **Generate**.

   A notification is displayed in the **Alerts** panel when the Control Plan is generated.

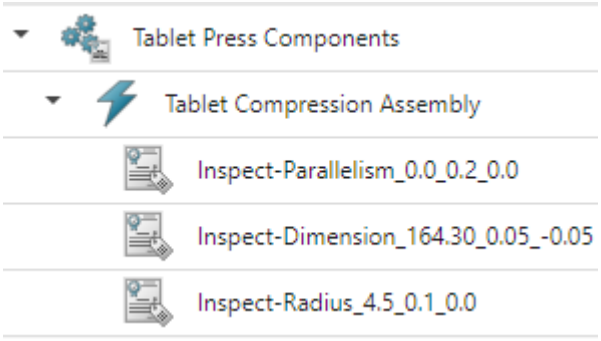
   > Note:
   >
   > The administrator must have started the Dispatcher services to generate the Control Plan.

9. Click **Alerts** and click the generated Control Plan in the **Target Object** section to open the Control Plan.

Example:

From the source FMEA, the **Tableting Component** system element representation is generated as the **Tableting Component** operation of the Control Plan. The **Hopper Function Testing**, **Powder Flow Inspection**, and **Punching Inspection** Inspection Definitions in the FMEA are generated as Inspection Definitions under the **Tableting Component** operation of the Control Plan.

The following Control Plan is generated from the FMEA:



Compare and align updates between the source FMEA and generated target Control Plan

After you generate a Control Plan from an FMEA, you might make updates to the source FMEA and the target Control Plan. To ensure that the target Control Plan and the source FMEA contain the latest data, you must compare and align the updates between them.

Some of the updates in the source FMEA can be:

- Adding new system elements, functions, or Quality Characteristics
- Editing existing FMEA properties, system elements, functions, or Quality Characteristics
- Removing system elements, functions, or Quality Characteristics

Some of the updates in the target Control Plan can be:

- Adding Inspection Definitions, Quality Characteristics, or reference objects
- Editing Inspection Definitions, Quality Characteristics, or reference objects
- Removing Inspection Definitions, Quality Characteristics, or reference objects

You can generate a summary of the differences between the source FMEA and the target Control Plan. You can review each difference, and then you can choose to align the update ensuring that the source FMEA and the target Control Plan contain the latest data.

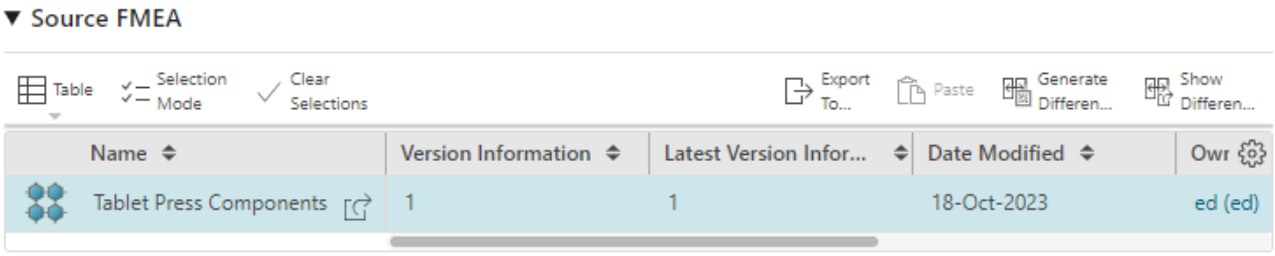
> Example:
>
> If you add an Inspection Definition to a function in the source FMEA, the summary notifies you that the Inspection Definition is missing in the target Control Plan. If you update an Inspection Definition in the Control Plan, the summary notifies you that the Inspection Definition exists only in the target Control Plan.

If the source FMEA is generated from an existing bill of materials (BOM) or bill of processes (BOP), the part from the product structure is added to the Inspection Definition as a reference in the FMEA. When you generate a Control Plan from this FMEA, the part is added to the Control Plan's Inspection Definition as a reference. If you remove the part from the Control Plan's Inspection Definition, you can add the part back to the Control Plan. To do this, generate a summary of the differences between the source FMEA and the target Control Plan, select the Inspection Definition where the reference object is modified, and align the difference.

Procedure

1. In the folder where you created the Control Plan, select and open the Control Plan that you want to compare and align with the source FMEA.

