Aras Innovator 12.0R1

Product Engineering User Guide

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Document Conventions

The following table highlights the document conventions used in the document:

Table 1: Document Conventions

Convention	Description
Bold	Emphasizes the names of menu items, dialog boxes, dialog box elements, and commands. Example: Click **OK**.
`Code`	Code examples appear in `courier` font. It may represent text you type or data you read.
`Yellow highlight`	Code highlighted in yellow draws attention to the code that is being indicated in the content.
`Yellow highlight with red text`	Red text highlighted in yellow indicates the code parameter that needs to be changed or replaced.
Italics	Reference to other documents.
	Notes contain additional useful information.
	Warnings contain important information. Pay special attention to information highlighted this way.
Successive menu choices	Successive menu choices may appear with a greater than sign (-->) between the items that you will select consecutively. Example: Navigate to **File** --> **Save** --> **OK**.

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1 Application Overview

The Aras Product Engineering application is a business-ready solution for product definition and engineering change management across the enterprise. Product Engineering includes core PLM data and process functionality such as Parts, Bill of Materials (BOM), Documents, CAD Documents, Approved Manufacturer Lists/Approved Vendor Lists (AML/AVL) and Change items.

Benefits of the Aras Product Engineering application include:

- Visibility into key development indicators increases engineering effectiveness and provides a basis for continuous improvement.
- Secure online management of product definition processes fosters the development of high-quality products.
- Engineering change management reduces cycle times and streamlines business operations.
- Controlled product information release between departments, divisions, suppliers, and customers provides effective coordination.
- Reuse of product and process information increases productivity and controls costs.
- Industry best practices for configuration management and engineering change are incorporated using CMII principles and processes.
- Unparalleled flexibility enables application modification to address proprietary engineering processes and specific competitive practices.

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2 User Interface (UI) Overview

In Aras Innovator 12.0, a new User Interface (UI) is introduced to improve the User Experience (UX) in interacting with the Aras platform and applications. This section describes essential UI interactions and components to navigate in the Product Engineering application.

The Aras Innovator 12.0 UI is dynamic; UI components, such as dialogs, toolbars, and buttons are shown or hidden depending on the context. Additionally, when a UI component is displayed in a lighter color, it indicates that this component is not available in the current context.

2.1 Client Header

Upon login, Aras Innovator 12.0 displays the **Header**, which contains:

1. The **Navigation** button
2. The **Enterprise Search** box
3. The **Corporate Time** box
4. The **Notifications** button
5. The **User Menu** button

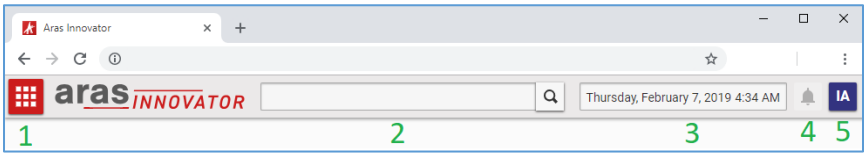

Figure 1.

Clicking the **User Menu** button displays the **User Menu** for Aras Innovator management.

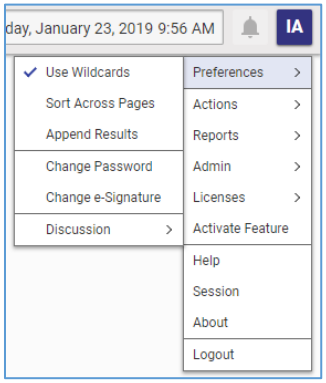

Figure 2.

2.2 The Navigation Button

Clicking the **Navigation** button displays the **Navigation Panel.** The panel displays the Aras Innovator Table of Contents. A User's permissions determine the entries that appear in the Navigation Panel. The Navigation Panel disappears when you click outside the TOC.

Click the **Pin** button in the Navigation Panel to pin it to the UI.

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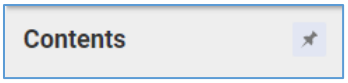

Figure 3.

The item types that appear in the **Navigation** panel are grouped in categories and subcategories, which can be expanded and collapsed.

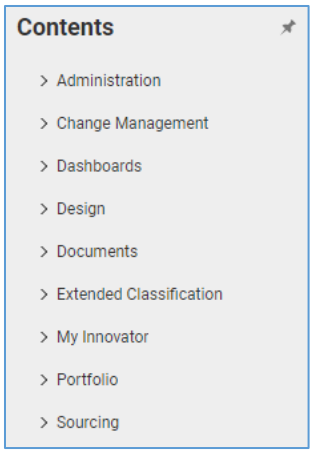

Figure 4.

When you select an Item type in the Navigation panel, the **Search** icon appears. Click this icon to access the Search grid.

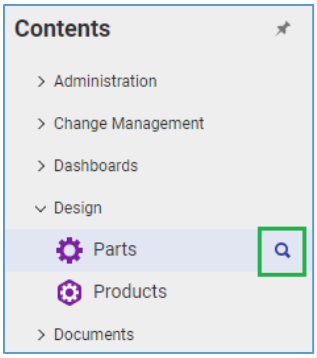

Figure 5.

When you click an item type on the **Navigation** panel, a menu similar to the following appears:

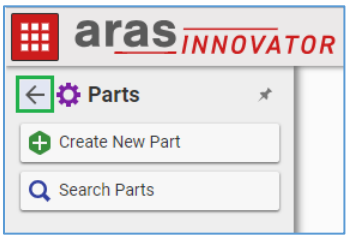

Figure 6.

- Click the **left arrow** to return to the Navigation panel.
- Click **Create New *Item Type*** to create an item.
- Click **Search *Item Type*** to access the Search grid and search for an item.

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The Product Engineering application has several categories on the **Navigation** panel:

- **Change Management** contains Engineering Change Items, such as Problem Reports (PRs), Engineering Change Requests (ECRs) and Engineering Notices (ECNs). This list may vary depending on how an administrator configures the system.
- **Design** contains Part and Product items.
- **Documents** contains Document and CAD Document items.
- **Sourcing** contains Manufacturers, Manufacturer Parts, and Vendor items.

2.3 Search Page

The **Search** page in Aras Innovator contains:

1. The **Search** toolbar
2. The **Search** grid
3. The **Page Navigation** bar

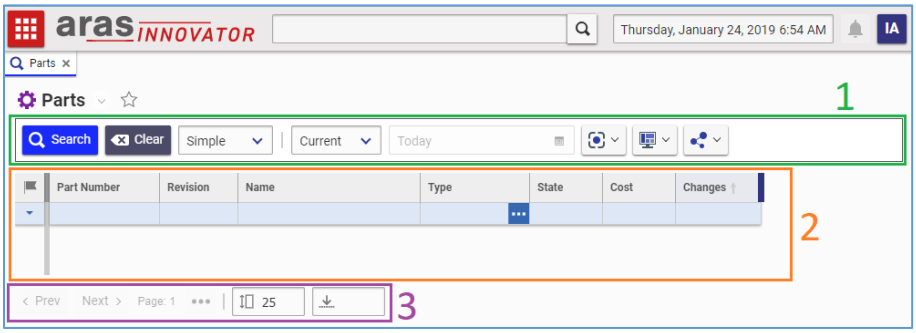

Figure 7.

Click an item in the search results to select it and see its details; double-click the item to open it in a new item view or right-click it to access the context menu. If you select multiple items, the context menu displays multi-item actions applicable for that item type.

2.3.1 Search Toolbar

The **Search** toolbar enables you to search for items and view the search results:

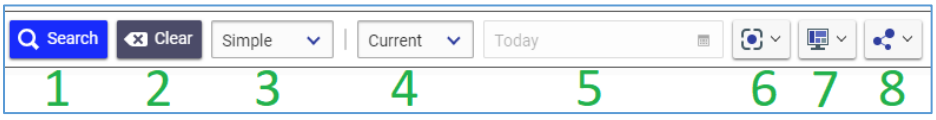

Figure 8.

1. Click the **Search** button to run a search.
2. Click the **Clear** button to clear search criteria.
3. **Search modes** dropdown menu:
   - Use **Simple** search when the columns that appear in the search grid are sufficient for the desired search criteria.
   - Use **Advanced** search when entering complex search criteria where each criterion can use one of these operators: =, ≠, like, not like, null, not null.

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- Use **AML** search to create a complex search query.
- Use **Hidden** to hide the search criteria from the search grid.

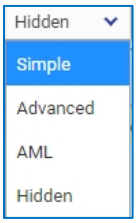

Figure 9.

- All searches are case insensitive.
- Use ***** or **%** as a wildcard search.
- Use ***** to search for all non-blank values.
- Use 0 or 1 to filter on properties with check boxes: 0 corresponds to not-checked, 1 corresponds to checked values.

1. **Query Type** menu:
   - **Current** returns the current version of items.
   - **Latest** returns the most recent version of items based on a specified date.
   - **Released** returns the most recent version in the released state on a specified date.
   - **Effective** returns the effective version on a specified date.

Figure 10.

2. The **Query Date** dialog box enables you to select a date in conjunction with the **Latest**, **Released**, and **Effective** Query Types. By default, it is set to Today.
3. The **Refine** menu presents a list of item Properties and Extended Properties to select that appear in the Search Grid.

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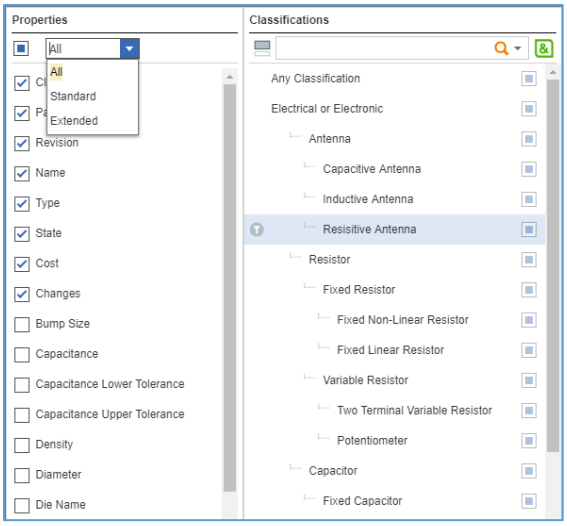

Figure 11.

4. The **Display** menu presents the following options that determine the level of details to display when you select an item from the search results.
    - Choose **Form** to display selected an item's form at the bottom pane of the search results page.

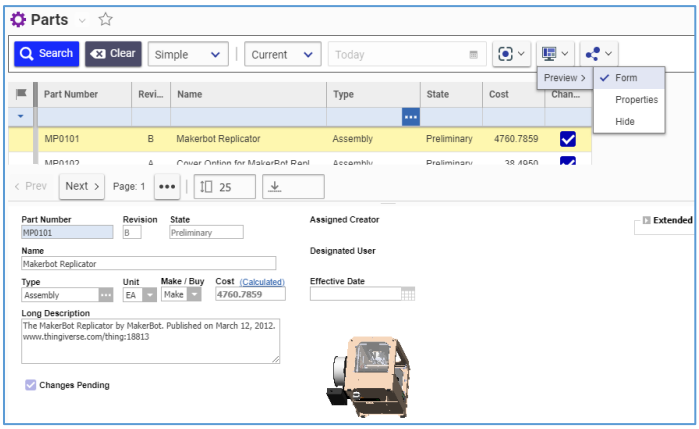

Figure 12.

- Choose **Properties** to display details in a pane to the left of the search results page.

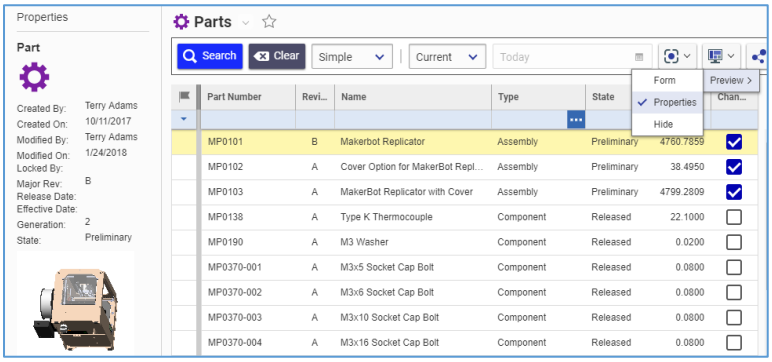

Figure 13.

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- Choose **Hide** to show no details.

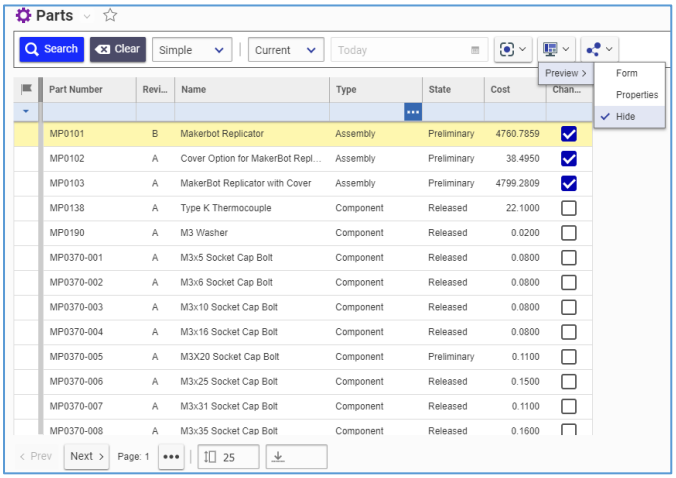

Figure 14.

5. The **Share** menu presents options to export search results.
   - **Export to Excel**
   - **Export to PDF**
   - **Export to Word**

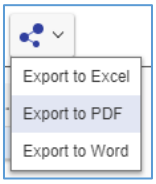

Figure 15.

2.3.2 Search Grid

A Search Grid page shows search results for items of one item type.

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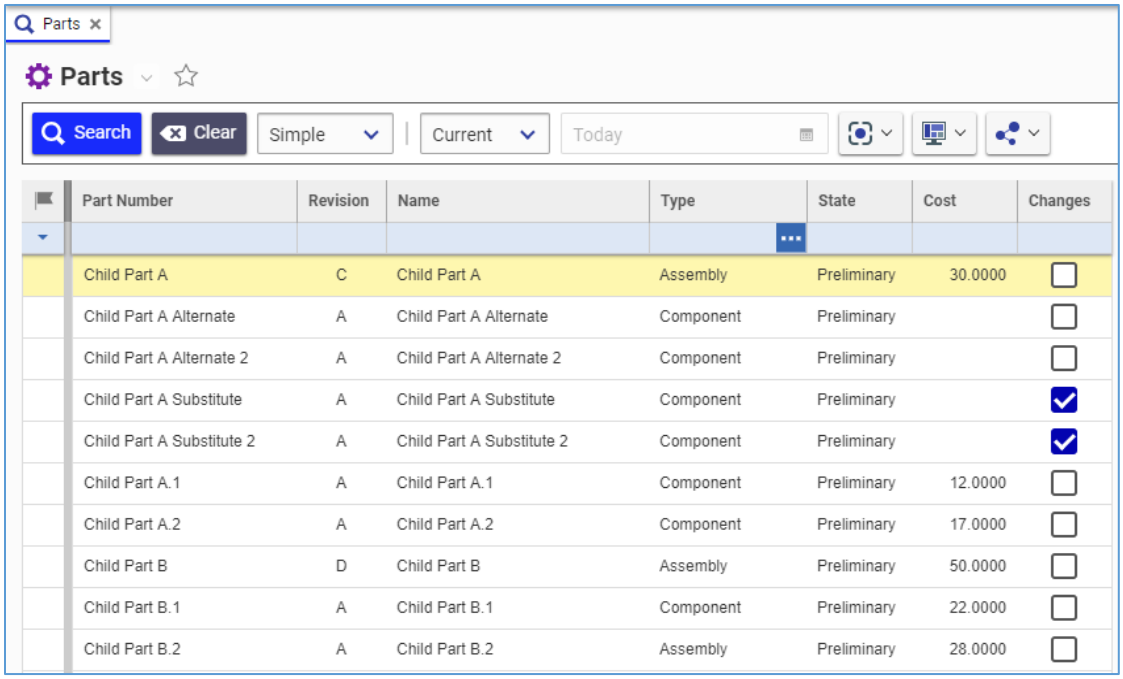

Figure 16.

In Simple Search mode, you can enter simple search criteria in the first blue row of the Grid to filter the Grid against these criteria. For example, you can type **Parent*** or **Parent%** in the **Name** blue cell of the Parts Search Grid to get all the Parts that have names that include the word Parent.

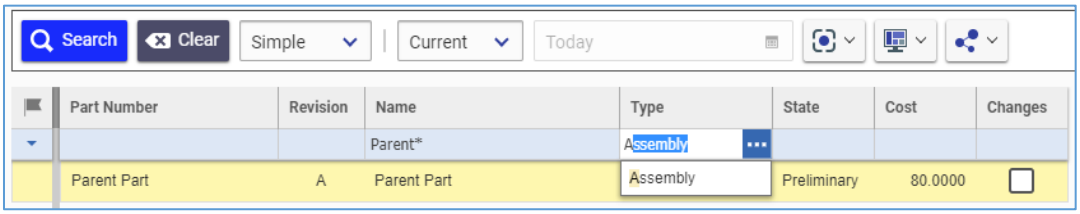

Figure 17.

The first Grid column shows the claim status of Items: **Unclaimed**, **Claimed By Me**, **Claimed By Others,** and **Claimed by Anyone**. For details, refer to section *2.6 Item Claiming*. You can filter a Search Grid against a claim status.

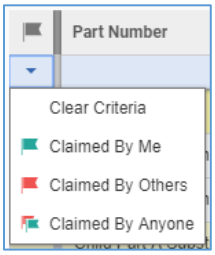

Figure 18.

2.3.3 Paging Controls

The **Paging Controls** toolbar enables you to move from page to page in the Search grid, specify the total number of pages/results, and specify the maximum number of results that display on a page:

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Figure 19.

1. Click the **Prev** button to go to the previous page.
2. Click the **Next** button to go to the next page.
3. Displays the **Current page** indicator.
4. Click the **Show Total Pages and Results** button to view this information.

Figure 20.

5. Use the **Results per Page** box to specify the number of entries that appear on a page.
6. Enter a number in the **Maximum Results** box to specify the maximum number of results resulting from a search.

2.3.4 Action Menu

The action context menu displays the commands for items appearing in the Search Results grid. Right-click an item in the grid to access this menu.

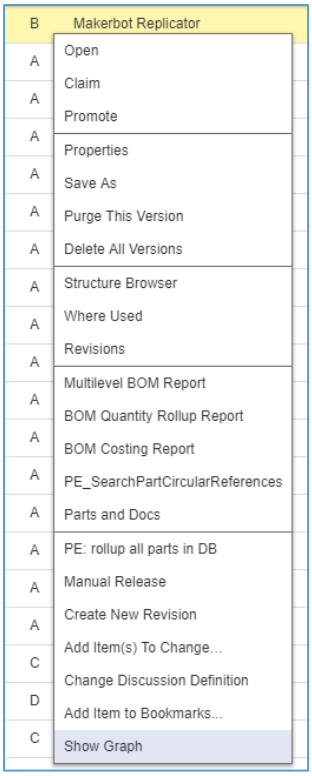

Figure 21.

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The action menu is an alternative access point to the functionality provided in the **Item** toolbar when you open an item. Each action menu contains commands specific to the item type and state of the item, and are subject to permissions. As such, the action menus are dynamic and variable. The commands common to most action menus are explained here.

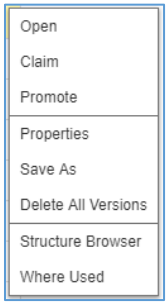

Figure 22.

- **Open** displays an Item in a new page tab with its details.
- **Claim** explicitly locks an item to prevent editing by other users and keeps the item locked/claimed between sessions. For details, refer to section *2.6 Item Claiming*.
- **Unclaim** removes the lock from the item.
- **Promote** takes the item to its next life cycle state if any is available. For details, refer to section *4.3.2 Manual State Promotion*.
- **Properties** displays the item's properties in the ***Item Title* properties** dialog.

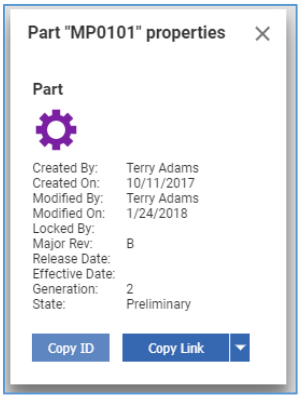

Figure 23.

- **Save As** starts the copy process by opening the form page tab to create a new item.

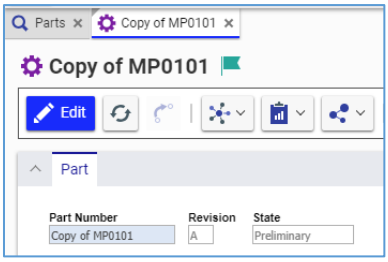

Figure 24.

- **Delete All Versions** deletes the item and all its versions.

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- **Structure Browser** is used for exploration and comparison of item's relationships. For details, refer to section *11.2 Comparing Items*.
- **Where Used** is used for exploration and comparison of an item's relationships. For details, refer to section *11.1 Finding Where an Item is Used*.

2.4 Item View

A view of an item appears as a new **Page** tab with:

1. The Page Title bar.
2. The Item toolbar.
3. The Form accordion.
4. The Relationships accordion.
5. The Accordion Arrow button, which folds and unfolds an accordion.

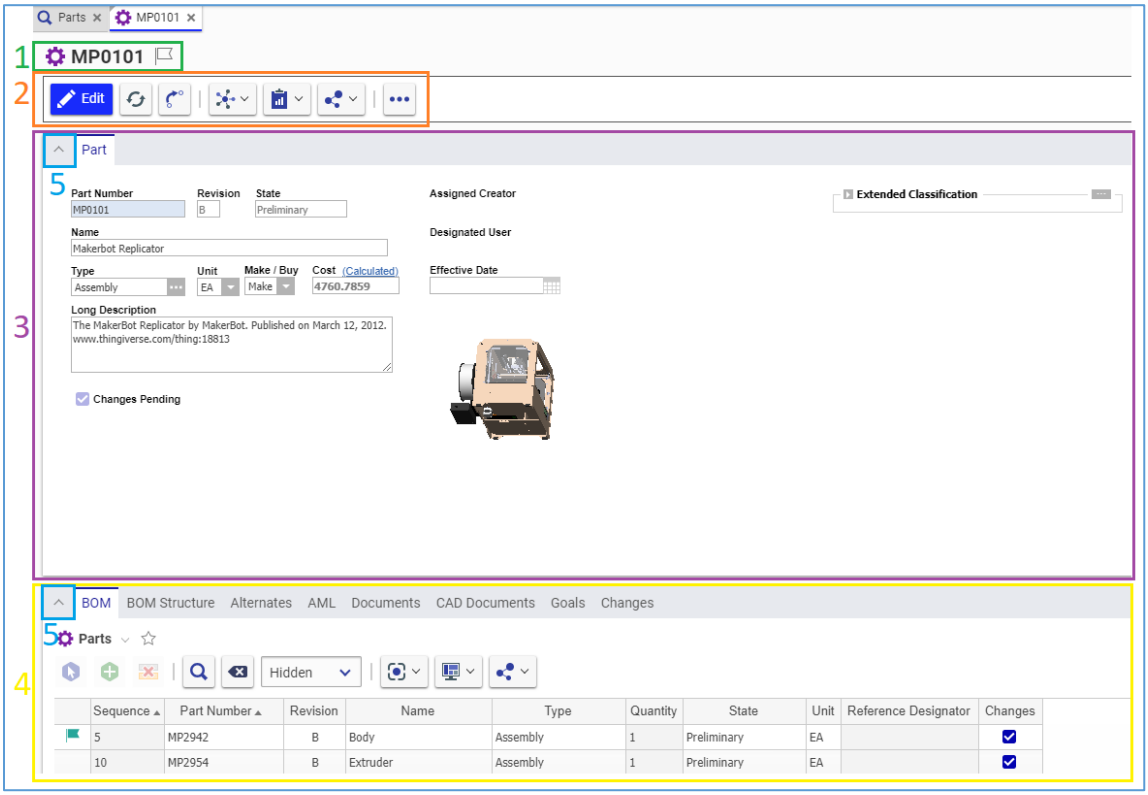

Figure 25.

2.4.1 Item Toolbar

In the **Item** view, use the **Item** toolbar to:

- Create a new item.
- Edit a saved/existing item.
- View an existing item.

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When you create a new item, the **Item** toolbar displays the following buttons:

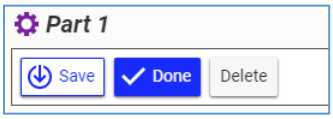

Figure 26.

- **Save** enables you to save changes to the Item and continue editing it.
- **Done** enables you to save changes to the Item and unclaim it.
- **Delete** enables you to delete the Item.

When editing a saved/existing item, the **Item** toolbar displays the following buttons:

Figure 27.

1. **Save** saves changes to the item and enables you to continue editing it.
2. **Done** saves changes to the item, unclaims it, and quits edit mode.
3. **Discard** undoes all changes to the item, unclaims it, and quits edit mode.
4. **Refresh** updates the data in the View with the latest information.
5. **Promote** takes the item to its next life cycle state if any is available. For details, refer to section *4.3.2 Manual State Promotion*.
6. **Navigate** displays a menu with options to explore the item's history, usage, and relationships.
7. **Reports** displays a menu with reports available for this item type.
8. **Share** displays a menu with export options available for this item type.
9. **More** displays a menu with additional capabilities available for this item type.

When viewing an item, the **Item** toolbar displays the same buttons, except the **Edit** button, which replaces the **Save**, **Done**, and **Discard** buttons:

Figure 28.

10. **Edit** claims the item and launches it in edit mode.

The contents of menus available from the **Item** toolbar depend on the item type, state of the item, and permissions. Additional menus are described in subsequent sections of this document.

2.4.2 Relationships Accordion

The **Relationships** accordion hosts:

1. The **Relationships** accordion tabs
2. The **Relationships** title bars
3. The **Relationships** toolbars
4. The **Relationships** content area

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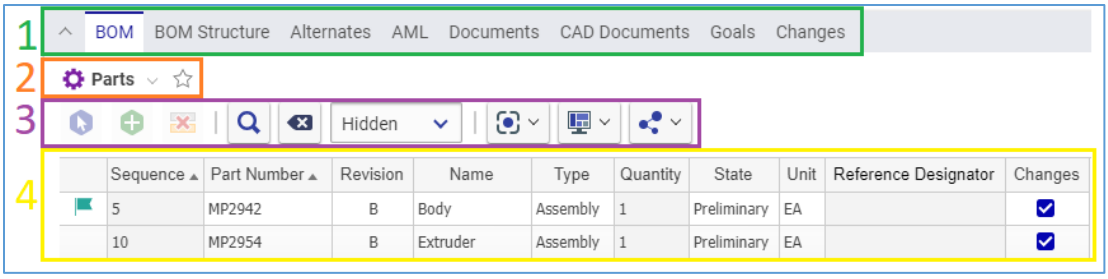

Figure 29.

2.4.3 Relationships Toolbar

Each **Relationships** accordion tab has a **Relationships** toolbar to provide functionality specific to its relationship type and **Relationships** content area. The **Relationships** toolbars are dynamic and variable. The buttons common to most **Relationships** toolbars are explained here.

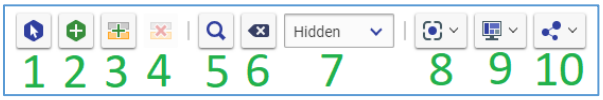

Figure 30.

1. The **Select Items** button launches a **Search dialog** to search for and add existing items to the **Relationships** grid.
2. The **Create Item** button creates a new row in the **Relationships** grid. When the item is saved, the related item is created.
3. The **Add Row** button creates a new row in the **Relationships** table without creating a related item.
4. The **Delete Row** button removes the selected row (relationship) from the table without deleting the related item.
5. The **Run Search** button runs the search criteria on the related items.
6. The **Clear Search Criteria** button clears the search criteria on the related items.
7. The **Search modes** menu allows selecting the mode for the search criteria. For details on the search modes, refer to section *2.3.1 Search Toolbar*.
8. The **Refine** menu presents a list of item Properties and Extended Properties to select which will be displayed in the **Relationships** grid.

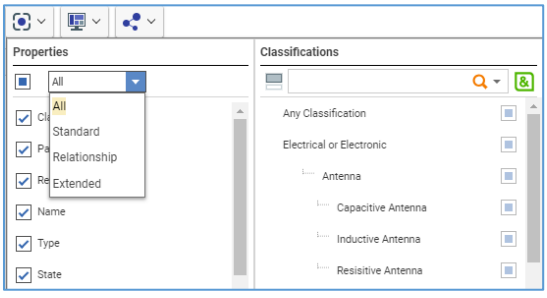

Figure 31.

9. The **Display** menu provides the Redline View option, which compares each item to its previous Released revision.

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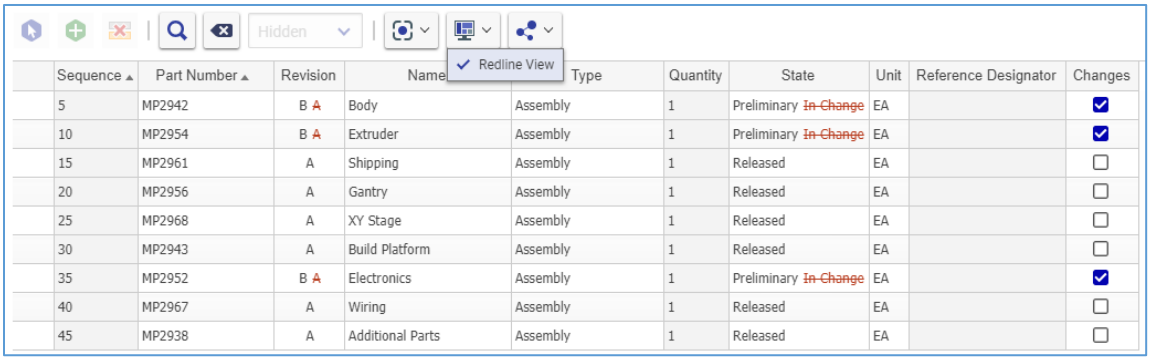

Sequence	Part Number	Revision	Name	Type	Quantity	State	Unit	Reference Designator	Changes
5	MP2942	B ~~A~~	Body	Assembly	1	Preliminary ~~In Change~~	EA		☑
10	MP2954	B ~~A~~	Extruder	Assembly	1	Preliminary ~~In Change~~	EA		☑
15	MP2961	A	Shipping	Assembly	1	Released	EA		☐
20	MP2956	A	Gantry	Assembly	1	Released	EA		☐
25	MP2968	A	XY Stage	Assembly	1	Released	EA		☐
30	MP2943	A	Build Platform	Assembly	1	Released	EA		☐
35	MP2952	B ~~A~~	Electronics	Assembly	1	Preliminary ~~In Change~~	EA		☑
40	MP2967	A	Wiring	Assembly	1	Released	EA		☐
45	MP2938	A	Additional Parts	Assembly	1	Released	EA		☐

Figure 32.

10. The **Share** menu displays options to export search results available for an item.

The contents of the **Relationships** toolbar depends on the relationship type, state of the item, and permissions. Additional toolbars are in subsequent sections of this document.

2.4.4 Relationships Content Area

A **Relationships** content area can be a **Relationships grid** or a **Relationships structure**, such as a multiple level Tree Grid View.

The standard behavior of an **item** in a **Relationships grid** is as described here. Single clicking on an item selects and highlights the **item** for further actions. Double-click opens the Item in a new tab. Right-click highlights the **item** and opens its action menu. Standard Aras Innovator search procedures are applicable to the **Relationships** grids.

The standard behavior of an **item** in a **Relationships structure** is as described here. Single click on an item to highlight it. Right-click highlights the **item** and opens its action menu. A click on the **plus** sign before the **item** expands its underlying tree level. A click on the **minus** sign before the **item** collapses the underlying tree level.

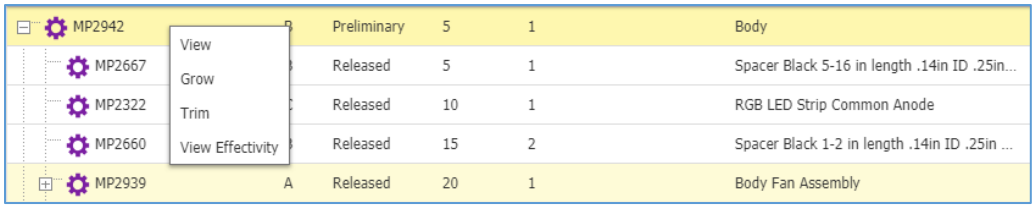

Figure 33.

2.4.5 Relationship Action Menu

A **Relationship** action menu contains commands for a relationship and related items. This kind of menu can be accessed by right clicking the related item.

The **Relationship** action menus are dynamic and variable. The list of available actions depends on the type and life cycle state of the related item, the relationship type, and permissions. Actions that are common to most menus are explained here.

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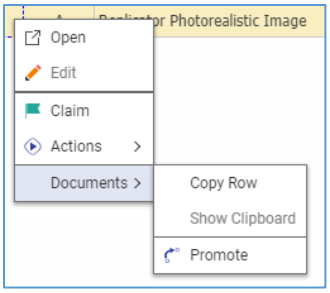

Figure 34.

- **Open** displays the item in its page tab in viewing mode.
- **Edit** claims the item and launches it in edit-in-row mode.
- **Done Editing** unclaims the item, saves changes made to it in its table row, and stops edit-in-row mode.
- **Discard Changes** unclaims the item, undoes changes made to it in its table row, and stops edit-in-row mode.

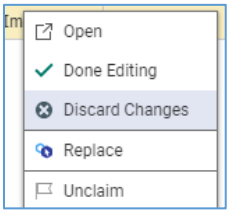

Figure 35.

- **Replace** replaces the Item in its table row with another Item while retaining relationship information if it exists.
- **Remove** deletes the Item from the table.

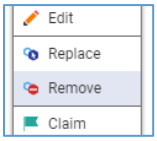

Figure 36.

- **Claim** explicitly locks an item to prevent editing by other users and keeps the item locked/claimed between sessions. For details, refer to section *2.6 Item Claiming*.
- **Unclaim** unlocks the item.
- **Actions**:
  - **Add Item(s) to Change** opens the **Choose Change Item** dialog to select the change type with an option to create a new change vs. add to an existing change. For details, refer to section *13 Change Management*.

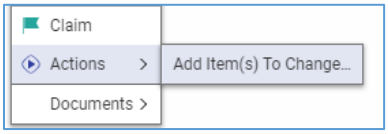

Figure 37.

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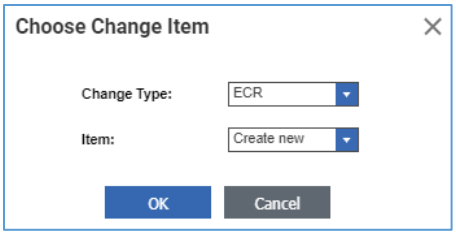

Figure 38.

- ***A Relationships Accordion Tab Name:***

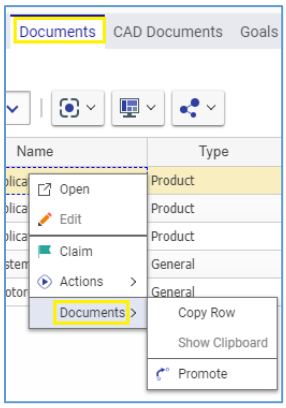

Figure 39.

  - **Copy Row** copies the Item to the clipboard.
  - **Show Clipboard** opens the **Clipboard Manager** dialog.

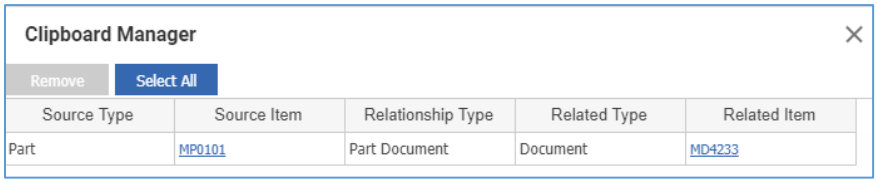

Figure 40.

  - **Promote** takes the item to its next life cycle state if any is available. For details, refer to section *4.3 Manual Promotion and Revise*.

For an item in a **Relationships** structure, the common action in the action menu is the following:

- **View** displays the item in its view in the viewing mode.

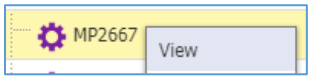

Figure 41.

The contents of the **Relationship Action** menu depends on the item type, state of the item and permissions. Additional menus are described in subsequent sections of this document.

2.4.6 Item Thumbnail

An Item can include a thumbnail image, which you can select using the **Image Browser** dialog:

1. Open the Item view.

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2. Click **Edit**. The **Select an image** link appears.

Note: The **Select an image** link is visible only when an Item is in Edit mode.

3. Click the **Select an image** link.

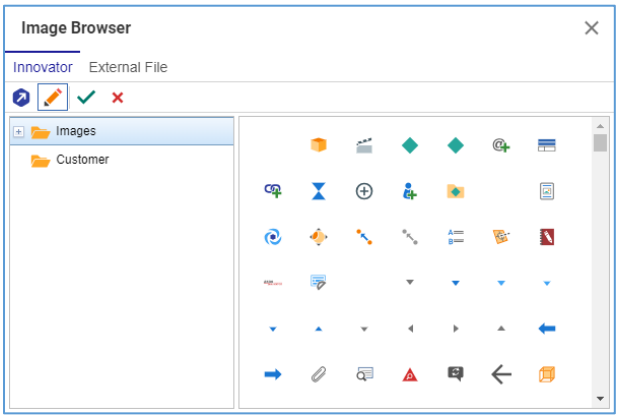

Figure 42.

The **Image Browser** dialog has two tabs:

- **Aras Innovator** enables you to browse existing images in Aras Innovator. It has two buttons to toggle between browsing modes:
  - **Icons**, which previews the images in a grid.
  - **Details**, which shows details of the images in a table and previews a selected image.

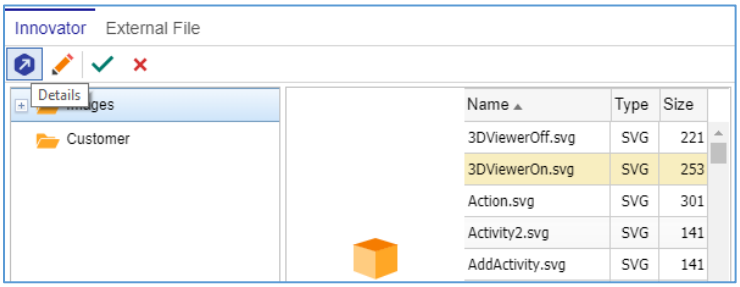

Figure 43.

- **External File** enables you to browse images available on your computer and network. Click the **Open file** icon to bring up the standard dialog of your operating system for file browsing and selection.

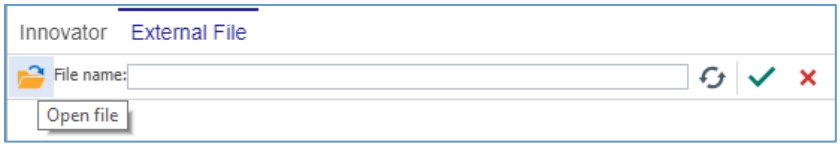

Figure 44.

Note: When you access the **Image Browser** dialog for the first time, it appears in Aras **Innovator Icons** mode. Subsequently, it displays in the last executed mode.

To assign a thumbnail to an Item:

1. Open the **Image Browser** dialog.

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2. Search for the thumbnail image.
3. Select the image, either by:

    a. Double-clicking the **thumbnail**.

Note: The double-click selection (step 3.a) is not available for external files.

    b. Clicking the **thumbnail** and then clicking **Return Selected**.

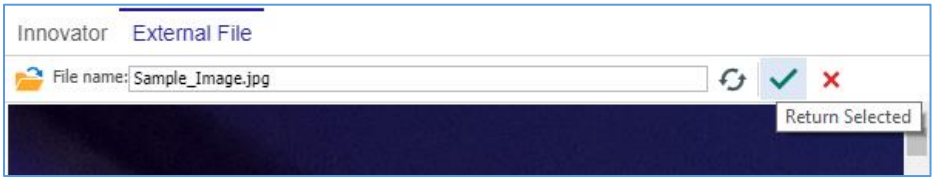

Figure 45.

The **thumbnail** appears on the Item view.

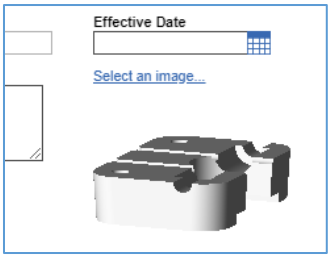

Figure 46.

4. Save the Item.

To change the Item thumbnail, follow the previous procedure to select a different image file.
To remove a thumbnail from an Item:

1. Open the **Image Browser** dialog.
2. Click **Clear Selection**.

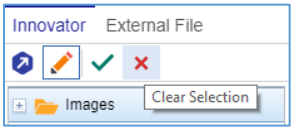

Figure 47.

The **thumbnail** disappears from the Item view.

3. Save the Item.

2.5 Standard Search Dialog

When creating relationships or populating a property with data from another item, one of the main approaches is to search for and add existing items. For that purpose, there is the **Search dialog –*Item Type*** standard search dialog. When accessed, it appears as a new dialog on top of the main screen:

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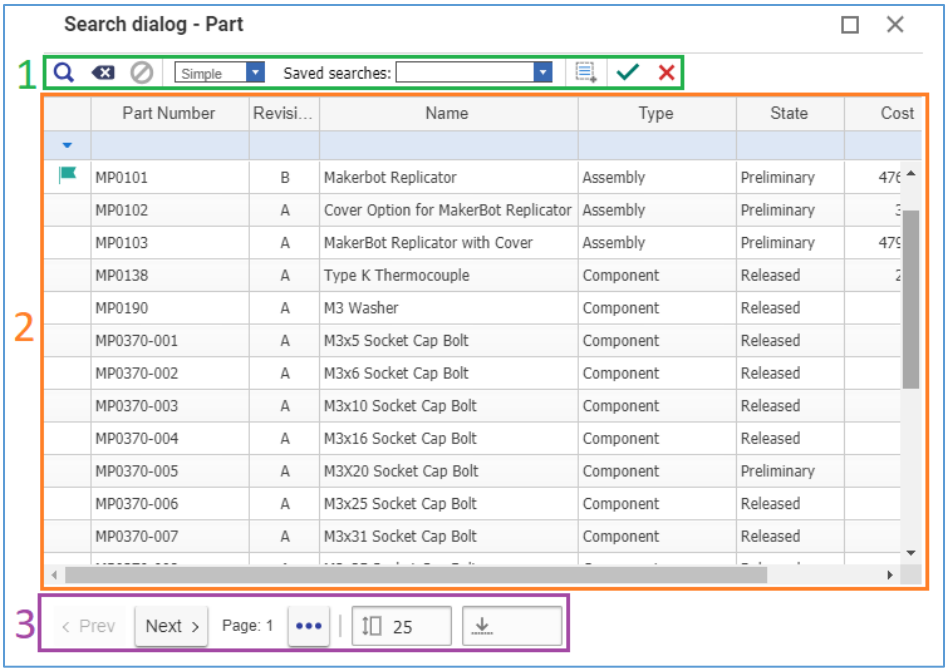

Figure 48.

1. The **Search** toolbar
2. The **Search** grid
3. The **Paging** toolbar

In the standard search dialog, the **Search** toolbar provides functionality for searching and viewing search results in the **Search** grid of this dialog:

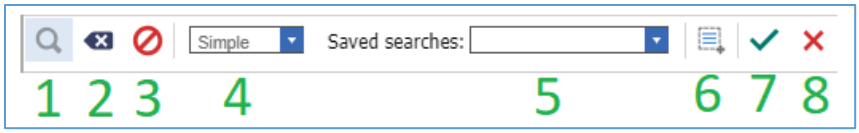

Figure 49.

1. The **Search** button runs a search.
2. The **Clear Search Criteria** button clears the search criteria.
3. The **Stop Search** button dismisses searching.
4. The **Search modes** menu provides mode options for the search criteria. For details on the search modes, refer to section *2.3.1 Search Toolbar*.
5. The **Saved searches** menu provides saved searches for selection.

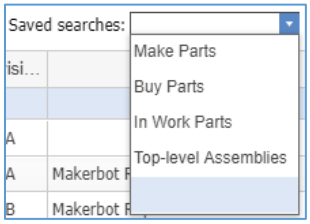

Figure 50.

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6. The **Select All** button selects all items in the **Search** table.
7. The **Return Selected** button populates a grid or property field from which the search dialog was launched with the item(s) selected in the **Search** table.
8. The **Clear Selection** button closes the search dialog with no item selection.

2.6 Item Claiming

Aras Innovator 12.0 introduces the **Claim** and **Unclaim** item actions, replacing the **Lock** and **Unlock** actions, which are used in previous versions of Aras Innovator.

A user needs to claim items to prevent them from being edited by someone else. The user can edit only items claimed by this user. An unclaimed item automatically becomes claimed when a user puts it in Edit mode, and it becomes unclaimed when the user exits Edit mode.

The following are equal options to claim an item explicitly:

- Click the **blank Claim** flag at the item's **Page Title** bar.

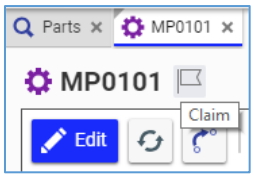

Figure 51.

- Right-click the **item** in the Search Grid and then click **Claim**.

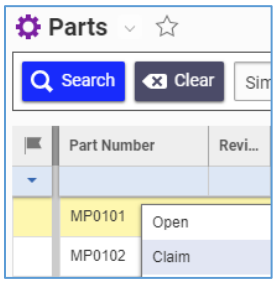

Figure 52.

- Right-click the **item** in the **Relationships** grid and then click **Claim**.

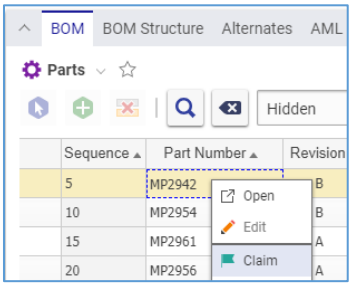

Figure 53.

A claimed item has a green flag:

- At the **Page Title** bar.