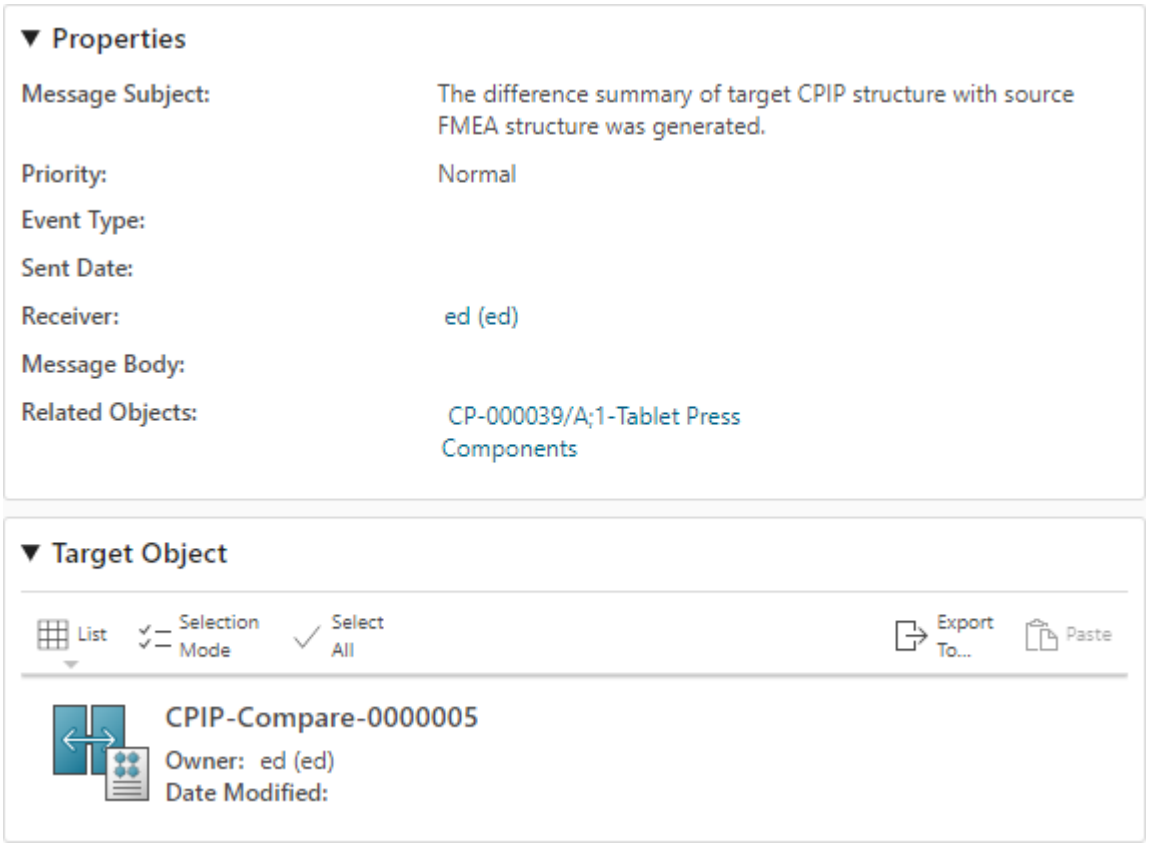
2. In the **Overview**, select the source FMEA in the **Source FMEA** section, and click **Generate Difference Summary** in the work area toolbar.



A notification is displayed in the **Alerts** panel when a summary of the differences is generated.

> Note:
>
> The administrator must have started the Dispatcher services to generate a summary of the differences.

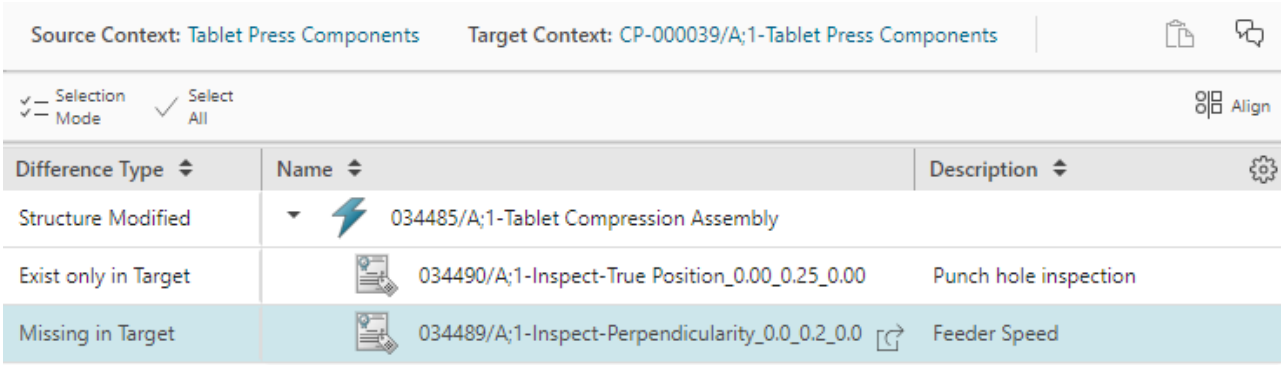
3. To view the summary, click **Alerts** and click the generated summary in the **Target Object** section.



To view the summary, you can also click **Show Difference Summary** in the work area toolbar.

4. Expand the summary to view the list of differences.

   The source FMEA and target Control Plan information is displayed, and you can compare and perform the alignment.



   > Example:
   >
   > **Exist only in Target** indicates that the update is available only in the target Control Plan. In the example depicted in the previous image, two Inspection Definitions were added in the target Control Plan, and they are indicated by **Exist only in Target**.
   >
   > **Missing in Target** indicates that the update is available only in the source FMEA. In the example depicted in the previous image, a function was added in the source FMEA, and it is indicated by **Missing in Target**.

5. Select a difference to be updated in the target Control Plan, and click **Align** in the work area toolbar.

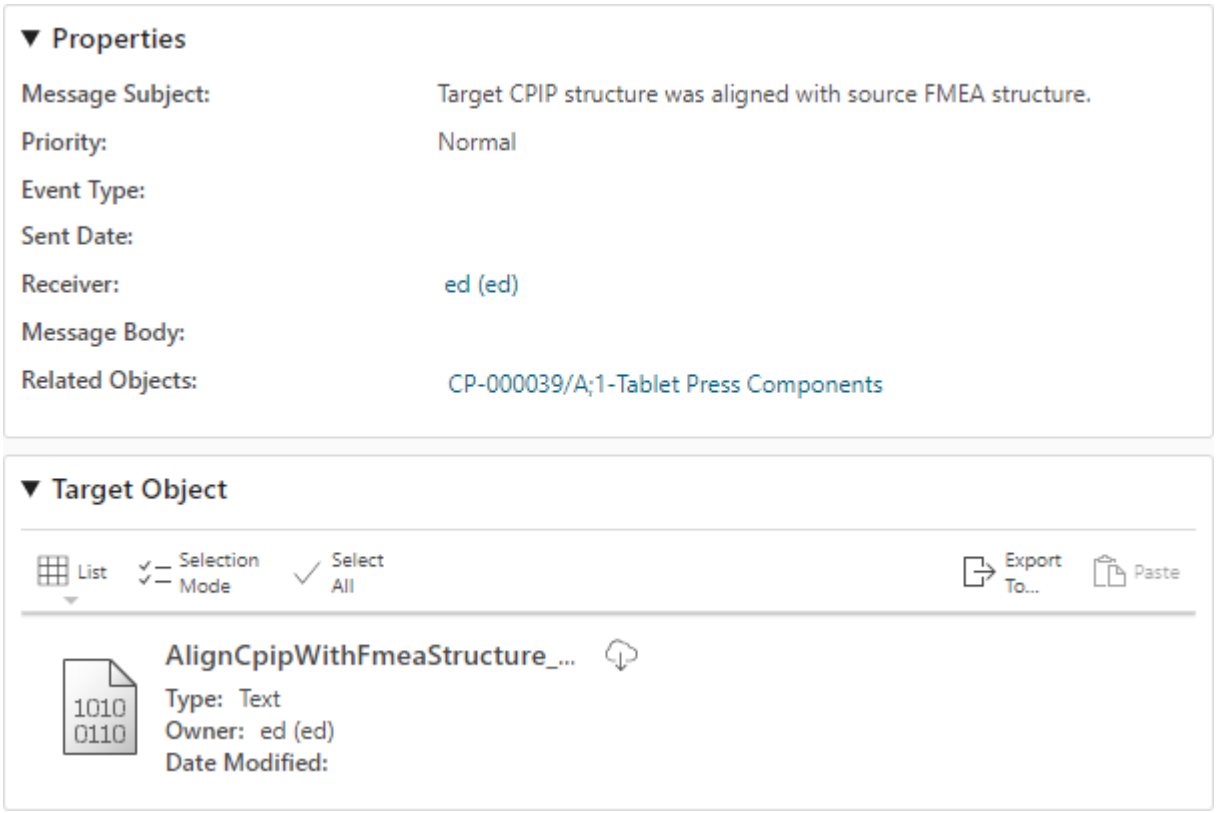
   The target Control Plan is updated from the source FMEA as follows:

   - If the update is **Missing in Target**, then the update is added to the target Control Plan.
   - If the update is **Exist only in Target**, then the update is removed from the target Control Plan.
   - If the update is **Structure Modified**, then no updates are made to the target Control Plan.

   A notification is displayed in the **Alerts** panel when the update is done.

   > Note:
   >
   > The administrator must have the Dispatcher services running to update the target Control Plan.

6. Click **Alerts** to view the details of the alignment update. You can also download the logs of the alignment update from the **Target Object** section.



Generate a DPV workbook from an operation

Dimensional Planning and Validation (DPV) is a quality management solution that you can integrate into your Teamcenter environment. DPV enables the extended enterprise to collect, manage, dimensionally analyze, and report quality-measurement information. It provides rapid access to design and manufacturing information that directly influences your enterprise's quality targets.

For each operation in a Control Plan, you can generate a DPV workbook. The generated workbook records information from the Inspection Definitions of the operation. For more information, see *Managing Inspection Plans and Shop Floor Data for Dimensional Planning and Validation* in the *Dimensional Planning and Validation* documentation.