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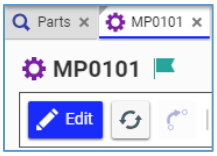

Figure 54.

- In the left-most column of the Search Grid.

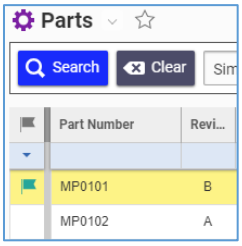

Figure 55.

- In the left-most column of the **Relationships** grid.

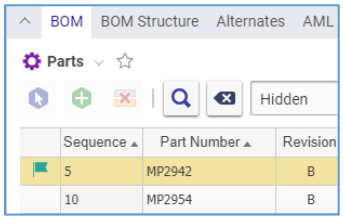

Figure 56.

The claimed item appears with a green flag if it is claimed by a session user or a red flag if claimed by another user. The item's view also appears with a red flag when the **Edit** action is not allowed.

If an item is not claimed by any user, its view has neutral flag.

To unclaim an item explicitly, either:

- Click the **green Claim** flag at the item's **Page Title** bar.

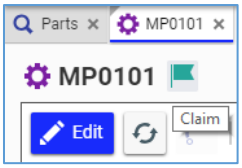

Figure 57.

- Right-click the **item** in the Search Grid and click **Unclaim**.

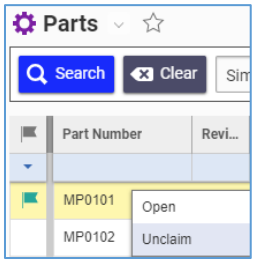

Figure 58.

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- Right-click the **item** in the **Relationships** Grid and click **Unclaim**.

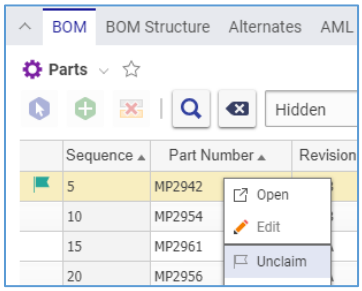

Figure 59.

An unclaimed item has a blank **Claim** flag.

If you unclaim an Item, which has unsaved changes, a notification dialog appears asking whether to keep or dismiss changes:

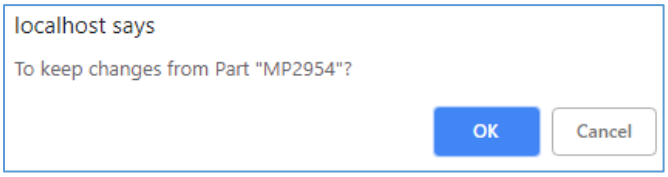

Figure 60.

- Click OK to keep the changes.
- Click Cancel to dismiss the changes.

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3 Items Permissions

An Item Permission defines which access rights each user role has for performing actions on Items at a particular Item Life Cycle state. Your ability to add, edit, delete, view, and search Items depends on the Item Permissions set by an administrator for you.

This section assumes that you have the necessary Permissions to perform actions, which is determined by the **Can Change Access** grant covered in subsections *3.2 Understanding Access Rights* and *3.3 Defining Private Permissions*.

Examples shown on Parts are applicable to other items, such as Documents and CAD Documents.

3.1 Viewing Permissions

Use this procedure to view the current Permission for an Item:

1. Go to the Item view.
2. On the **Item** toolbar, click **More** and then select **Permissions**. The **Permissions** submenu appears. The current Item Permission displays the **blue checkmark**.

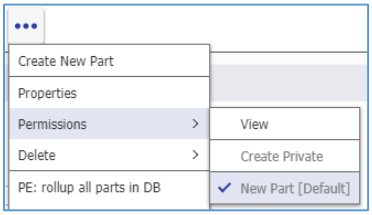

Figure 61.

3. Click **View**. The view of the current Item Permission appears showing the **Access** accordion with identities and their rights.

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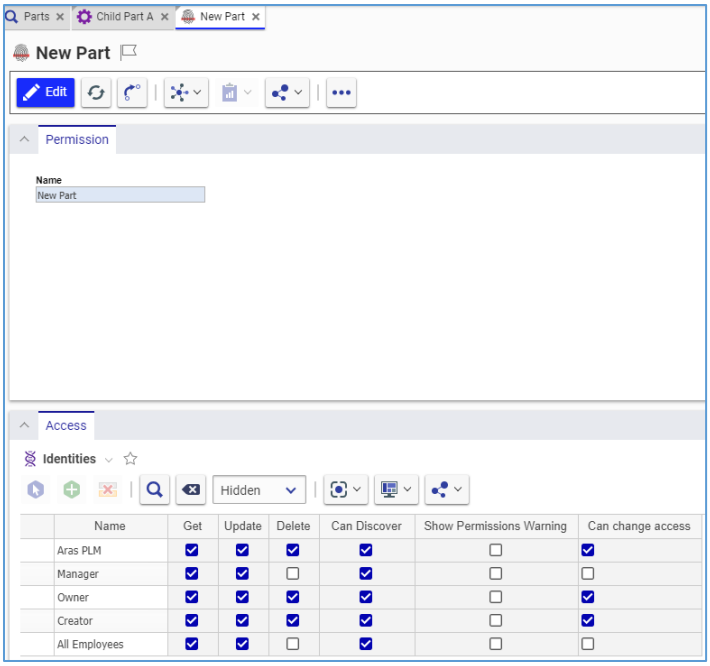

Figure 62.

3.2 Understanding Access Rights

Access rights are defined in an Item Permission as a set of grants to identities. Each grant enables an identity to perform a corresponding set of actions on Items.

The following grants are available in a Permission:

- **Get** to search and open Items in a viewing mode.
- **Update** to claim and edit Items.
- **Delete** to delete Items from Aras Innovator.
- **Can Discover** to search for Items and see a limited set of properties in the Search Grid.
- **Show Permission Warning** to show a warning message if access is restricted to the identity.
- **Can Change Access** to change Item's Permissions.

Identities are created and managed by an Aras Administrator. There are several identities available in Aras Innovator.

Certain item types, such as Parts, Documents, CAD Documents, have the following identities that can be tied to permissions, as shown in Figure 62:

- **Manager** is responsible for the management, usage, and review of the Item and assigns the **Designated User** property on the Item view. This property is optional.
- **Owner** is the Item owner who has the **Assigned Creator** property on the Item view. For details, refer to section *4.3.1 Assigning Ownership*. This property is optional.
- **Creator** is the creator of the Item who is in the **Created By** property on the Item view. It is assigned automatically and cannot be changed.

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Note: The **Aras PLM** system role represents the change management process and does not contain any individuals. Its permissions should not be changed.

Item types can have different permissions based on their Life Cycle states. For example, an Item has different permissions for its Preliminary, In Review, and Released Life Cycle states. When the Item enters a certain state, it is assigned a Permission defined by this state. An Administrator can adjust these permissions if necessary.

A new Item is assigned the Preliminary state and has the New Item Permissions assigned (see Fig. 62).

When In Review, the Item has the In Review Item Permission.

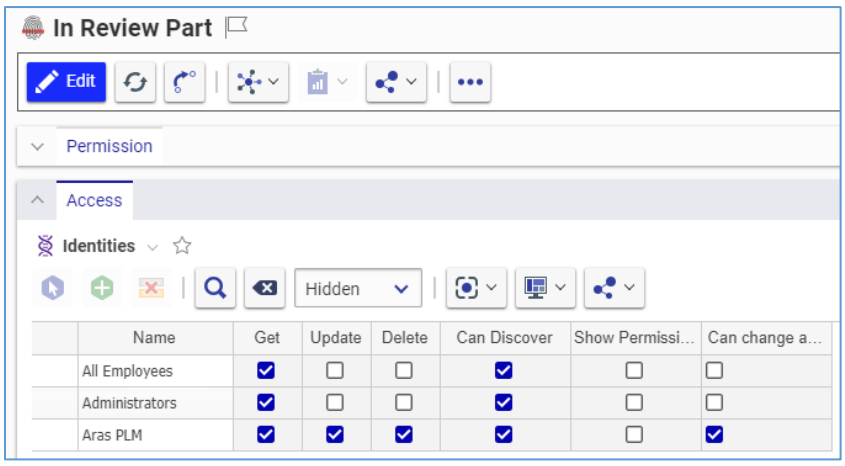

Figure 63.

When in the Released state, the Item has the Released Item Permissions.

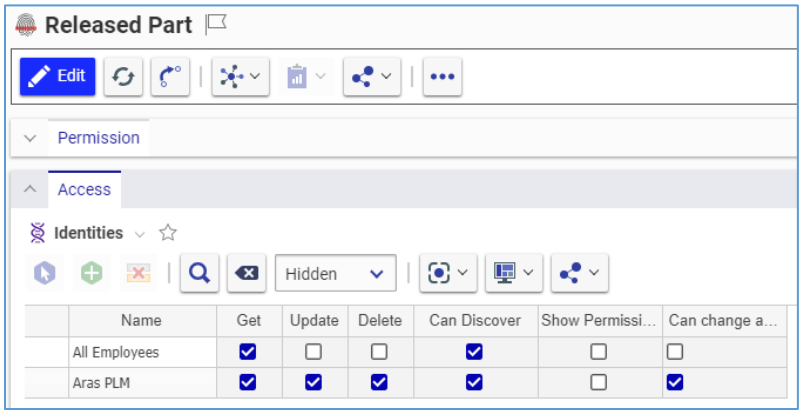

Figure 64.

3.3 Defining Private Permissions

A Private Permission is a Permission set specifically for a given Item overriding its current Item Permission. For example, Private Permissions can be set for confidential Items to prevent viewing by other Identities.

For a single Item, a user can change access rights defined by the current Item Permission. To do so, the user must create a Private Permission for this Item, which is saved as a separate Permission item and applied to this Item only. Once set, the Private Permission controls access to the Item imposing a new set of access rights.

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It is possible to roll back to the default Item Permission. Once it is reapplied, the Private Permission is deleted.

The **Can Change Access** grant in an Item Permission defines who can create Private Permissions. By default, the Item Creator and Assigned Creator have this grant. Aras Administrators can define who can change access rights for Items.

The following subsections assume that the user has change access rights.

3.3.1 Creating Private Permissions

To create a private permission for an Item, follow this procedure:

1. Go to the Item view.
2. On the **Item** toolbar, click **Edit**.
3. Click the **More** button and select **Permissions**> **Create Private**.

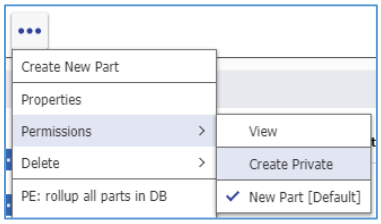

Figure 65.

The view of a new Private Permission appears pre-populated with the grants definition from the default Permission.

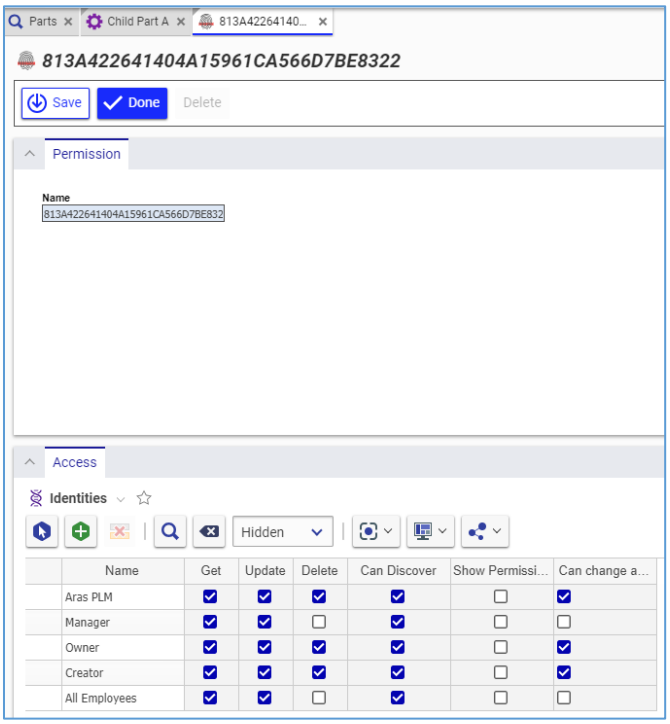

Figure 66.

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If necessary,

- Add identities as described in section *3.3.1.1 Adding Identities to Private Permission*.
- Create identities and add them as described in section *3.3.1.2 Creating Identities for Private Permission*.
- Replace identities as described in section *3.3.1.3 Replacing Identities in Private Permissions*.
- Remove identities as described in section *3.3.1.4 Removing Identities from Private Permissions*.
- Click the appropriate check boxes in the **Access** grid to define who has which grants.
- Click **Done** on the **Private Permission** toolbar to create the Private Permission.

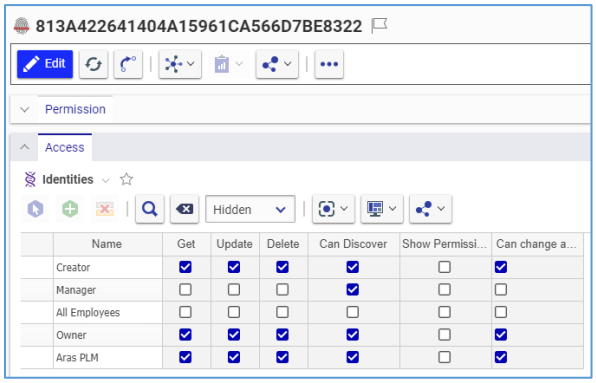

Figure 67.

- Go to the Item view.

4. This step is optional to confirm that the private permissions are set. On the **Item** toolbar, click **More** and point to **Permissions**. **Create Private** is disabled, and **Current Item Permission [Default]** has no blue checkmark.

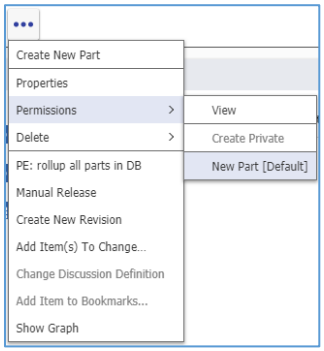

Figure 68.

5. On the **Item** toolbar, click **Done**. The new Private Permission is assigned to the Item and takes control of the access rights to the Item.

3.3.1.1 Adding Identities to Private Permission

Use the following procedure to add identities to a Private Permission:

1. Click **Select Items** on the **Access** accordion toolbar on the Private Permission view. The **Search dialog – Identity** appears.
2. Using the standard procedures, search for and select the necessary identity, which appears at the bottom of the **Access** grid.

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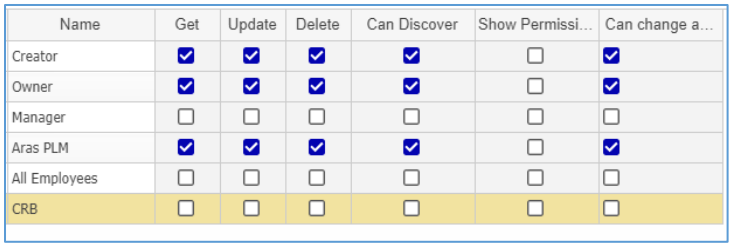


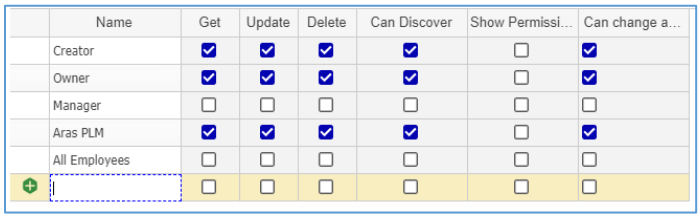
Name	Get	Update	Delete	Can Discover	Show Permissi...	Can change a...
Creator	☑	☑	☑	☑	☐	☑
Owner	☑	☑	☑	☑	☐	☑
Manager	☐	☐	☐	☐	☐	☐
Aras PLM	☑	☑	☑	☑	☐	☑
All Employees	☐	☐	☐	☐	☐	☐
CRB	☐	☐	☐	☐	☐	☐

Figure 69.

3.3.1.2 Creating Identities for Private Permission

Use the following procedure to create identities and add them to a Private Permission:

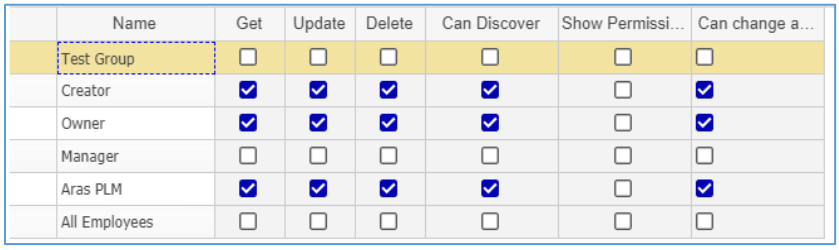
1. Click **Create Items** on the **Access** accordion toolbar on the Private Permission view. A **new row** appears at the bottom of the grid.



	Name	Get	Update	Delete	Can Discover	Show Permissi...	Can change a...
	Creator	☑	☑	☑	☑	☐	☑
	Owner	☑	☑	☑	☑	☐	☑
	Manager	☐	☐	☐	☐	☐	☐
	Aras PLM	☑	☑	☑	☑	☐	☑
	All Employees	☐	☐	☐	☐	☐	☐
⊕		☐	☐	☐	☐	☐	☐

Figure 70.

2. In the **Name** cell of the **new row**, enter ***a name*** for the identity.
3. Save the Permission. The new identity is created.



	Name	Get	Update	Delete	Can Discover	Show Permissi...	Can change a...
	Test Group	☐	☐	☐	☐	☐	☐
	Creator	☑	☑	☑	☑	☐	☑
	Owner	☑	☑	☑	☑	☐	☑
	Manager	☐	☐	☐	☐	☐	☐
	Aras PLM	☑	☑	☑	☑	☐	☑
	All Employees	☐	☐	☐	☐	☐	☐

Figure 71.

4. This step is optional.

    c. Right-click the **new identity** and then click **Open**. The view of the new group appears.

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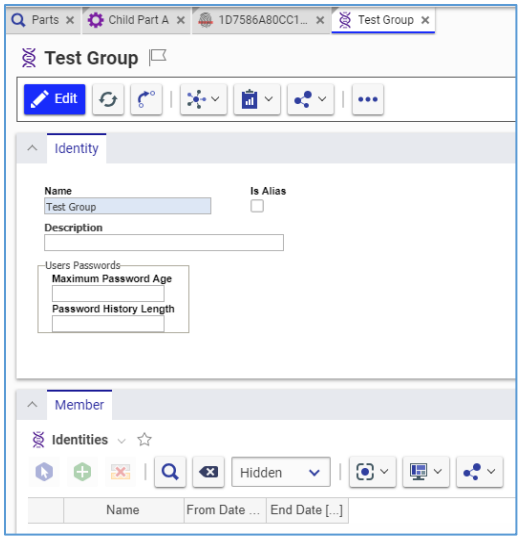

Figure 72.

a. Configure the new group, and add members, per your needs.

3.3.1.3 Replacing Identities in Private Permissions

Use the following procedure to replace identities in a Private Permission with other existing identities:

1. Right-click an identity to be replaced and then click **Replace**. The **Search dialog – Identity** appears.

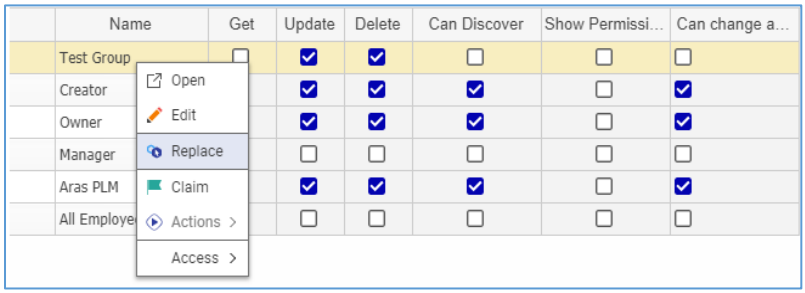

Figure 73.

2. Using the standard procedures, search for and select the necessary identity, which replaces the previous identity. The grants are retained for the selected identity.

Name	Get	Update	Delete	Can Discover	Show Permissi...	Can change a...
CM	☐	☑	☑	☐	☐	☐
Creator	☑	☑	☑	☑	☐	☑
Owner	☑	☑	☑	☑	☐	☑
Manager	☐	☐	☐	☐	☐	☐
Aras PLM	☑	☑	☑	☑	☐	☑
All Employees	☐	☐	☐	☐	☐	☐

Figure 74.

3.3.1.4 Removing Identities from Private Permissions

Use the following procedure to remove identities from a Private Permission:

1. Select the identities to be removed.

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2. Click **Delete Row** on the **Access** accordion toolbar. The selected identities become light in color.

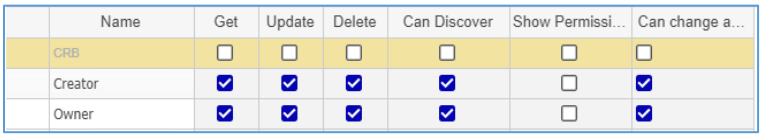

Figure 75.

3. Save the Permission. The selected identities disappear from the grid.

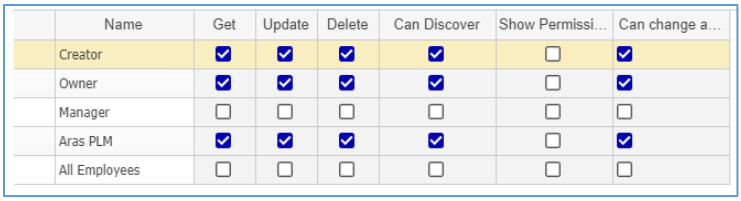

Figure 76.

3.3.2 Rolling Back to Default Permissions

Use the following procedure to restore the control of access rights to an Item to the default Permission:

1. Go to the Item view.
2. Click **Edit** on the **Item** toolbar.
3. On the **Item** toolbar, click **More**, point to **Permissions**, and then click ***Current Item Permission* [Default]**. A **blue checkmark** appears before the default Permission, which takes control of the access rights to the Item. The Private permission is deleted.

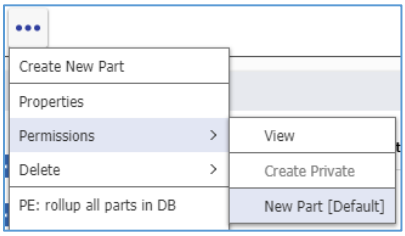

Figure 77.

4. On the Item toolbar, click **Done**.

Note: It is possible to delete a Private Permission from the toolbar (**More --> Delete --> Delete**) before it is assigned to an Item, prior to step 8 of the Creating Private Permissions procedure. Once you assign a Private Permission to an Item, it cannot be deleted. Aras Innovator returns an error that the private permission is used.

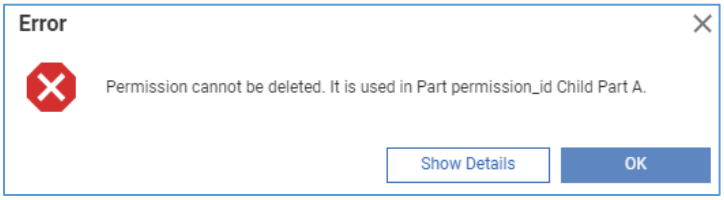

Figure 78.

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4 Versioning and Promoting

The Product Engineering (PE) application has versionable item types: Parts, Documents, CAD Documents, and sourcing items. Such items keep a history of changes by storing a new version of the item each time a change is made.

A Life Cycle is a series of defined states and the transitions between them that an item traverses during its existence. The PE application provides a unique default Life Cycle for most of its item types.

In this section, the term *Item* means a versionable item with a Life Cycle. Examples shown on Parts are applicable to other versionable Items, such as Documents and CAD Documents.

4.1 Item Revisions and Versions

During life cycle states where editing of the Item is allowed, such as in Preliminary state, the Claim, Save, and Unclaim sequence of actions creates a new generation for the Item. When the Item reaches the Released state, no changes can be made to the released revision. Any further changes to the Item require it to be revised to create a new revision in the Preliminary state.

4.1.1 Versions Exploration

To view all versions of an Item, access the **Item versions** dialog, either:

- In the Item Search Grid, right-click the **Item** and then click **Revisions**.

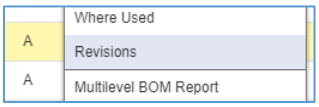


Figure 79.

- Open the Item view, on the **Item** toolbar, click **Navigate** and then click **Versions**.

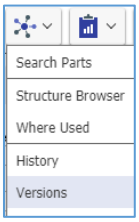
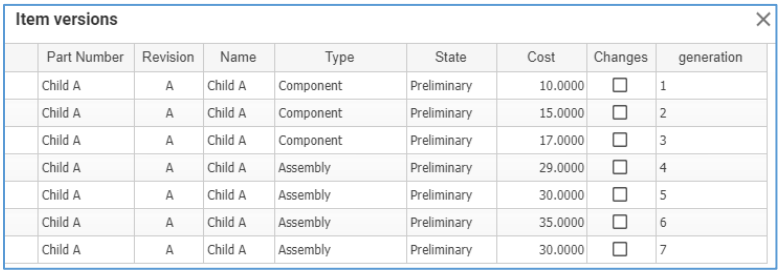


Figure 80.

The **Item versions** dialog shows a list of old versions.


Item versions

Part Number	Revision	Name	Type	State	Cost	Changes	generation
Child A	A	Child A	Component	Preliminary	10.0000	☐	1
Child A	A	Child A	Component	Preliminary	15.0000	☐	2
Child A	A	Child A	Component	Preliminary	17.0000	☐	3
Child A	A	Child A	Assembly	Preliminary	29.0000	☐	4
Child A	A	Child A	Assembly	Preliminary	30.0000	☐	5
Child A	A	Child A	Assembly	Preliminary	35.0000	☐	6
Child A	A	Child A	Assembly	Preliminary	30.0000	☐	7

Figure 81.

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To examine details of an old version of an Item, double-click on the corresponding row in the **Item versions** dialog. The old version contains the properties and related items that were saved for that specific version. Its view appears with a **red Claimed** flag because old versions cannot be edited.

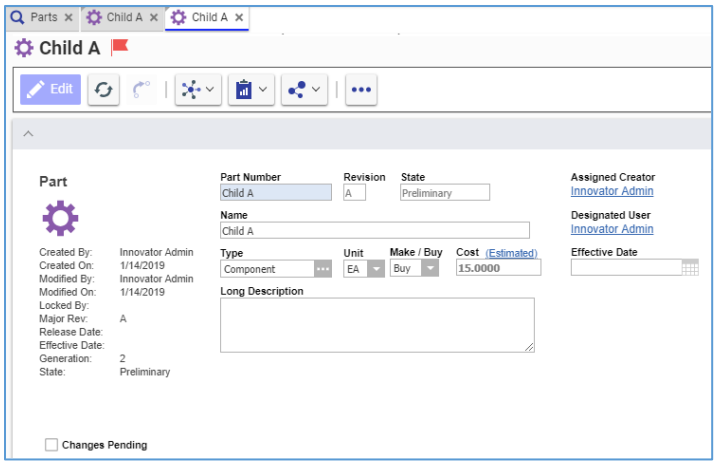

Figure 82.

To view where an old version of an Item is used, right-click the old version in the **Item versions** dialog, and then click **Where Used**.

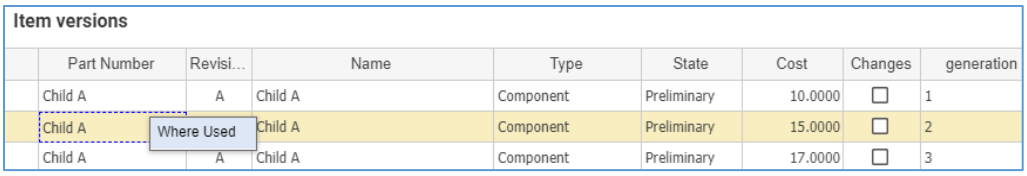

Figure 83.

The **Where Used – *Item Type*** dialog displays a tree where this Item version is used.

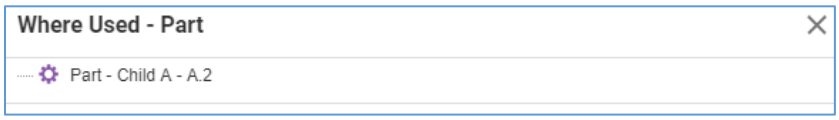

Figure 84.

4.1.2 Version Deletion

To delete a version of an Item, a user must have **Delete** permission rights granted for the current Life Cycle state of the Item. For details on access rights, refer to section *3. Item Permissions*. This subsection assumes the user has **Delete** rights.

Note: The version deletion feature is not available for claimed Items.

Use the following procedure to delete an old version of an Item:

1. Go to the **Item versions** dialog for the Item.
2. Go to the view of the old version to be deleted.
3. On the **old version** toolbar, click **More**, point to **Delete**, and then click **Purge This Version**. A notification dialog appears.

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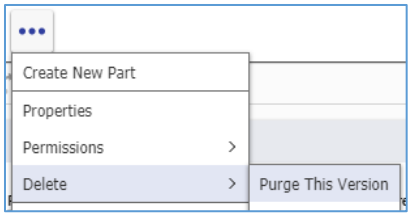


Figure 85.

4. In the notification dialog, click **OK**.

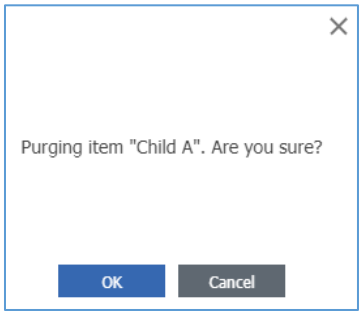
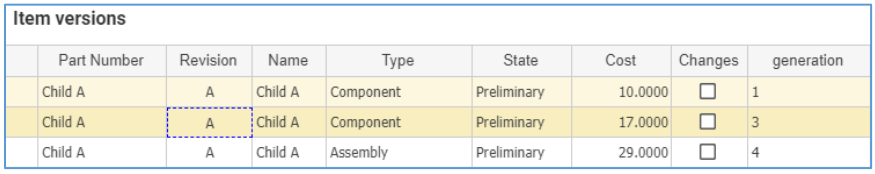


Figure 86.

The version is deleted.



Item versions

Part Number	Revision	Name	Type	State	Cost	Changes	generation
Child A	A	Child A	Component	Preliminary	10.0000	☐	1
Child A	A	Child A	Component	Preliminary	17.0000	☐	3
Child A	A	Child A	Assembly	Preliminary	29.0000	☐	4

Figure 87.

It is also possible to delete the current version of an Item using the **Purge This Version** feature, which can be accessed from the Item view or its action menu in the Item Search Grid.

Warning If the current version of the Item is the only version existing in Aras Innovator, its purging deletes this Item completely. To avoid unwanted deletion, check Item versions before purging the current version.

To delete the current version of an Item using its view:

1. Go to the Item view.
2. On the **Item** toolbar, click **More**, point to **Delete**, and then click **Purge This Version**. A notification dialog appears.
3. In the notification dialog, click **OK**. The version is deleted.

To delete the current version of an Item using its action menu:

1. Go to the Items Search Grid.
2. Right-click the **Item**, and then click **Purge This Version**. A notification dialog appears.

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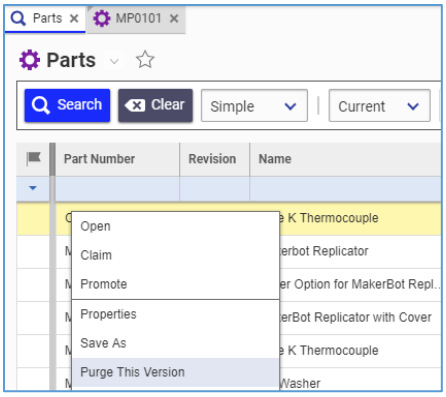

Figure 88.

3. In the notification dialog, click **OK**. The version is deleted.

Aras Innovator returns an error when a user tries to delete an Item version without the **Delete** rights granted in Permission for the current Life Cycle state of the Item. For details on access rights, refer to sections *3. Item Permissions*.

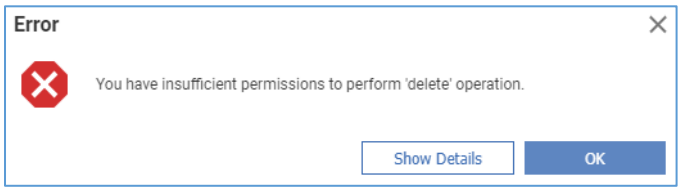

Figure 89.

4.2 Item History

The Product Engineering application can track changes made to an Item at both the item and property level, including who made the change and when. A specific list of Actions causes a history record to be written. By default, these actions are Add, Update, Promote, Reset or Set Default Lifecycle State, and Delete.

To view the history of an Item, access the **Item History** dialog:

1. Open the Item view.
2. On the **Item** toolbar, click **Navigate** and then click **History**.

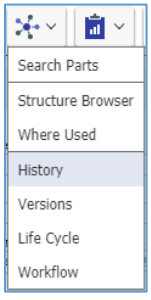

Figure 90.

The **Item History** dialog shows a grid of changes including time stamps, Identities, Actions, Comments, Item states, Revisions, and Generations.

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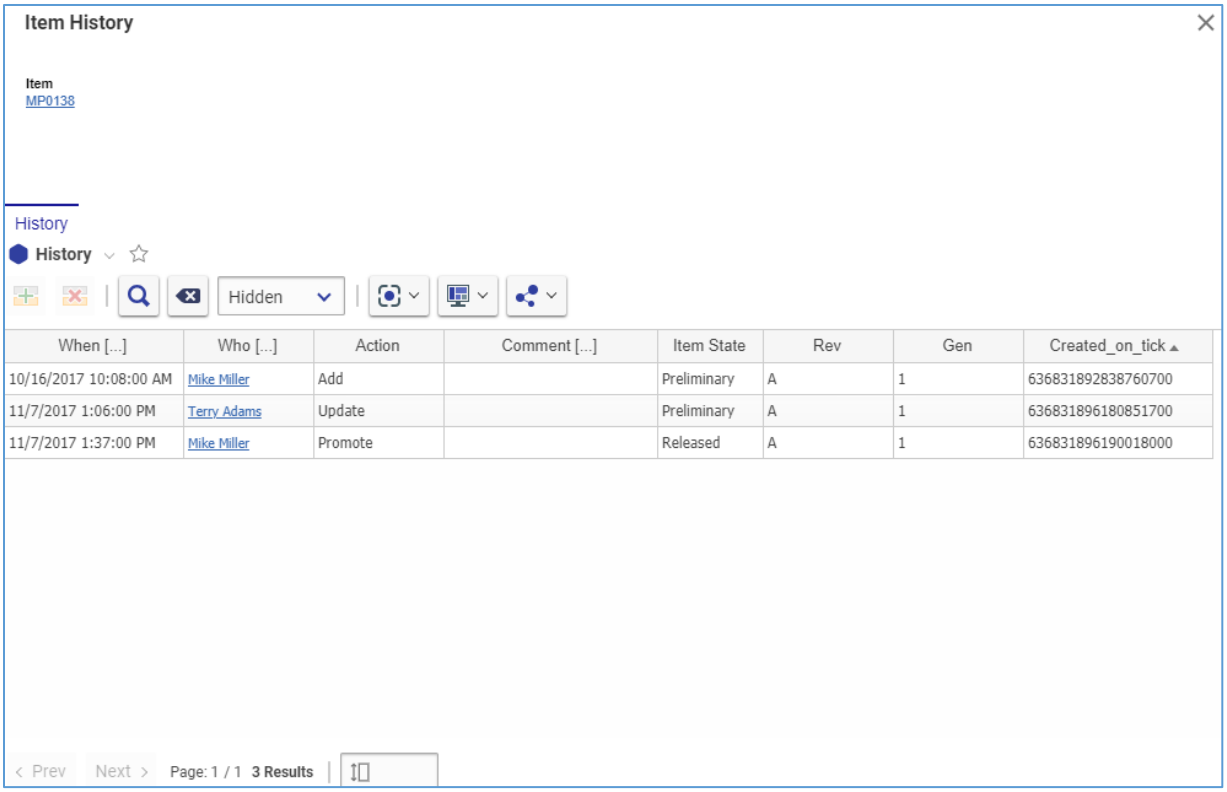

Figure 91.

4.3 Manual Promotion and Revise

Items can be released and/or revised either via change processes or manually. The change management processes can automatically release the Items where Life Cycles are automatically controlled by Workflows if these Items are in the affected items list. If an item has never been released or revised via a change process before, it is possible to release and revise it manually. This section describes the manual process. For details on the release and revise features with change management, refer to section *13. Change Management*.

The manual release and revise features are available only when the following requirements are met:

- None of the generations of the Item has been previously released or revised via a change process.
- The Item is not claimed.
- The user performing the action is the Assigned Creator of the Item.

4.3.1 Assigning Ownership

To manually release or revise an Item, a user must be a member of the Assigned Creator Identity, which is responsible for the design or content of an Item. An Assigned Creator is often identified as the Owner of the Item. This may not be the same person who enters the Item data into Aras Innovator as listed in its **Created By** property.

Use the following procedure to specify an Assigned Creator of an Item:

1. Go to the Item view.

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2. Click the **ellipsis** in the **Assigned Creator** box. The **Search dialog – Identity** appears.

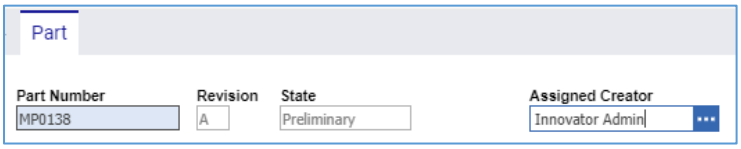

Figure 92.

3. Using the standard search procedure, search for and select the proper Assigned Creator Identity, which then appears in the **Assigned Creator** box.
4. Save and unclaim the Item.

4.3.2 Manual State Promotion

According to the default Item Life Cycle, the Assigned Creator can manually promote an Item to the next state if the requirements for manual release and revision are met and if there is a state available.

The **Promote** feature can be accessed from either the Item view or its action menu in the Items Search Page.

To promote an Item using its view, use the following procedure:

1. Go to the Item view.
2. On the **Item** toolbar, click **Promote**. The **Promote *Item Number*** dialog appears.

Figure 93.

3. This step has the following options:
   a. Double-click the **state** to which an item should be promoted.
   b. Click the **state** to promote and then click **Promote to Selected State**.

The promoted Item has its **State** box updated. Under **Revision**, the **plus** button appears to allow for the manual revise.

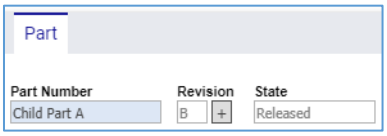

Figure 94.

To promote an Item using its action menu, follow this procedure:

1. Go to the Items Search Grid.
2. Right-click the **Item** and then click **Promote**. The **Promote *Item Number*** dialog appears.

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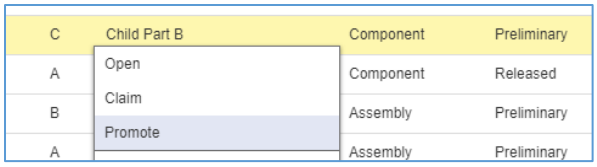

Figure 95.

3. Use one of the following methods to promote the Item:

    c. Double-click the **state** to which the item should be promoted.

    d. Click the **state** to which the item should be promoted and then click **Promote to Selected State**.

The promoted Item has its **State** cell updated.

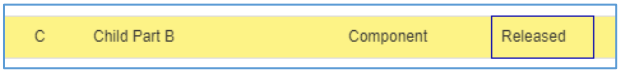

Figure 96.

If you try to promote an Item without meeting all necessary promotion conditions, Aras Innovator displays the following error.

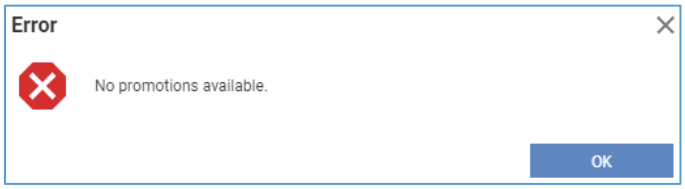

Figure 97.

4.3.3 Manual Release

In addition to the manual promotion feature, you have the ability to release an Item in one action. According to the default Item Life Cycle, the Assigned Creator can manually promote an Item to the Released state if the requirements for manual release are met.

You can access the **Manual Release** feature from either the Item view or its action menu in the Items Search Page.

To release an Item using its view, use the following procedure:

1. Go to the Item view.
2. On the **Item** toolbar, click **More** and then click **Manual Release**.

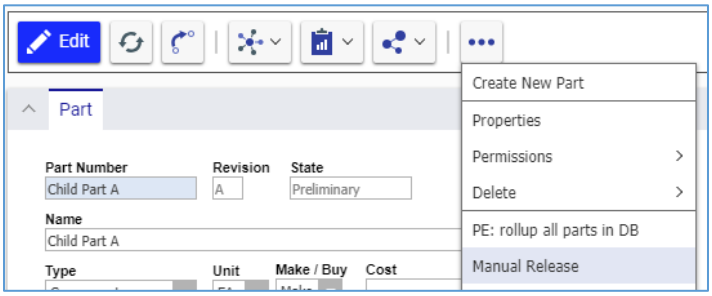

Figure 98.

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The promoted Item gets the **Released** value in the **State** box. The **plus** button also appears in the **Revision** field for manual revision.

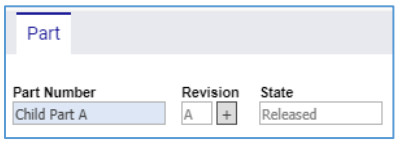

Figure 99.

Use the following procedure to release an Item using its action menu:

1. Go to the Items Search Grid.
2. Right-click the **Item** and then click **Manual Release**.

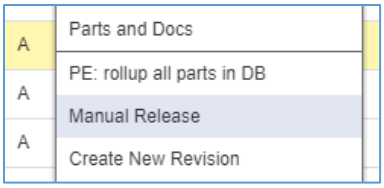

Figure 100.

Aras Innovator returns an error for the **Manual Release** feature in the following cases:

- A user performing the manual release is not the Assigned Creator of the Item. The user must be this Identity as outlined in the subsection *4.3.1 Assigning Ownership*.

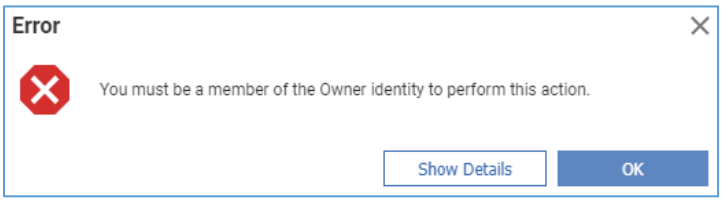

Figure 101.

- An Item is not in the Preliminary or Manual change states.

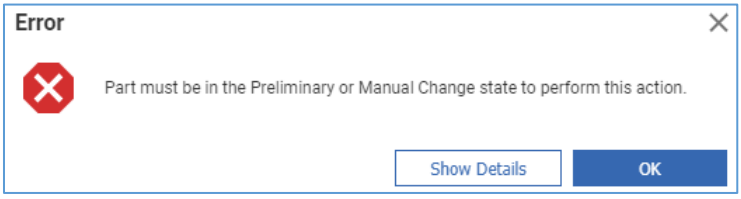

Figure 102.

4.3.4 Manual Revise

The Assigned Creator can manually create a new major revision of an Item if the abovementioned requirements for manual revision are met and if the Item is in the Released state.

The **Create New Revision** feature can be accessed either from the Item view or from its action menu in the Items Search Page.

Use the following procedure to revise an Item manually using its view:

1. Go to the Item view.
2. Use one of the following options:

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a. On the **Item** toolbar, click **More** and then click **Create New Revision**.
b. Click the **plus** button next to the **Revision** field.

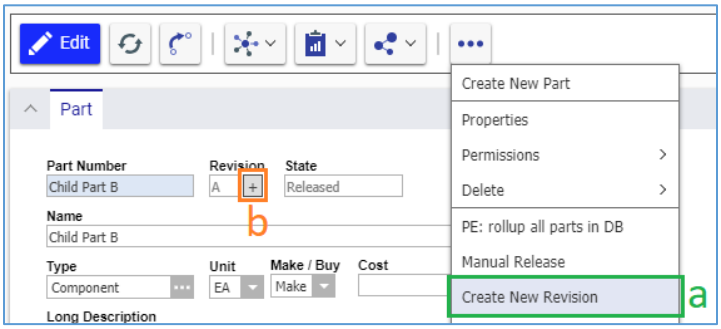

Figure 103.

3. Click **OK** in the dialog box displayed in case of step 2.b.

Figure 104.

The revised Item gets the **new major** value in the **Revision** box and the Preliminary state. Under **Revision**, the **plus** button disappears.

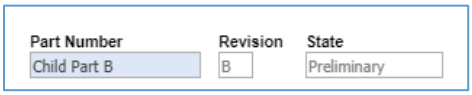

Figure 105.

Use the following procedure to revise an Item using its action menu:

1. Go to the Items Search Grid.
2. Right-click the **Item**, and then click **Create New Revision**.

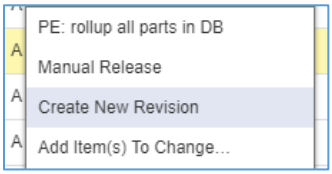

Figure 106.

Note: If you cannot see the latest Item generation in a Search Grid, click **Search** to reload the Grid. Another option is to use the Version exploration procedure.

Aras Innovator raises errors for the **Create New Revision** feature in the following cases:

- A user performing the manual revision is not the Assigned Creator of the Item. The user must be this Identity as outlined in the subsection *4.3.1 Assigning Ownership*.

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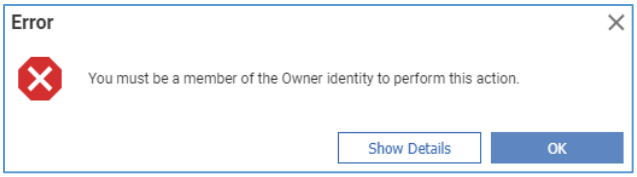

Figure 107.

- An Item is not in the Released state.