1. In the folder where you created the Control Plan, select and open the Control Plan that you want to edit.

2. In the Control Plan, select the operation where you want to generate a DPV workbook from its Inspection Definitions.

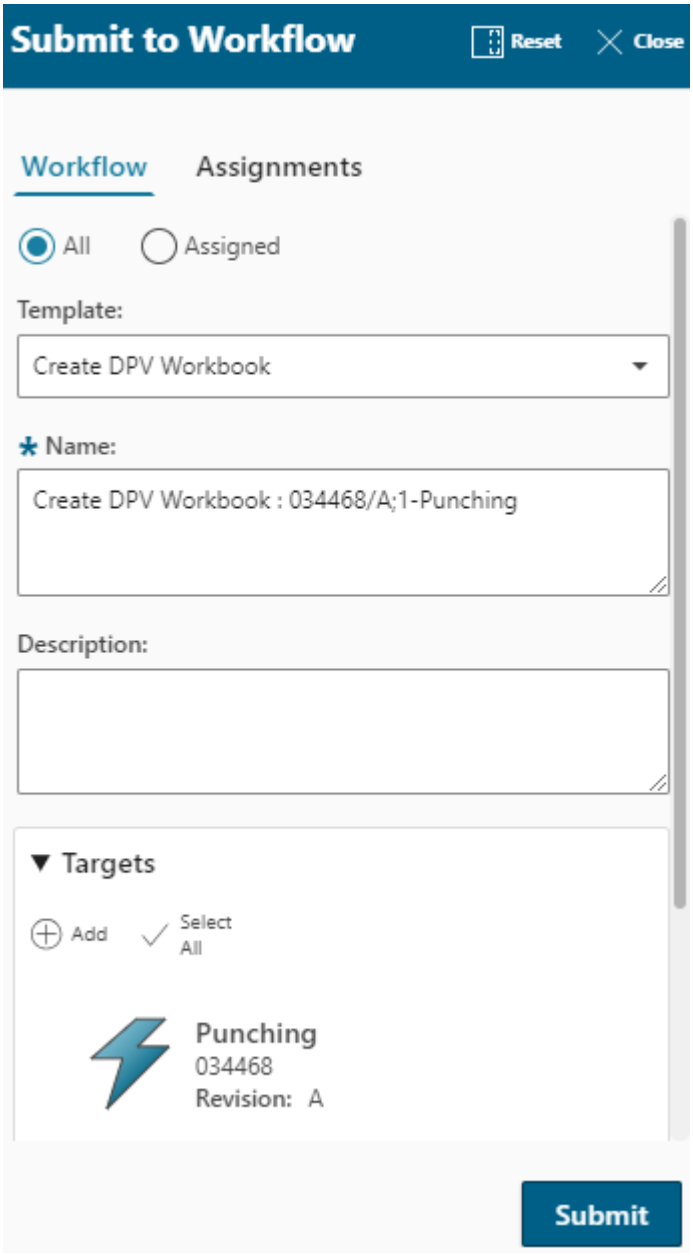
3. Choose **More Commands** ••• > **Manage** > **Submit to Workflow**.

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

    a. From the **Template** list, ensure that the **Create DPV workbook** workflow is selected.

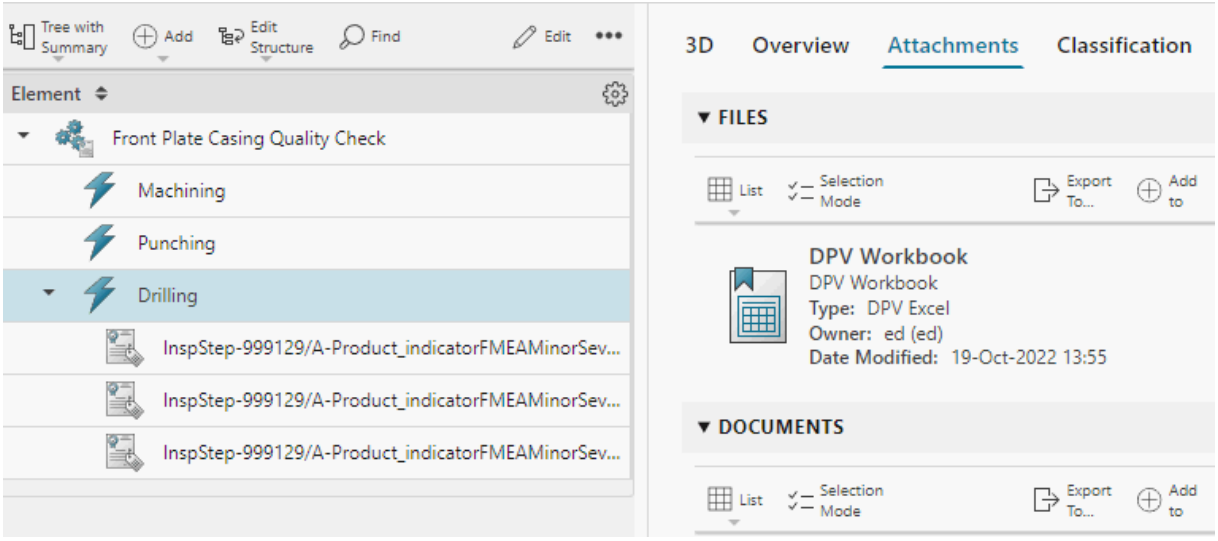
b. Accept the default workflow **Name** or type your own.

c. Enter a **Description** for the new workflow.

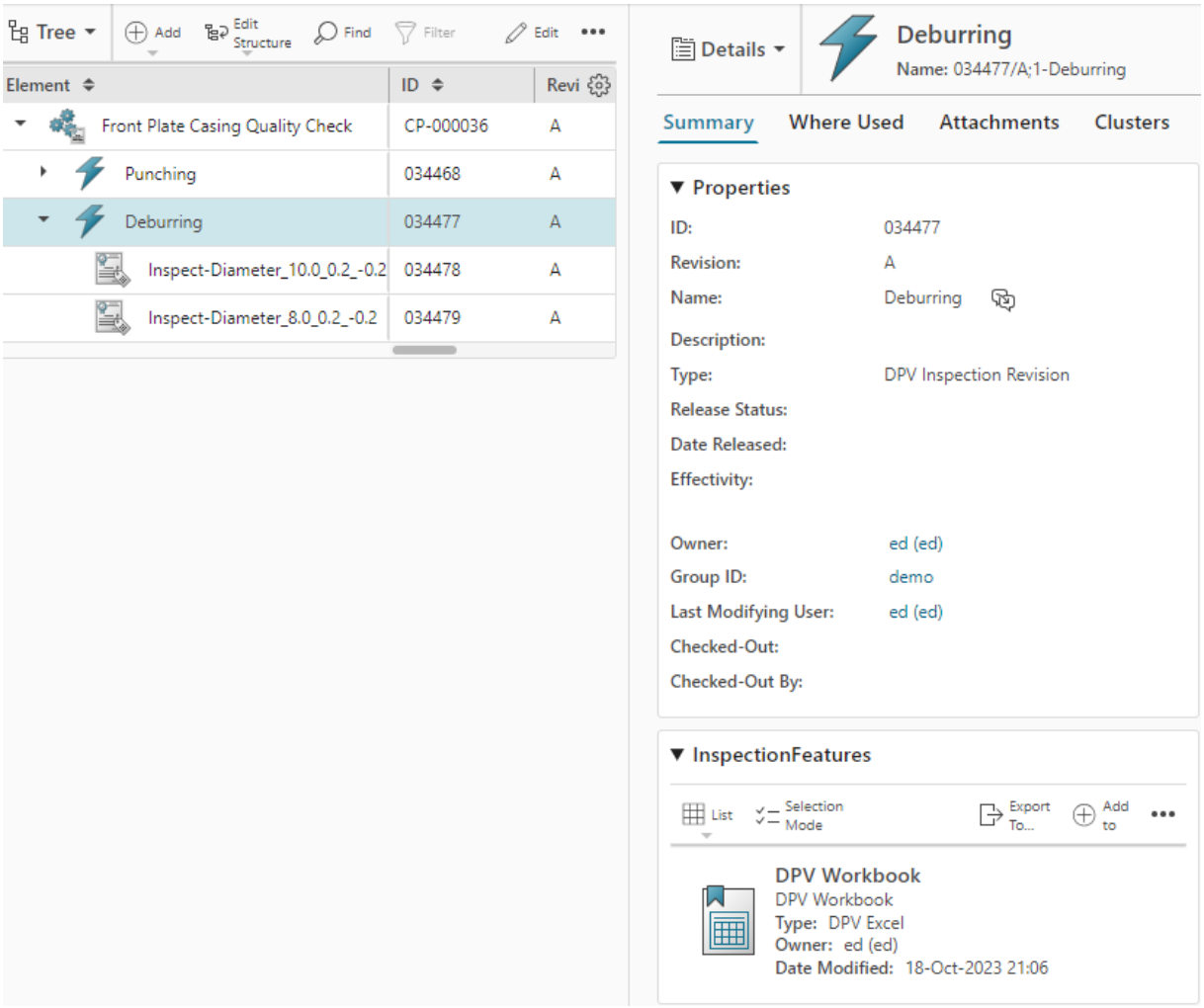


d. Click **Submit**.

If you are generating a DPV workbook for a Manufacturing operation, the DPV workbook is generated and added to the **Attachments** tab in the right pane.



If you are generating a DPV workbook for a DPV operation, the DPV workbook is generated and added to the **InspectionFeatures** section of the **Summary** tab in the right pane.



To download the DPV workbook, select it and click **Download File**.

5. If you update an existing Inspection Definition or add a new Inspection Definition to an operation, you can regenerate the DPV workbook by submitting the operation to the **Create DPV workbook** workflow.