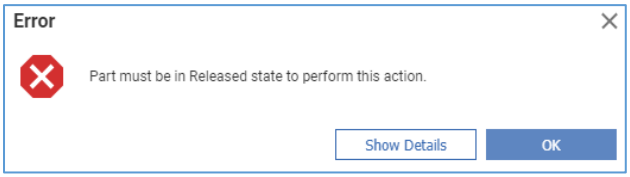

Figure 108.

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5 Parts

Parts are the basic item of any Bill of Materials (BOM) management application. They can have a part classification, such as Assembly, Component, Material or Software. A part can be bought or made in-house. It can be associated with other items. It can have alternate or substitute parts. It can have a list of approved manufacturers (AML) for making the part, and a list of approved vendors (AVL) for purchasing the part. It can have associated documentation, such as drawings and specifications. It can have a Bill of Material (BOM) and/or it can be part of another parts' BOMs. It can be the top-level assembly for a product model.

The following figure shows the underlying Data Model for a Part. Each of the relationships shown in the figure is described in detail in the following sections.

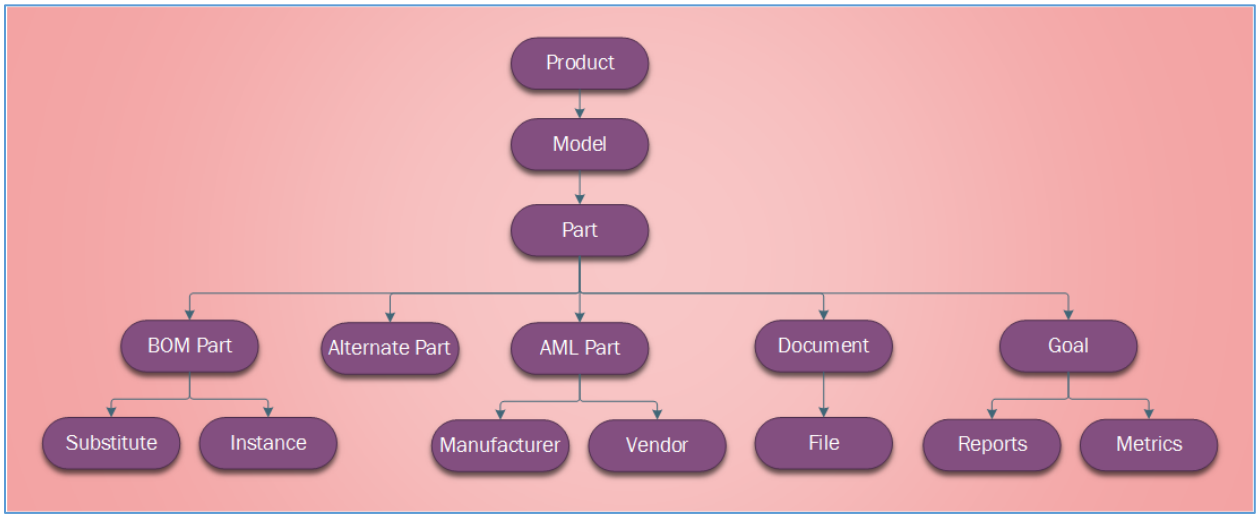

Figure 109.

Each part has a life cycle associated with it as shown here. A new Part has the **Preliminary** state associated with it by default and can be released manually in its early stages or via a change process as it matures. Refer to sections *4.3. Manual Promotion and Revise* and *13. Change Management* for details.

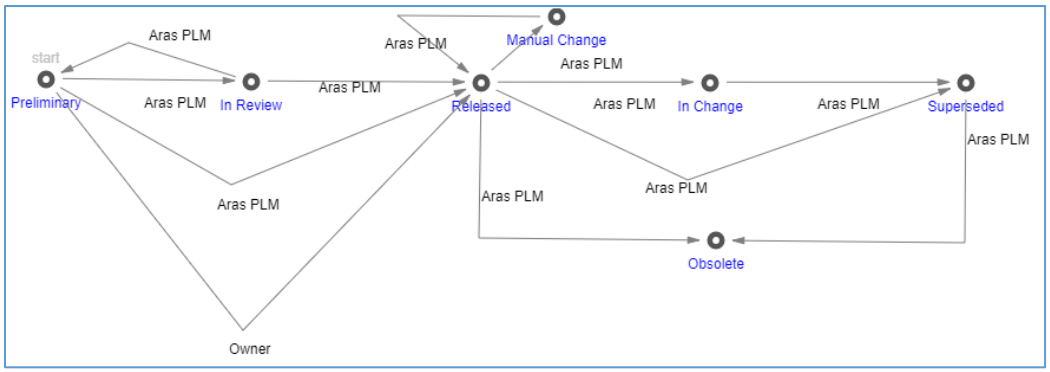

Figure 110.

Part reports, such as a Multilevel BOM report or a BOM Costing Report, are available to output information.

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5.1 Creating a Part

Use the following procedure:

1. Go to Contents --> Design --> Parts.
2. Click **Create New Part**. The **Part 1** item view appears.

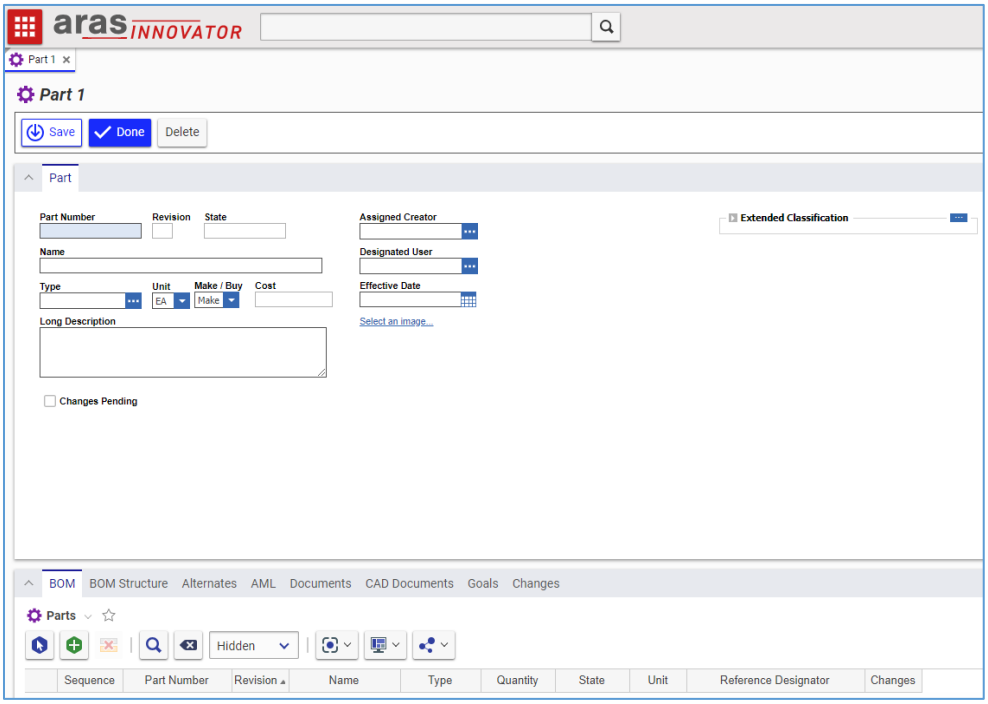

Figure 111.

3. Enter the part number in the **Part Number** field.

Note: The Part Number is the only required Manufacturer property for you to provide. An error appears when you try to save a Part without a Part Number.

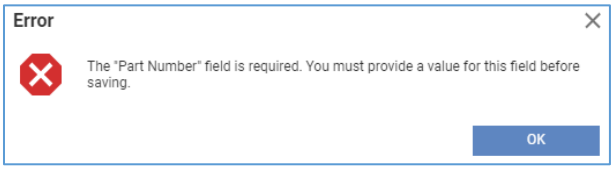

Figure 112.

Note: The Part Number property must be unique. An error appears when you try to save a Part with a Part Number that already exists in Aras Innovator.

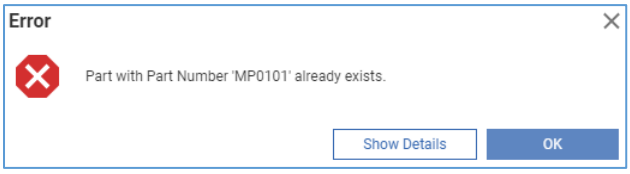

Figure 113.

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4. Enter the Part name in the **Name** field.
5. Click the **ellipsis** button in the **Type** box. The **classification** dialog appears displaying the Part Classification tree.

Note: The following is the standard Part classification tree in Aras Innovator. It can be extended, as needed, by an administrator.

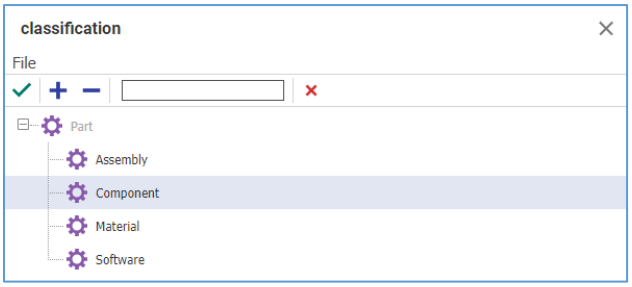

Figure 114.

6. Specify the Part type by either:
   - Double-clicking the **type**.
   - Selecting the **type** and clicking **Return selected** in the **classification** toolbar.

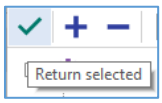

Figure 115.

7. In the **Unit** drop-down list, select the proper unit of measure for the Part:

Note: The following is the standard **Units** list in Aras Innovator. This list can be changed, as needed, by an administrator.

- **EA**, each
- **IN**, inches
- **FT**, feet
- **MM**, millimeters
- **CM**, centimeters
- **M**, meters

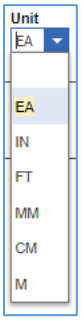

Figure 116.

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8. Depending on whether the Part is made in-house or bought from a manufacturer, select the corresponding value in the **Make/Buy** drop-down list.

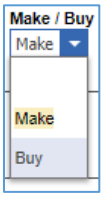

Figure 117.

9. Provide additional information about the Part in the **Long Description** text box.
10. Click the **ellipsis** in the **Assigned Creator** box. The **Search dialog – Identity** appears.
11. Using the standard search procedure, search for and select the Assigned Creator Identity, which populates the **Assigned Creator** property box.

Note: The **Assigned Creator** is responsible for the design or the content of the part. The Assigned Creator is often identified as the Owner of the item, who may be different from the user creating the part in the system.

12. Click the ellipsis in the Designated User box. The Search dialog – Identity appears.
13. Using the standard search procedure, search for and select the Designated User Identity, which populates the Designated User property box.

Note: The **Designated User** is responsible for the management, usage, and review of a Part.

14. If applicable, provide the Effective Date of the Part, either by:
    - Typing the date in the Effective Date property box,
    - Selecting the date using the Date dialog.

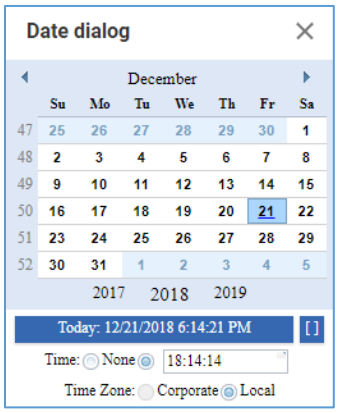

Figure 118.

Note: The **Effective Date** is the date when a Part actually goes into production or the process that signifies its availability. This can be different from the release date, which is when the Part reaches the Released state in its life cycle.

15. Select an icon from the Image Browser to generate a thumbnail for the Part. For more details, refer to section *2.4.6 Item Thumbnail*.
16. If it is necessary to populate extended properties:

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a. Click the **ellipsis** button in the **Extended Classification** pane. The **Classification** dialog appears.

Figure 119.

b. Search for and select extended properties that appear in the **Extended Classification** pane.

c. Provide values to the extended properties in the **Extended Classification** pane.

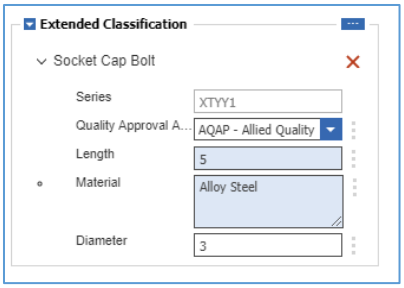

Figure 120.

17. Save the Part. The Part is created.

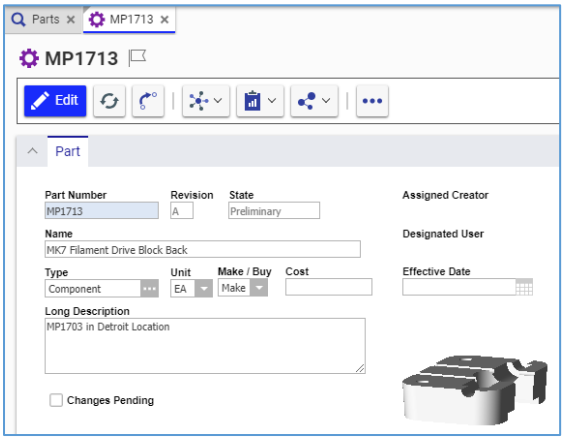

Figure 121.

The part is now available via search, subject to permissions.

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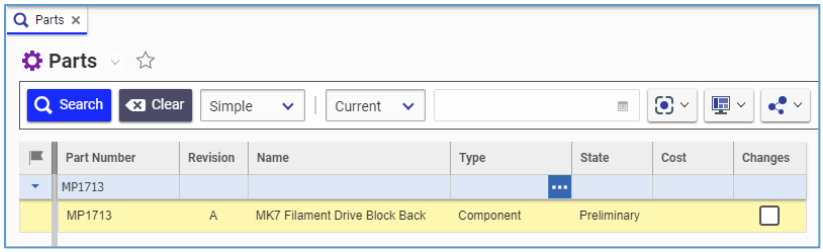

Figure 122.

5.2 Part Relationships

A Part can have relationships with other items. The **Relationships** accordion keeps these relationships grouped in separate **Relationships** tabs. Each **Relationships** tab represents a single relationship type. The tabs are as follows:

- **BOM** is a single-level BOM editor that enables you to view and manage the direct Children of this Part. For more details, refer to section *6.1 Understanding Part BOM Relationship*.

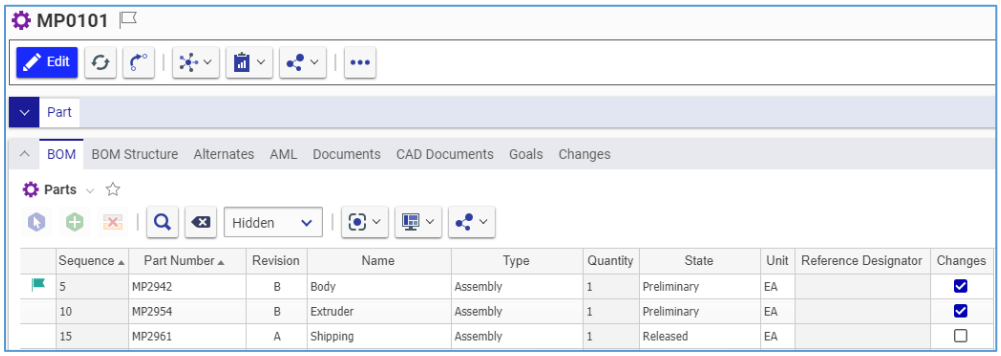

Figure 123.

- **BOM Structure** is a multi-level, read-only view of the Part's BOM. For more details, refer to section *6.2 Understanding BOM Structure*.

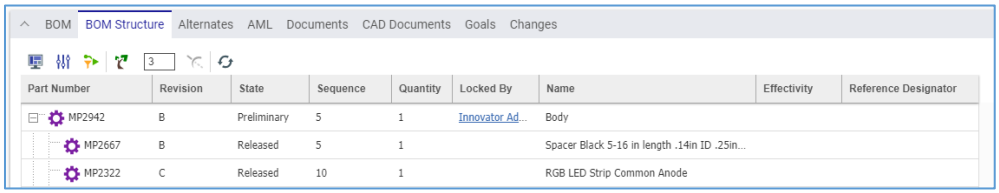

Figure 124.

- **Alternates** is a list of alternate Parts for this Part. For more details, refer to section *6.8 Using Alternates*.

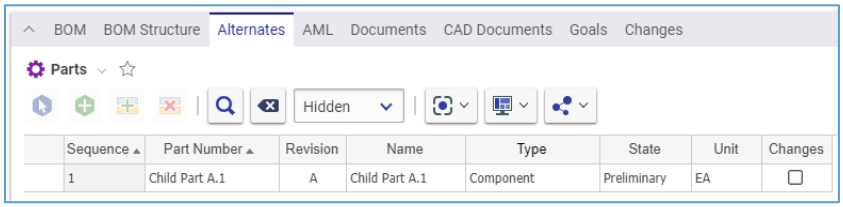

Figure 125.

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- **AML** is an Approved Manufacturing List for this Part. For more details, refer to section *7.7 Approved Manufacturer List (AML)*.

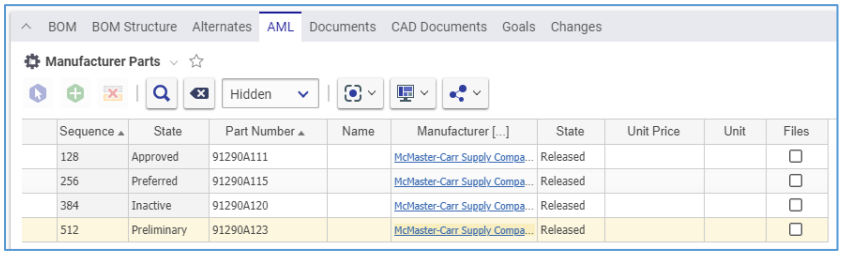

Figure 126.

- **Documents** is a list of documents for this Part. For more details, refer to section *8.4 Managing Part Documents*.

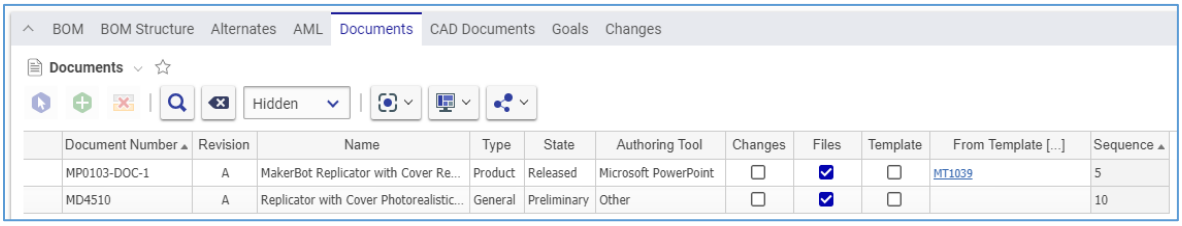

Figure 127.

- **CAD Documents** is a list of CAD documents, such as 2D/3D models and drawings for this Part. For more details, refer to section *9.5 Managing CAD Documents in Parts*.

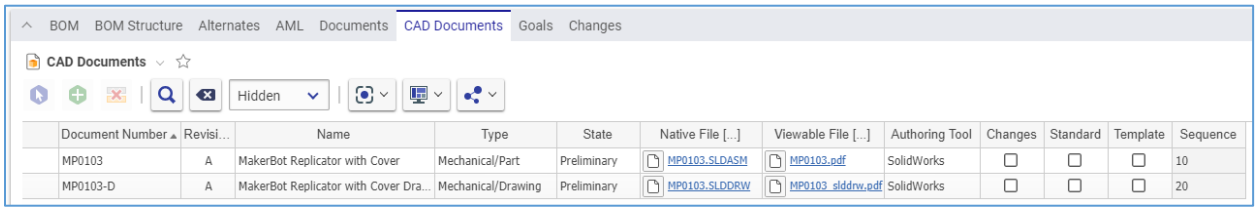

Figure 128.

- **Goals** keeps Goals set for this Part. For more details, refer to sections *5.5 Goals for a Part* and *6.11 Goals Rollup*.

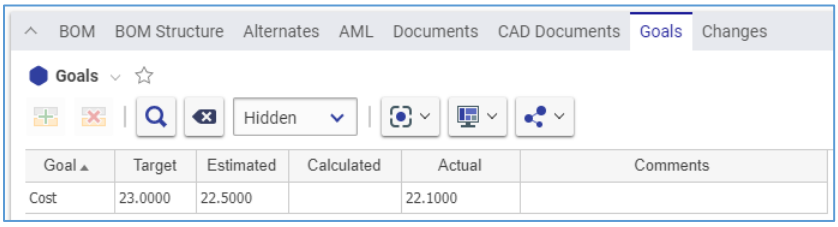

Figure 129.

- **Changes** displays a list of change items, such as Problem Report, ECR or ECN, where the Part is an affected item. For more details, refer to section *13. Change Management*.

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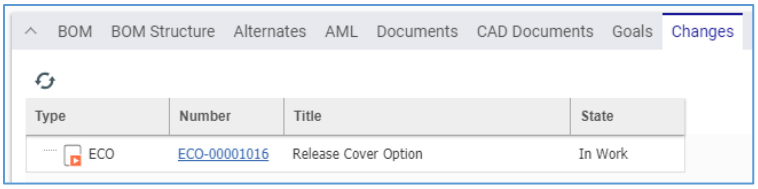

Figure 130.

5.3 Part Life Cycle

Each Part has a Life Cycle associated with it. The following figure shows the default Life Cycle Map of a Part. A newly created Part is assigned the Preliminary state by default. It can be released manually or via a change process. Refer to the *4.3 Manual Promotion and Revise* section for the details on how manual release works. The Product Engineering application provides change management processes, which are used for releasing Parts after appropriate review and approval steps. During the change processes, the Part goes through different life cycle states depending on the step in the workflow. For more details, refer to section *13. Change Management*.

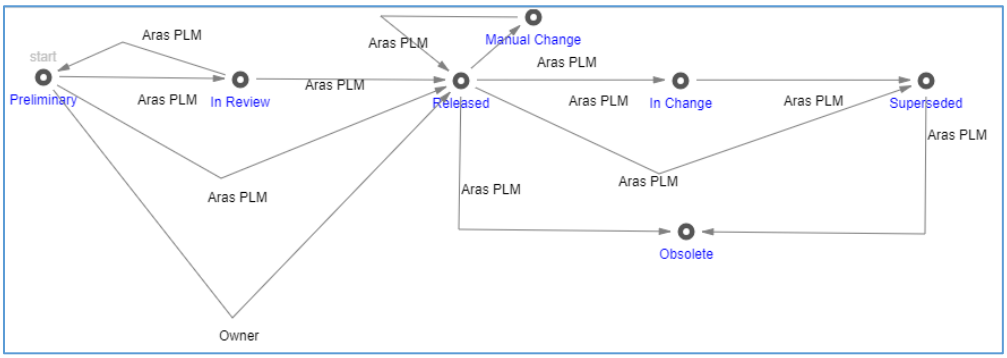

Figure 131.

The current State of a Part appears in several places:

- In the **State** column of the Parts Search Grid.

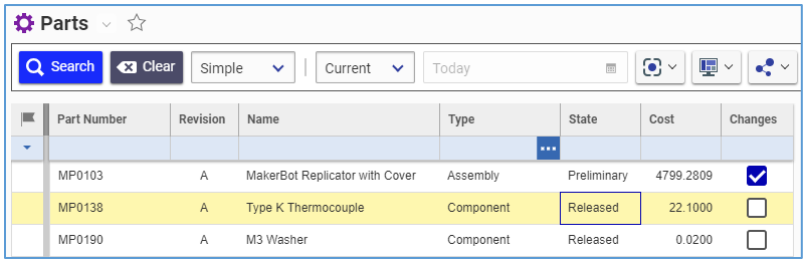

Figure 132.

- In the **State** read-only property box of the Part view.

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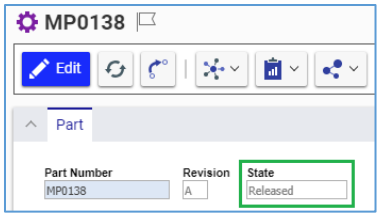

Figure 133.

- In the ***Part Number*** **Life Cycle** dialog, where the light gray word **current** appears under the current State.

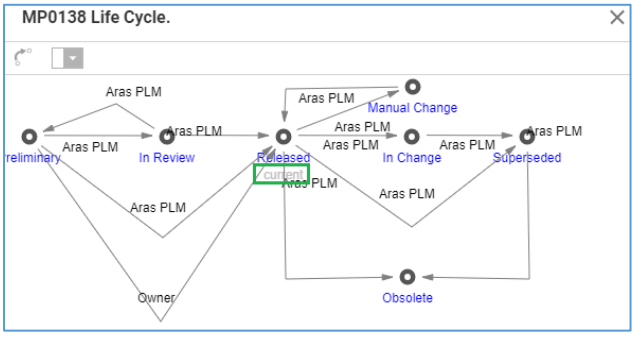

Figure 134.

To access the ***Part Number*** **Life Cycle** dialog for a Part:

1. Open the Part view
2. On the **Part** toolbar, click **Navigate** and then click **Life Cycle**.

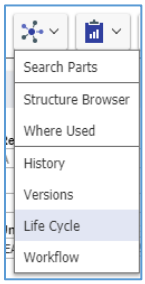

Figure 135.

5.4 Part Deletion

It is possible to delete all or some versions of a Part. In the former case, the Part is deleted from Aras Innovator completely. For details on the latter case, refer to section *4.1.2 Version Deletion*.

To delete a Part completely, a user must have the **Delete** rights granted in Permissions for all Life Cycle states the Part has including the current one. For example, if the Part is currently in the Released state and was in Preliminary before, the user must have the **Delete** rights granted in Permissions for both states. For details on access rights, refer to section *3. Item Permissions*. This subsection assumes the user has these rights.

You can delete a Part either from its view or from using the action menu in the Parts Search Page.

Use the following procedure to delete a Part from its view:

1. Go to the Part view.

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2. On the **Part** toolbar, click **More** select **Delete**, and click **Delete All Versions**.

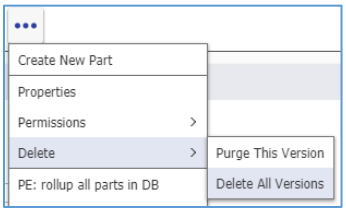

Figure 136.

A notification dialog appears.

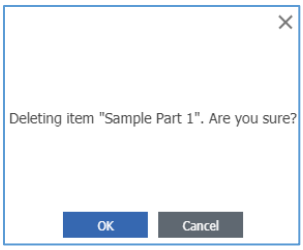

Figure 137.

3. Click **OK**.

The Part is deleted.

Use the following procedure to delete a Part from its action menu:

1. Go to the Part Search Grid.
2. Right-click the **Part** and then click **Delete All Versions**. A notification dialog appears.

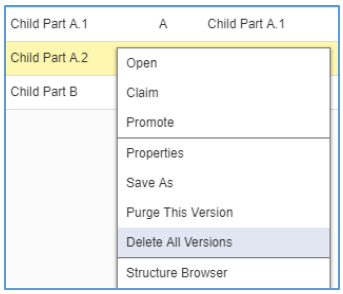

Figure 138.

3. Click **OK**. The Part is deleted.

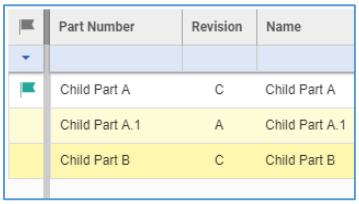

Figure 139.

Aras Innovator returns an error if you try to delete a Part but do not have **Delete** rights on any one of the Life Cycle states that part's versions have. To be able to delete the Part, you should have the **Delete** rights for all its states across its versions. For details on access rights, refer to sections *3. Item Permissions* and *3.3 Defining Private Permissions*.

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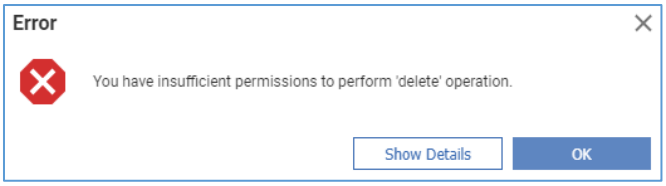

Figure 140.

If a Part has only one version, you can delete the Part using the **Purge This Version** feature. For details about this feature, refer to section *4.1.2 Version Deletion*. For details on how to find out if the current version is the only one, refer to section *4.1.1 Versions Exploration*.

5.5 Goals for a Part

A Part may have Goals for its Cost and/or Weight.

The following is the hierarchy of Goal Bases for Goal values (from lower to higher):

- *Target* is the desired value to be achieved.
- *Estimated* is a value roughly calculated or judged from real-world data.
- *Calculated* is the sum of Estimated and/or Actual values of Children.
- *Actual* is the actual value.

If a Part has a Goal with values set for several Bases, the highest Goal Base value overrides its lower bases. For example, the Calculated overrides the Estimated and the Target. The Actual overrides all.

The Goal Bases hierarchy enables you to track, compare, and analyze a Part's Cost and Weight. A Parent's Goals are automatically acquired from the associated BOM. For more details on this topic, refer to section *6.11 Goals Rollup*.

5.5.1 Goals Assignment

Use the following procedure to set Cost and Weight Goals for a Part:

1. Open the Part view in the Edit mode.
2. Go to the **Goals** relationships accordion tab of the Part view.

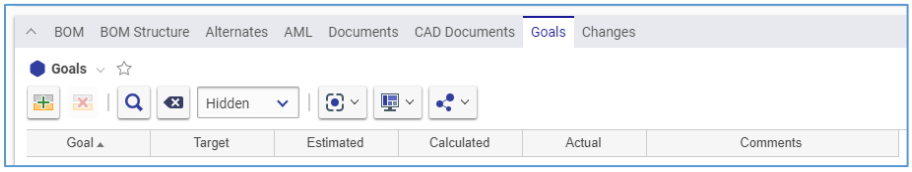

Figure 141.

3. Click **Add row** on the **Goals** relationships toolbar. A new nameless row appears in the **Goals** table.

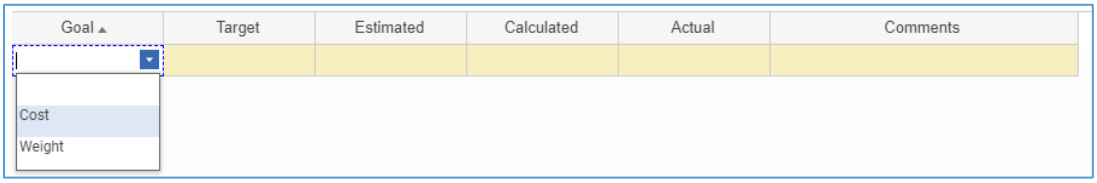

Figure 142.

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4. Select **Cost** from the dropdown list in the **Goal** cell.
5. Enter the corresponding value for Cost in the **Target** cell.

Warning Goals and their calculations do not have a unit of measure. Their values must be entered in the same units.

6. Enter the corresponding value in the **Estimated** cell.
7. Enter the corresponding value in the **Actual** cell.
8. Enter any additional information In the **Comments** cell, if necessary.
9. Repeat steps 3-8 for the Weight Goal.
10. Save the Part.

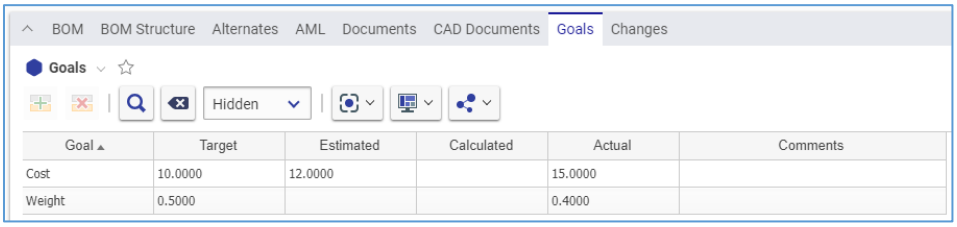

Figure 143.

Note: A Part can have one Cost and one Weight Goal rows. If there are several rows for Goals of the same type, Aras Innovator returns an error when the Part is saved. Delete the extra row to fix this issue.

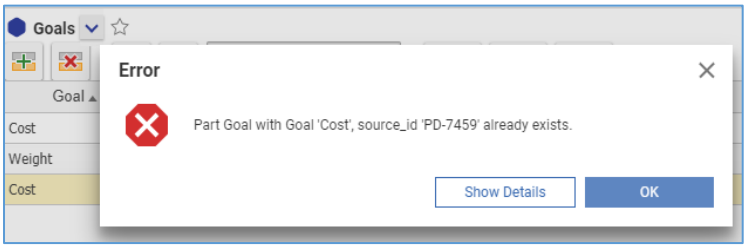

Figure 144.

Note: The **Goal** cell is required. If there is a row with the **Goal** cell empty, Aras Innovator returns an error when the Part is saved. Enter a value in this cell to fix this issue.

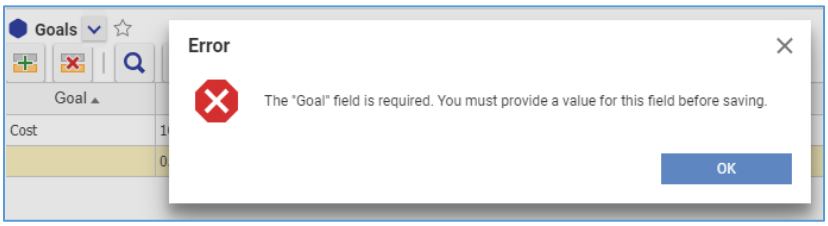

Figure 145.

5.5.2 Goals Modification

Use the following procedure to modify a Part Goal value:

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1. Open the Part view in Edit mode.
2. Go to the **Goals** relationships accordion tab of the Part view.
3. Click the **value** to be modified. The **value** becomes available for editing.
4. Enter a **new value**.
5. Save the Part.

If this Part is a Child, the corresponding Goal values of its Parents are updated.

5.5.3 Goals Removal

To remove a value from a Goal, follow the Goals Modification procedure with the exception of step 4 to delete the value.

Use the following procedure to remove a Goal from a Part:

1. Open the Part view in Edit mode.
2. Go to the **Goals** relationships accordion tab of the Part view.
3. Click the **row** of the Goal to be removed.
4. Click **Delete Row** on the **Goals** relationships toolbar. The **row** of the Goal to be removed is grayed out to indicate that it is unavailable.

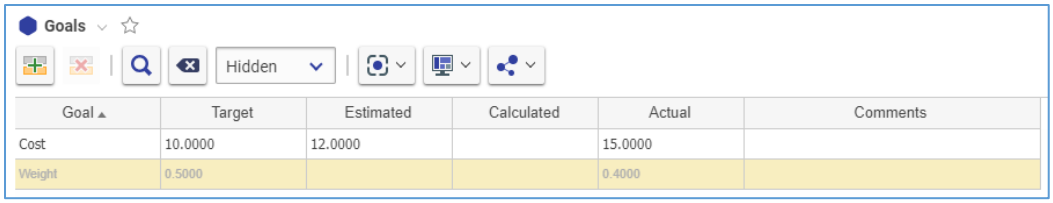

Figure 146.

5. Save the Part. The Goal is removed. If this Part is a Child, the corresponding Goal values of its Parents are updated.

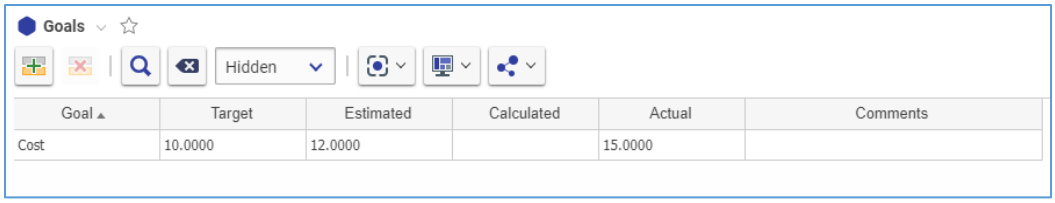

Figure 147.

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6 Bill of Materials

A Part may be an assembly of other Parts keeping them in a Bill of Materials (BOM). A BOM is a list of components, parts, materials, other assemblies, and the quantities of each that are needed to put together this Part. A BOM is sometimes called a parts list, product structure, or associated list. In process industries, it is also known as a formula, recipe, or ingredients list.

A Part with a BOM is a Parent that has Parts as Children. In technical terms, it is a Part that has *Part BOM Relationships* with other Parts. A Child can be a single Part or another assembly (Parent) creating a multi-level BOM structure.

There are two ways to set up a BOM Relationship:

- Create all the necessary Children and then create a Parent to populate the **BOM** tab with its Children. This approach builds a new assembly using existing Parts. For more details on this approach, refer to section *6.3 Creating a BOM*.
- Create a Parent and then create its Children from the BOM tab. This approach is convenient for populating nested BOMs or creating BOM structures quickly without getting into the details of each Child. However, it is still necessary to complete each Child later. For more details on this approach, refer to section *6.4 Creating Parts from a BOM*.

Note: An Administrator can restrict Aras Innovator to one approach.

A Part may have Alternates. Alternates are Parts that can replace this Part globally in the scope of a company. For more details on this topic, refer to section *6.8 Using Alternates*. A Part can have Substitutes, which are Parts that can replace this Part in a specific BOM only. For more details on this topic, refer to section *6.9 Using Substitutes*.

A Child Part can be used in a Parent multiple times. Each of the child instances may need to be identified individually to provide its specific X, Y and Z coordinates or Reference Designation information. Use the **Instances** tab of a BOM relationship to specify instance information.

The Goals of a Parent Part are automatically rolled up from all its Children. For more details on Goals, refer to section *5.5 Goals for a Part*, and on Roll-up — to *6.11 Goals Rollup*.

6.1 Understanding Part BOM Relationship

A *Part BOM relationship* is a relationship between a Parent Part and its Child Part defined in the **BOM** relationships accordion tab of the Parent.

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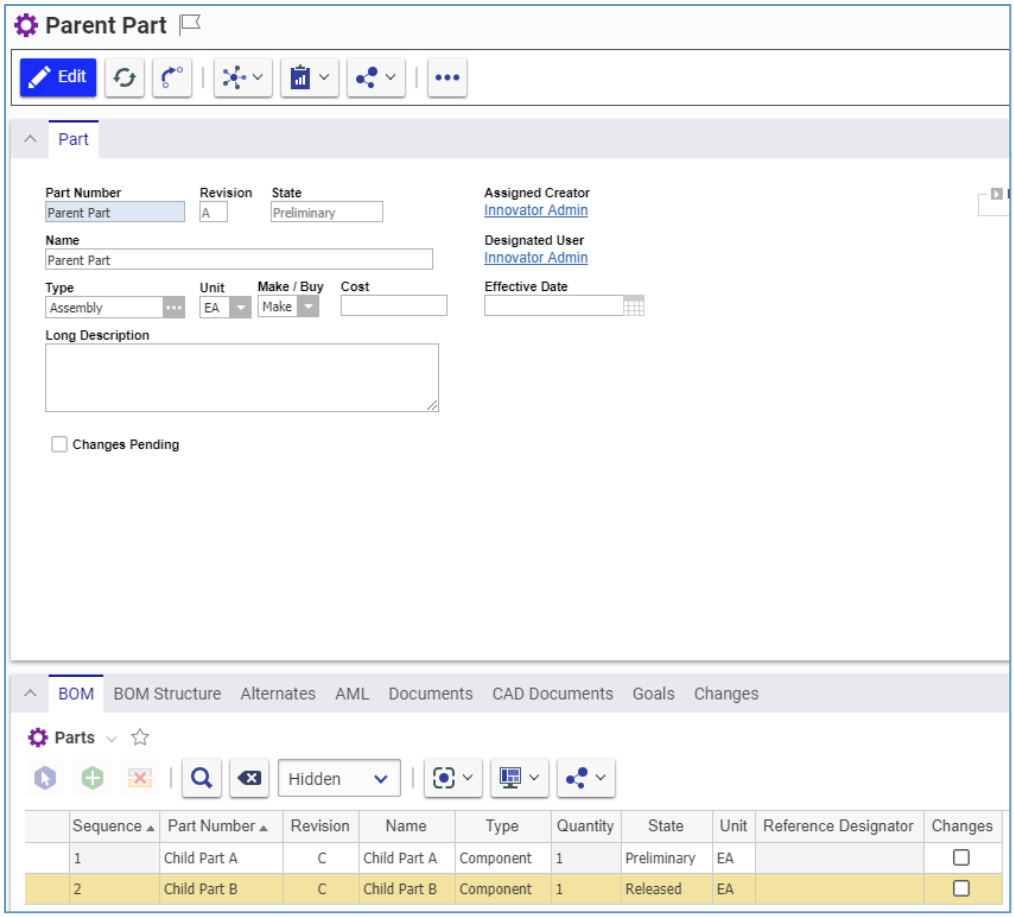

Figure 148.

Use the following procedure to view a Part BOM relationship:

1. Go to the **BOM** tab of a Parent.
2. In the **BOM** grid, right-click a **Child**, point to **BOM** and then click **Open**.

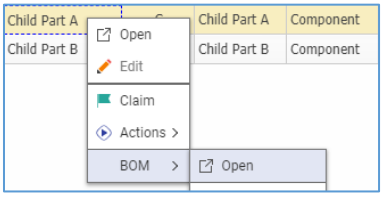

Figure 149.

The view of the Part BOM relationship between the Parent and the Child appears with the toolbar menu buttons providing some functionality specific to this relationship type.

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Figure 150.

The **Navigate** button has the following specific features:

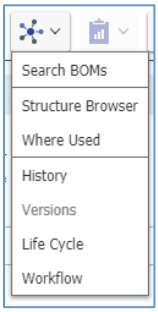

Figure 151.

- **Search BOMs** takes you to the Part BOM Search Grid.

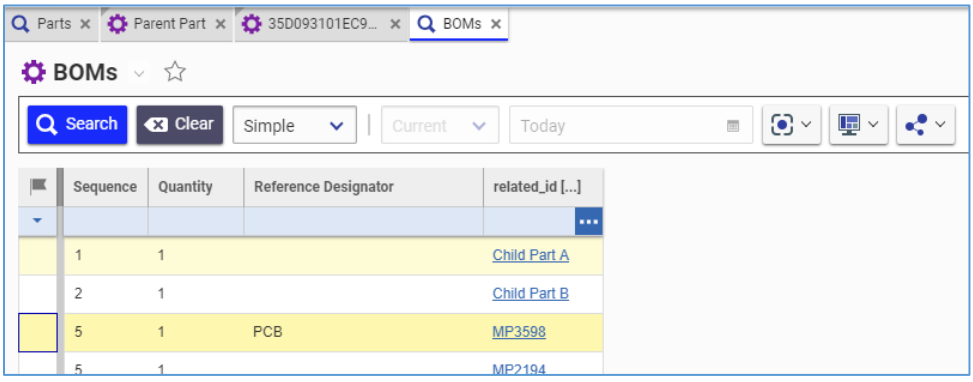

Figure 152.

- **Where Used** shows the tree where this relationship and its related Part are used and affected.

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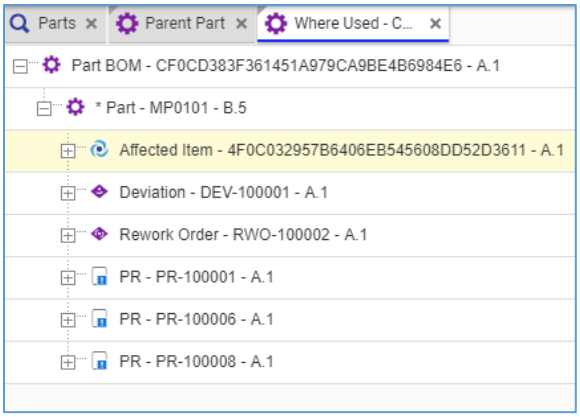

Figure 153.

The **Share** button has the following specific features:

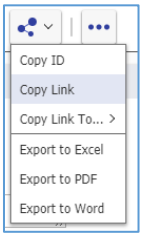

Figure 154.

- **Copy ID** copies the Part BOM relationship ID to the clipboard.
- **Copy Link** copies the link to the Part BOM relationship to the clipboard.

The **More** button has the following specific features:

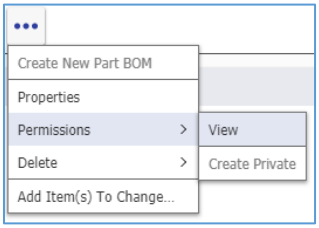

Figure 155.

- **Properties** displays the Part BOM relationship's properties in the **Part BOM *Number*** dialog.

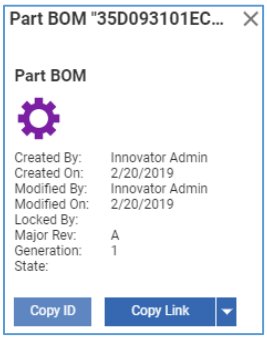

Figure 156.

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- **Permissions** to view the current permission for the Part BOM relationship. Refer to section *3. Items Permissions* for details.
- **Delete** to delete the Part BOM relationship.

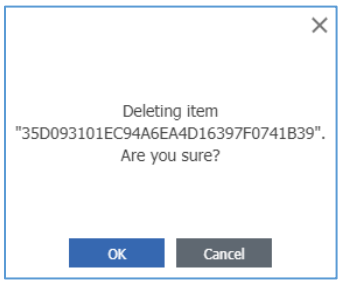

Figure 157.

- **Add Item(s) To Change** to add the related Part (Child) to a change item. For details, refer to section *13. Change Management*.

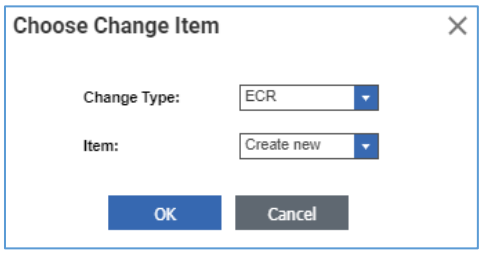

Figure 158.

The Part BOM view contains the **Reference Designator** text box, which is used primarily in electronic assemblies to list labels of each Instance. Refer to section *6.7 Using Instances* for more details on this topic.

The relationships accordion of the Part BOM view has three tabs:

- **Instances**, refer to section *6.7 Using Instances* for details.
- **Substitutes**, refer to section *6.9 Using Substitutes* for details.
- **Effectivity**, refer to section *6.10 Effectivity Management* for details.

6.2 Understanding BOM Structure

A multi-level BOM is a structure of Parts and is often designed to be configurable. This approach enables you to have a single product structure for numerous product configurations.

Aras Innovator provides functionality to resolve a BOM structure using:

- Structure Resolution, which identifies Part versions depending on a Resolution Mode. Refer to section *6.10 Applying Structure Resolution Modes* for details.
- Effectivity, which identifies valid Parts to be used under different conditions. Refer to section *6.11 Effectivity Management* for details.

The following procedure explains BOM Structure exploration features:

1. Go to the **BOM Structure** accordion tab of a Parent Part.

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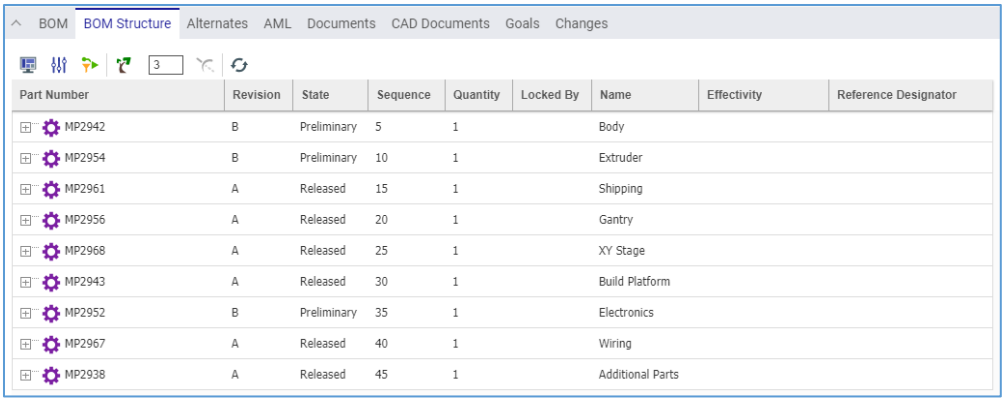

Figure 159.

2. Click **Grow** on the **BOM Structure** toolbar. The tree of Children is unfolded up to 3 levels deep, as set in the **Growth Depth** box right after **Grow**. The Growth Depth value can be changed.

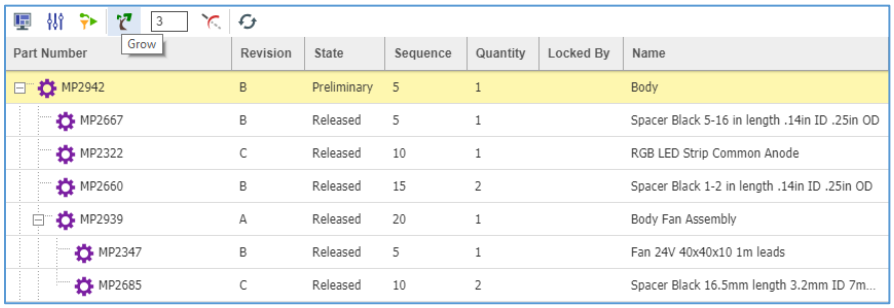

Figure 160.

3. On the **BOM Structure** toolbar, click **Trim**. All the items of a selected tree level are folded back.

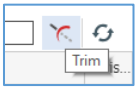

Figure 161.

4. On the **BOM Structure** toolbar, click **Display Settings**.

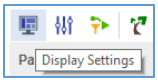

Figure 162.

The **Display Settings** dialog appears.

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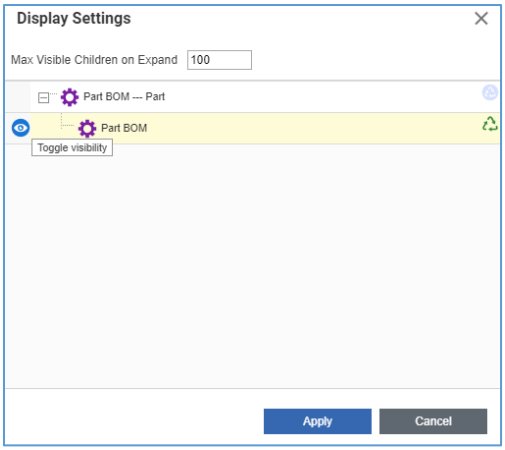

Figure 163.

5. Click **Toggle visibility** before **Part BOM** and then click **Apply**. The Part BOM Relationships disappear: there are no Children.

Part Number	R...	State	Seque...	Quantity	Locked By	Name
MP2942	B	Preliminary	5	1		Body
MP2954	B	Preliminary	10	1		Extruder
MP2961	A	Released	15	1		Shipping
MP2956	A	Released	20	1		Gantry
MP2968	A	Released	25	1		XY Stage
MP2943	A	Released	30	1		Build Platform
MP2952	B	Preliminary	35	1		Electronics
MP2967	A	Released	40	1		Wiring
MP2938	A	Released	45	1		Additional Parts

Figure 164.

6. Repeat steps 4 and 5 to toggle back. The Part BOM Relationships reappear: there are Children.
7. On the **BOM Structure** toolbar, click **Modify Parameters.**

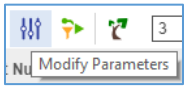

Figure 165.

The Parameters dialog appears. Use it to resolve the BOM Structure by a Resolution Mode. Refer to section *6.10 Applying Structure Resolution Modes* for details.

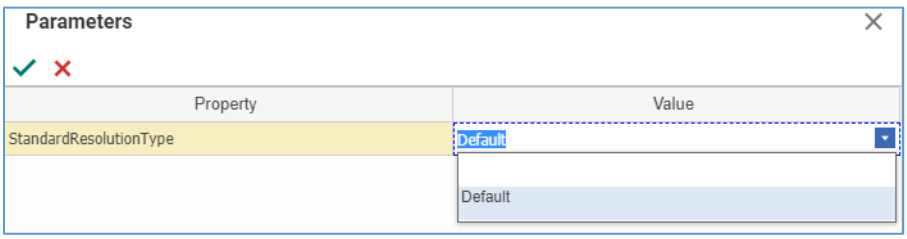

Figure 166.

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8. Close the **Parameters** dialog.
9. On the BOM Structure toolbar, click Set Effectivity Criteria.

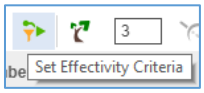

Figure 167.

The **Effectivity Criteria Filter** dialog appears. Use it to resolve the BOM Structure by Effectivity. Refer to section *6.11 Effectivity Management* for details.

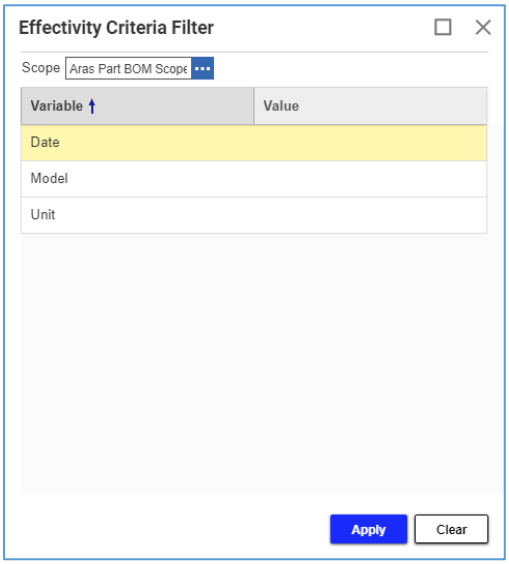

Figure 168.

10. In the header rows, click **arrows** after titles to sort the structure. Refer to section *6.16 Sorting BOM Structures* for details.

Figure 169.

11. On the **BOM Structure** toolbar, click **Export To Excel** to download the opened structure as an Excel file. Refer to section *6.17 Exporting BOM Structures to Excel* for details.

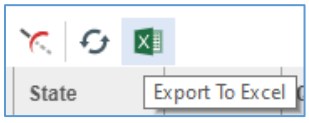

Figure 170.

Note: A BOM exploration feature not noted in this procedure is the Structure Browser. For more details on this feature, refer to section *6.14 Comparing BOMs*. Although the Structure Browser is intended for comparing two BOMs, you can use it for exploring one too.

6.3 Creating a BOM

Use the following procedure to create BOM Relationships:

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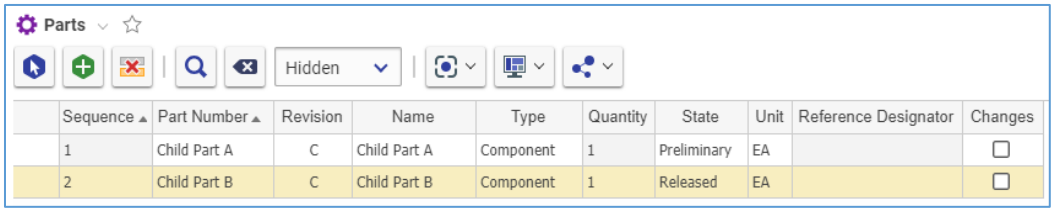
1. Create all the necessary Child Parts.
2. Create a Parent Part.
3. Populate the **BOM** tab of the Parent with Children.

This approach is used for building a new assembly using existing Parts.

This section assumes that a Parent and all the necessary children exist.

Use the following procedure to set up a BOM:

1. Open the **Parent** view.
2. On the **Parent** toolbar, click **Edit**.
3. Go to the **BOM** accordion tab.
4. On the **BOM** accordion toolbar, click **Select Items**. The **Search dialog – Part** appears.
5. Using the standard search procedure, search for and select all the necessary Children that appear in the table on the **BOM** accordion tab.



Sequence	Part Number	Revision	Name	Type	Quantity	State	Unit	Reference Designator	Changes
1	Child Part A	C	Child Part A	Component	1	Preliminary	EA		
2	Child Part B	C	Child Part B	Component	1	Released	EA		

Figure 171.

6. Enter relationship information, such as Quantity and Reference Designator, as needed. Double-click the **Quantity** cells of each Child and enter the required quantity.

Sequence	Part Number	Revision	Name	Type	Quantity	State	Unit	Reference Designator	Changes
1	Child Part A	C	Child Part A	Component	1	Preliminary	EA		
2	Child Part B	C	Child Part B	Component	2	Released	EA		

Figure 172.

7. On the **Parent** toolbar, either click **Done** or **Save**. The BOM is created.

6.4 Creating Parts from a BOM

Use the following procedure to create Parts from a BOM.

1. Create a Parent Part
2. Create all necessary Child Parts from the **BOM** tab of the Parent
3. Complete the Children with necessary details

This approach is convenient for populating nested BOMs or creating BOM structures quickly without getting into the details of each Child. However, you still need to complete the details for each Child later.

This section assumes that a Parent is created.

Use the following procedure to set up a BOM:

1. Open the **Parent** view.
2. Click **Edit** on the **Parent** toolbar.
3. Go to the **BOM** accordion tab.

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4. Click **Create Items** on the **BOM** accordion toolbar. A new **row** appears in the **BOM** table.

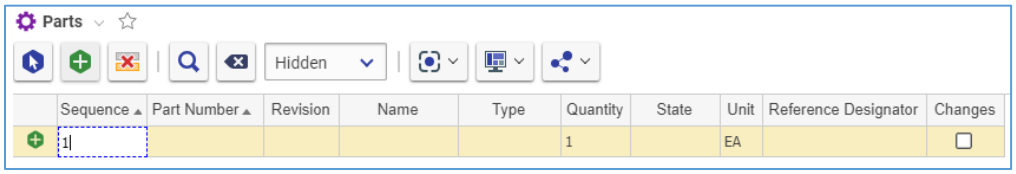

Figure 173.

5. Click the **Part Number** cell and enter the new Child ***Part number***.

Note: The Part Number must be unique. It is the only required Part property provided by the user.

6. If you need to provide any other data for the Child, click the **corresponding cell** and enter ***this data***.
7. Repeat steps 4-6 to create other Children.
8. Click **Done** or **Save** on the **Parent** toolbar. The BOM and the Children are created.
9. Edit any Children that are missing data. Refer to sections *5.1 Creating a Part* and *6.6 Editing Parts within a BOM* for details on this topic.

6.5 Editing a BOM

You can update an existing BOM in the following ways:

- Add new Children.
- Replace Children within the BOM.
- Remove Children from the BOM.

6.5.1 Adding New Children

To add new Children to an existing BOM, follow the BOM creation procedure. For more details on this topic, refer to sections *6.3 Creating a BOM* and *6.4 Creating Parts from a BOM*.

6.5.2 Replacing Children

Use the following procedure to replace Children in a BOM:

1. Open the Parent.
2. Click **Edit** on the **Parent** toolbar.
3. Go to the **BOM** accordion tab.
4. Right-click the **Child** to be replaced and then click **Replace**. The **Search dialog - Part** appears.
5. Using the standard search procedure, search for and select a replacing Part. The Child in the BOM is replaced with the Part selected. The BOM relationship data, such as Quantity and Reference Designator, is retained.

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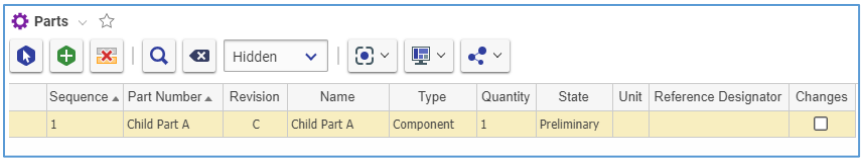

Figure 174.

6. Repeat steps 4 and 5 for other Children to be replaced.
7. Click **Done** or **Save** on the **Parent** toolbar. The Children are replaced.

6.5.3 Removing Children

Use the following procedure to remove Children from a BOM:

1. Open the **Parent** view.
2. Click **Edit** on the **Parent** toolbar.
3. Go to the **BOM** accordion tab.
4. Click the **Children** and then click **Delete Row** on the **BOM** table toolbar. The **Children** become unavailable.

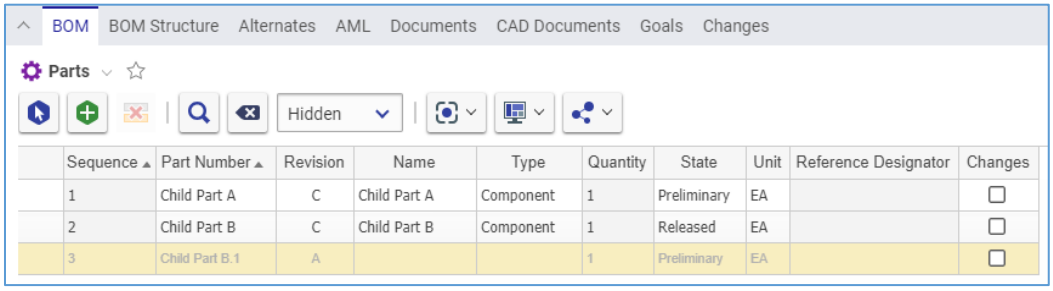

Figure 175.

5. Click **Done** or **Save** on the **Parent** toolbar. The **unavailable Children** are removed from the BOM.

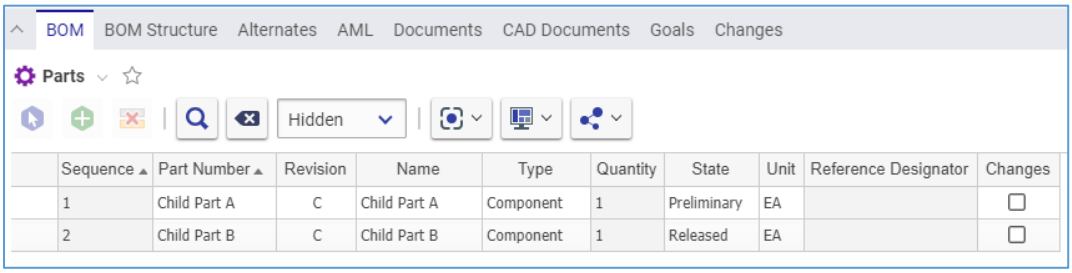

Figure 176.

6.6 Editing Parts within a BOM

Use the following procedure to edit Children (related Parts) from the Parent BOM:

1. Open the **Parent** view.
2. Click **Edit** on the **Parent** toolbar.

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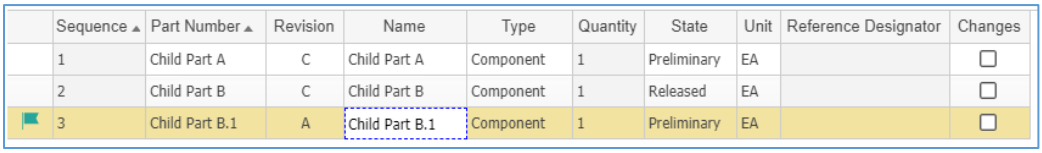
3. Go to the **BOM** accordion tab.
4. Right-click a **Child** and click **Edit**. The Child becomes claimed, and **its row** becomes editable.

Note: If you need to edit data of the Part BOM relationship with a Child, e.g., Quantity, not the Child itself, click the corresponding cell and edit the data.

5. In the proper cells, add, modify, or remove the appropriate **Child data**.



	Sequence	Part Number	Revision	Name	Type	Quantity	State	Unit	Reference Designator	Changes
	1	Child Part A	C	Child Part A	Component	1	Preliminary	EA		☐
	2	Child Part B	C	Child Part B	Component	1	Released	EA		☐
⚑	3	Child Part B.1	A	Child Part B.1	Component	1	Preliminary	EA		☐

Figure 177.

6. To undo the new data, right-click the **Child** and then click **Discard Changes**. The Child becomes unclaimed, its properties are rolled back, and **its row** becomes read-only.

Note: After you save the Child's Parent, the Child remains claimed with all new data saved. It is possible to continue editing the Child in its row, but it is not possible to discard this data.

7. Right-click the **Child** and then click **Done Editing**. The Child becomes unclaimed, **its row** becomes read-only, and its new property values are saved.

Note: After you click **Done** on the toolbar of Child's Parent, the Child becomes unclaimed, and all new data is saved.

8. If you need to edit properties not present in the table, right-click the **Child** and then click **Open**. The Child view appears, and you can edit those properties. Refer to section *5.1 Creating a Part* for details on this topic.

Note: If you need to keep a Child or a Parent claimed, save it and close its view.

9. To edit other Children, repeat steps 4-8.
10. Click either **Done** or **Save** on the **Parent** toolbar.

6.7 Using Instances

A Parent Part can have multiple Instances of the same Child in its BOM. It may be necessary to identify information about each instance. For example, an assembly (Parent) can be fastened using several of the same bolt. It may be needed to specify the location of each instance.

The **Part BOM** view contains the **Instances** tab. This tab displays the properties of each Child Part Instance for its identification in a BOM:

- **Reference Designator**. This is a unique Instance label.
- **X**. This is an X coordinate of Instance location in the assembly.
- **Y**. This is a Y coordinate of Instance location in the assembly.
- **Z**. This is a Z coordinate of Instance location in the assembly.
- **Angle**. This is an angle of Instance location in the assembly.
- **Side**. This is from where (Top or Bottom) the Instance location is measured.

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Warning The coordinates and angle do not have a unit of measure. Their values must be entered in the same units.

The Reference Designator data is used primarily in electronic diagrams. For example, a circuit board consists of four Instances of the same resistor. Each Instance has its own Reference Designator to identify it unambiguously within the electrical schematic or on the printed circuit board.

Use the following procedure to specify Instances of a Child in a BOM:

1. Claim the Parent.
2. Access the view of the Part BOM relationship as described in section *6.1 Understanding Part BOM Relationship*.
3. Click **Edit** on the **Part BOM** toolbar.
4. Click **Add Row** on the **Instances** accordion toolbar. A new **row** appears in the **Instances** table.

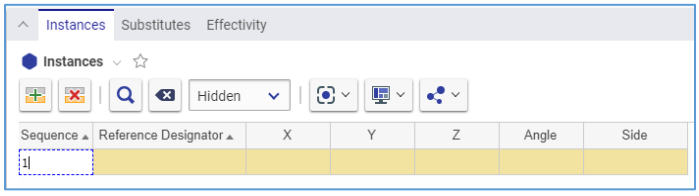

Figure 178.

5. Click the **Reference Designator** cell and then enter a unique label for Instance identification when referencing.

Note: The **Instances** table has no required cells.

6. If it is necessary to provide topological information on the Instance location on the Parent, enter it in the **X**, **Y**, **Z**, and **Angle** cells.
7. If the information is provided in step 7, specify in the **Side** cell which side the coordinates begin, either **Top** or **Bottom**.
8. Repeat steps 4-7 for other Instances of the Child that must be identified.

Sequence	Reference Designator	X	Y	Z	Angle	Side
1	Instance 1	10	20	3	0	Top
2	Instance 2	15	20	3	0	Top
3	Instance 3	10	20	3	0	Top

Figure 179.

9. Use the following procedure if it is necessary to remove an Instance:
   e. Click the **Instance**.
   f. Click **Delete Row** on the **Instances** accordion toolbar. The **Instance** becomes unavailable.

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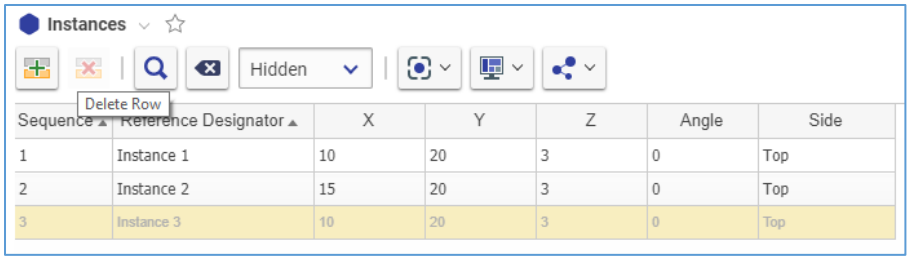

Figure 180.

g. On the **Part BOM** toolbar, click **Save**. The **Instance** disappears.

Note: The **Instance** disappears immediately if you do not save the Part BOM after it was added.

10. On the Part BOM view, in the Reference Designator text box, enter a comma-separated list of Reference Designators for all the Instances.

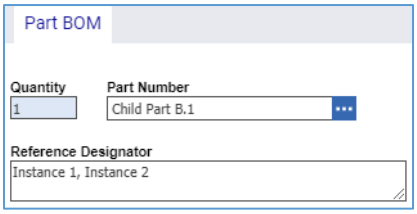

Figure 181.

11. On the **Part BOM** toolbar, click **Done**.
12. Go to the **Parent** view. The **list of Instances** provided in step 10 is displayed in the Child's **row**.

	Sequence	Part Number	Revision	Name	Type	Quantity	State	Unit	Reference Designator	Changes
	1	Child Part A	C	Child Part A	Component	1	Preliminary	EA		☐
	2	Child Part B	D	Child Part B	Component	1	Preliminary	EA		☐
	3	Child Part B.1	A	Child Part B.1	Assembly	2	Preliminary	EA	Instance 1, Instance 2	☐

Figure 182.

13. Unclaim the Parent.

6.8 Using Alternates

A Part may have an Alternate Part that can replace it globally. A Part is interchangeable with its Alternate regardless of where the Part is used in BOM structures.

The presence of an Alternate in a Part is for informational purposes only. To replace a Part with its Alternate in a BOM, you must follow the Child replacement procedure as outlined in section *6.5.2. Replacing Children*.

If the Parts are interchangeable only in specific BOM structures, Substitutes should be used instead of Alternates. Refer to section *6.9 Using Substitutes* for details on this topic.

6.8.1 Assigning Alternates

Use the following procedure to add an existing Part to another Part as an Alternate:

1. Open the view of the **Part** to create the Alternate.

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2. Click **Edit** on the **Part** toolbar.
3. Go to the **Alternates** accordion tab.
4. Click **Select Items** on the **Alternates** accordion toolbar. The **Search dialog – Part** appears.
5. Using the standard search procedure, search for and select a Part, which is defined as an Alternate for the Part edited. The Alternate Part then appears under **Alternates**.

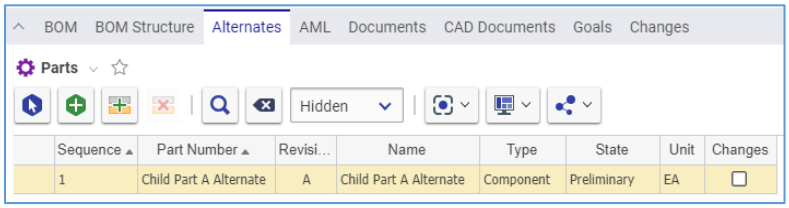

Figure 183.

6. Click either **Done** or **Save** on the **Part** toolbar. The Alternate is assigned.

6.8.2 Creating Alternates

Use the following procedure to create a new Part and add it to another Part as an Alternate:

1. Use steps 1-3 of the Alternate Assignment procedure.
2. Click **Create Item** on the **Alternates** accordion toolbar. A **blank row** appears in the **Alternates** grid.

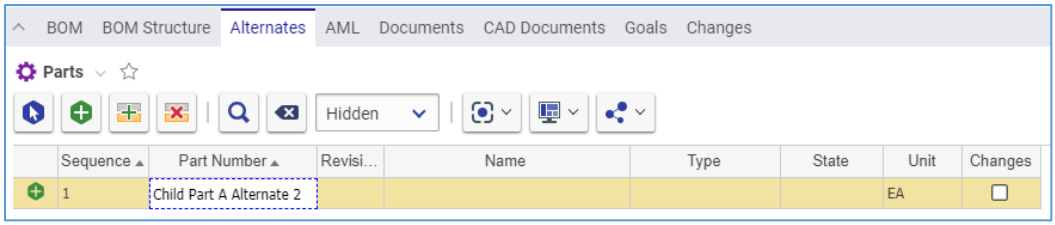

Figure 184.

3. Click the **Part Number** cell and then enter the ***Part number*** of a new Child.

Note: The Part Number must be unique. It is the only required Part property, which a user provides.

4. If it is necessary to provide any other data on the Alternate, click the corresponding cell and enter this data.
5. Click either **Done** or **Save** on the **Part** toolbar. The new Part is created in Aras Innovator and assigned as the Alternate.
6. If it is necessary to provide any missing data on the Alternate Part created, edit it. Refer to sections *5.1 Creating a Part* and *6.6 Editing Parts within a BOM* for details on this topic.

6.8.3 Replacing Alternates

Use the following procedure to replace an Alternate in a Part:

1. Follow steps 1-3 of the Alternate Assignment procedure.
2. Right-click the **Alternate** and then click **Replace**. The **Search dialog – Part** appears.

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3. Using the standard search procedure, search for and select a replacing Alternate Part. The **Alternate** is replaced with the Part selected.
4. Click either **Save** or **Done** on the **Part** toolbar.

6.8.4 Removing Alternates

Use the following procedure to remove an Alternate from a Part:

1. Follow steps 1-3 of the Alternate Assignment procedure.
2. Click the **Alternate** and then click **Delete Row** on the **Alternates** accordion toolbar.

The **Alternate** becomes unavailable.

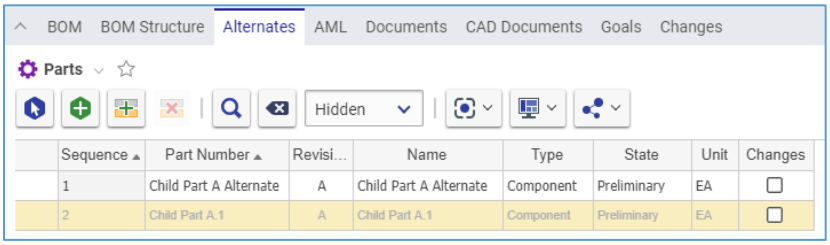

Figure 185.

3. Click either **Save** or **Done** on the **Part** toolbar. The **Alternate** disappears from the grid.

Note: The **Alternate** disappears immediately if the Part was not saved after it was added.

6.9 Using Substitutes

A Part may have a Substitute Part that can replace it only in specific BOM structures.

The presence of a Substitute in a BOM is for informational purposes only. To replace a Part with its Substitute in a BOM, you must follow the Child replacement procedure as outlined in section *6.5.2 Replacing Children*.

If the Parts are interchangeable in the global scope regardless of where they are used in BOM structures, Alternates should be used instead of Substitutes. Refer to section *6.8 Using Alternates* for details on this topic.

6.9.1 Assigning Substitutes

Use the following procedure to add a Substitute Part for a Child Part in a BOM:

1. Claim the Parent.
2. Access the view of the Part BOM relationship as described in section *6.1 Understanding Part BOM Relationship*.
3. Click **Edit** on the **Part BOM** toolbar.
4. Click **Select Items** on the **Substitutes** accordion toolbar. The **Search dialog – Part** appears.
5. Using the standard search procedure, search and select a Part that is defined as a Substitute for the Part edited. The Substitute Part appears under **Substitutes**.

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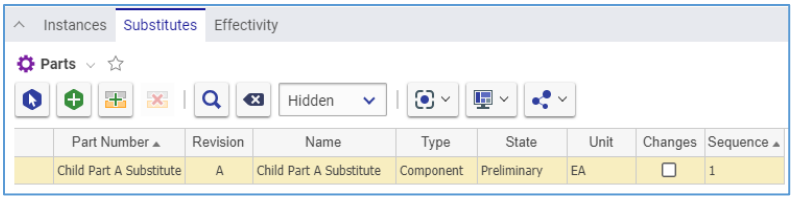

Figure 186.

6. Click **Done** on the **Part BOM** toolbar.
7. Unclaim the Parent.

6.9.2 Creating Substitutes

Use the following procedure to create a new Part and add it as a Substitute Part for a Child Part in a BOM:

1. Follow steps 1-3 of the Substitute Assignment procedure.
2. Click **Create Item** on the **Substitutes** accordion toolbar. A **blank row** appears in the **Substitutes** grid.

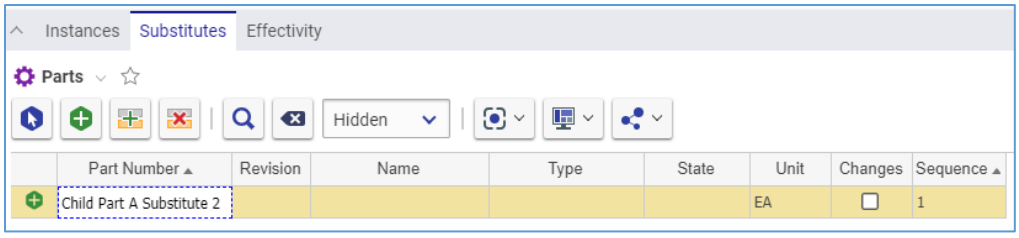

Figure 187.

3. Click the **Part Number** cell and then enter a ***Part number*** for a new Child.

Note: The Part Number must be unique. It is the only required Part property, which a user provides.

4. If it is necessary to provide any other data on the Substitute Part, click the **corresponding cell** and enter this data.
5. Click either **Done** or **Save** on the **Part** toolbar. The new Part is created in Aras Innovator and assigned as the Substitute.
6. If it is necessary to provide any missing data on the Substitute Part created, edit it. Refer to sections *5.1 Creating a Part* and *6.6 Editing Parts within a BOM* for details on this topic.

6.9.3 Replacing Substitutes

Use the following procedure to replace a Substitute in a Part:

1. Follow steps 1-3 of the Substitute Assignment procedure.
2. Right-click the **Substitute** and then click **Replace**. The **Search dialog – Part** appears.
3. Using the standard search procedure, search for and select a replacing Substitute Part. The **Substitute** is replaced with the Part selected.
4. Follow steps 6-7 of the Substitute Assignment procedure.

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6.9.4 Removing Substitutes

Use the following procedure to remove a Substitute from a Part:

1. Follow steps 1-3 of the Substitute Assignment procedure.
2. Click the **Substitute** and then click **Delete Row** on the **Substitutes** accordion toolbar.

The **Substitute** becomes unavailable.

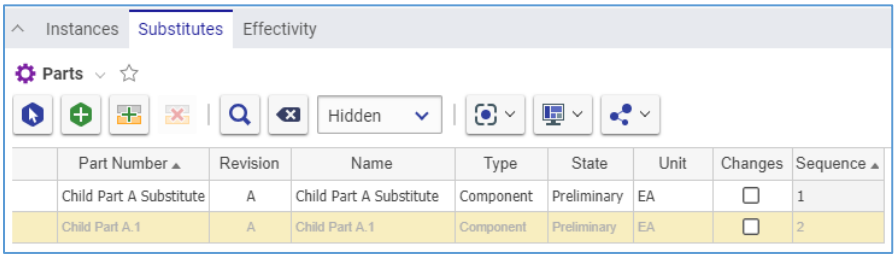

Figure 188.

3. On the **Part BOM** toolbar, click either **Save** or **Done**. The **Substitute** disappears from the grid.

Note: The **Substitute** disappears immediately if you did not save the Part BOM after adding it.

4. Unclaim the Parent.

6.10 Applying Structure Resolution Modes

The following Structure Resolution Modes are available to dynamically resolve a multi-level Part BOM structure using item versions as specified in the Resolution Mode:

- **Default**—the version of the related Part as stored on the Part BOM Relationship is used. This is the standard resolution.
- **Latest**—the latest version of the related Part is used in the resolution.
- **Latest Released**—the latest Released version of the related Part is used in the resolution.
- **Latest Released or Latest**—the latest Released version of the related Part is used in the resolution. If there are no Released versions of the related Part, then the latest version is used.

The Part BOM structure is resolved recursively from top down based on the Resolution Mode. To select a Resolution Mode, use the **Modify Parameters** button in the **BOM Structure** accordion tab, as described below.

You can also resolve the Part BOM Structures by specifying both a Resolution Mode and Effectivity Criteria.

To apply a Structure Resolution Mode to a BOM structure:

1. Open the Item view of the Part.
2. Go to the **BOM Structure** accordion tab.
3. Click **Modify Parameters** on the toolbar. The **Parameters** dialog appears.

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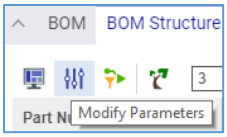

Figure 189.

4. Select the ***Mode*** in the **Value** drop-down list of the **StructureResolutionMode** row in the **Parameters** dialog.

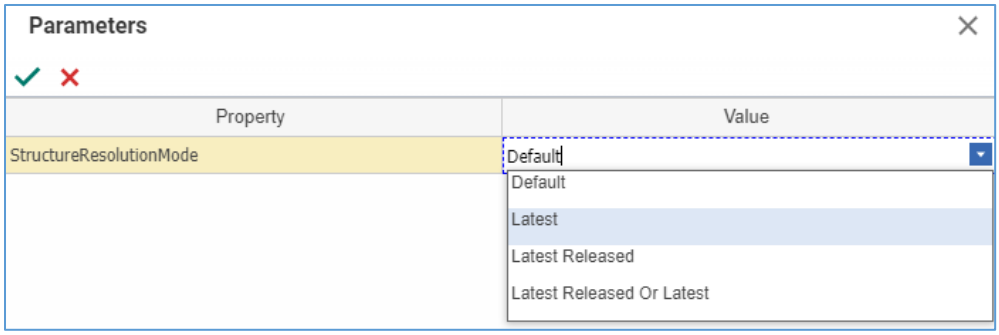

Figure 190.

5. Click **Apply**. The **Parameters** dialog disappears.

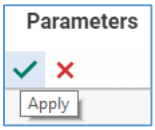

Figure 191.

The BOM is resolved to a Part structure according to the selected Mode.

To explain how different Resolution Modes work, this section uses a set of Parts that have multiple versions as follows:

- **Child A**:
  - A—Released
  - B—Preliminary
- **Child A.1**:
  - A—Preliminary
- **Child A.2**:
  - A, B, C—Released
- **Child A.3**:
  - A, B—Released
  - C—Preliminary
- **Child B**:
  - A, B—Released
- **Child B.1**:

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    - A—Released
- **Child B.2**:
    - A, B, C—Released
    - D—Preliminary
- **Child C**:
    - A—Preliminary
- **Child C.1**:
    - A—Preliminary
- **Child C.2**:
    - A, B—Released

From these Parts, a simple BOM structure example is created as described in the following table.

Table 2: A simple BOM example

BOM Level			Part	Revision	State
0			Parent	A	Preliminary
	1		Child A	B	Preliminary
		2	Child A.1	A	Preliminary
		2	Child A.2	C	Released
		2	Child A.3	C	Preliminary
	1		Child B	B	Released
		2	Child B.1	A	Released
		2	Child B.2	B	Released
	1		Child C	A	Preliminary
		2	Child C.1	A	Preliminary
		2	Child C.2	B	Released

6.10.1 Default Resolution Mode

The **Default** Resolution Mode uses the versions of related child Parts as stored on the BOM Relationships. This is the standard resolution in Aras Innovator.

Below image shows the resolved structure when the **Default** resolution mode is selected:

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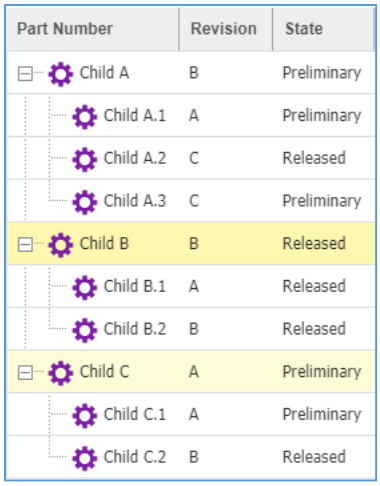


Part Number	Revision	State
Child A	B	Preliminary
Child A.1	A	Preliminary
Child A.2	C	Released
Child A.3	C	Preliminary
Child B	B	Released
Child B.1	A	Released
Child B.2	B	Released
Child C	A	Preliminary
Child C.1	A	Preliminary
Child C.2	B	Released

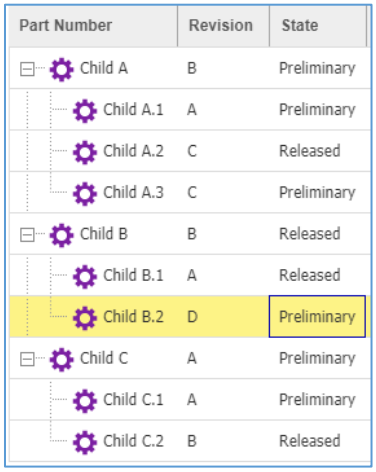
Figure 192.

6.10.2 Latest Resolution Mode

When the **Latest** resolution mode is selected, the structure is resolved starting from the top using the latest versions of child items. When a child item is resolved to its latest version, then its child items are resolved using this resolution mode. This is done recursively.

The **Latest** resolution mode does not consider the release state of the child Parts.

The following image shows the resolved structure when **Latest** resolution mode is selected:



Part Number	Revision	State
Child A	B	Preliminary
Child A.1	A	Preliminary
Child A.2	C	Released
Child A.3	C	Preliminary
Child B	B	Released
Child B.1	A	Released
Child B.2	D	Preliminary
Child C	A	Preliminary
Child C.1	A	Preliminary
Child C.2	B	Released

Figure 193.

The latest revision **D** of **Child B.2** is shown where this Part version is in the **Preliminary** state.

6.10.3 Latest Released Resolution Mode

When the **Latest Released** resolution mode is selected, the structure is resolved starting from the top using the latest versions of child items that are in Released state. When the child item is resolved to its latest Released version, then its child items are resolved using this resolution mode. This is done recursively.

If the related child item has no versions that are in Released state, then a blank row is displayed for that item. There is no further processing on that item.

The following image shows the resolved structure when **Latest Released** resolution mode is selected:

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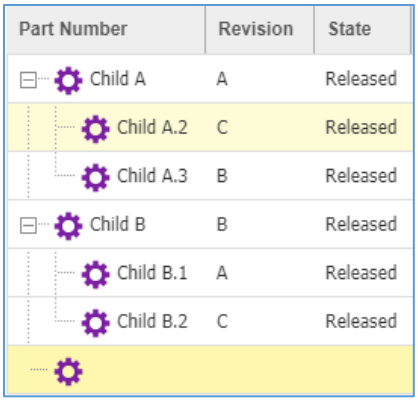

Figure 194.

The latest Released versions of child parts are resolved. A blank row is displayed for **Child C** because it has no version that is in the Released state.

6.10.4 Latest Released Or Latest Resolution Mode

When the **Latest Released or Latest** resolution mode is selected, the structure is resolved starting from the top using the latest versions of child items that are in Released state. If there are no versions that are in Released state, then the latest version is used. When the child item is resolved to a version, then its child items are resolved using this resolution mode. This is done recursively.

The following image shows the resolved structure when **Latest Released or Latest** resolution mode is selected:

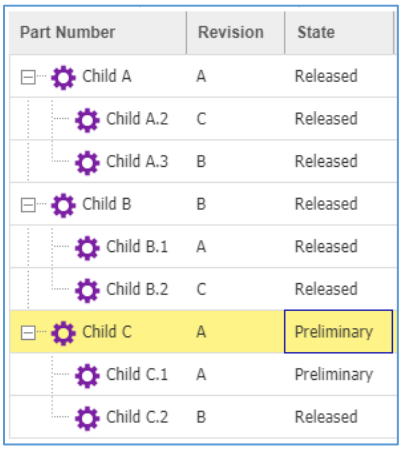

Figure 195.

The latest Released versions of child parts are resolved. **Child C** does not have any version that is in the Released state. Therefore, its latest Preliminary version is resolved.

6.11 Effectivity Management

In Aras Innovator 12, Effectivity management has been incorporated into Part BOM Structures. Using effectivity, the conditions for which to include or exclude items in specific configurations can be expressed.

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Many variables influence effectivity decisions. They depend on the industry, product and business processes among others. The PE application provides the most commonly used **Model**, **Unit**, and **Date** effectivity variables out-of-the-box with an ability to add other effectivity variables easily.

Effectivity scopes organize lists of relevant effectivity variables. For example, if one product uses Model and Unit effectivity and another uses Model, Lot, and Date effectivity, two different effectivity scopes can be created. The PE application provides **Aras Part BOM Scope** with Model, Unit and Date variables. Additional effectivity scopes and variables can be created by the Administrator and used without requiring any configuration or customization.

Aras Innovator supports both simple and complex effectivity expressions using free-form Boolean expression language. Complex effectivity expressions can be created using Boolean operators, like equal, greater than and equal, less than and equal, not, and, and or. The effectivity expression editor provides guided editing user interface, as shown in the below figure.

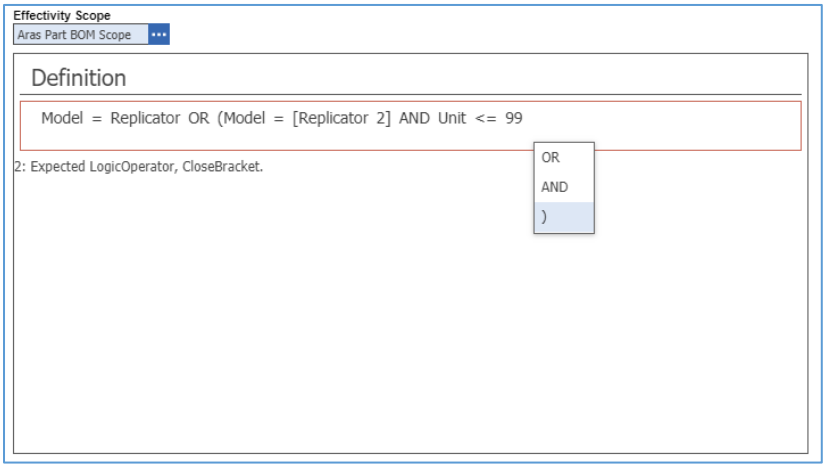

Figure 196.

Effectivity, which is set on Part BOM relationships, can be viewed from the **BOM Structure** tab.

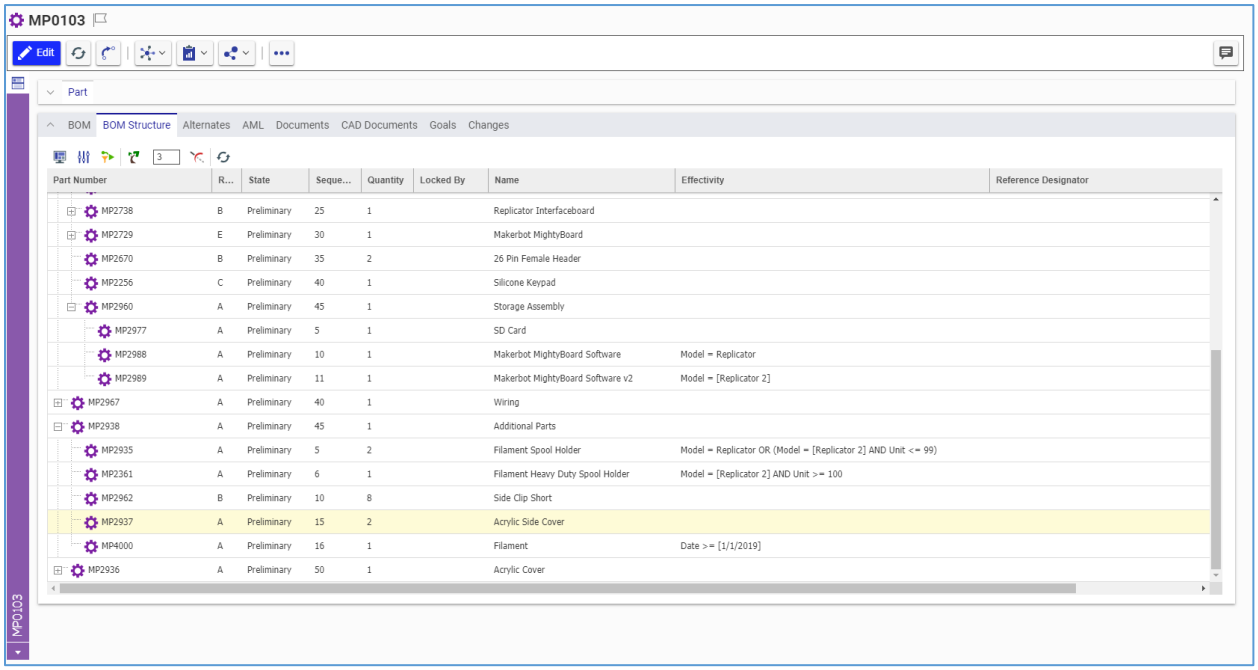

Figure 197.

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The BOM Structure can be resolved for selected effectivity criteria. To fully-resolve a BOM, a value is expected for each effectivity variable. To resolve a BOM partially, values for one or more effectivity variables can be left blank on the criteria dialog. If a variable(s) value is left blank, that variable(s) is ignored while evaluating if the Part BOM relationship is effective.