   The DPV workbook is regenerated and contains the information from the updated or new Inspection Definition.

6. To create cluster groups for combining multiple clusters from different sources and inspection operations, do the following:

   a. Select the required DPV operation and click the **Clusters** tab in the right pane.

   b. In the **Clusters** section, click **Add to**.

   c. In the **Add** panel, specify the information required to create a DPV cluster.

   Cluster and cluster group help quality analysts to access the features quickly and easily in DPV Reporting & Analysis. The cluster of features and cluster group of clusters that you define from different sources and inspection devices in design data can be accessed in DPV Reporting & Analysis.

   For more information, see *Analyzing Measurement Data and Publishing Reports for Dimensional Planning and Validation* in the *Dimensional Planning and Validation* documentation.

Release a Control Plan

After you create, review, and get the Control Plan approved by the necessary stakeholders, you must release it to make it available for use. This releases all the associated objects of the Control Plan, including the operations, Inspection Definitions, control methods, and unreleased Quality Characteristics added to the Inspection Definitions.

Procedure

1. In the folder where you created the Control Plan, select and open the Control Plan that you want to release.

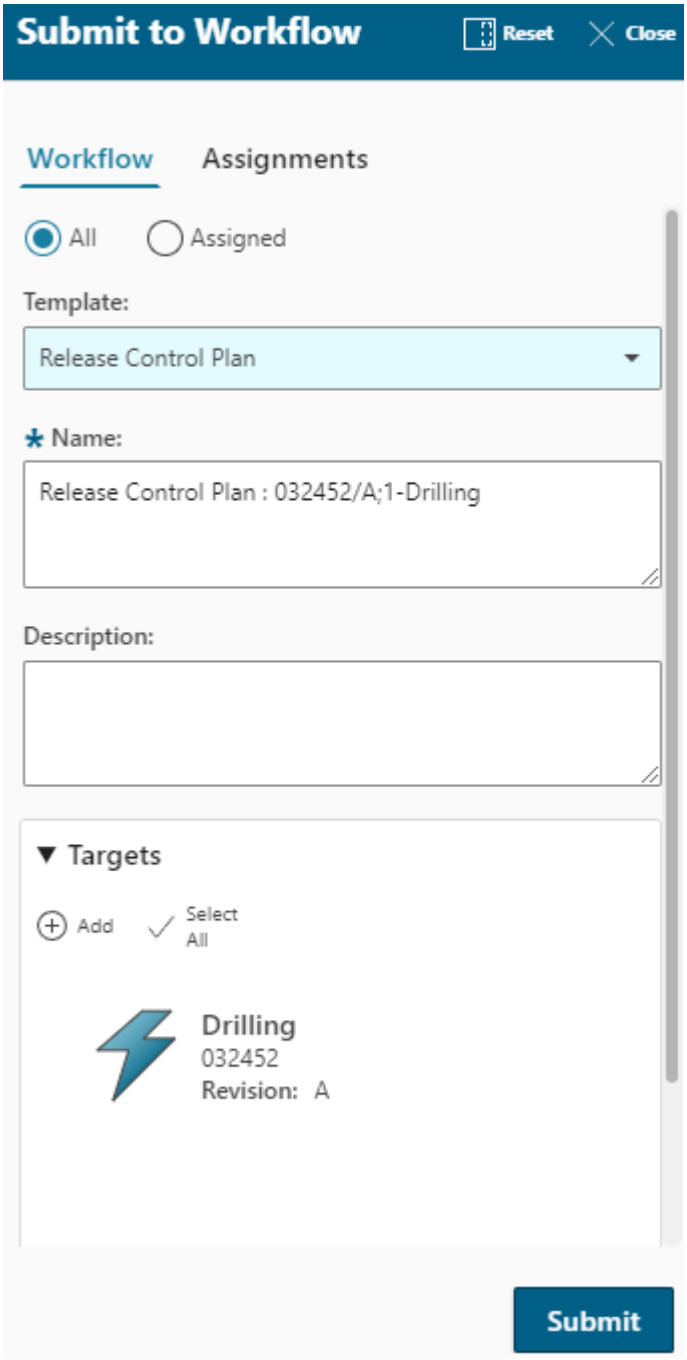
2. Select the Control Plan or an operation of the Control Plan, and choose **More Commands** ••• > **Manage** > **Submit to Workflow**.

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

   a. From the **Template** list, select the **Release Control Plan** workflow.

   b. Accept the default workflow **Name** or type your own.

c. Enter a **Description** for the new workflow.



d. Click **Submit**.

The workflow releases all the associated objects of the Control Plan, including the operations, Inspection Definitions, control methods, and unreleased Quality Characteristics added to the Inspection Definitions.

> Note:
>
> Reference objects of Inspection Definitions are excluded from this workflow.