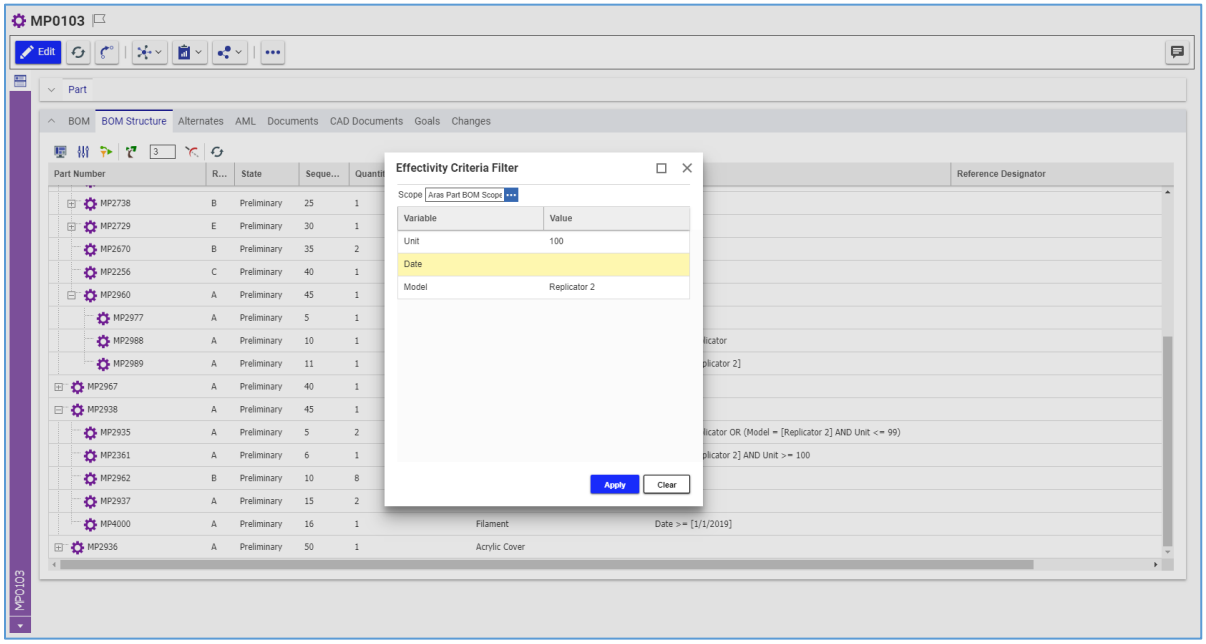

Figure 198.

After selecting the effectivity criteria, the resolved BOM is displayed.

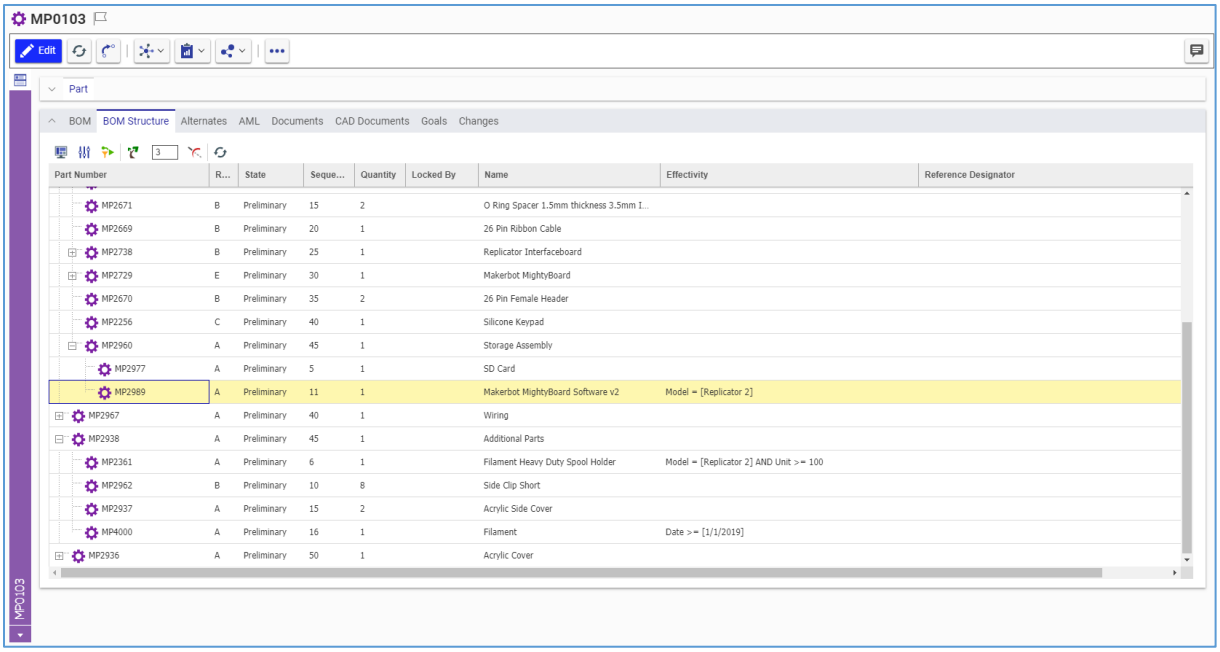

Figure 199.

The following table defines terms, acronyms, and abbreviations used for Effectivity in the PE application.

Table 3: The Effectivity terminology

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Term	Definition
Effectivity	Identification of valid uses of an item in a structure if this item's use is conditional.
Effectivity Variable	A variable that influences effectivity decisions, such as a date, model, unit, batch, lot, plant, etc.
Effectivity Scope	A built-in item type that represents a list of relevant Effectivity Variables. For example, the Scope may contain a Model, Unit, and Date Effectivity Variables.
Effectivity Expression	A representation of an effectivity condition in the Boolean Expression Language. For example: Model = "Model X" and (Unit >= 10 and Unit <=20)
Effectivity Criteria	The criteria to resolve a structure by effectivity. Effectivity conditions set on relationships are evaluated against the input criteria to determine the inclusion or exclusion of conditional items in the resolved structure. For example: resolve the structure for criteria: (Model = "Model X" and Unit = 15).

If your business uses **Model** as an effectivity variable, the Administrator will create the Models to be used in effectivity.

To access the Effectivity Services, go to **Contents --> Administration --> Effectivity Services**.

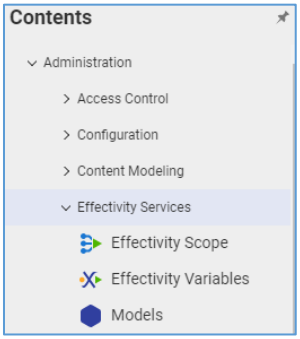

Figure 200.

As a member of the **Effectivity Management** Identity, you can manage Effectivity on BOMs using the Part Item view or Part BOM Relationship Item view. Both approaches provide the same functionality.

Note: It is highly recommended to use the Part item view because this approach has fewer steps.

6.11.1 Managing Effectivity on a BOM Using Part Item View

6.11.1.1 Setting Effectivity on a BOM Using Part Item View

Use the following procedure to set Effectivity on a BOM using the Part Item view:

1. Open the ***Parent Part*** Item view.
2. Go to the **BOM Structure** accordion tab.

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3. Right-click a ***Child Part*** and click **View Effectivity**.

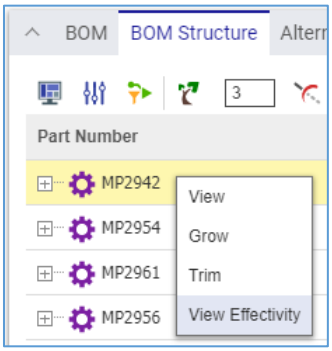

Figure 201.

The **Manage Effectivity Expressions** split pane appears on the right.

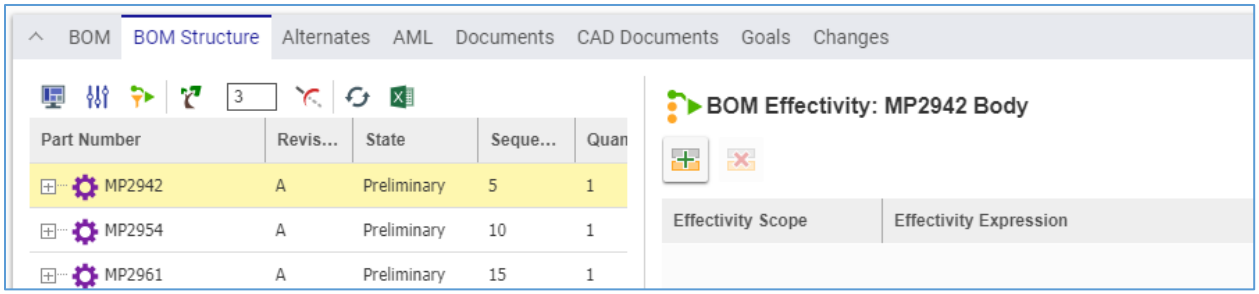

Figure 202.

4. Click **Create a new effectivity expression item**.

Figure 203.

The **Add Effectivity Expression** dialog box appears.

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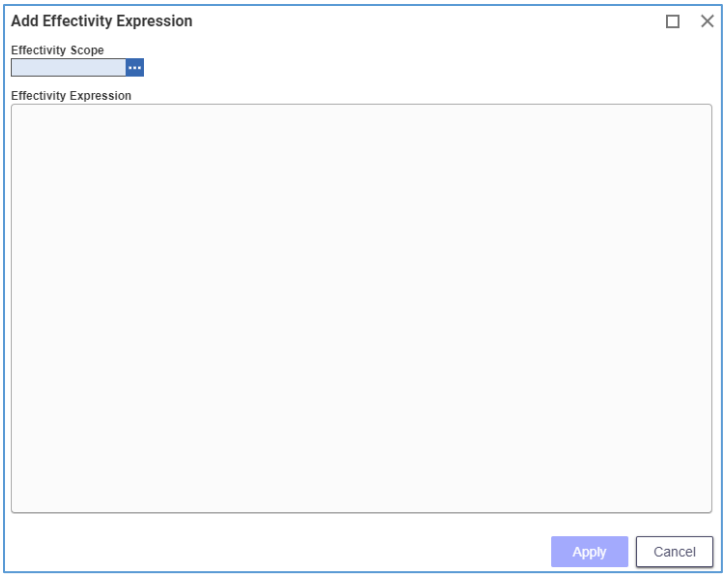

Figure 204.

5. Click the **ellipsis** in the **Effectivity Scope** field. The **Search dialog – Effectivity Scope** appears.
6. Using the standard search procedure, search for and select an ***Effectivity Scope***. When selected, the **Effectivity Scope** populates the **Scope** cell.

Note: As an alternative to steps 5 and 6, you can start typing the ***name*** of an Effectivity Scope. Aras Innovator will offer for your selection Effectivity Scopes containing the typed string.

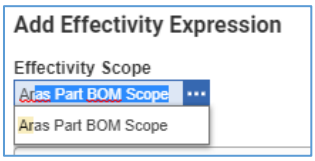

Figure 205.

7. Enter ***your Effectivity Expression*** in the **Effectivity Expression** text field of the **Add Effectivity Expression** dialog box.

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Note: Aras Innovator supports both simple and complex Effectivity Expressions using the free-form Boolean expression language. Effectivity Expressions can be created using Boolean operators, like `equal`, `greater than and equal`, `less than and equal`, `not`, `and`, and `or`. The Effectivity Expression editor provides guided editing user interface as an Effectivity Expression is entered.

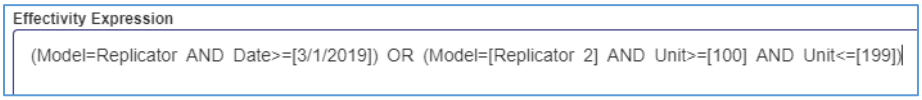

Figure 206.

8. Click **Apply**. The ***Effectivity Expression*** appears in the **Manage Effectivity Expressions** split pane. Effectivity is set on the BOM.

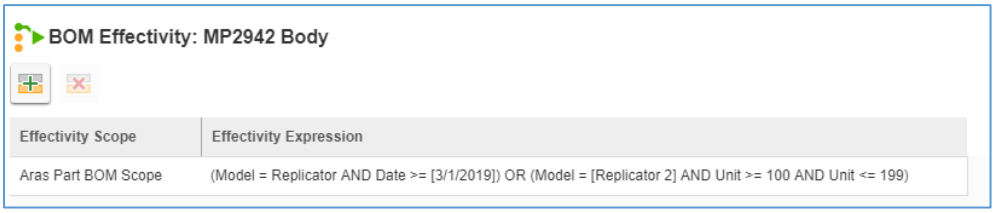

Figure 207.

9. This step is optional. Click **Refresh** on the **Part BOM** toolbar. The **Effectivity Expression** appears in the **Expression** cell.

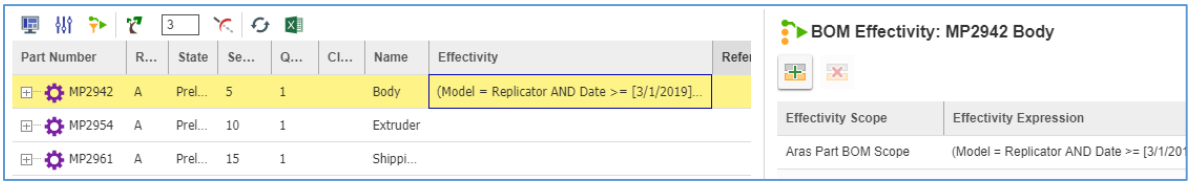

Figure 208.

Note: Multiple Effectivities can be set on a single Part BOM Relationship. These Effectivities can use the same or a different Effectivity Scope depending on how your business uses multiple Effectivities. To create additional Effectivities, repeat steps 5-8.

10. This step is optional. Close the **Manage Effectivity Expressions** split pane.

Figure 209.

6.11.1.2 Updating Effectivity on a BOM Using Part Item View

Use the following procedure to update Effectivity on a BOM with the help of a Part Item view:

1. Follow steps 1-3 of the *Setting Effectivity on a BOM Using Part Item View* procedure.
2. In the **Manage Effectivity Expressions** split pane, right-click *an* ***Effectivity*** and click **Edit Effectivity**. The **Edit Effectivity Expression** dialog box appears.

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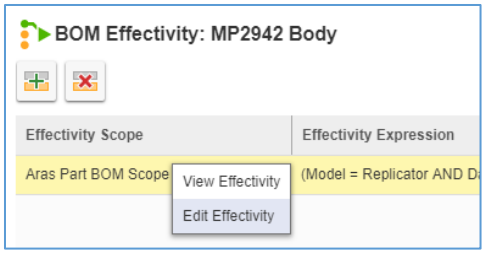

Figure 210.

3. Update the ***Effectivity Expression*** as required.

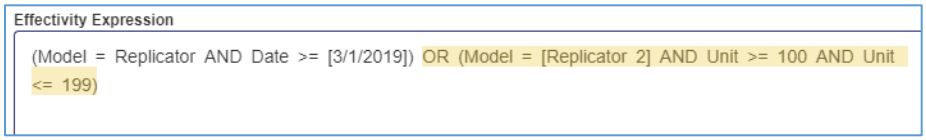

Figure 211.

4. Click **Apply**. The updated ***Effectivity Expression*** appears in the **Manage Effectivity Expressions** split pane. The updated Effectivity Expression is set on the BOM.
5. This step is optional. Click **Refresh** on the **Part BOM** toolbar. The **Effectivity Expression** is updated in the **Expression** cell.

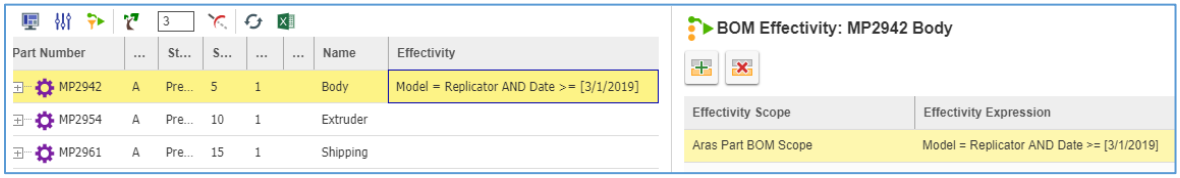

Figure 212.

6. This step is optional. Close the **Manage Effectivity Expressions** split pane.

6.11.1.3 Removing Effectivity from a BOM Using Part Item View

Use the following procedure to remove an Effectivity from a BOM with the help of a Part Item view:

1. Follow steps 1-3 of the *Setting Effectivity on a BOM Using Part Item View* procedure.
2. In the **Manage Effectivity Expressions** split pane, click *an* ***Effectivity***.
3. Click **Delete an effectivity expression item**.

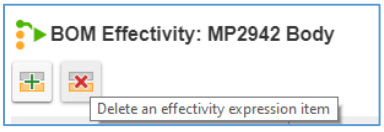

Figure 213.

The **Confirm Delete** dialog box appears.

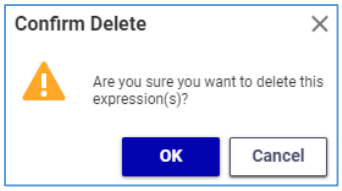

Figure 214.

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4. Click **OK**. The ***Effectivity Expression*** disappears from the **Manage Effectivity Expressions** split pane. Effectivity is removed from the BOM.

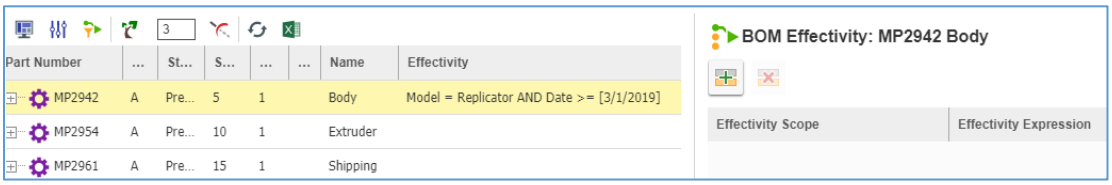

Figure 215.

5. This step is optional. Click **Refresh** on the **Part BOM** toolbar. The **Effectivity Expression** disappears from the **Expression** cell.

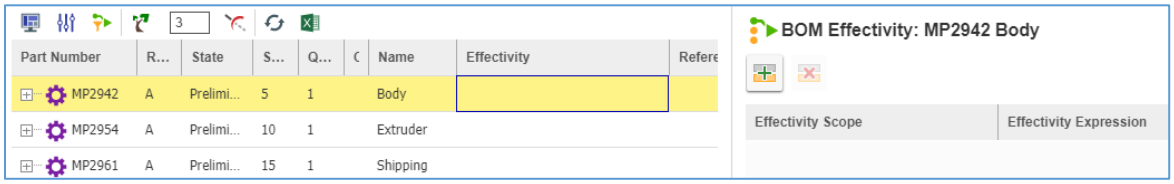

Figure 216.

6. This step is optional. Close the **Manage Effectivity Expressions** split pane.

6.11.2 Managing Effectivity on a BOM Using Part BOM Relationship Item View

6.11.2.1 Setting Effectivity on a BOM using Part BOM Relationship Item View

Use the following procedure to set Effectivity on a BOM using the Part BOM Relationship Item view:

1. Claim the Parent.
2. Access the view of a Part BOM relationship as described in section *6.1 Understanding Part BOM Relationship*.
3. Click **Edit** on the **Part BOM** toolbar.
4. Go to the **Effectivity** accordion tab.
5. Click **Add Row** on the **Effectivity** accordion toolbar. A **blank row** appears.

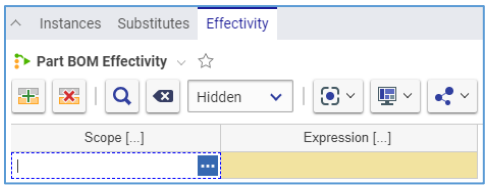

Figure 217.

6. Click the **ellipsis** in the **Scope** cell. The **Search dialog – Effectivity Scope** appears.
7. Using the standard search procedure, search for and select an Effectivity Scope. When selected, the **Effectivity Scope** populates the **Scope** cell.
8. Right-click **the new row**, point to **Effectivity**, and then click **Open**.

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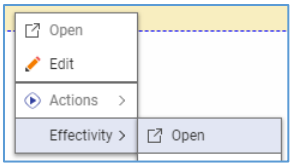

Figure 218.

The view of the new Effectivity appears.

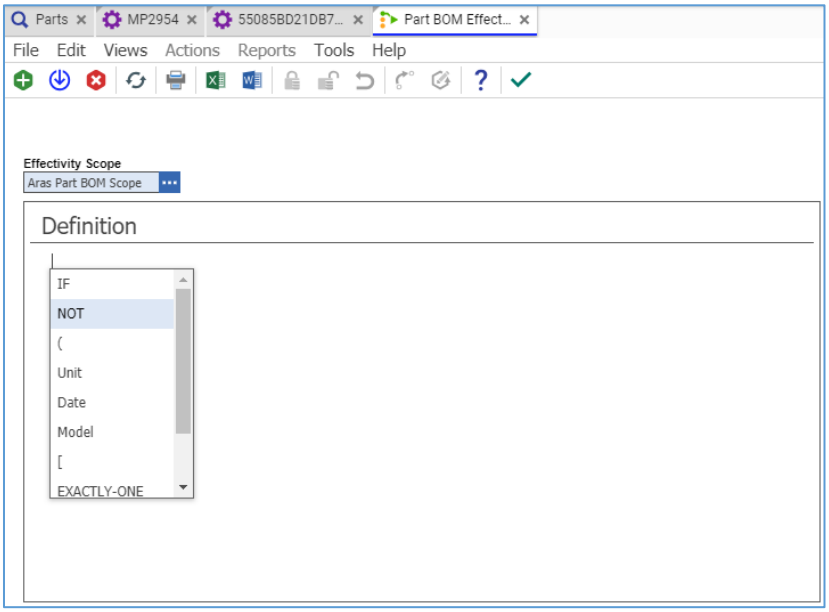

Figure 219.

9. Enter ***your Effectivity Expression*** in the **Definition** box of the **Part BOM Effectivity** view.

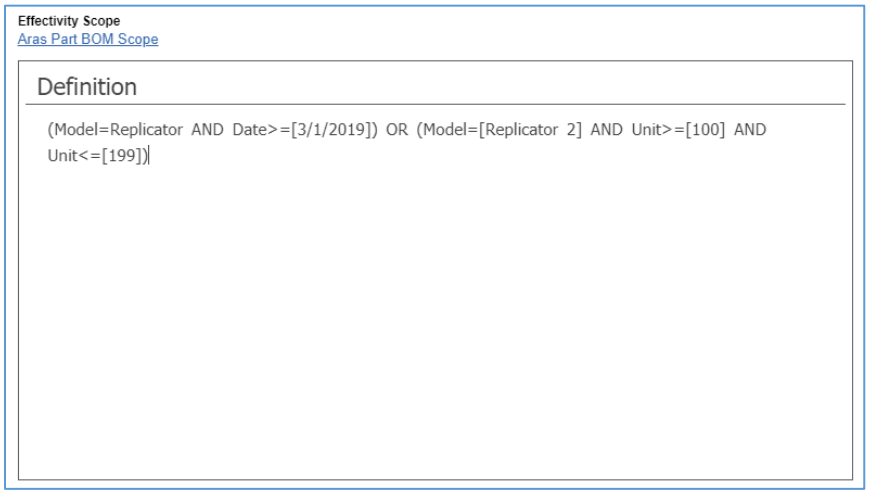

Figure 220.

10. Click **Save, Unlock and Close** on the **Part BOM Effectivity** toolbar. The Effectivity Expression you entered is set on the Part BOM relationship of the given Part, and the **Part BOM Effectivity** view disappears.

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11. This step is optional. Click **Refresh** on the **Part BOM** toolbar. The **Effectivity Expression** appears in the **Expression** cell.

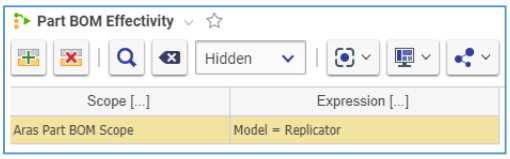

Figure 221.

Note: Aras Innovator returns an error if you try to save a Part BOM relationship that contains an unpopulated **Expression** cell.

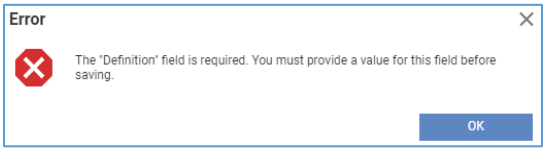

Figure 222.

12. Click **Done** on the **Part BOM** toolbar.
13. Unclaim the Parent keeping the changes. Effectivity is set on the BOM.

6.11.2.2 Updating Effectivity on a BOM using Part BOM Relationship Item View

Use the following procedure to update an Effectivity on a BOM using the Part BOM Relationship Item view:

1. Follow steps 1-4 of the *Setting Effectivity on a BOM using the Part BOM Relationship Item View* procedure.
2. Right-click **a row of the Effectivity to be updated**, point to **Effectivity**, and then click **Open**. The view of the Effectivity appears.

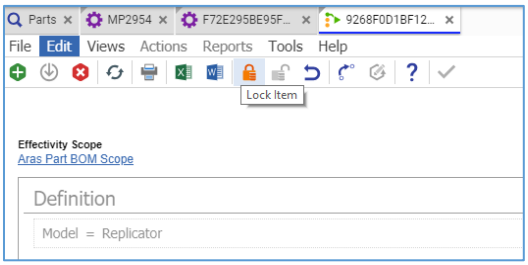

Figure 223.

3. Click **Lock Item** on the **Effectivity** toolbar. A notification appears.

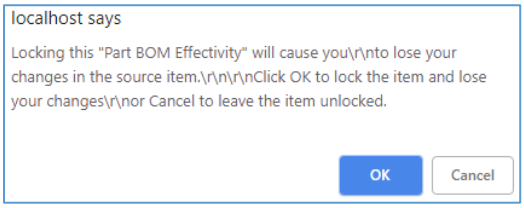

Figure 224.

4. Click **OK** in the notification. The **Definition** box becomes editable.
5. Update ***the Effectivity Expression*** in the **Definition** box.

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6. Follow steps 10-13 of the Setting Effectivity on a BOM procedure. The updated Effectivity Expression is set on the BOM.

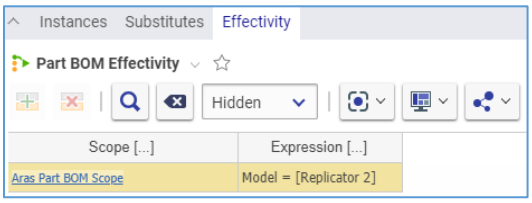

Figure 225.

6.11.2.3 Removing Effectivity from a BOM using the Part BOM Relationship Item View

Use the following procedure to remove an Effectivity from a BOM using the Part BOM Relationship Item View:

1. Follow steps 1-4 of the *Setting Effectivity on a BOM using the Part BOM Relationship Item View* procedure.
2. Click **the row to be removed from the Effectivity**.
3. Click **Delete Row** on the **Effectivity** toolbar. **The selected row** becomes unavailable.

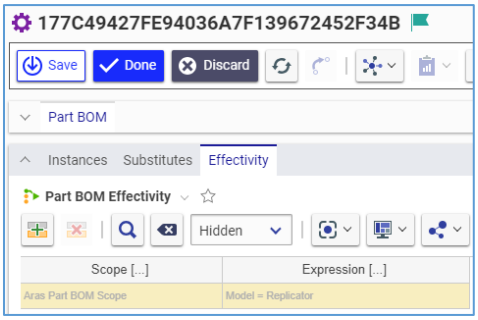

Figure 226.

4. Either click **Save** or **Done** on the **Part BOM** toolbar. **The selected row** disappears. The Effectivity Expression is removed from the Part BOM relationship.

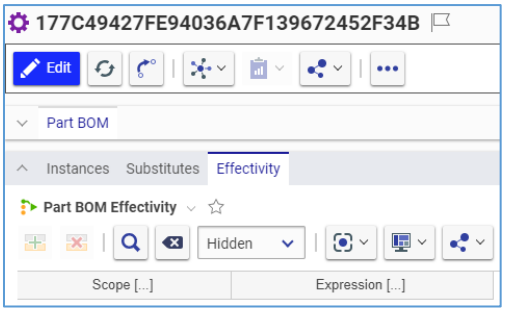

Figure 227.

5. Follow steps 10-13 of the Setting Effectivity on a BOM procedure. The Effectivity Expression is removed from the BOM.

You can also remove an Effectivity from a BOM using an Effectivity view:

1. Follow steps 1-4 of the Setting Effectivity on a BOM procedure.
2. Right-click **the Effectivity row to be removed**, point to **Effectivity**, and then click **Open**. The **Effectivity** view appears.

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3. Click **Delete Item** on the **Effectivity** toolbar. A notification appears.

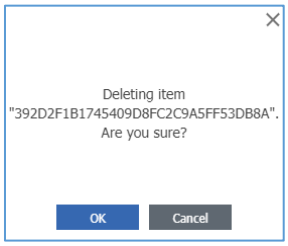

Figure 228.

4. Click **OK** in the notification. The **Effectivity** view disappears; you are back to the **Part BOM** view. The Effectivity Expression is removed from the BOM.
5. This step is optional. Click Refresh on the **Part BOM** toolbar. The **Effectivity row** disappears.
6. Follow steps 12-13 of the Setting Effectivity on a BOM procedure. The Effectivity Expression is removed from the BOM.

6.11.3 Viewing Effectivity on BOM Structure tab

Use the following procedure to view an Effectivity on a multi-level BOM:

1. Open the Parent.
2. Explore the **Effectivity** accordion tab as described in section *6.2 Understanding BOM Structure*.
3. View Children with Effectivities set. Such a Child has an **Effectivity Expression** shown in the **Effectivity** column.

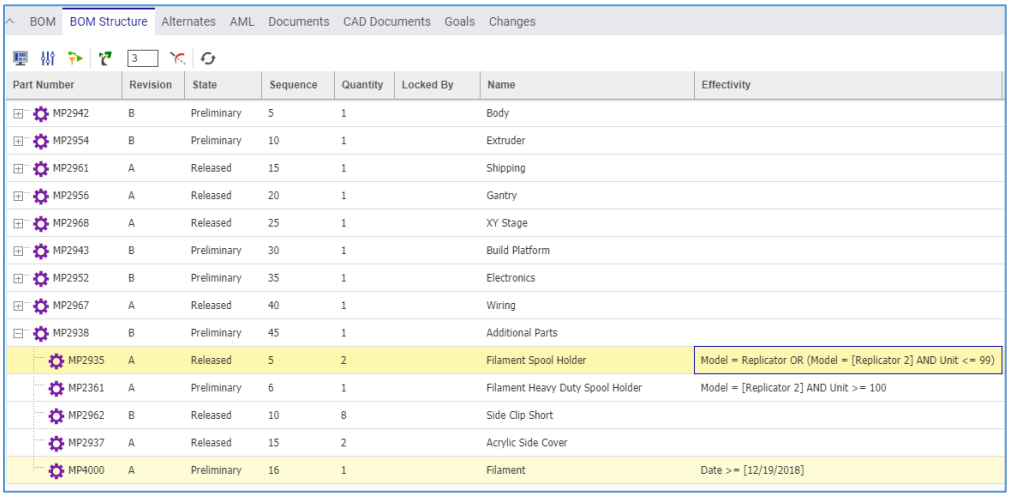

Figure 229.

4. To view full details, right-click a **BOM** row and then click **View Effectivity**.

Figure 230.

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A split pane appears in the **BOM Structure** tab with a list of effectivities set on the BOM row clicked.

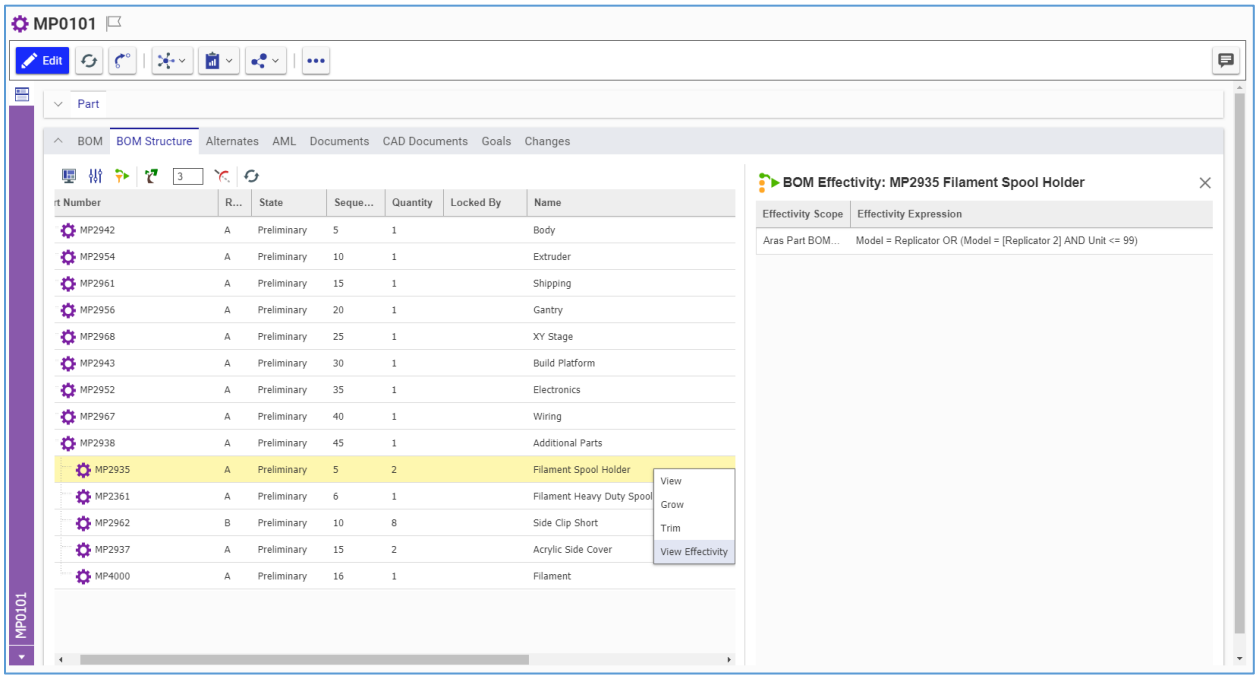

Figure 231.

5. Take step 4 for a different **BOM** row to see the list of effectivities set on it.
6. Click the **X** button to close the split pane in the BOM Structure tab.

6.11.4 Resolving BOM Structure by Effectivity

Use the following procedure to resolve a BOM by Effectivity:

1. Follow the Viewing Effectivity procedure steps 1-3. Since no Effectivity Criteria is specified yet, the unfiltered BOM structure is displayed. You can find extra Parts. For example, Parts for two different models are both included.

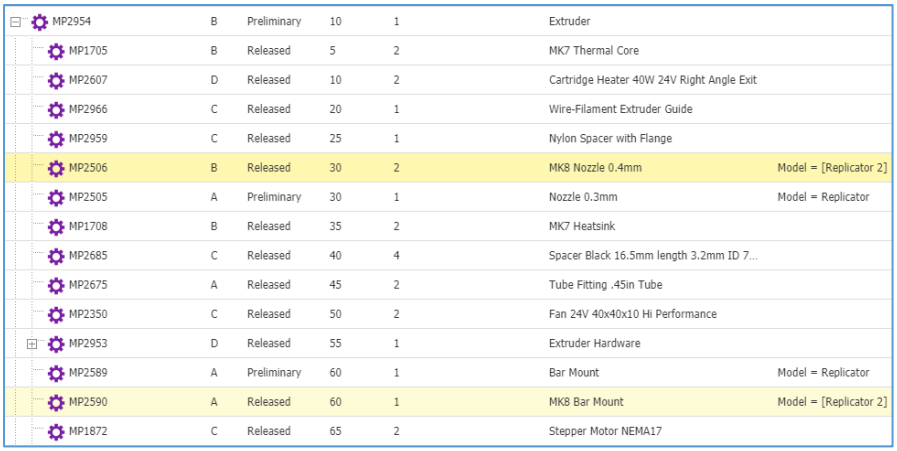

Figure 232.

2. On the **BOM Structure** toolbar, click **Set Effectivity Criteria**. The **Effectivity Criteria Filter** dialog appears.

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3. Click the **ellipsis** in the **Scope** field. The **Search dialog – Effectivity Scope** appears.
4. Using the standard search procedure, search for and select a proper Effectivity Scope. The **Search dialog – Effectivity Scope** disappears. You are back to the **Effectivity Criteria Filter** dialog, where the selected Effectivity Scope populates the **Scope** field and Effectivity Variables of this Scope appear as **editable rows**.

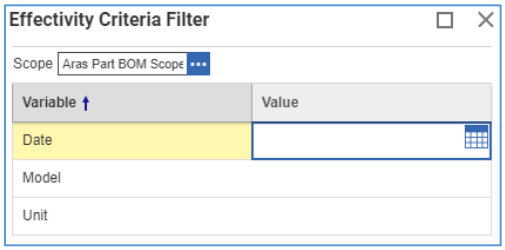

Figure 233.

5. Provide the Effectivity Criteria you need to resolve the BOM structure in the **Value** cells of the Effectivity Variables. For example, select **a model** in the **Value** cell in the **Model** row.
6. Click **Apply**.
7. Follow the Viewing Effectivity procedure. The BOM structure appears as resolved by the Effectivity Criteria you specified at step 5. For example, only Parts for the selected model are included.

Note: It is possible to resolve the structure either fully or partially. To fully-resolve a structure, a value must be entered for every effectivity variable on the **Effectivity Criteria Filter** dialog for the selected scope. To resolve a structure partially, one or more effectivity variable values can be left blank. When left blank, those effectivity variables are ignored while evaluating if the Part BOM relationship is effective.

MP2954	B	Preliminary	10	1	Extruder	
MP1705	B	Released	5	2	MK7 Thermal Core	
MP2607	D	Released	10	2	Cartridge Heater 40W 24V Right Angle Exit	
MP2966	C	Released	20	1	Wire-Filament Extruder Guide	
MP2959	C	Released	25	1	Nylon Spacer with Flange	
MP2505	A	Preliminary	30	1	Nozzle 0.3mm	Model = Replicator
MP1708	B	Released	35	2	MK7 Heatsink	
MP2685	C	Released	40	4	Spacer Black 16.5mm length 3.2mm ID 7...	
MP2675	A	Released	45	2	Tube Fitting .45in Tube	
MP2350	C	Released	50	2	Fan 24V 40x40x10 Hi Performance	
MP2953	D	Released	55	1	Extruder Hardware	
MP2589	A	Preliminary	60	1	Bar Mount	Model = Replicator
MP1872	C	Released	65	2	Stepper Motor NEMA17	

Figure 234.

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Note: If the effectivities set within the BOM structure use more than one effectivity scope, then during structure resolution, the effectivities are evaluated for the scope selected on the Effectivity Criteria Filter dialog.

If there are multiple effectivities set on a single Part BOM relationship, they are evaluated using OR logic duringstructure resolution. This means that if at least one of the effectivies set on the relationship meet the effectivity criteria, the child item is evaluated as effective for the parent and displayed in the resolved structure. IF your business requires evaluating such cases using AND logic, the administrator can change the configuration.

8. If you need to provide other Effectivity Criteria, follow steps 5-7.
9. If you need to provide Effectivity Criteria in other Effectivity Scope, follow steps 3-7.
10. To go back to the unfiltered structure, remove the Effectivity Criteria by following these steps:
    a. Access the **Effectivity Criteria Filter** dialog.
    b. Click **Clear**. The **Effectivity Criteria Filter** dialog disappears. The Effectivity Criteria are removed from the BOM.
    c. This step is optional. Follow the Viewing Effectivity procedure. The unfiltered BOM structure appears.
    d. This step is optional. Access the **Effectivity Criteria Filter** dialog. It appears blank.

6.12 Goals Rollup

A Part may have Goals for its cost and/or weight. For more details on this topic, refer to section *5.5 Goals for a Part*.

A Goal has a hierarchy of Bases to set its value (from lower to higher):

- Target
- Estimated
- Calculated
- Actual

If a Part has a Goal with values set for several Bases, the value of the highest Base overrides the values of all lower Bases. For example, Calculated overrides Estimated and Target. Actual overrides all.

A *Goal Rollup* is a dynamic calculation of a Goal value of a Parent Part from its BOM as a sum of the values of the Goals of its Child Parts.

The Rollup for a Parent requires each Child of this Parent to have a Goal with a Basis other than Target. A Parent gets a Calculated Goal only when each Child has an Estimated, Calculated or Actual Goal. A Parent Goal is automatically re-calculated whenever any Child has a Goal changed.

It is possible to view Cost Goals Rollup for a whole BOM as a single report. For more details on this topic, refer to *6.12.3 BOM Costing Report*.

6.12.1 Single Level BOM Example

There is a Parent assembled from two Children: Child A and Child B. Each Part has initial Goals assigned as defined in the following Table.

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Initial Cost Goals for a Rollup example

Part	Cost Goals, $			
	Target	Estimated	Calculated	Actual
Child A	10			
Child B	11			
Parent	15			

Warning Goals and their calculations are unitless. Their values must be entered in the same units. Ensure that you enter Cost in the same currency and Weight in the same unit of mass.

The Target Cost Goal for the Parent is $15.

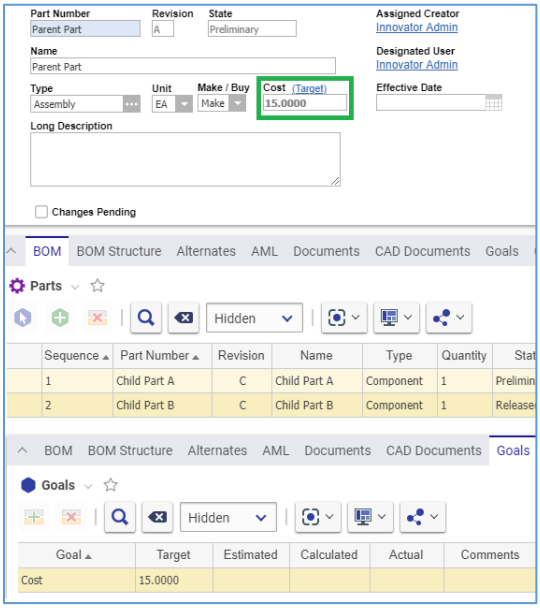

Figure 235.

The Target Cost Goal for the Child A is $10.

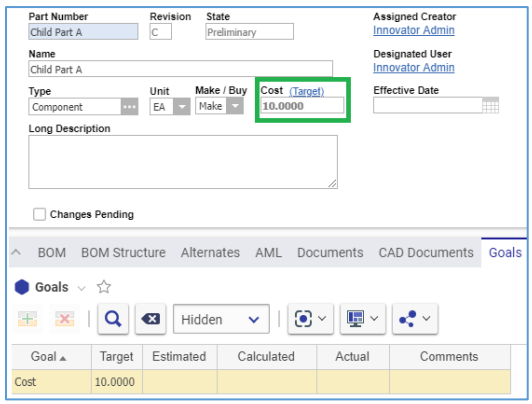

Figure 236.

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The Target Cost Goal for the Child B is $11.

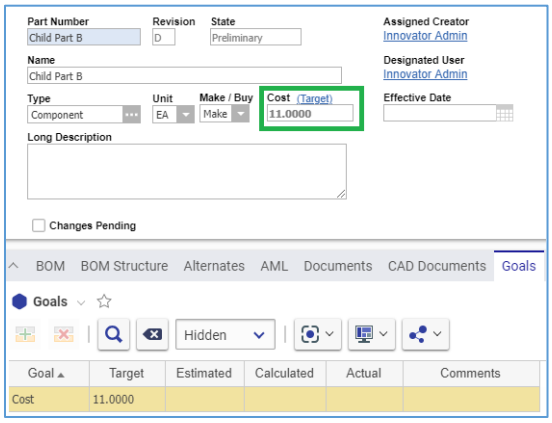

Figure 237.

Before buying Child A, its Cost Goal was estimated to be $15.

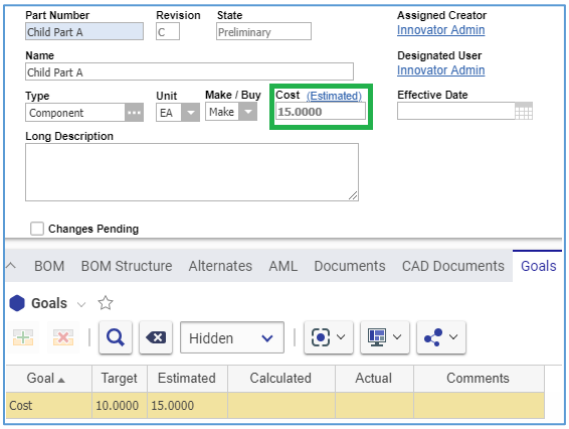

Figure 238.

The Parent has no changes in its Cost Goals because Child B has neither Estimated nor Actual Cost Goals.

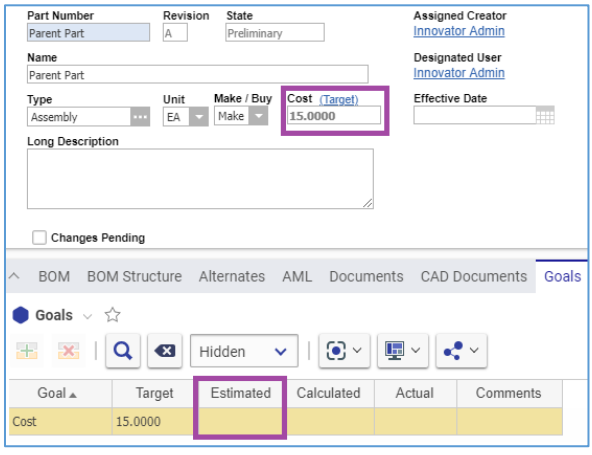

Figure 239.

The table below summarizes Cost Goals values after Child A gets its Estimated.

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Table 4: Child A Cost Goal is estimated

Part	Cost Goals, $			
	Target	Estimated	Calculated	Actual
Child A	10	15		
Child B	11			
Parent	15			

Note: If you cannot see an automatically re-calculated Parent Goal, click **Refresh** on the Parent toolbar.

Then, before buying, Child B cost was estimated to be $12.

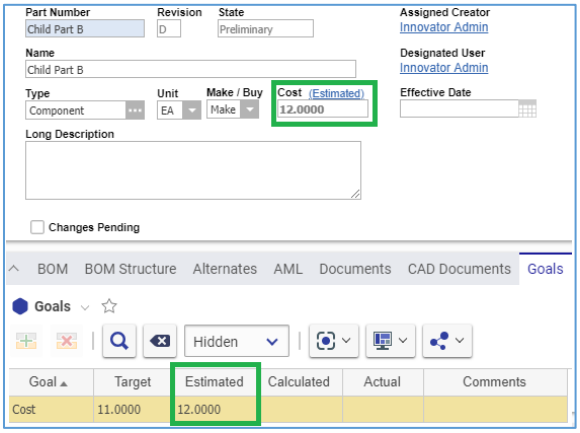

Figure 240.

Now, the Parent has its Cost Goal calculated to be $27.

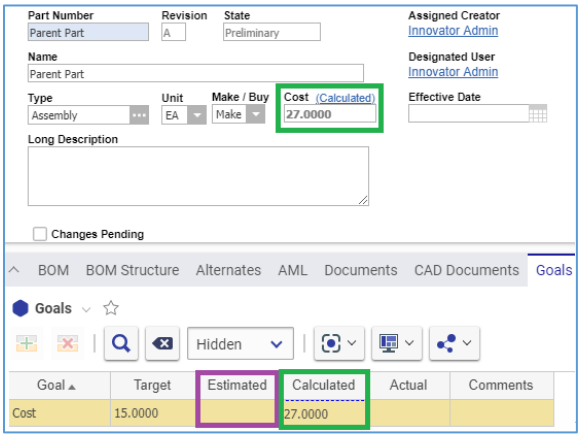

Figure 241.

The following table summarizes Cost Goals values after Child B gets its Estimated. The Parent has its Cost Goal as the sum of Estimated Cost Goals of both Children.

Table 5: Child B Cost Goal is estimated

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Part	Cost Goals, $			
	Target	Estimated	Calculated	Actual
Child A	10	15		
Child B	11	12		
Parent	15		27	

Child A is bought for $17, and its Actual value is set.

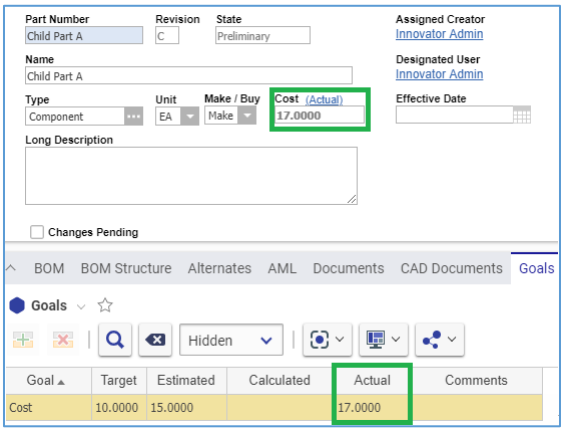

Figure 242.

The Parent has its Cost Goal recalculated to be $29.

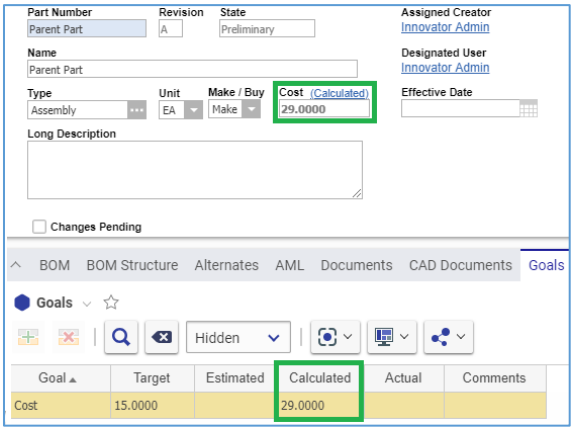

Figure 243.

The following table summarizes Cost Goals values after Child A gets its Actual. The Parent has its Cost Goal as the sum of Child A Actual and Child B Estimated.

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Table 6: Child A is bought

Part	Cost Goals, $			
	Target	Estimated	Calculated	Actual
Child A	10	15		17
Child B	11	12		
Parent	15		29	

Finally, Child B is bought for $14, and its Actual value is set.

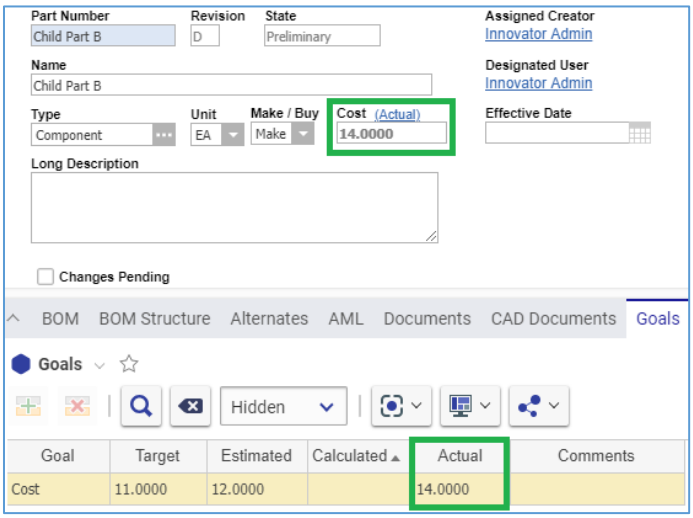

Figure 244.

The Parent has its Cost Goal recalculated to be $31 according to the final Goals change.

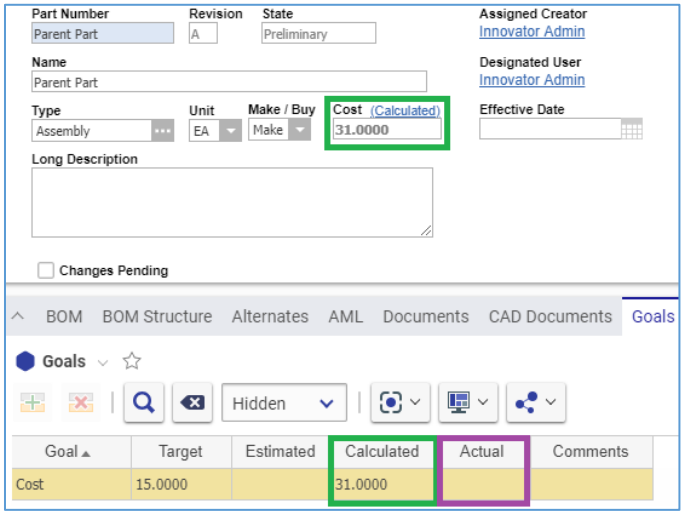

Figure 245.

The following table summarizes the final Cost Goals values. The Parent has its Cost Goal as the sum of Actual Cost Goals of both Children.

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Table 7: Child B is bought

Part	Cost Goals, $			
	Target	Estimated	Calculated	Actual
Child A	10	15		17
Child B	11	12		14
Parent	15		31	

6.12.2 Multilevel BOM Example

There is a multilevel BOM with Cost Goals set as defined in the table and figure below.

Table 8: Initial Cost Goals for a multi-level BOM

BOM Level			Part	Cost Goal, $	Goal Basis
0			Parent	40	Target
	1		Child A	23	Target
		2	Child A.1	10	Target
		2	Child A.2	15	Target
	1		Child B		
		2	Child B.1	20	Target
		2	Child B.2	25	Target

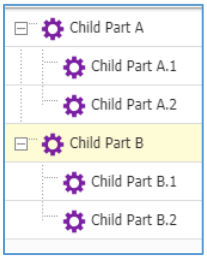

Figure 246.

The Target Goals of Children do not affect the Goals of their Parents. A Goal of a Parent is rolled up from its Children as soon as each Child gets either Estimated, Actual, or Calculated Goal. The following table illustrates this roll-up logic.

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Table 9: The first change of Goals in the Multilevel BOM

BOM Level			Part	Cost Goal, $	Goal Basis
0			Parent	40	Target
	1		Child A	23	Target
		2	Child A.1	10	Target
		2	Child A.2	17	Estimated
	1		Child B	49	Calculated
		2	Child B.1	22	Estimated
		2	Child B.2	27	Estimated

Even though Child B has no Goals set, it gets a Calculated Goal because both Child B.1 and Child B.2 have Estimated Goals.

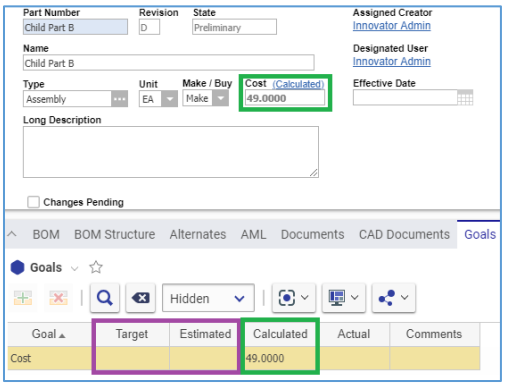

Figure 247.

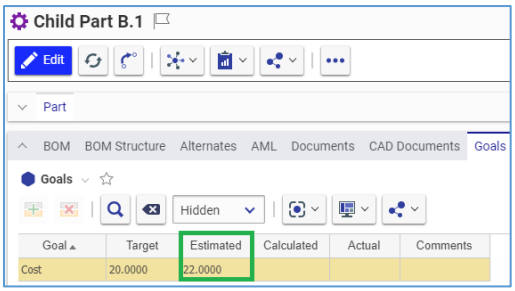

Figure 248.

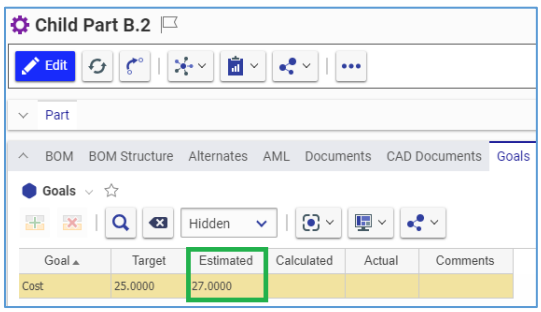

Figure 249.

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The Goal of Child A is unchanged as a Target because its Child A.1 does not have an Estimated Goal. As a result, its Parent has its Goal unchanged as a Target because Child A still has only a Target Goal.

As soon as Child A.1 gets an Estimated Goal, there are no Children missing Goals required for the Rollup of Child A Goals.

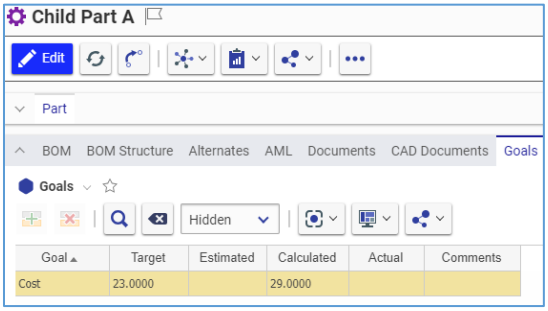

Figure 250.

Consequently, all Children have Goals required for the Rollup to the Parent.

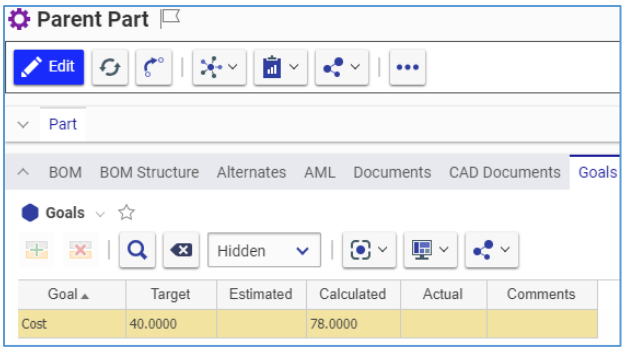

Figure 251.

The following table summarizes Cost Goals values after Child A.1 gets its Estimated. The Parent's Goal is rolled up as the sum of the Calculated Goals of both Children, which are rolled up from their Children following the same logic.

Table 10: Goals second change

BOM Level			Part	Cost Goal, $	Goal Basis
0			Parent	78	Calculated
	1		Child A	29	Calculated
		2	Child A.1	12	Estimated
		2	Child A.2	17	Estimated
	1		Child B	49	Calculated
		2	Child B.1	22	Estimated
		2	Child B.2	27	Estimated

Then, Child B.2 has gotten its Actual Goal set.

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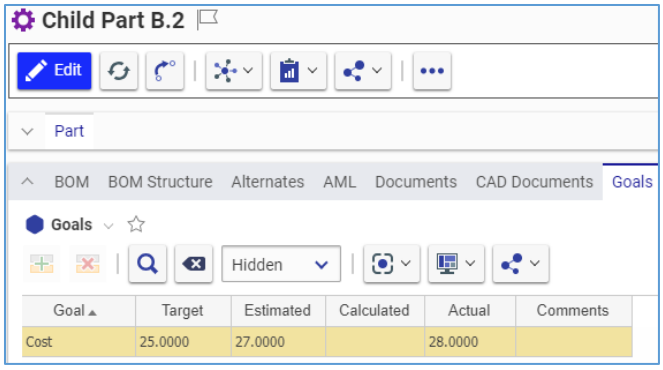

Figure 252.

The setting of the Actual Goal for Child B.2 recalculated its parent Child B Goal.

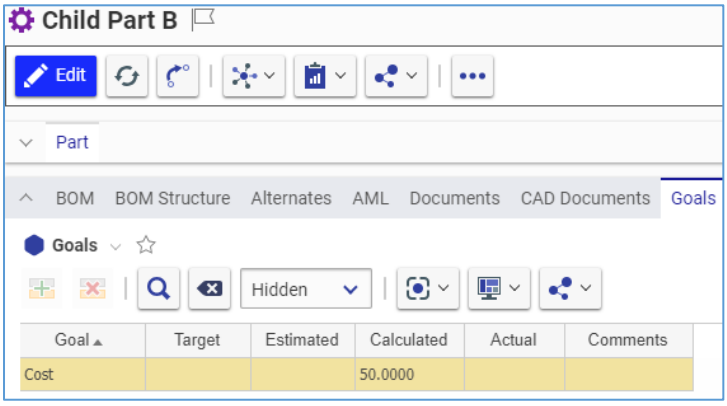

Figure 253.

Child A gets an Actual Goal which overrides the Goal calculated from Child A.1 and Child A2.

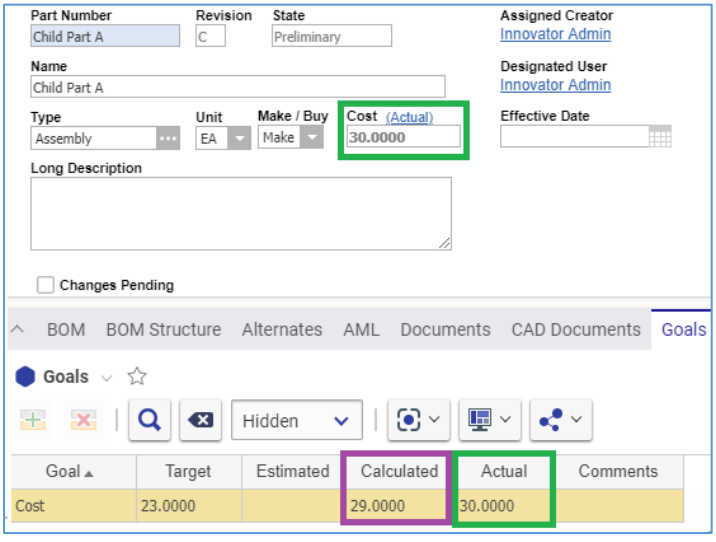

Figure 254.

Finally, the Parent has its Goal automatically recalculated in response to all changes.

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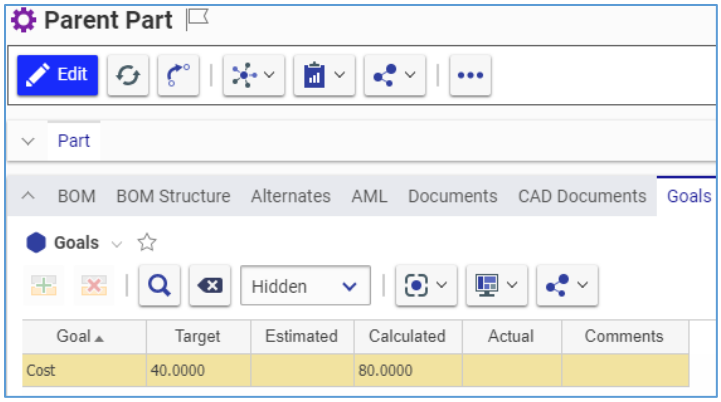

Figure 255.

The following table summarizes the final Cost Goals values of the multilevel BOM example.

Table 11: Goals third change

BOM Level			Part	Cost Goal, $	Goal Basis
0			Parent	80	Calculated
	1		Child A	30	Actual
		2	Child A.1	12	Estimated
		2	Child A.2	17	Estimated
	1		Child B	50	Calculated
		2	Child B.1	22	Estimated
		2	Child B.2	28	Actual

6.13 BOM Reports

To present complex multi-level BOMs in a well-organized layout, Aras Innovator offers four standard types of Reports:

- *Multilevel BOM Report* shows all Parts of a BOM with their position in the hierarchy and their quantity.
- *BOM Quantity Rollup Report* shows total quantities of all Parts of a BOM.
- *BOM Costing Report* calculates the cost of a Parent from Actual or Estimated Costs of its Children.
- *Part Circular Reference Report* detects Circular References in a BOM.

Each Report type is discussed in further detail in this section.

In addition to the standard Reports, Aras subscribers can create their own custom Reports. Refer to *Self-Service Reporting User Guide* for details.

There are several ways to access standard Reports:

- Go to **Contents -> Parts**, right-click a **Part** containing a BOM that needs to be explored, and then click the **Report** you need.

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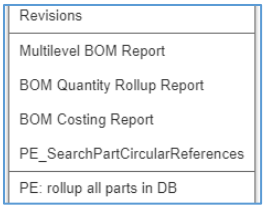

Figure 256.

- Open the view of a Part containing a BOM that needs to be explored, on the **Part** toolbar, click **Reports**, and then click the **Report** you need.

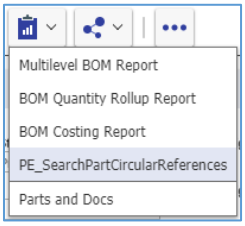

Figure 257.

When you access a Report, it appears as a new tab.

To quit a Report, close its view in Aras Innovator.

At the top left corner of each Report tab, there is a Print button. The print button uses standard browser print function. Depending on the browser and your specific configuration, various print choices, such as printing to a printer or saving to PDF, are available.

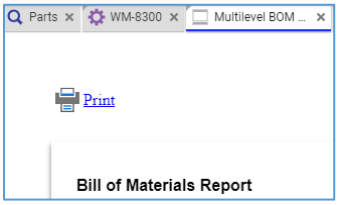

Figure 258.

6.13.1 Multilevel BOM Report

The Multilevel BOM Report shows a BOM hierarchy where you can see the properties for each Part: BOM level, Quantity, AML Status, Manufacturer, and Manufacturer Part.

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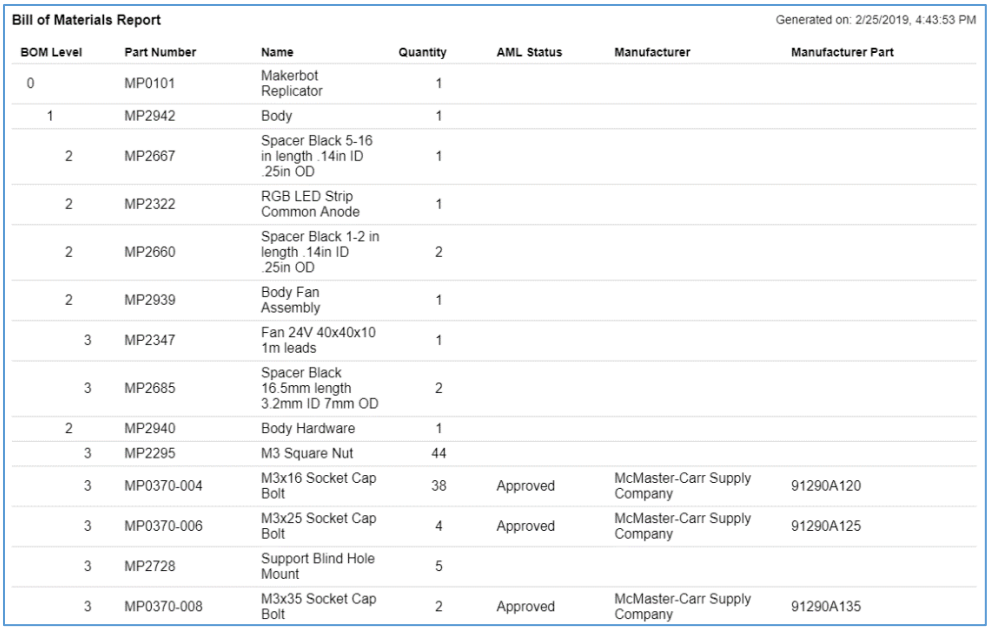

Bill of Materials Report — Generated on: 2/25/2019, 4:43:53 PM

BOM Level	Part Number	Name	Quantity	AML Status	Manufacturer	Manufacturer Part
0	MP0101	Makerbot Replicator	1			
1	MP2942	Body	1			
2	MP2667	Spacer Black 5-16 in length .14in ID .25in OD	1			
2	MP2322	RGB LED Strip Common Anode	1			
2	MP2660	Spacer Black 1-2 in length .14in ID .25in OD	2			
2	MP2939	Body Fan Assembly	1			
3	MP2347	Fan 24V 40x40x10 1m leads	1			
3	MP2685	Spacer Black 16.5mm length 3.2mm ID 7mm OD	2			
2	MP2940	Body Hardware	1			
3	MP2295	M3 Square Nut	44			
3	MP0370-004	M3x16 Socket Cap Bolt	38	Approved	McMaster-Carr Supply Company	91290A120
3	MP0370-006	M3x25 Socket Cap Bolt	4	Approved	McMaster-Carr Supply Company	91290A125
3	MP2728	Support Blind Hole Mount	5			
3	MP0370-008	M3x35 Socket Cap Bolt	2	Approved	McMaster-Carr Supply Company	91290A135

Figure 259.

6.13.2 BOM Quantity Rollup Report

The BOM Quantity Rollup Report displays a list of BOM Parts where for each Part displays the total quantity required for this BOM.

Quantity Rollup Report for MP0101 — Generated on: 2/25/2019, 4:46:58 PM

Part Number	Name	Calculated Quantity
MP2942	Body	1
MP2954	Extruder	1
MP2961	Shipping	1
MP2956	Gantry	1
MP2968	XY Stage	1
MP2943	Build Platform	1
MP2952	Electronics	1
MP2967	Wiring	1
MP2938	Additional Parts	1
MP1705	MK7 Thermal Core	2
MP2667	Spacer Black 5-16 in length .14in ID .25in OD	1
MP2935	Filament Spool Holder	2
MP2459	M3 Thumb Nuts	4
MP1531	ABS Black 1kg Spool 1.75mm	1
MP2295	M3 Square Nut	84
MP2584	PTFE Tubing 14in OD 18in ID	2
MP2753	Shaft 8mm x 424mm	2
MP2827	Nylon 440 screw	6

Figure 260.

6.13.3 BOM Costing Report

The BOM Costing Report shows the Cost Goal Rollup for a given BOM where each Part displays its level in the BOM and its properties at that level: Quantity, Cost value, and Cost Basis.

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Warning Goals and their calculations are unitless. Their values must be entered in the same units. Ensure that you enter Cost in the same currency and Weight in the same unit of mass.

Refer to sections *5.5 Goals for a Part* and *6.11 Goals Rollup*, for more detailed information on this topic.

Bill of Materials Costing Report Generated on: 2/25/2019, 4:50:03 PM

BOM Level	Part Number	Name	Quantity	Cost	Cost Basis
0	MP0101	Makerbot Replicator	1	4760.7859	Calculated
1	MP2942	Body	1	443.5369	Calculated
2	MP2667	Spacer Black 5-16 in length .14in ID .25in OD	1	0.0600	Actual
2	MP2322	RGB LED Strip Common Anode	1	3.8000	Actual
2	MP2660	Spacer Black 1-2 in length .14in ID .25in OD	2	0.6500	Actual
2	MP2939	Body Fan Assembly	1	9.9000	Calculated
3	MP2347	Fan 24V 40x40x10 1m leads	1	9.0000	Actual
3	MP2685	Spacer Black 16.5mm length 3.2mm ID 7mm OD	2	0.4500	Actual
2	MP2940	Body Hardware	1	5.6800	Calculated

Figure 261.

6.13.4 Circular Reference Report

A *Circular Reference* is a situation when a BOM becomes “infinite” because of a Parent Part that has a Child Part that has this Parent as its Child. A Parent and a Child can be at any place or level in a BOM.

For example, there is a BOM where the Parent has two Children A and B and each Child has two sub-Children 1 and 2. In this BOM, the Parent is also a Child of Child B.2.

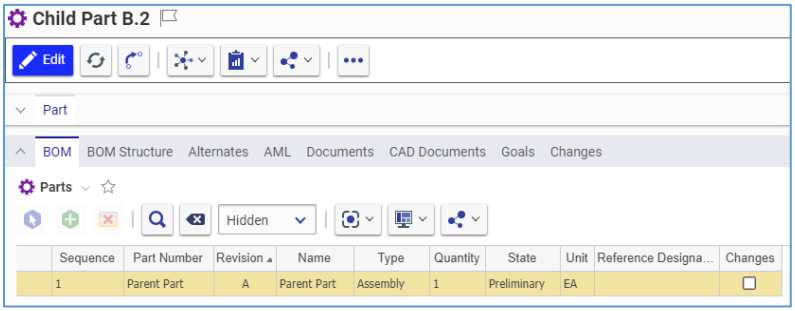

Figure 262.

The BOM Relationship from Child B.2 to the Parent creates a Circular Reference in this BOM.

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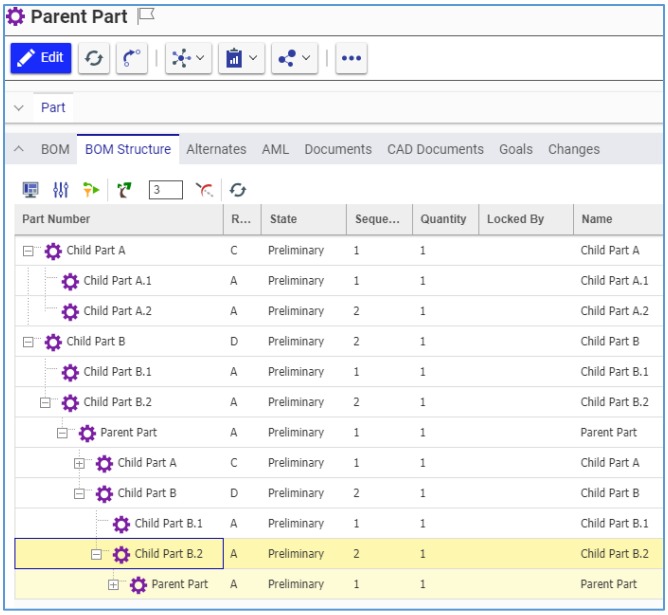
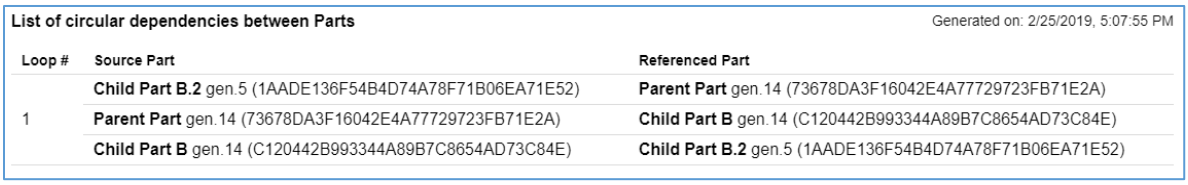


Figure 263.

When the Circular Reference Report is accessed, it detects Relationship loops in a BOM indicating which Parts are mutually related to each other.



List of circular dependencies between Parts Generated on: 2/25/2019, 5:07:55 PM

Loop #	Source Part	Referenced Part
1	**Child Part B.2** gen.5 (1AADE136F54B4D74A78F71B06EA71E52)	**Parent Part** gen.14 (73678DA3F16042E4A77729723FB71E2A)
	Parent Part gen.14 (73678DA3F16042E4A77729723FB71E2A)	**Child Part B** gen.14 (C120442B993344A89B7C8654AD73C84E)
	Child Part B gen.14 (C120442B993344A89B7C8654AD73C84E)	**Child Part B.2** gen.5 (1AADE136F54B4D74A78F71B06EA71E52)

Figure 264.

If there are no Circular References in a BOM, the Circular Reference Report displays an appropriate message.

List of circular dependencies between Parts Generated on: 2/25/2019, 5:09:45 PM

No circular dependencies between Parts are found.

Figure 265.

6.14 Comparing BOMs

To compare complex multi-level BOMs side-by-side, Aras Innovator offers the Structure Browser. Refer to section *11.2 Comparing Items* for information about comparing BOMs. All examples in that section are applicable to BOMs and Parts.

6.15 Finding Where a Part is Used

Aras Innovator offers the Where Used feature to show in which Parents a Part is used. Refer to section *11.1 Finding Where an Item is Used* for information about how to find out where a Part is used. All examples in that section are applicable to BOMs and Parts.

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6.16 Sorting BOM Structures

On the **BOM Structure** accordion tab, the header rows have transparent **arrows** after titles. These **arrows** appear in light gray when you hover over them.

Figure 266.

Click an **arrow** to sort a BOM structure by property values in a given column:

- **Upward arrow**—ascending order

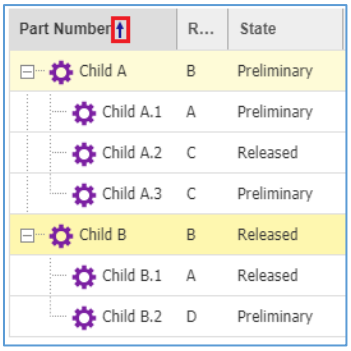

Figure 267.

- **Downward arrow**—descending order

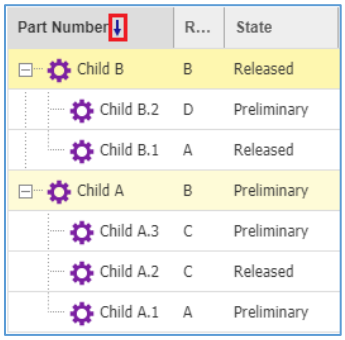

Figure 268.

Sorting is applied to each BOM level recursively. When a level of Parts is sorted, then children of each Part are sorted within this Part.

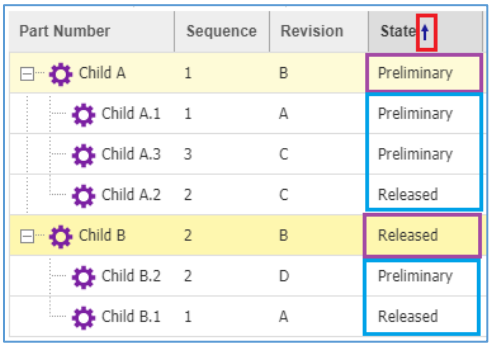

Figure 269.

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The structure can be sorted by several columns: press and hold the **Control** key while clicking **arrows**.

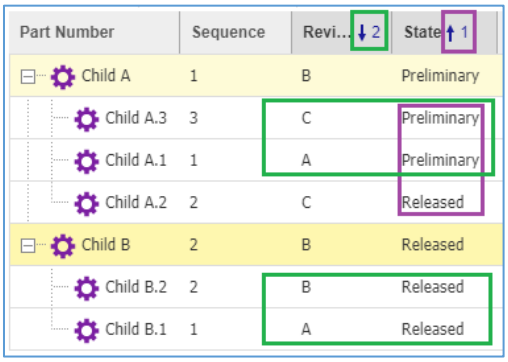

Figure 270.

6.17 Exporting BOM Structures to Excel

The **BOM Structure** accordion tab has the **Export To Excel** button.

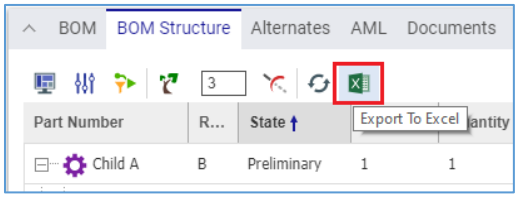

Figure 271.

Click **Export To Excel** to download an Excel file to your machine.

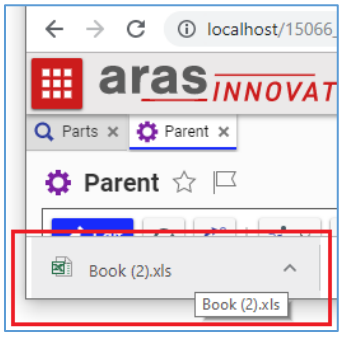

Figure 272.

The content of the Excel file is the same as it is displayed on the **BOM Structure** tab.

	A	B	C	D	E	F	G	H	I	J	K
1	Level		Part Number	Revision	State	Sequence	Quantity	Claimed By	Name	Effectivity	Reference Designator
2	1	-	Child A	B	Preliminary	1	1		Child A		
3	2		Child A.1	A	Preliminary	1	1		Child A.1		
4	2		Child A.2	C	Released	2	1		Child A.2		
5	2		Child A.3	C	Preliminary	3	1		Child A.3		
6	1	+	Child B	B	Released	2	1		Child B		
7											
8											

Figure 273.

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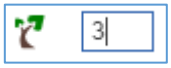
To export a fully expanded structure:

11. Click **Display Settings** .
12. Clear the **Max Visible Child on Expand** field in the **Display Settings** dialog.

Figure 274.

13. Set desired ***Grow Depth***  to specify the number of BOM levels to expand.
14. Click **Grow** to expand the structure.
15. After the structure is expanded, click **Export to Excel** .

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7 Sourcing Items

To simplify the sourcing process, the Product Engineering (PE) application uses a data model based on the Part as the central item. A Part can be made in-house or purchased. In the latter case, the Part can have the **AML** (Approved Manufacturers List) to maintain one or more Manufacturer Parts associated with it. Each Manufacturer Part can be produced by only one Manufacturer and be sold by many Vendors. A Vendor may sell the same Part from more than one Manufacturer and can include all their available Parts with their Manufacturer information.

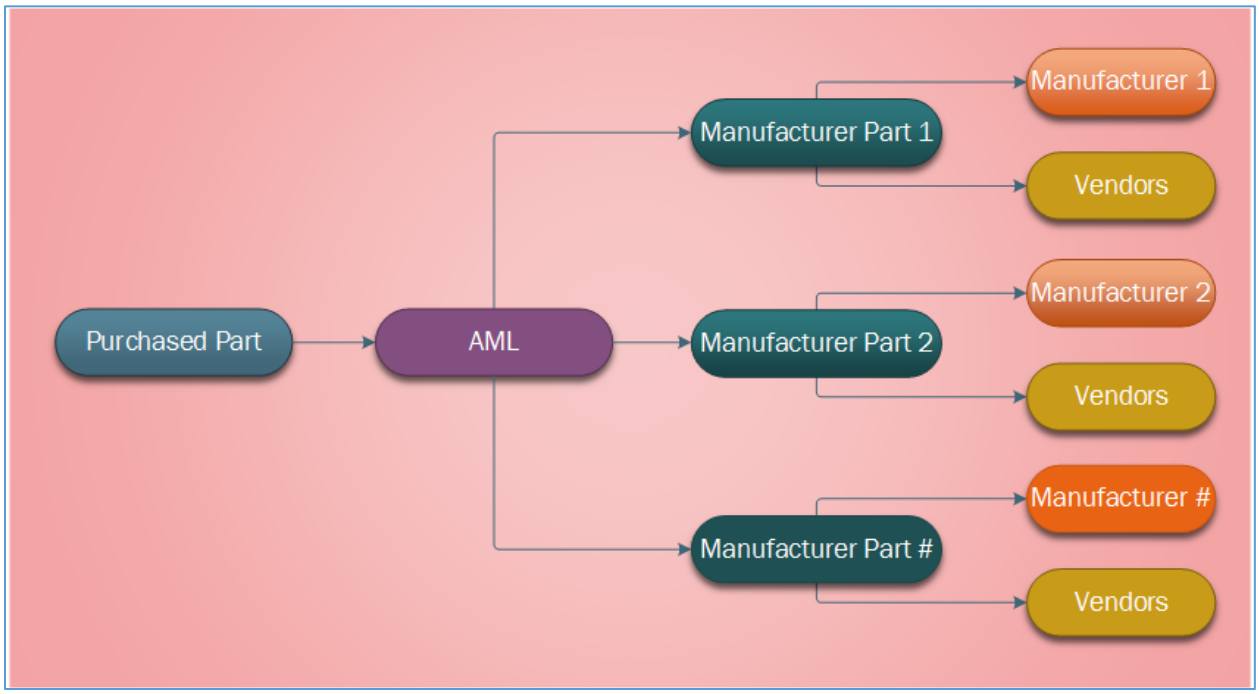

Figure 275.

Each Manufacturer Part has the Manufacturer property to denote who makes the Part. You can assign only one Manufacturer to a Manufacturer Part. If there are several Manufacturers making similar, equivalent, or identical Parts, you must create the corresponding number of Manufacturer Parts.

Note: By default, only members of the Component Engineering identity can create and maintain Sourcing Items. An administrator can change this accessibility if it is necessary.

The recommended workflow for Sourcing is the following sequence of steps:

1. Create Manufacturers.
2. Create Manufacturer Parts.
3. Create Vendors.
4. Approve Manufacturers, Manufacturer Parts, and Vendors.
5. Add Manufacturer Parts to the AML of the corresponding Part.

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7.1 Life Cycle of Sourcing Items

The PE application has the following Sourcing Life Cycles:

- Manufacturer
- Part AML
- Vendor

Each Sourcing Life Cycle is based on the same Life Cycle Map. An Aras administrator can change the Life Cycle Maps if it is necessary to meet other criteria.

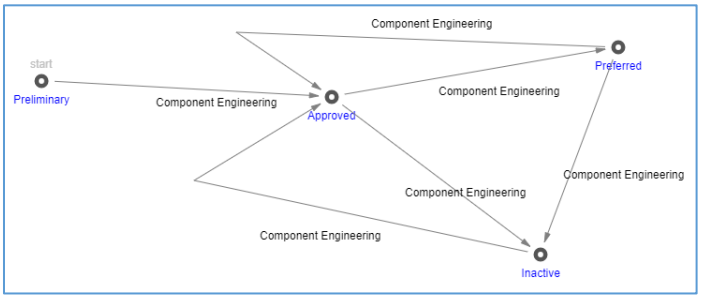

Figure 276.

When created, each Sourcing Item is in the Preliminary state. To indicate their approval status, Items can be promoted to the Approved state. From the Approved state, the Item can further be promoted to the Preferred state. To deactivate an approved item that is no longer used, the item can be promoted to the Inactive state.

By default, only members of the **Component Engineering identity** have access rights to promote Sourcing Items. An Aras administrator can change this accessibility if it is necessary. For information about promoting Sourcing Items, refer to section *7.5 Promoting Sourcing Items*.

7.2 Creating a Manufacturer

A Manufacturer produces Manufacturer Parts.

Use the following procedure to create a Manufacturer:

1. Go to **Contents --> Sourcing --> Manufacturers**.
2. Click **Create New Manufacturer**. The view of a new Manufacturer appears.

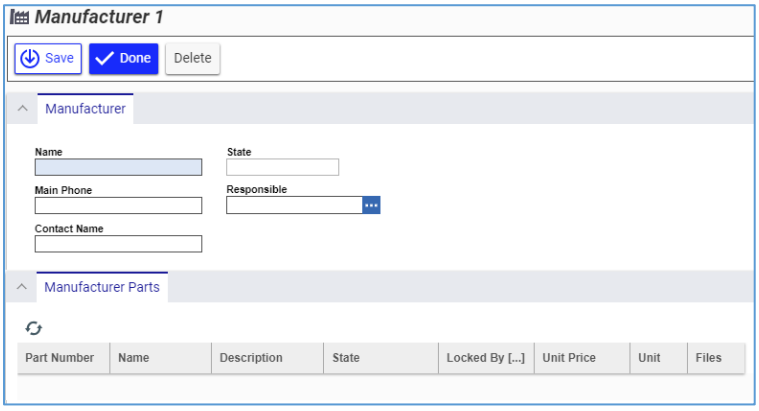

Figure 277.

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3. Enter ***the name of a manufacturing company*** in the **Name** text box.

Note: The Name is the only required Manufacturer property for you to provide. An error appears when you try to save a Manufacturer without a Name.

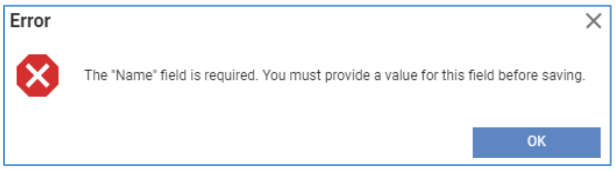

Figure 278.

Note: The Name Manufacturer property must be unique. An error appears when you try to save a Manufacturer with a Name that already exists in Aras Innovator.

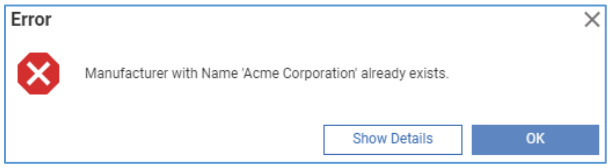

Figure 279.

If it is necessary:

- enter ***the phone number*** to call in the **Main Phone** text box.
- enter ***the name*** of a contact person in the **Contact Name** text box.
- enter the name of the Responsible identity for the Manufacturer:

Note: The Responsible identity is a user or group responsible for this Manufacturer. This role is often identified as the Owner of the Manufacturer item, who may be different from the user creating the Manufacturer in the system.

a. Click the **ellipsis** button in the **Responsible** box. The **Search dialog – Identity** appears.

b. Using the standard search procedure, search for and select the Identity of a responsible person, which populates the **Responsible** property box.

4. Click **Done** on the **Manufacturer** toolbar. The Manufacturer is created.

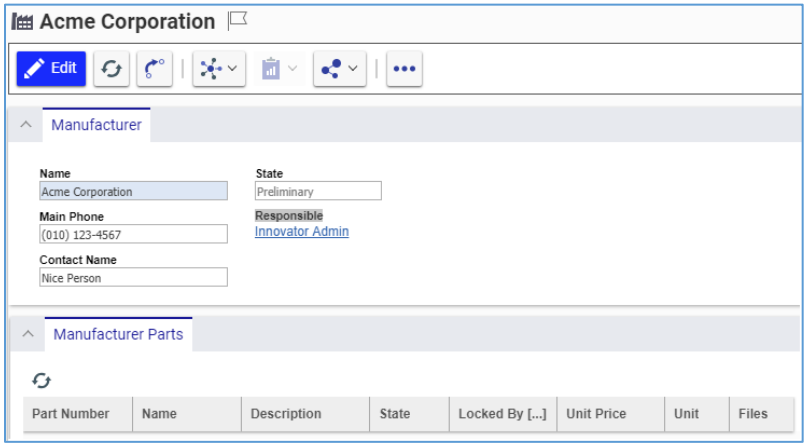

Figure 280.

©2019 Aras Corporation All Copyrights Reserved.

The Manufacturer is now available via search, subject to permissions.

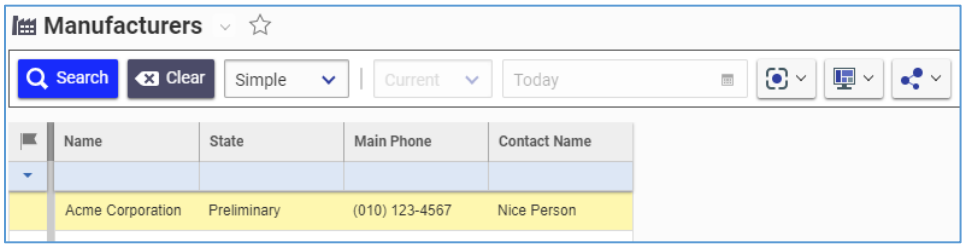

Figure 281.

7.3 Creating a Manufacturer Part

Each Manufacturer Part has the Manufacturer property to denote who makes the Part. Only one Manufacturer can be assigned to a Manufacturer Part. If there are several Manufacturers making similar, equivalent, or identical Parts, a Manufacturer Part must be created for each of them.

Use the following procedure to create a new Manufacturer Part:

1. Go to **Contents --> Sourcing --> Manufacturer Parts**.
2. Click **Create New Manufacturer Part**. The view of a new Manufacturer Part appears.

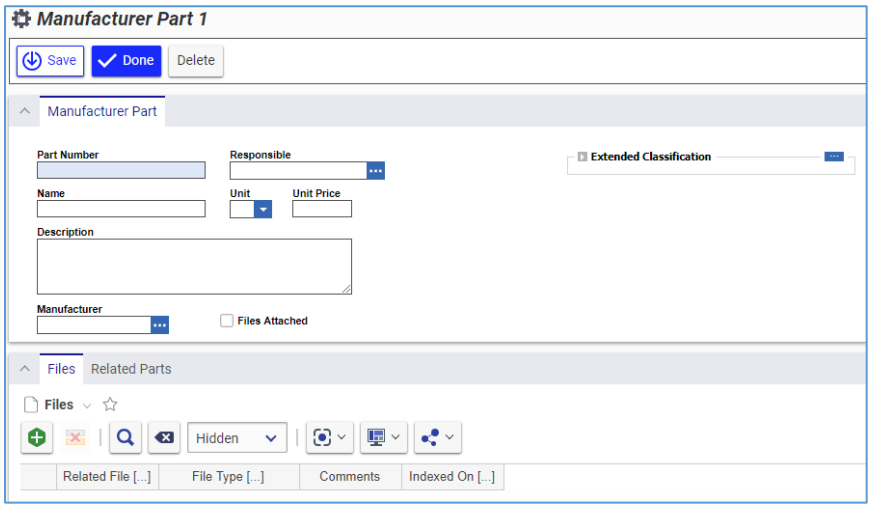

Figure 282.