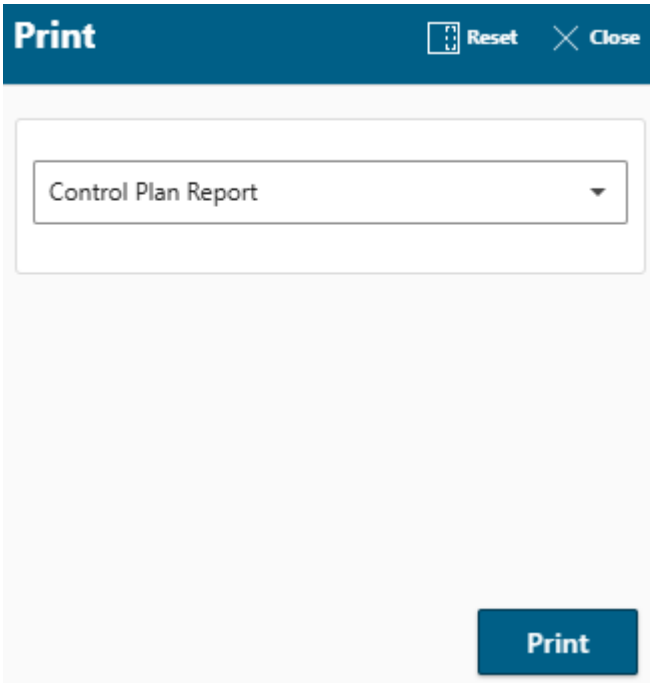
Print the Control Plan

After you complete creating the Control Plan, you can preview and print the Control Plan to generate a Control Plan norm document.

1. In the folder where you created the Control Plan, select and open the Control Plan that you want to print.

2. Select the Control Plan in the left pane, and choose **More Commands** ••• > **Share** > **Print**.

3. In the **Print** panel, select the report style, and click **Print**.



   The HTML report is added to the **Attachments** tab for the current session only.

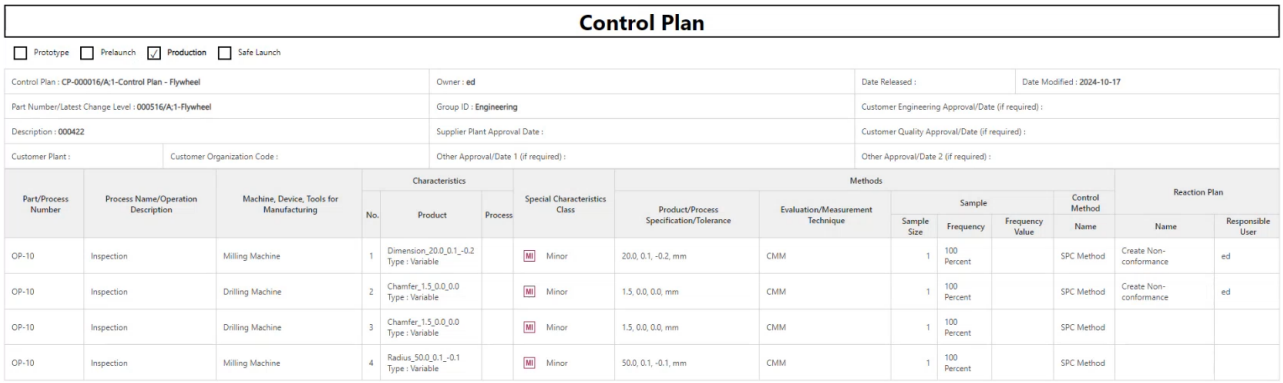
4. To view the Control Plan norm document, download the HTML report from the **Attachments**.

5. Use your browser print function to print the Control Plan.

6. After printing the Control Plan, you can preview the Control Plan by using any of the following methods:

- Select the Control Plan in the left pane, and, in the right pane, click the **Overview** tab, and expand the **Preview** section.

- Select the Control Plan in the left pane, and, in the right pane, click the **Document** tab to preview the Control Plan.



Control Plan

☐ Prototype ☐ Prelaunch ☑ Production ☐ Safe Launch

Control Plan : **CP-000016/A;1-Control Plan - Flywheel**	Owner : **ed**	Date Released :	Date Modified : **2024-10-17**
Part Number/Latest Change Level : **000516/A;1-Flywheel**	Group ID : **Engineering**	Customer Engineering Approval/Date (if required) :	
Description : **000422**	Supplier Plant Approval Date :	Customer Quality Approval/Date (if required) :	
Customer Plant : / Customer Organization Code :	Other Approval/Date 1 (if required) :	Other Approval/Date 2 (if required) :	