3. Enter the Manufacturer's ***part number*** in the **Part Number** text box.

Note: The Part Number is the only required Manufacturer Part property for you to provide. An error appears when you try to save the Manufacturer Part without a Part Number.

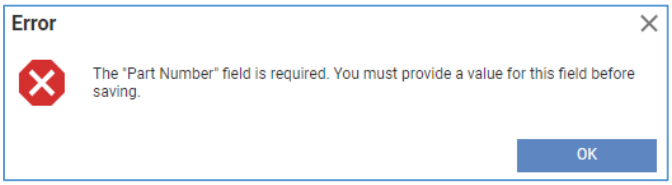

Figure 283.

4. If it is necessary, set the Responsible Identity for the Manufacturer Part:

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Note: The Responsible identity is a user or group responsible for this Manufacturer Part. This role is often identified as the Owner of the Part, who may be different from the user creating the Part in the system.

a. Click the **ellipsis** button in the **Responsible** box. The **Search dialog – Identity** appears.

b. Using the standard search procedure, search for and select the Identity of a responsible person, which populates the **Responsible** property field.

5. If it is necessary, enter the Manufacturer's ***name*** for the Part in the **Name** box.

6. In the **Unit** drop-down list, select the proper unit of measure for the Part:

Note: The following is the standard **Units** list in Aras Innovator. This list can be changed, as needed, by an administrator.

- **EA**, each
- **IN**, inches
- **FT**, feet
- **MM**, millimeters
- **CM**, centimeters
- **M**, meters

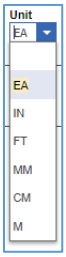

Figure 284.

7. If it is necessary, enter the price per Part unit in the **Unit Price** text box.

8. If it is necessary, provide additional information about the Part in the **Description** text box.

9. Click the **ellipsis** in the **Manufacturer** box. The **Search dialog – Manufacturer** appears.

10. Using the standard search procedure, search for and select the Manufacturer of the Part that populates the **Manufacturer** property box.

11. If it is necessary to add a file:

a. Click **Create Item** on the **Files** accordion toolbar. The standard dialog of your operating system for file browsing and selection appears.

b. Search for and select a file. A new row appears in the **Files** grid with the file attached.

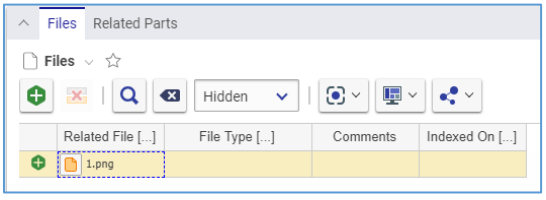

Figure 285.

12. If it is necessary to populate extended properties:

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a. Click the **ellipsis** button in the **Extended Classification** pane. The **Classification** dialog appears.

Figure 286.

b. Search for and select extended properties that appear in the **Extended Classification** pane.

c. Provide values to the extended properties in the **Extended Classification** pane.

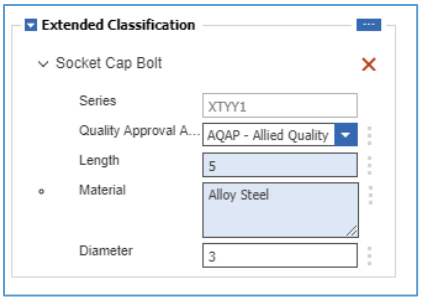

Figure 287.

13. Click **Done** on the **Manufacturer Part** toolbar. The Manufacturer Part is created.

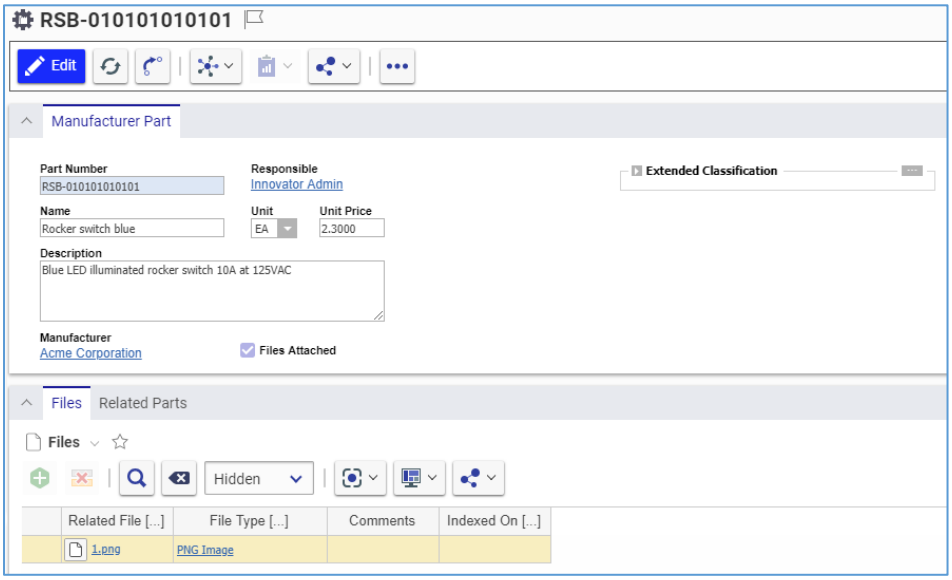

Figure 288.

The Manufacturer is now available via search, subject to permissions.

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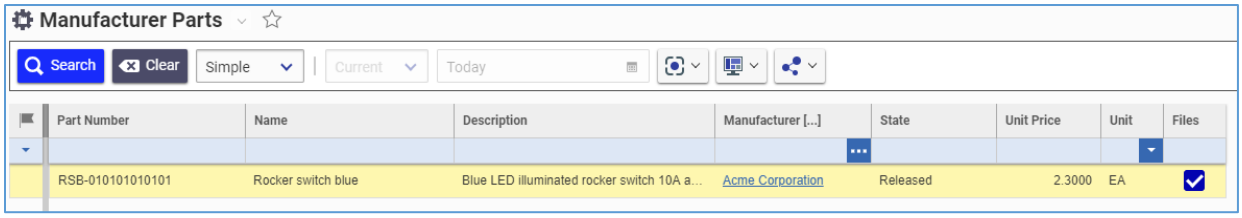

Figure 289.

14. This step is optional. Go to the **Manufacturer Part** view and click the ***Manufacturer*** link. The Manufacturer view appears showing the Manufacturer Part on the **Manufacturer Part** accordion tab.

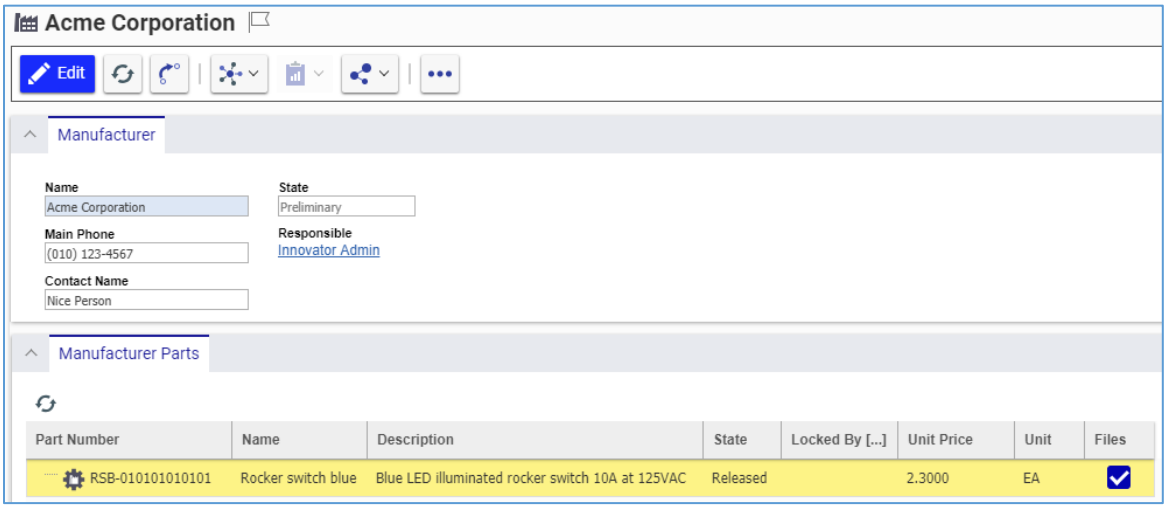

Figure 290.

7.4 Creating a Vendor

A Vendor sells Manufacturer Parts. You can assign many Vendors to a Manufacturer Part.
Use the following procedure to create a new Vendor:

1. Go to **Contents --> Sourcing --> Vendors**.
2. Click **Create New Vendor**. The view of a new Vendor appears.

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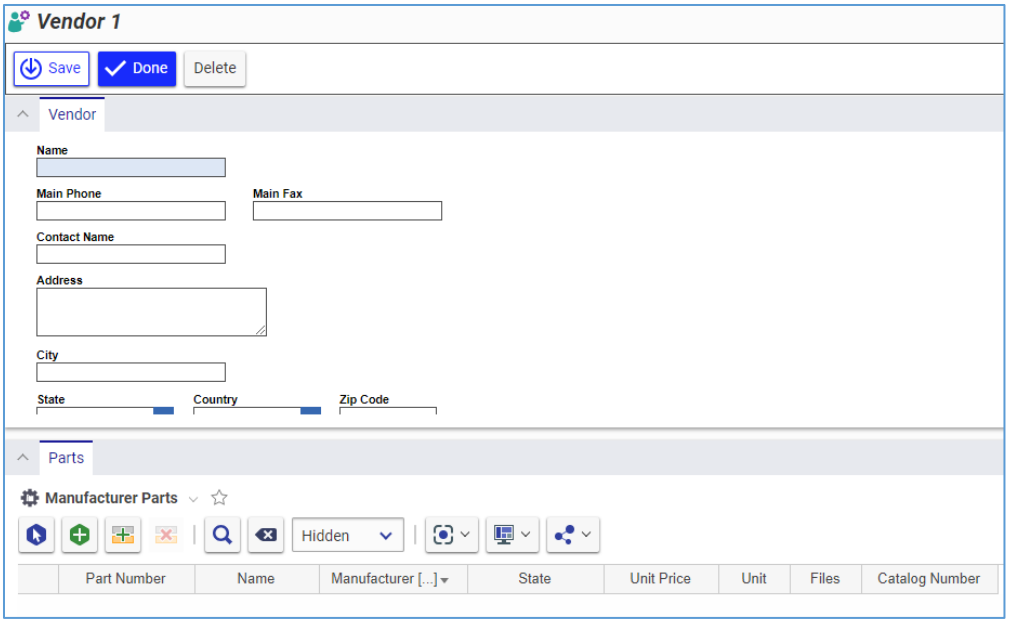

Figure 291.

3. Enter ***the name of the vendor*** in the **Name** text box.

Note: The Name is the only required Vendor property for you to provide. An error appears when you try to save a Vendor without a Name.

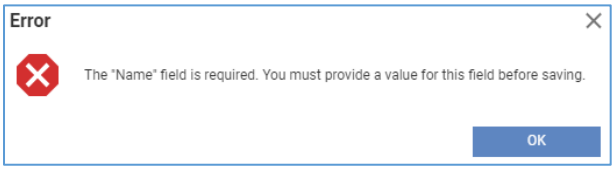

Figure 292.

Note: The Vendor Name property must be unique. An error appears when you try to save a Vendor with a Vendor Name that already exists in Aras Innovator.

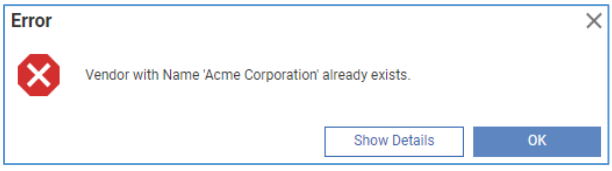

Figure 293.

4. Enter the following optional information:
   - ***Phone number*** to call in the **Main Phone** text box.
   - ***Fax number*** in the **Main Fax** text box.
   - ***Name*** of a contact person in the **Contact Name** text box.
   - ***Vendor's street*** in the **Address** text box.
   - ***Vendor's city*** in the **City** text box.
   - ***Vendor's US State / Canadian Province*** in the **State** list.

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- ***Vendor's country*** in the **Country** list.
- ***Vendor's postal code*** in the **Zip Code** text box.
- ***Vendor's website address*** in the **Web Site** text box.
- Additional information about the Vendor in the **Description** text box.

5. Assign Manufacturer Parts to the Vendor as described in section *7.4.1. Assigning Manufacturer Parts to a Vendor*.
6. If it is necessary, create new Manufacturer Parts and assign them to the Vendor as described in section *7.4.2. Creating Manufacturer Parts from a Vendor*.
7. Click **Done** on the **Vendor** toolbar. The Vendor is created.

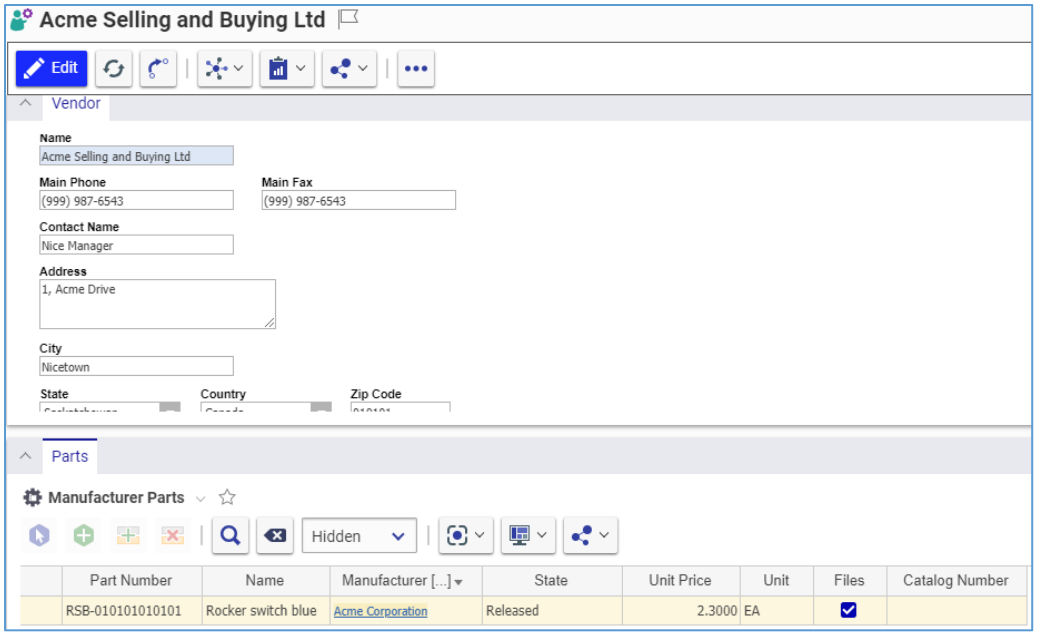

Figure 294.

The Vendor is now available via search, subject to permissions.

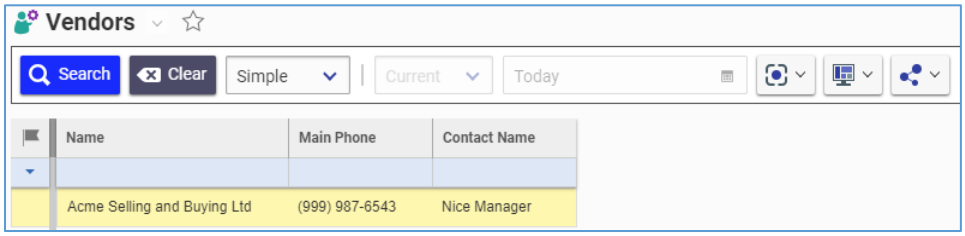

Figure 295.

7.4.1 Assigning Manufacturer Parts to a Vendor

Use the following procedure to add an existing Manufacturer Part to a Vendor:

1. Open the Vendor view.
2. Click **Edit** on the **Vendor** toolbar.
3. Go to the **Parts** accordion tab.

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4. Click **Select Items** on the **Parts** accordion toolbar. The **Search dialog – Manufacturer Part** appears.
5. Using the standard search procedure, search for and select a Manufacturer Part that the Vendor supplies. The selected Manufacturer Parts then appears in the **Manufacturer Parts** grid.

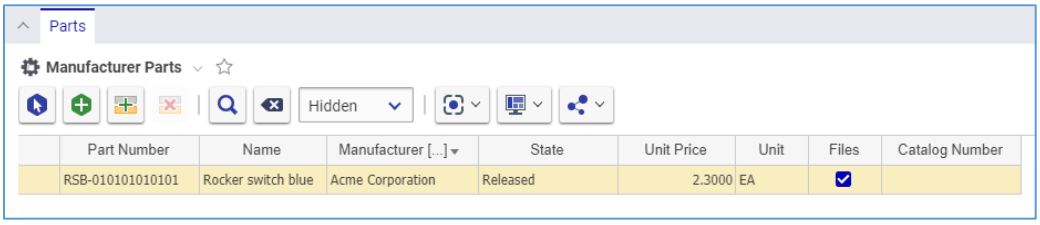

Figure 296.

6. Click either **Done** or **Save** on the **Vendor** toolbar. The Manufacturer Part is assigned to a Vendor.

7.4.2 Creating Manufacturer Parts from a Vendor

Use the following procedure to create a new Manufacturer Part and add it to a Vendor:

1. Use steps 1-3 of the Assigning Manufacturer Parts to a Vendor procedure.
2. Click **Create Item** on the **Parts** accordion toolbar. A **blank row** appears in the **Manufacturer Parts** grid.

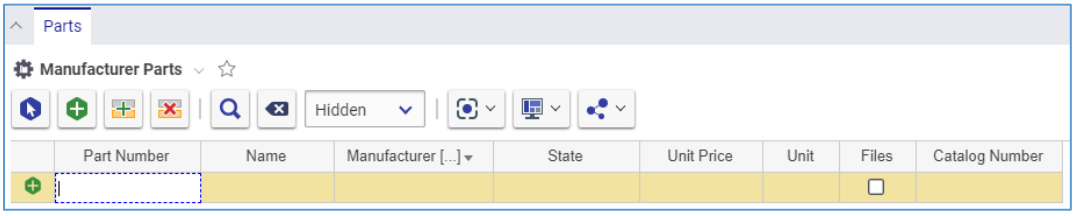

Figure 297.

3. Click the **Part Number** cell and enter the Manufacturer's ***part number*** for the new Manufacturer Part.

Note: The Part Number must be unique. It is the only required Manufacturer Part property, which you provide.

4. If it is necessary to provide any other data on the Manufacturer Part, click the appropriate cell and enter this data.
5. Click either **Done** or **Save** on the **Vendor** toolbar. The new Manufacturer Part is created and assigned to the Vendor.
6. If it is necessary to provide any missing data on the Manufacturer Part, edit the Manufacturer Part. Refer to section *7.3. Creating a Manufacturer Part* for more information.

7.4.3 Replacing Manufacturer Parts in a Vendor

Use the following procedure to replace a Manufacturer Part in a Vendor:

1. Follow steps 1-3 of the Assigning Manufacturer Parts to a Vendor procedure.

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2. Right-click the **Manufacturer Part** and then click **Replace**. The **Search dialog – Manufacturer Part** appears.
3. Using the standard search procedure, search for and select a replacement Manufacturer Part. The selected Manufacturer Part replaces the old one.
4. Click either **Save** or **Done** on the **Vendor** toolbar.

7.4.4 Removing Manufacturer Parts from a Vendor

Use the following procedure to remove a Manufacturer Part from a Vendor:

1. Follow steps 1-3 of the Assigning Manufacturer Parts to a Vendor procedure.
2. Click the **Manufacturer Part** and then click **Delete Row** on the **Parts** accordion toolbar.

The **Manufacturer Part** becomes unavailable.

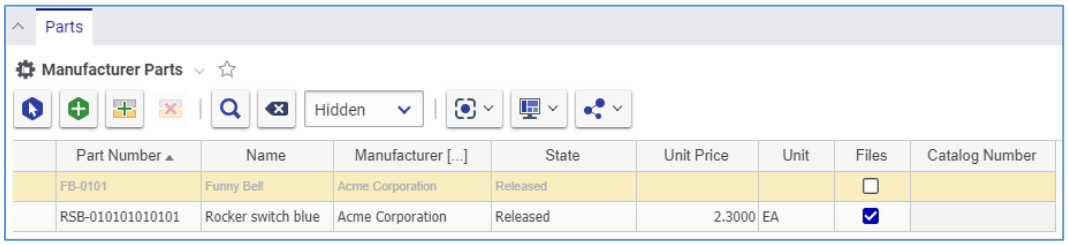

Figure 298.

3. Click either **Save** or **Done** on the **Vendor** toolbar. The **Manufacturer Part** disappears from the grid.

Note: The **Manufacturer Part** disappears immediately if the Vendor is not saved after it is added.

7.5 Promoting Sourcing Items

To indicate their approval status, Sourcing Items must be promoted to the Approved or Preferred State. For details, refer to section *7.1 Life Cycle of Sourcing Items*.

Note: By default, only members of the Component Engineering identity have access rights to promote Sourcing Items. An Aras administrator can change this access if it is necessary.

You can promote a Sourcing Item either from its view or from its action menu in the *Sourcing Item* Search Page. For details, refer to section *4.3 Manual Promotion and Revise*.

7.6 Approved Vendors Report

To display a list of all approved Vendors, Aras Innovator provides the Approved Vendors Report.

There are several ways to access the Approved Vendors Reports:

- Go to **Contents --> Sourcing --> Vendors**, right-click a **Vendor**, and then click **Approved Vendors Report**.

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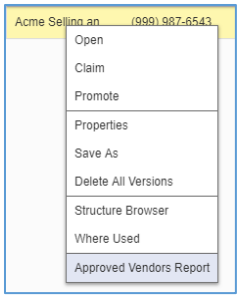

Figure 299.

- Open the view of a Vendor on the **Vendor** toolbar, click **Reports**, and then click **Approved Vendors Report**.

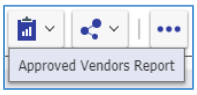

Figure 300.

When you access the Approved Vendors Report, it appears as a new view.

Figure 301.

To quit the Approved Vendors Report, close the view.

At the top left corner of the Report, there is a **Print** button. The print button uses the standard browser print function. Depending on the browser and your specific configuration, various print choices, such as printing to a printer or saving to PDF, are available.

7.7 Approved Manufacturer List (AML)

The Approved Manufacturer List (AML) is a list of Manufacturer Parts associated with a given Part.

You can create a new AML by assigning Manufacturer Parts to a Part using its **AML** relationships accordion tab. You can also edit an existing AML.

Note: By default, only members of the Component Engineering identity can promote AMLs. An administrator can change this accessibility if it is necessary.

7.7.1 Assigning Manufacturer Parts to a Part

Use the following procedure to assign a Manufacturer Part to a Part:

1. Open the **Part** view.
2. Click **Edit** on the **Part** toolbar.

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3. Go to the **AML** accordion tab.

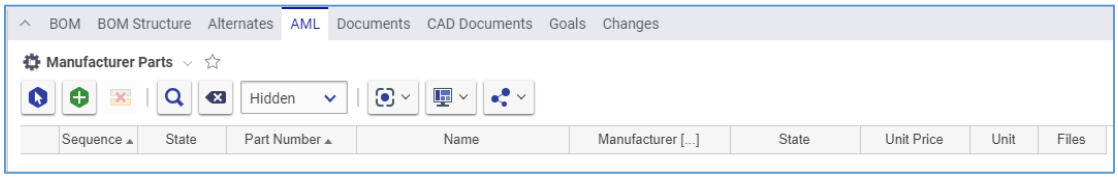

Figure 302.

4. Click **Select Items** on the **AML** accordion toolbar. The **Search dialog – Manufacturer Part** appears.
5. Using the standard search procedure, search for and select all the necessary Manufacturer Parts that appear in the **AML**.

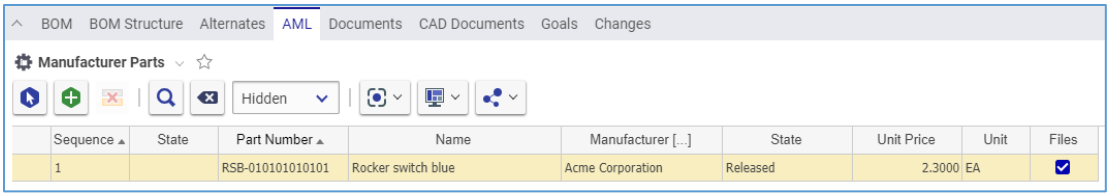

Figure 303.

6. Click either **Done** or **Save** on the **Part** toolbar. The Manufacturer Part is assigned to the Part.

7.7.2 Creating Manufacturer Parts from an AML

Use the following procedure to create a new Manufacturer Part and add it to a Part:

Note: By default, only members of the Component Engineering identity can create and maintain Manufacturer Parts. An administrator can change this accessibility if it is necessary.

1. Use steps 1-3 of the Assigning Manufacturer Parts to a Part procedure.
2. Click **Create Item** on the **AML** accordion toolbar. A **blank row** appears in the **AML** grid.

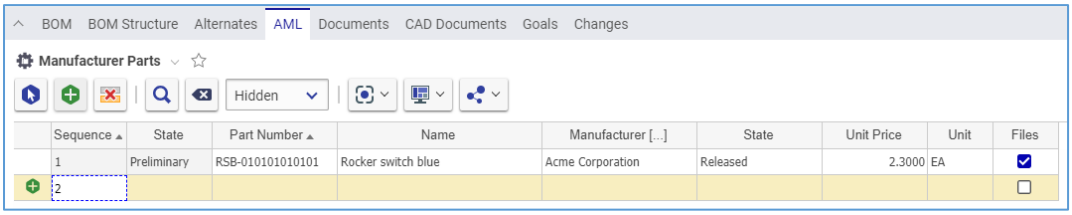

Figure 304.

3. Click the **Part Number** cell and then enter the Manufacturer's ***part number***.

Note: The Part Number is the only required Manufacturer Part property, which you provide.

4. If it is necessary to provide any other data on the Manufacturer Part, click the corresponding cell and enter this data.
5. Click either **Done** or **Save** on the **Part** toolbar. The new Manufacturer Part is created in Aras Innovator and assigned to the Part.
6. If it is necessary to provide any missing data on the Manufacturer Part created, edit it. Refer to section *7.3 Creating a Manufacturer Part* for details on this topic.

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7.7.3 Replacing Manufacturer Parts in an AML

Use the following procedure to replace a Manufacturer Part in a Part:

1. Use steps 1-3 of the Assigning Manufacturer Parts to a Part procedure.
2. Right-click the **Manufacturer Part** and then click **Replace**. The **Search dialog – Manufacturer Part** appears.
3. Using the standard search procedure, search for and select a replacing Manufacturer Part. The selected Manufacturer Part replaces **Manufacturer Part** right-clicked.
4. Click either **Save** or **Done** on the **Part** toolbar.

7.7.4 Removing Manufacturer Parts from an AML

Use the following procedure to remove a Manufacturer Part from a Part:

1. Use steps 1-3 of the Assigning Manufacturer Parts to a Part procedure.
2. Click the **Manufacturer Part** and then click **Delete Row** on the **Parts** accordion toolbar. The **Manufacturer Part** becomes unavailable.

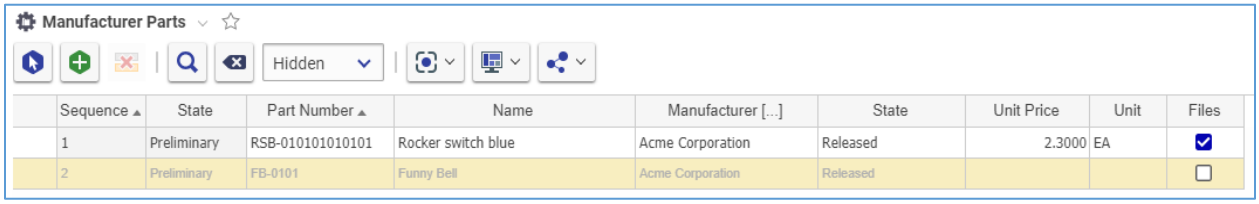

Figure 305.

3. Click either **Save** or **Done** on the **Part** toolbar. The **Manufacturer Part** disappears from the grid.

Note: The **Manufacturer Part** disappears immediately if the Part was not saved after it was added.

7.7.5 Promoting Manufacturer Parts for a Part

For a given part, you can promote its Manufacturer Parts to one of the Approved, Preferred, or Inactive states from the Part's AML. For details on AML life cycle states, refer to section *7.1 Life Cycle of Sourcing Items*.

Note: By default, only members of the Component Engineering identity have access rights to promote Sourcing Items and AMLs. An Aras administrator can change this access if it is necessary.To be available for promotion, a Sourcing Item must be unclaimed and in the Viewing mode.

Use the following procedure to promote a Manufacturer Part from an AML:

1. Open the view of a Part that is associated with the Manufacturer Part.
2. Go to the **Manufacturer Parts** accordion tab.
3. Right-click the **Manufacturer Part**, point to **AML**, and then click **Promote**. The **Promote Manufacturer Part's Name** dialog appears with **States available for promotion**.

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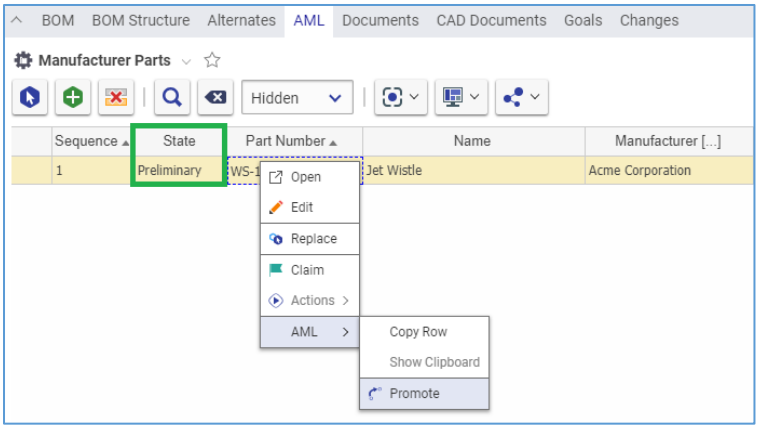

Figure 306.

4. Use one of the following options:
   - Click the ***State*** and then click **Promote to Selected State**.
   - Double-click the ***State***.

   The Manufacturer Part's AML Status is promoted to the selected State.

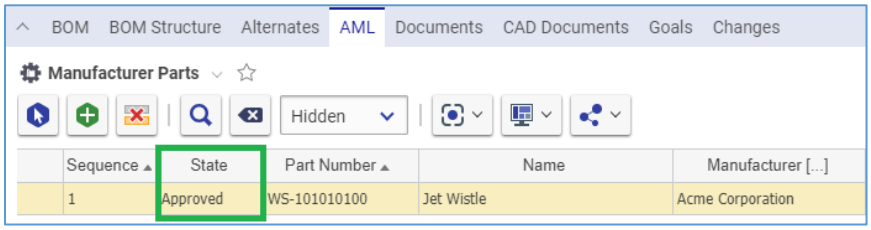

Figure 307.

If you try to promote a Sourcing Item that does not have any available promote States, Aras Innovator displays the following error. This message also appears if the user performing the promotion has no access rights for this action.

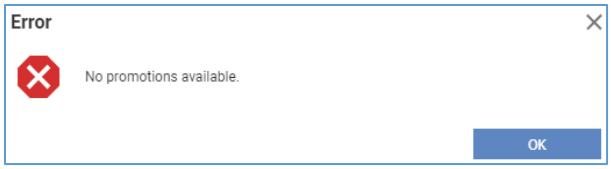

Figure 308.

Note: To promote to the Preferred or Inactive state, the AML should be in "Approved" state.

5. Repeat steps 3-4 to set AML status on other Manufacturer Parts for the Part.

7.8 Finding Where Used and Comparing Sourcing Items

You can explore Manufacturers, Manufacturer Parts, Vendors, and their usage with the Where Used and Structure browsers. For details on how to use these browsers, refer to section *11 Exploring Usage and Comparing Items*.

Each browser shows information specific to each Sourcing Item:

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- For Manufacturers, the Where Used browser shows Manufacturer Parts, Parts, and Affected Items associated with the Manufacturer.

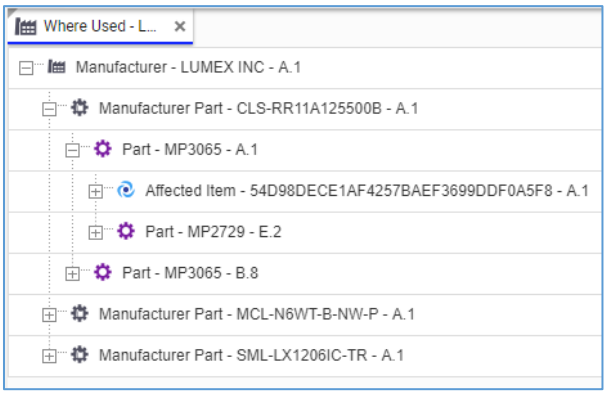

Figure 309.

- For Manufacturer Parts, the Where Used browser shows Parts and Affected Items that use the Manufacturer Part.

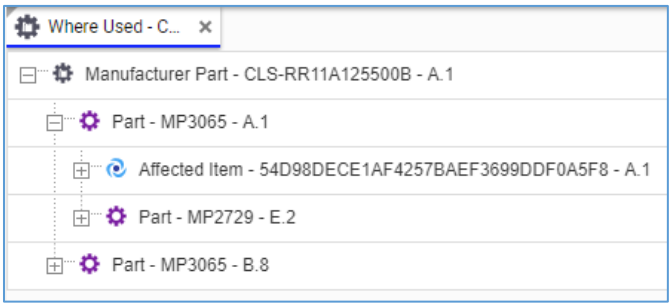

Figure 310.

- For Vendors, the Structure browser shows the Manufacturer Parts associated with the Vendor.

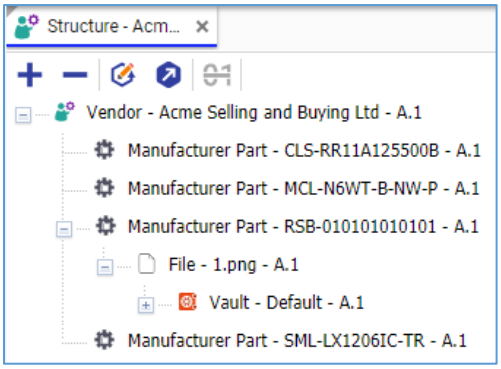

Figure 311.

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8 Documents

A Part can have one or more Documents associated with it. A Document can be a drawing, a specification, quality control, etc. Documents are an important component of any Part since they can describe how to make the specific Part or its expected performance and function. Documents also play an important role in Change Management.

CAD documents are a separate item type. For more information, refer to section *9. CAD Documents*.

You can create new Documents in Aras Innovator in two ways:

- Create the Document and then attach them to a Part. This is the recommended approach.
- Create the Document and attach it to a Part in one action.

A Document can have associated files that are kept in the Aras Innovator Vault.

8.1 Documents Life Cycle

By default, the Document Life Cycle has the following states: Preliminary, In Review, Released, Manual Change, In Change, Superseded, and Obsolete. An Aras administrator can change the Life Cycle Map if it is necessary to meet specific business needs.

Each Document has a life cycle associated with it as shown here. A new Document has the **Preliminary** state associated with it by default and can be released manually in its early stages, or via a change process as it matures. Refer to sections *4.3. Manual Promotion and Revise* and *13. Change Management* for details.

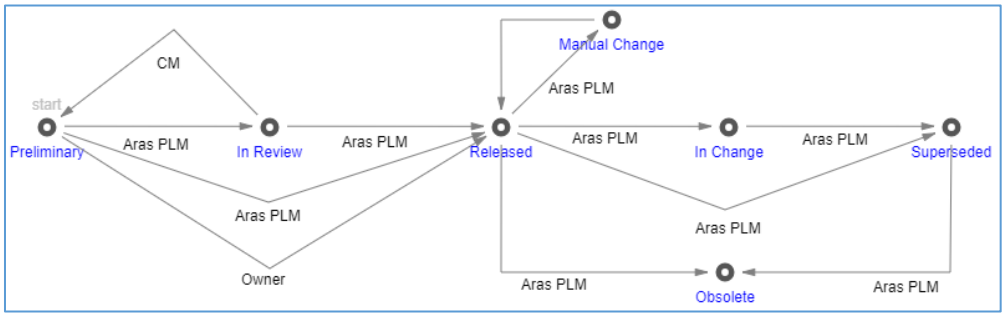

Figure 312.

8.2 Creating a Document

Use the following procedure to create a new Document:

1. Go to **Contents --> Documents --> Documents**.
2. Click **Create New Document**. The view of a new Document appears.

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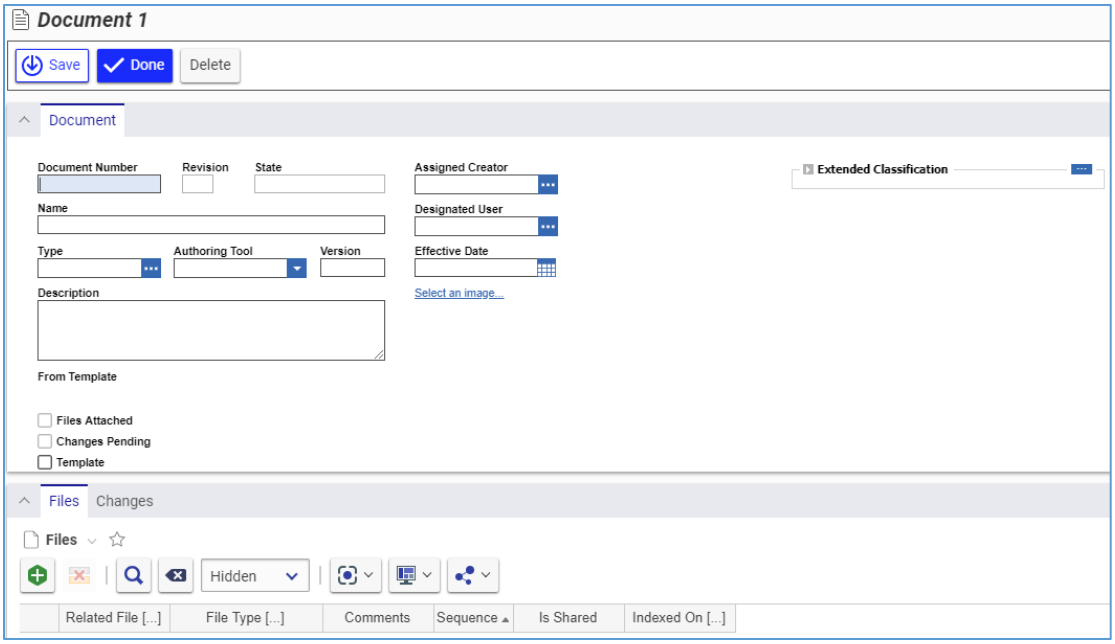

Figure 313.

3. Enter the ***Document number*** in the **Document Number** field.

Note: The Document Number is the only required Document property for you to provide. An error appears when you try to save a Document without a Document Number.

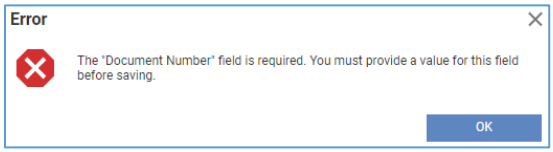

Figure 314.

Note: The Document Number property must be unique. An error appears when you try to save a Document with a Document Number that already exists in Aras Innovator.

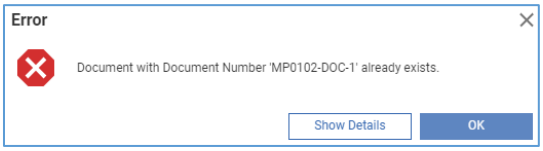

Figure 315.

4. Enter the ***Document name*** in the **Name** field.
5. Click the **ellipsis** button in the **Type** box. The **classification** dialog appears displaying the Document Classification tree.

Note: The following is the Document Classification tree in Aras Innovator. It can be extended, as needed, by an administrator.

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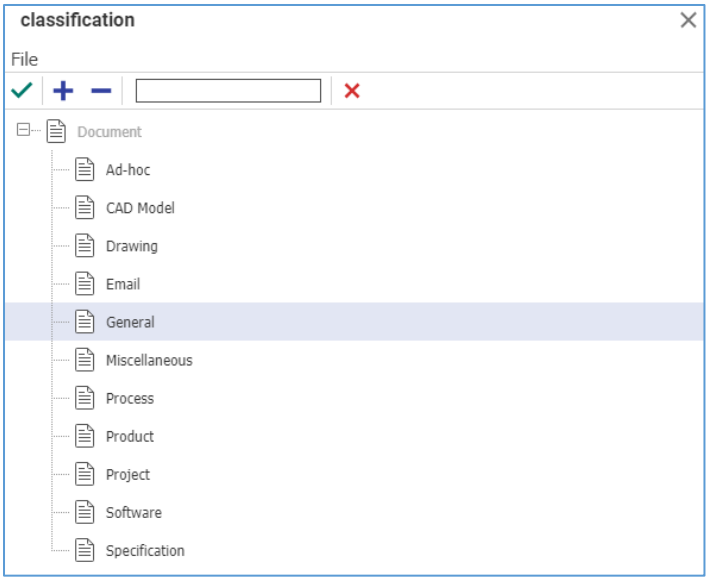

Figure 316.

6. Specify the Document type by either:
   a. Double-clicking the **type**.
   b. Selecting the **type** and clicking **Return selected** in the **classification** toolbar.

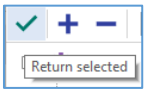

Figure 317.

7. In the **Authoring Tool** drop-down list, select the application used to create the Document:

Note: The following is the standard **Authoring Tool** list in Aras Innovator. This list can be changed, as needed, by an administrator.

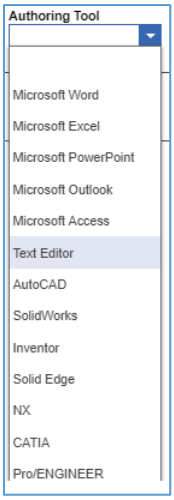

Figure 318.

8. Enter the version of the authoring tool in the **Version** text box.
9. Provide additional information about the Document in the **Description** text box.

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10. Click the **ellipsis** in the **Assigned Creator** box. The **Search dialog – Identity** appears.
11. Using the standard search procedure, search for and select the Assigned Creator Identity, which populates the **Assigned Creator** property box.

Note: The Assigned Creator is responsible for the design or the content of the Document. The Assigned Creator is often identified as the Owner of the Document, who may be different from the user creating the Document in the system.

12. Click **ellipsis** in the **Designated User** box. The **Search dialog – Identity** appears.
13. Using the standard search procedure, search for and select the Designated User Identity, which populates the Designated User property box.

Note: The Designated User is responsible for the management, usage, and review of a Document.

14. If applicable, provide the Effective Date of the Document, either by:
    - Typing ***the date*** in the **Effective Date** property box,
    - Selecting the date using the **Date** dialog.

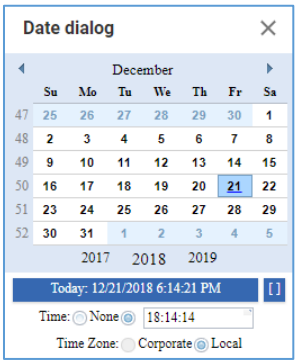

Figure 319.

Note: The Effective Date is the date when a Document actually goes into publishing or the process that signifies its availability. This can be different from the release date, which is when the Document reaches the Released state in its life cycle.

15. Select an icon from the Image Browser to generate a thumbnail for the Document. For more details, refer to section *2.4.6. Item Thumbnail*.
16. If it is necessary to populate extended properties:
    a. Click the **ellipsis** button in the **Extended Classification** pane. The **Classification** dialog appears.

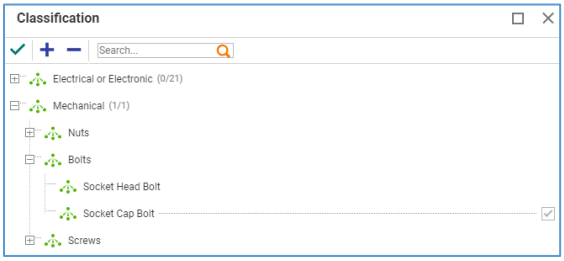

Figure 320.

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b. Search for and select extended properties that appear in the **Extended Classification** pane.

c. Provide values for the extended properties in the **Extended Classification** pane.

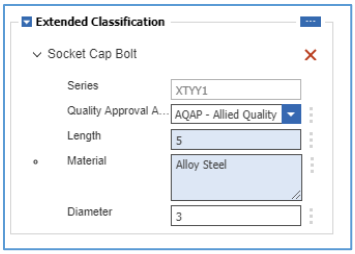

Figure 321.

17. If the Document is a template, select the **Template** check box.
18. If it is necessary to attach files to the Document, use the procedure described in section *8.5.1. Attaching Files to a Document*.
19. Click either **Save** or **Done** on the **Document** toolbar. The Document is created.