Part/Process Number	Process Name/Operation Description	Machine, Device, Tools for Manufacturing	Characteristics			Special Characteristics Class	Methods					Reaction Plan	
			No.	Product	Process		Product/Process Specification/Tolerance	Evaluation/Measurement Technique	Sample		Control Method		
									Sample Size	Frequency	Frequency Value	Name	Name	Responsible User
OP-10	Inspection	Milling Machine	1	Dimension_20.0_0.1_-0.2 Type : Variable		MI Minor	20.0, 0.1, -0.2, mm	CMM	1	100 Percent		SPC Method	Create Non-conformance	ed
OP-10	Inspection	Drilling Machine	2	Chamfer_1.5_0.0_0.0 Type : Variable		MI Minor	1.5, 0.0, 0.0, mm	CMM	1	100 Percent		SPC Method	Create Non-conformance	ed
OP-10	Inspection	Drilling Machine	3	Chamfer_1.5_0.0_0.0 Type : Variable		MI Minor	1.5, 0.0, 0.0, mm	CMM	1	100 Percent		SPC Method		
OP-10	Inspection	Milling Machine	4	Radius_50.0_0.1_-0.1 Type : Variable		MI Minor	50.0, 0.1, -0.1, mm	CMM	1	100 Percent		SPC Method		

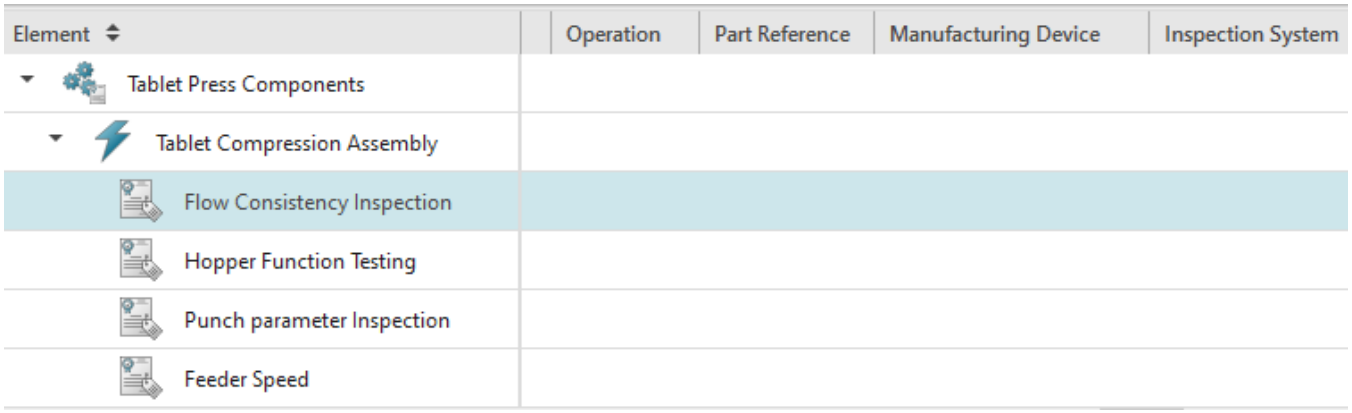
7. Sharing and reusing Control Plans

View reference details of an Inspection Definition

When the reference information is updated for a selected Inspection Definition, the values are displayed in the respective columns. You can view the information for all Inspection Definitions in one location without navigating to the **Reference** tab of each Inspection Definition.

You can view the following reference details when you select an Inspection Definition in the primary work area:

- **Operation**
- **Part Reference**
- **Manufacturing Device**
- **Inspection System**



Export a Control Plan for review or sharing

You can export a Control Plan externally for review or sharing purposes through a ZIP file.

1. Select the Control Plan to be exported, and choose **More Commands** ••• > **Import/Export** > **Export PLM XML** to display the **Export PLM XML** panel.

2. Accept the default file name or update it as necessary.

3. From the **Transfer Mode** list, select the **ACPExportControlPlanStructure** transfer mode to determine what Control Plan data is exported.

4. (Optional) Specify export languages to export as appropriate.

5. Click **Export** to create the exported PLM XML file. The export begins and you receive an alert when the export is complete.

Review the export report

You receive a report alert when your export completes. Click the alert to view the export report. Access all recent alerts from the **Subscription** tile.

The **Properties** section of the report includes details about the export such as the type of export, export completion status, and transfer mode used. Under **Related Objects**, click on the export log entry to view a detailed list of actions and results from the export.

Create a Control Plan by importing an existing Control Plan

You can create a Control Plan from an existing one by importing the Control Plan.

1. Select the folder to import the Control Plan.

2. Choose **More Commands** ••• > **Import/Export** > **Import PLM XML** to display the **Import PLM XML** panel.

3. Use **Choose File** to locate the *.zip* Control Plan file on your local system.

4. From the **Transfer Mode** list, select the **incremental import** transfer mode to determine what Control Plan data is imported.

5. Click **Import** to import the objects in the *.zip* file. The import begins and you receive an alert when the import is complete.

Review the import report and objects

You receive a report alert when your import is complete. Click on the alert to view the report. (Access all recent alerts from the **Subscription** tile.

Related Objects shows the folder in which the objects were imported, In **Target Object**, view a detailed list of actions and results during the import.

Open the folder in which the objects were imported and review the imported structure.