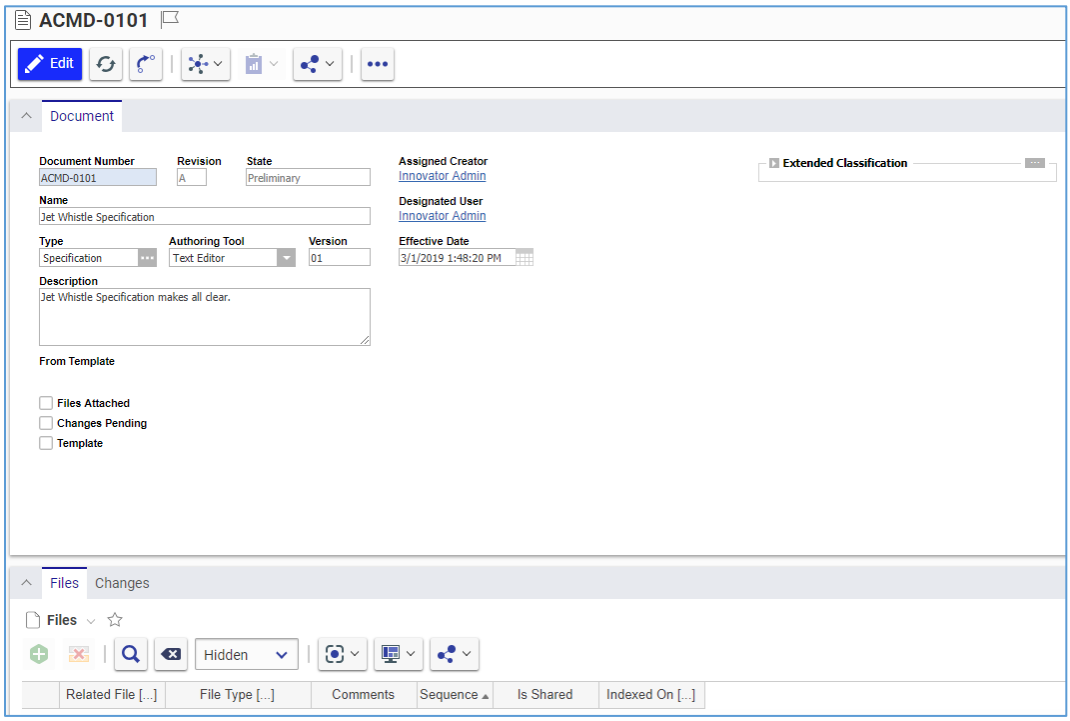

Figure 322.

The Document is now available via search, subject to permissions.

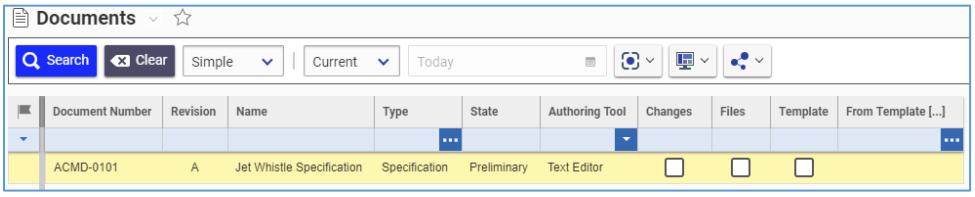

Figure 323.

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8.3 Creating a Document from a Part

Use the following procedure to create a new Document and attach it to a Part:

1. Open the **Part** view.
2. Click **Edit** on the **Part** toolbar.
3. Go to the **Documents** accordion tab.

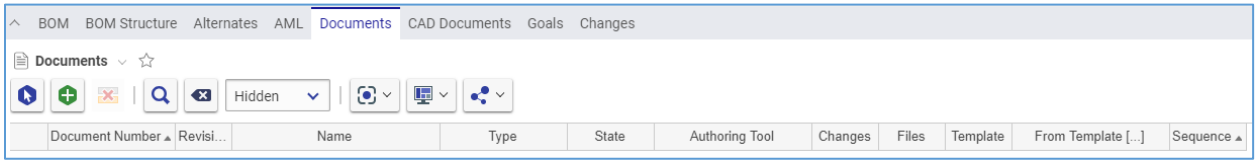

Figure 324.

4. Click **Create Item** on the **Documents** accordion toolbar. The view of a new Document appears. A row also appears in the **Documents** grid of the Part view.
5. Use the Creating Document procedure. The new Document is created.
6. Close the view of the new Document. You are back to the **Documents** accordion tab of the Part view, where the new Document created is present as a new row.

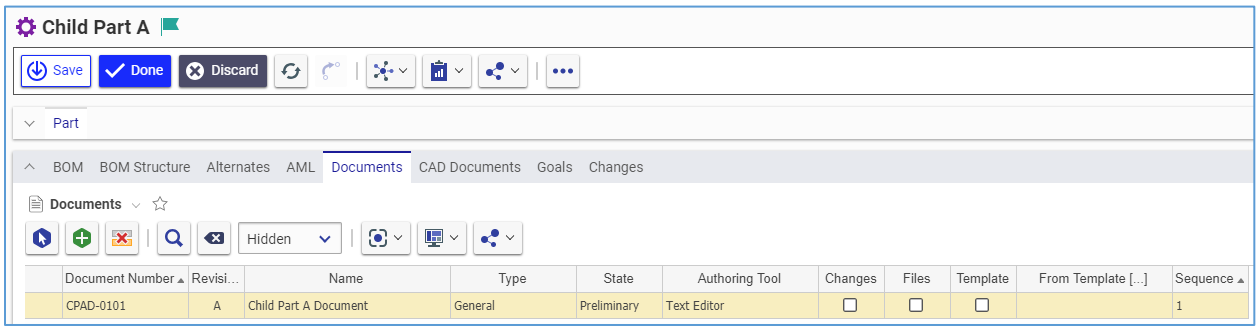

Figure 325.

7. Click either **Save** or **Done** on the **Part** toolbar. The new Document is attached to the Part.

8.4 Managing Part Documents

For a single Part, you can attach, replace, and remove Documents.

8.4.1 Attaching Documents to a Part

Use the following procedure to attach an existing document to a Part:

1. Use steps 1-3 of the Creating a Document from a Part procedure.
2. Click **Select Items** on the **Documents** accordion toolbar. The **Search dialog – Document** appears.
3. Using the standard search procedure, search for and select a Document. The selected Document then appears in the **Documents** grid.

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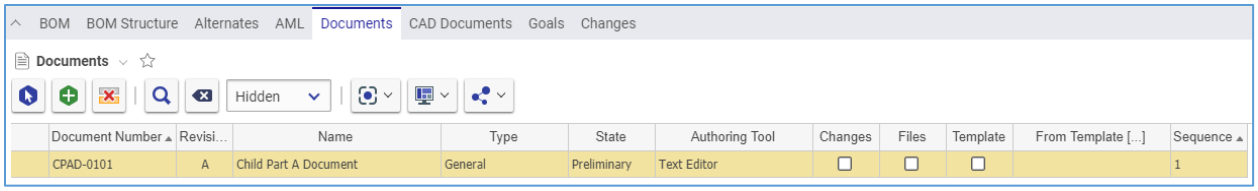

Figure 326.

4. Click either **Done** or **Save** on the **Part** toolbar. The Document is attached to the Part.

8.4.2 Replacing Documents in a Part

Use the following procedure to replace a document in a Part:

1. Use steps 1-3 of the Creating a Document from a Part procedure.
2. Right-click the **Document** and then click **Replace**. The **Search dialog – Document** appears.
3. Using the standard search procedure, search for and select a Document. The selected Document replaces the **Document** right-clicked.
4. Click either **Save** or **Done** on the **Part** toolbar.

8.4.3 Removing Documents from a Part

Use the following procedure to remove a Document from a Part:

1. Use steps 1-3 of the Creating a Document from a Part procedure.
2. Click the **Document** and then click **Delete Row** on the **Documents** accordion toolbar. The **Document** becomes unavailable.

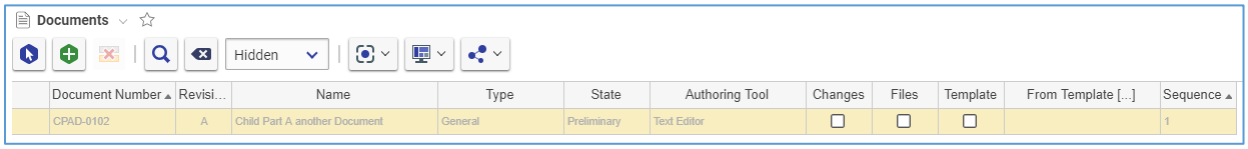

Figure 327.

3. Click either **Save** or **Done** on the **Part** toolbar. The **Document** disappears from the grid.

Note: The **Document** disappears immediately if the Part was not saved after it was added.

8.5 Managing Document Files

For a single Document, you can attach, download, replace, and remove Files. All Files are kept in the Aras Innovator Vault.

Files are not a versionable item type, but Documents are. When you make an action with Document Files, a new version of the Document is created. Old versions of the Document keep old Files. For example, if you replaced File A with File B, the previous version of the Document has File A, and the current one has File B. To access old Files, you can go to the view of corresponding Document version. For details about how to access Document versions, refer to section *4.1.1 Versions Exploration*.

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8.5.1 Attaching Files to a Document

Use the following procedure to attach a File to a Document:

1. Open the **Document** view.
2. Click **Edit** on the **Document** toolbar.
3. Go to the **Files** accordion tab.
4. Click **Create Item** on the **Files** accordion toolbar. The standard operating system dialog for file browsing and selection appears.
5. Search for and select a File. A new row appears in the **Files** grid with the file attached.

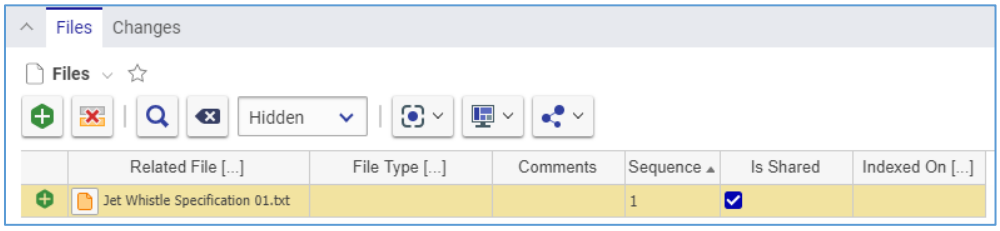

Figure 328.

6. Click the **File Type** cell that becomes editable and gets the **ellipsis** button.
7. This step is recommended. In the **File Type** cell, specify the file type using one of these options:

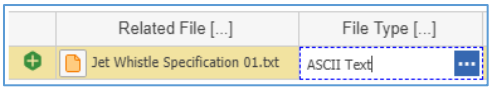

Figure 329.

   a. Click the **ellipsis** button and then select ***the file type*** in the **Search dialog – File Type** appeared.
   b. Enter ***the file type***, which should exist in Aras Innovator. An error tooltip appears if you entered a ***file type*** that does not exist in Aras Innovator.

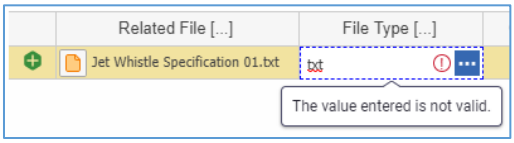

Figure 330.

Note: You can leave the **File Type** cell empty, omitting step 7. Aras Innovator will automatically assign a file type depending on File's extension when you save the Document.

8. If it is necessary to provide additional information on the File, enter it in the **Comments** cell.
9. If it is necessary to hide the File from other users, uncheck the **Is Shared** check box. In this case, only the Document Assigned Creator can see the file.
10. Click either **Done** or **Save** on the **Document** toolbar. The File is attached to the Document.

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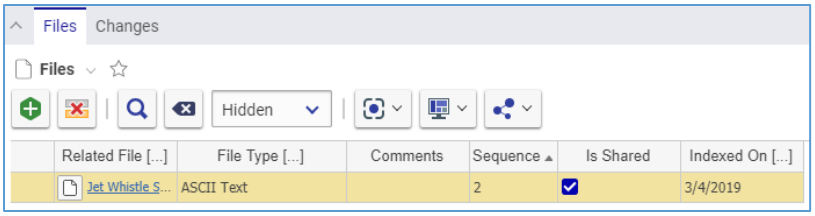

Figure 331.

8.5.2 Working with Files

Files are not a versionable item type, but Documents are. Whenever you make an action with Document Files, a new version of the Document is created. Old versions of the Document keep old Files. For example, if you replaced File A with File B, the previous version of the Document has File A, and the current has File B.

To access old Files, you can go to the view of the corresponding Document version. For details about how to access Document versions, refer to section *4.1.1 Versions Exploration*.

In this section, it is assumed that you are working with the current Document version.

To work with Files attached to a Document, you need to download them from the Aras Innovator Vault, where they are kept. You can download a File using one of two methods:

1. A link in the Files grid
2. The **Manage** file dialog.

Use the following procedure to download a File using the first method:

1. Open the **Document** view.
2. Go to the **Files** accordion tab.
3. Click ***a link*** in the **Related File** cell. The downloading process of your operating system starts.

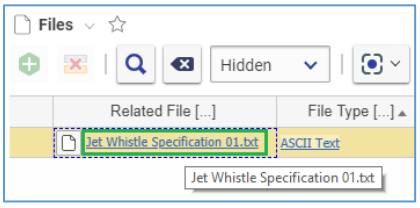

Figure 332.

Note: If you click a link in the **File Type** cell, the view of this file type appears.

Use the following procedure to download a File using the second method:

1. Use steps 1-2 of the previous procedure.
2. Click the **Manage file property** button in the **Related File** cell.

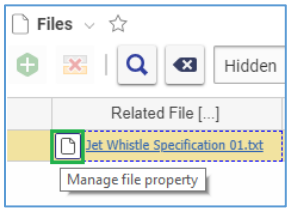

Figure 333.

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The **Manage File** dialog appears.

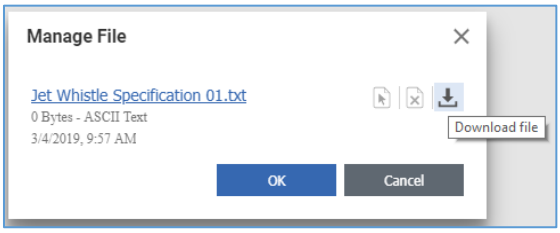

Figure 334.

3. Use one of these options
   a. Click ***a file name link***.
   b. Click the ***Download file*** button.

   The downloading process of your operating system starts.
4. Close the **Manage File** dialog.

8.5.3 Replacing Files in a Document

If you need to replace a File with another one, use one of the following methods:

1. Remove the old File from a Document and then attach the replacing File while keeping the Document in the **Editing** mode.
2. Use the **Manage file** dialog.

If you want to use the first method, follow the procedures described in sections *8.5.1 Attaching Files to a Document* and *8.5.4 Removing Files from a Document*.

If you want to use the second method, use the following procedure:

1. Use steps 1-3 of the Attaching Files to a Document procedure.
2. Click the **Manage file property** button in the **Related File** cell.

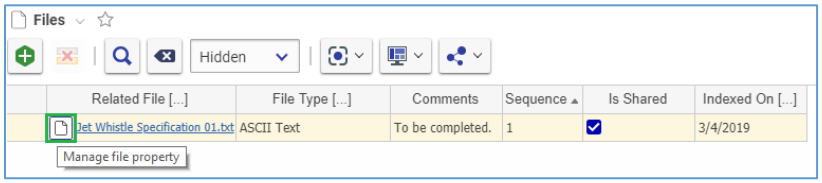

Figure 335.

The **Manage File** dialog appears.

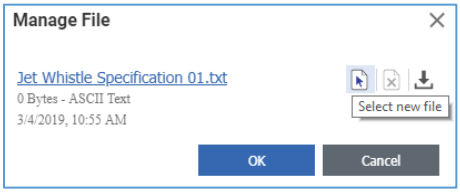

Figure 336.

3. Click the **Select new file** button. The standard dialog of your operating system for file browsing and selection appears.

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4. Search for and select a file. A **link with the name** of the old File is replaced with the **name** of the new File. There is no information on the new File.

Figure 337.

5. Click **OK**. The new File replaces the old one in the grid. The information on the old File is erased.

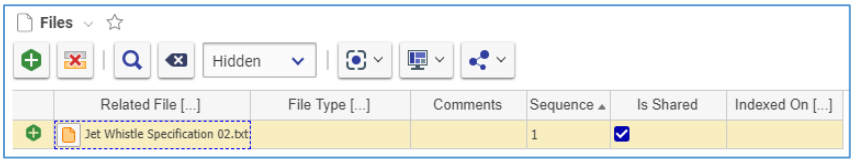

Figure 338.

6. Use steps 6-11 of the Attaching Files to a Document procedure.

8.5.4 Removing Files from a Document

Use the following procedure to remove a File from a Document:

1. Use steps 1-3 of the Attaching Files to a Document procedure.
2. Click the **File** and then click **Delete Row** on the **Files** accordion toolbar. The **File** becomes unavailable.

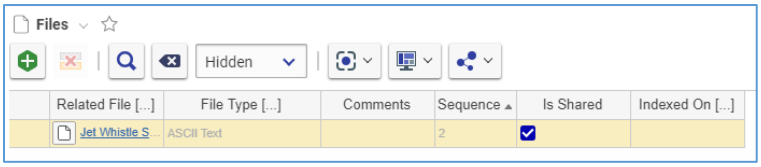

Figure 339.

3. Click either **Save** or **Done** on the **Document** toolbar. The **File** disappears from the grid.

Note: The **File** disappears immediately if the Document was not saved after it was added.

8.6 Deleting Documents

It is possible to delete all or some versions of a Document. In the former case, the Document is deleted from Aras Innovator completely. For details on the latter case, refer to section *4.1.2 Version Deletion*.

To delete a Document completely, you must have **Delete** rights granted in Permissions for all Life Cycle states the Document has, including the current one. For example, if the new Document revision is currently in the Preliminary state, but has Released revisions, you must have the **Delete** rights granted in Permissions for both life cycle states. For details on access rights, refer to section *3. Items Permissions*. This subsection assumes that you have all necessary rights.

You cannot delete a Document, which is attached to a Part.

Note: A claimed Document cannot be deleted.

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You can delete a Document from either its view or using the action menu in the Documents Search Page.
To delete a Document from its view, follow this procedure:

1. Go to the Document view.
2. On the **Document** toolbar, click **More**, select **Delete**, and click **Delete All Versions**.

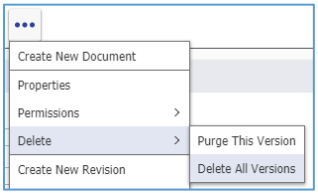

Figure 340.

A notification dialog appears.

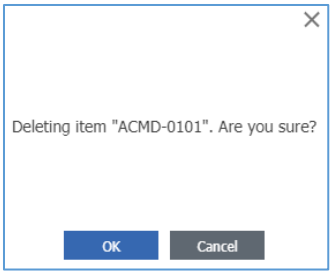

Figure 341.

3. Click **OK**.

The Document is deleted.

Use the following procedure to delete a Document from its action menu:

1. Go to the Documents Search Grid.
2. Right-click the **Document** and then click **Delete All Versions**. A notification dialog appears.

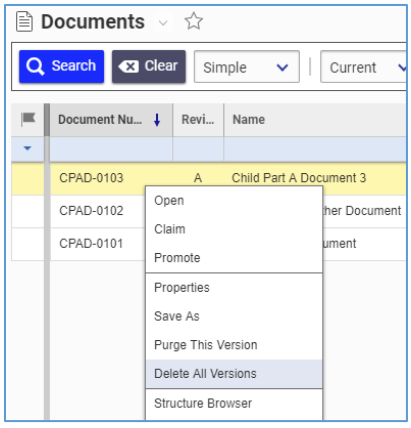

Figure 342.

3. Click **OK**. The Document is deleted.

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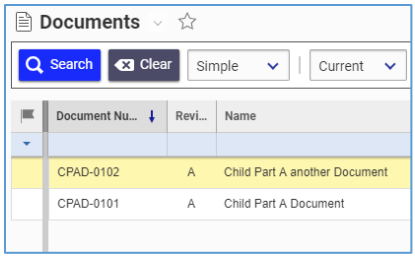

Figure 343.

Aras Innovator returns an error if you try to delete a Document and do not have **Delete** rights granted for at least one Permission for any Life Cycle state the Document revisions have.

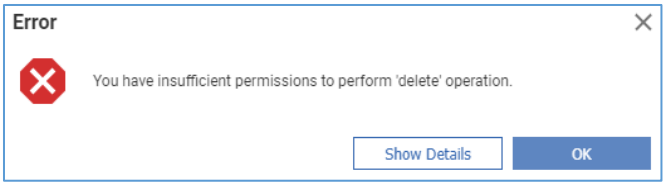

Figure 344.

Aras Innovator returns an error if you try to delete a Document assigned to a Part. You need to remove the Document from a Part first if allowed. For details, refer to section *8.4.3 Removing Documents from a Part*.

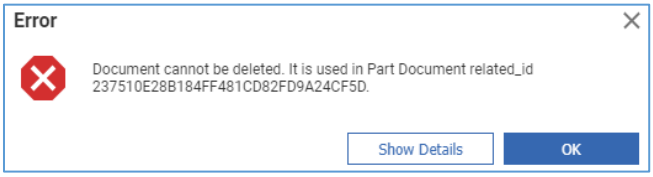

Figure 345.

If a Document has only one version, you can delete it using the **Purge This Version** feature. For details about this feature, refer to section *4.1.2 Version Deletion*. For details about how to find out if the current version is the only one, refer to section *4.1.1 Versions Exploration*.

8.7 Finding Where Used and Comparing Documents

You can explore Documents and their usage using the following browsers:

- The Where Used browser shows Parts and Affected Items that use the Document.

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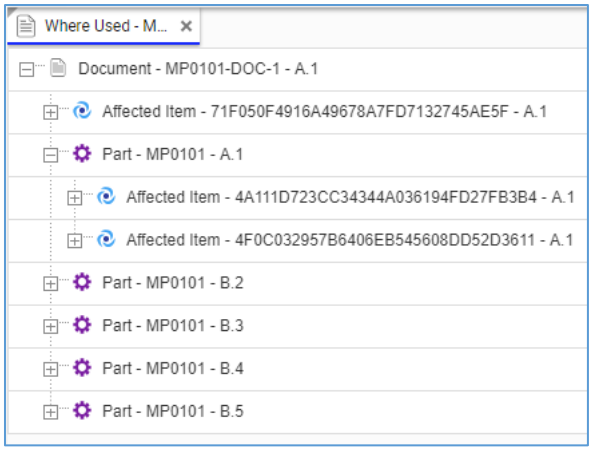

Figure 346.

- The Structure browser shows the Document Files, where they are saved, and compares either the Document versions or different Documents. You can search for old files in old Document versions.

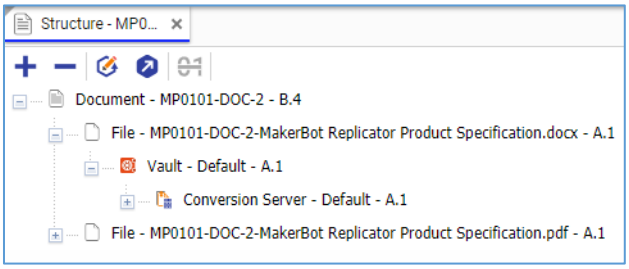

Figure 347.

For details on how to use these browsers, refer to section *11. Exploring Usage and Comparing Items*.

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9 CAD Documents

Along with Documents, a Part can have one or more Computer Aided Design (CAD) Documents associated with it. A CAD Document can be a drawing, a specification, 3D model, etc. created in a CAD authoring tool.

Documents other than CAD are a separate item type. For more information on them, refer to section *8 Documents*.

A CAD Document can have Files associated with it that are kept in the Aras Innovator Vault. If you have purchased a third-party integration to a CAD tool, you can attach a native File to a Part using your CAD Authoring tool and a viewable File. This subscription enables you to view and work with native Files using Aras Innovator.

Note: Some features of CAD Documents, such as the creation of CAD Documents, require an Aras subscription. Aras Innovator returns an error if you try to use these features without this subscription.

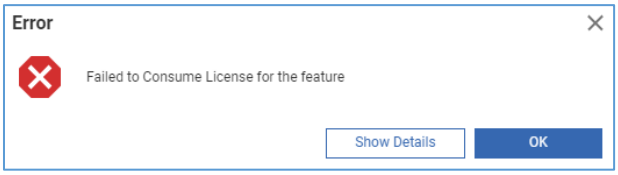

Figure 348.

You can create new CAD Documents in Aras Innovator in two ways:

- Create the Documents and then attach them to a Part. This approach is recommended.
- Create and attach the Documents in one action.

9.1 CAD Documents Life Cycle

By default in the Product Engineering (PE) application, the CAD Document Life Cycle has the following states:

- Preliminary
- In Review
- Released
- In Change
- Superseded
- Obsolete

An administrator can change the Life Cycle Map if it is necessary to meet specific criteria.

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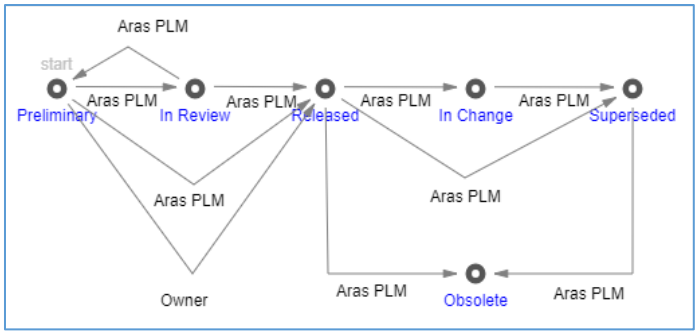


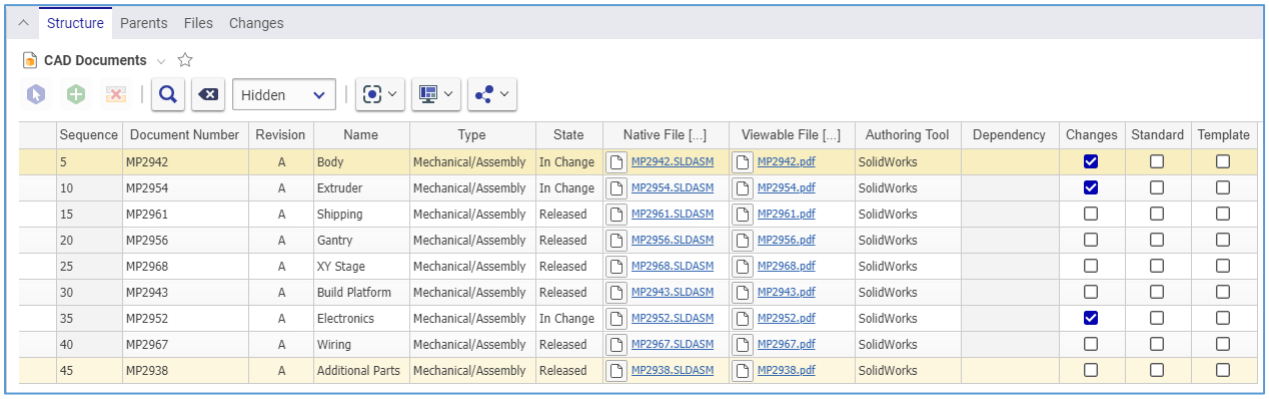
Figure 349.

When created, each CAD Document is in the Preliminary state. CAD Documents can be promoted either automatically or manually. Both the simplified and CMII change management processes can automatically promote the CAD Documents. The associated Life Cycles are automatically controlled by Workflows for those CAD Documents that are included in the affected items list. CAD Documents that are not included in the list because they do not require a full change process can be promoted using either manual release or revision. These are only available when certain requirements are met. By default, a Document Owner can release a CAD Document. For details on this feature, refer to section *4.3. Manual Promotion and Revise*.

9.2 CAD Document Relationships

A CAD Document can have relationships with other items. The **Relationships** accordion keeps these relationships grouped in separate **Relationships** tabs. Each **Relationships** tab represents a single relationship type. The tabs are as follows:

- **Structure** is a single-level CAD hierarchy editor that enables you to view and manage the direct Children of this CAD Document. For more details, refer to section *9.6 Hierarchy of CAD Documents*.



Sequence	Document Number	Revision	Name	Type	State	Native File [...]	Viewable File [...]	Authoring Tool	Dependency	Changes	Standard	Template
5	MP2942	A	Body	Mechanical/Assembly	In Change	MP2942.SLDASM	MP2942.pdf	SolidWorks		☑	☐	☐
10	MP2954	A	Extruder	Mechanical/Assembly	In Change	MP2954.SLDASM	MP2954.pdf	SolidWorks		☑	☐	☐
15	MP2961	A	Shipping	Mechanical/Assembly	Released	MP2961.SLDASM	MP2961.pdf	SolidWorks		☐	☐	☐
20	MP2956	A	Gantry	Mechanical/Assembly	Released	MP2956.SLDASM	MP2956.pdf	SolidWorks		☐	☐	☐
25	MP2968	A	XY Stage	Mechanical/Assembly	Released	MP2968.SLDASM	MP2968.pdf	SolidWorks		☐	☐	☐
30	MP2943	A	Build Platform	Mechanical/Assembly	Released	MP2943.SLDASM	MP2943.pdf	SolidWorks		☐	☐	☐
35	MP2952	A	Electronics	Mechanical/Assembly	In Change	MP2952.SLDASM	MP2952.pdf	SolidWorks		☑	☐	☐
40	MP2967	A	Wiring	Mechanical/Assembly	Released	MP2967.SLDASM	MP2967.pdf	SolidWorks		☐	☐	☐
45	MP2938	A	Additional Parts	Mechanical/Assembly	Released	MP2938.SLDASM	MP2938.pdf	SolidWorks		☐	☐	☐

Figure 350.

- **Parents** is a read-only list of the CAD Document's direct Parents.

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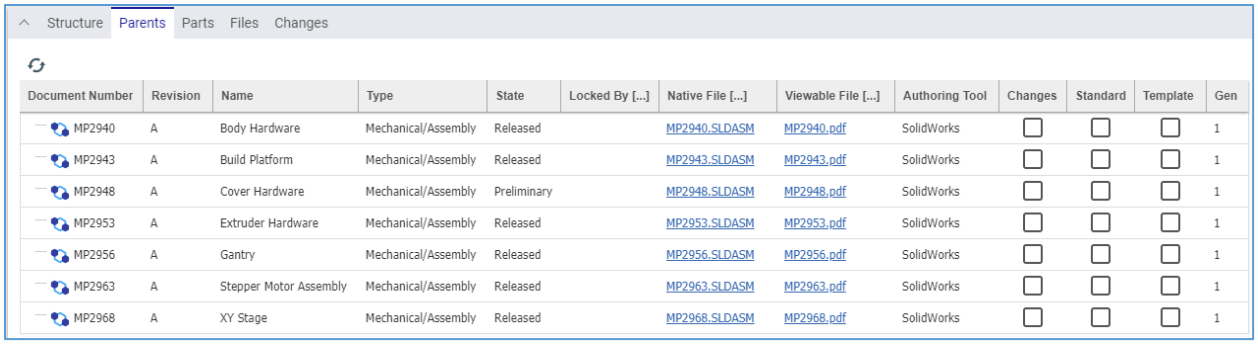
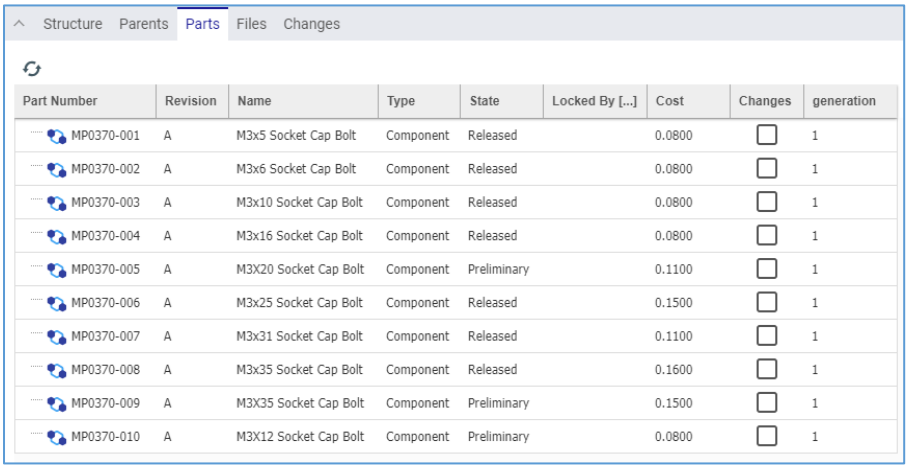


Document Number	Revision	Name	Type	State	Locked By [...]	Native File [...]	Viewable File [...]	Authoring Tool	Changes	Standard	Template	Gen
MP2940	A	Body Hardware	Mechanical/Assembly	Released		MP2940.SLDASM	MP2940.pdf	SolidWorks	☐	☐	☐	1
MP2943	A	Build Platform	Mechanical/Assembly	Released		MP2943.SLDASM	MP2943.pdf	SolidWorks	☐	☐	☐	1
MP2948	A	Cover Hardware	Mechanical/Assembly	Preliminary		MP2948.SLDASM	MP2948.pdf	SolidWorks	☐	☐	☐	1
MP2953	A	Extruder Hardware	Mechanical/Assembly	Released		MP2953.SLDASM	MP2953.pdf	SolidWorks	☐	☐	☐	1
MP2956	A	Gantry	Mechanical/Assembly	Released		MP2956.SLDASM	MP2956.pdf	SolidWorks	☐	☐	☐	1
MP2963	A	Stepper Motor Assembly	Mechanical/Assembly	Released		MP2963.SLDASM	MP2963.pdf	SolidWorks	☐	☐	☐	1
MP2968	A	XY Stage	Mechanical/Assembly	Released		MP2968.SLDASM	MP2968.pdf	SolidWorks	☐	☐	☐	1

Figure 351.

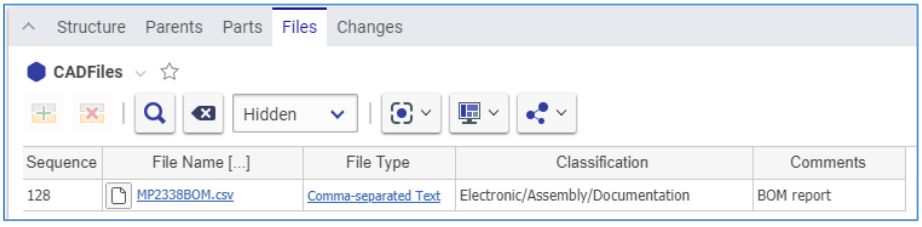
- **Parts** is a read-only list of the Parts attached to the CAD Document. This tab appears only when a CAD Document is attached to more than one Part. For more details, refer to section *9.7.2 Parts Associated with a CAD Document*.



Part Number	Revision	Name	Type	State	Locked By [...]	Cost	Changes	generation
MP0370-001	A	M3x5 Socket Cap Bolt	Component	Released		0.0800	☐	1
MP0370-002	A	M3x6 Socket Cap Bolt	Component	Released		0.0800	☐	1
MP0370-003	A	M3x10 Socket Cap Bolt	Component	Released		0.0800	☐	1
MP0370-004	A	M3x16 Socket Cap Bolt	Component	Released		0.0800	☐	1
MP0370-005	A	M3X20 Socket Cap Bolt	Component	Preliminary		0.1100	☐	1
MP0370-006	A	M3x25 Socket Cap Bolt	Component	Released		0.1500	☐	1
MP0370-007	A	M3x31 Socket Cap Bolt	Component	Released		0.1100	☐	1
MP0370-008	A	M3x35 Socket Cap Bolt	Component	Released		0.1600	☐	1
MP0370-009	A	M3X35 Socket Cap Bolt	Component	Preliminary		0.1500	☐	1
MP0370-010	A	M3X12 Socket Cap Bolt	Component	Preliminary		0.0800	☐	1

Figure 352.

- **Files** is a list of Files attached to the CAD Document. Typically, this tab hosts additional CAD Document Files. The **Native File** property of the CAD Document is a link to a native CAD File. The **Viewable File** property of the CAD Document is a link to a viewable representation of the native CAD File. For more details, refer to section *9.9 Managing CAD Files*.



Sequence	File Name [...]	File Type	Classification	Comments
128	MP2338BOM.csv	Comma-separated Text	Electronic/Assembly/Documentation	BOM report

Figure 353.

- **Changes** is a list of change items, such as DCOs, Express ECOs and EDRs, where this CAD Document is an affected item. For more details, refer to sections *13. Change Management*.

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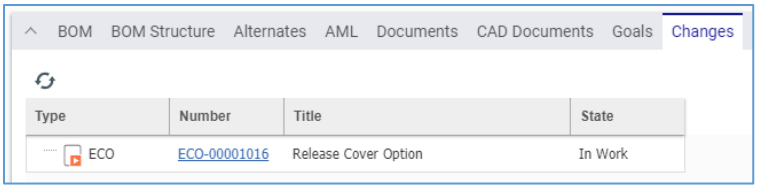

Figure 354.

9.3 Creating a CAD Document

Use the following procedure to create a CAD Document:

1. Go to **Contents --> Documents --> CAD Documents**.
2. Select **Create New CAD Document** from the menu. The view of a new CAD Document appears.

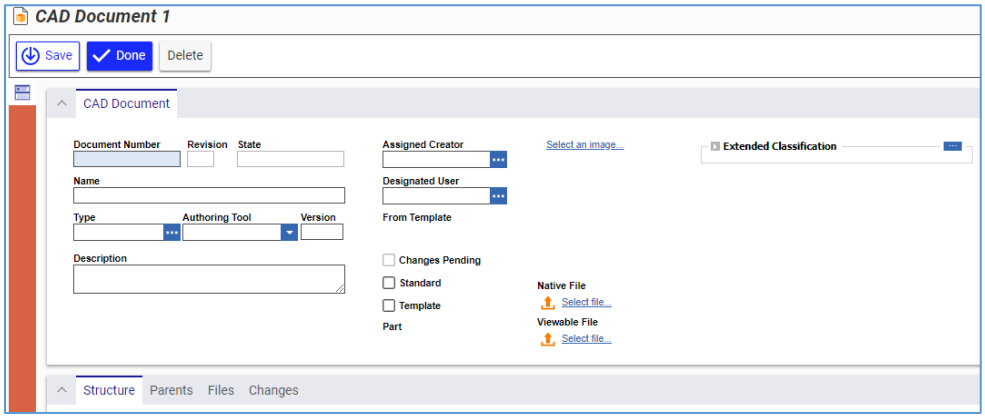

Figure 355.

3. Enter the ***CAD Document Number*** in the **Document Number** field.

Note: The Document Number is the only required CAD Document property for you to provide. An error appears when you try to save a CAD Document without a Document Number.

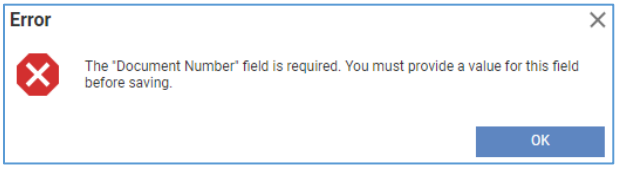

Figure 356.

4. Enter the ***CAD Document name*** in the **Name** field.
5. Click the **ellipsis** button in the **Type** box. The **classification** dialog appears displaying the Classification tree for CAD Documents.

Note: The following is the Classification tree for CAD Documents in Aras Innovator. It can be extended, as needed, by an administrator.

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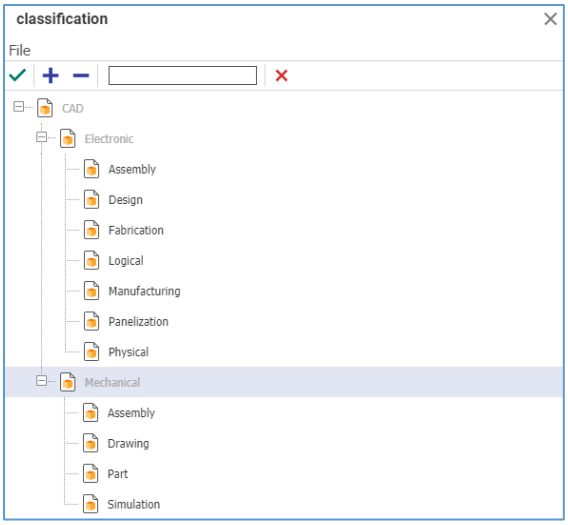

Figure 357.

6. Specify the CAD Document type by either:
   a. Double-clicking the **type**.
   b. Selecting the **type** and clicking **Return selected** in the **classification** toolbar.

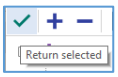

Figure 358.

7. In the **Authoring Tool** drop-down list, select the CAD application used to create the CAD Document:

Note: The following is some of the standard **Authoring Tool** list in Aras Innovator. Additional Authoring Tools can be accessed by scrolling down in the list. This list can be changed, as needed, by an Aras Innovator system administrator.

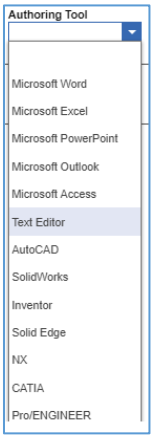

Figure 359.

8. Enter the version of the CAD application in the **Version** text box.
9. Provide additional information about the CAD Document in the **Description** text box.

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10. Click the **ellipsis** in the **Assigned Creator** box. The **Search dialog – Identity** dialog box appears.
11. Using the standard search procedure, search for and select the Assigned Creator Identity, which populates the **Assigned Creator** property box.

Note: The Assigned Creator is responsible for the design or the content of the CAD Document. The Assigned Creator is often identified as the Owner of the CAD Document, who may be different from the user creating the CAD Document in the system.

12. Click the **ellipsis** in the **Designated User** box. The **Search dialog – Identity** dialog box appears.
13. Using the standard search procedure, search for and select the Designated User Identity, which populates the Designated User property box.

Note: The Designated User is responsible for the management, usage, and review of a CAD Document.

14. Click the **Select an image** link to select an icon from the Image Browser to generate a thumbnail for the CAD Document. For more details, refer to section *2.4.6 Item Thumbnail*.
15. The **Changes Pending** check box is managed by the system. It is automatically checked; when the CAD Document is associated with a change item.
16. If the CAD Document follows a standard, select the **Standard** check box.
17. If the CAD Document is going to be used as a template, select the **Template** check box.
18. If it is necessary to attach a native or viewable File to the CAD Document, use the procedure described in section *9.9.1 Attaching Native and Viewable CAD Files to a CAD Document*.
19. If it is necessary to attach additional Files to the CAD Document, use the procedure described in section *9.9.2 Attaching Other Files to a CAD Document*.
20. If **Extended Classification** for CAD Documents is configured by your system administrator, you can populate extended properties:
    a. Click the **ellipsis** button in the **Extended Classification** pane. The **Classification** dialog appears.

Figure 360.

    b. Search for and select extended properties that appear in the **Extended Classification** pane.
    c. Provide values to the extended properties in the **Extended Classification** pane.

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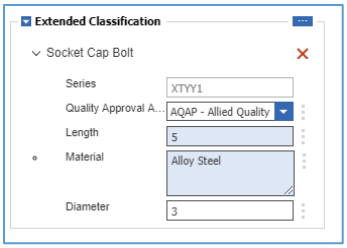

Figure 361.

Note: There are no extended classifications provided for CAD Documents out of the box.

21. Click either **Save** or **Done** on the **Document** toolbar. The CAD Document is created.

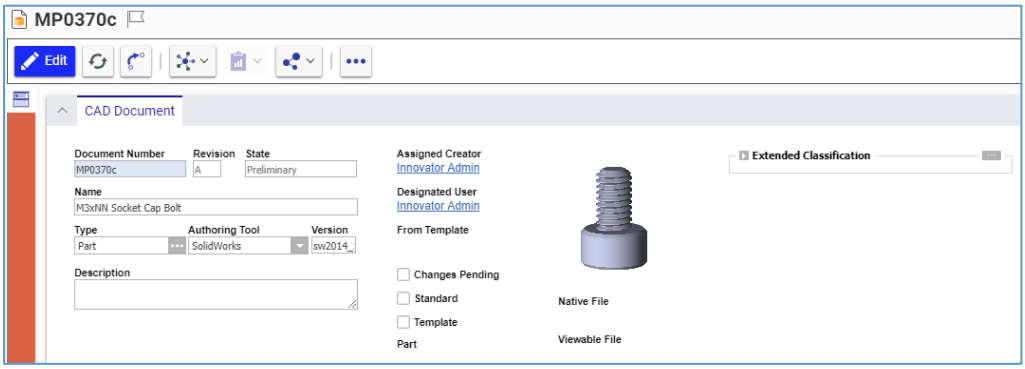

Figure 362.

The CAD Document is now available via search, subject to permissions.

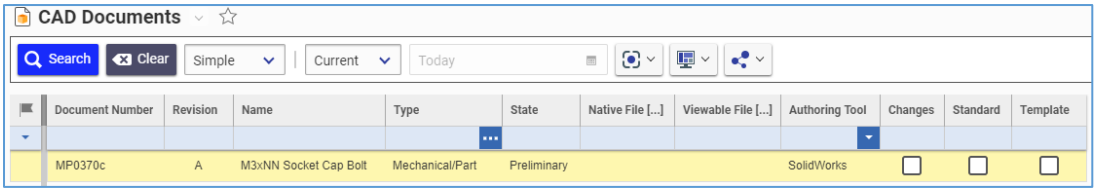

Figure 363.

9.4 Creating a CAD Document from a Part

Use the following procedure to create a new CAD Document and attach it to a Part:

1. Open the **Part** view.
2. Click **Edit** on the **Part** toolbar.
3. Go to the **CAD Documents** accordion tab.

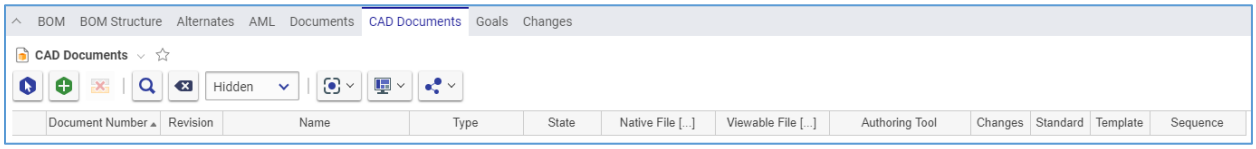

Figure 364.

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4. Click **Create Item** on the **CAD Documents** accordion toolbar. A new row appears at the bottom of the **CAD Documents** grid.

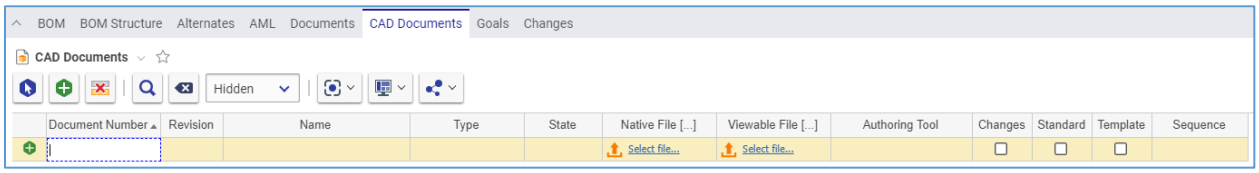

Figure 365.

5. Enter the ***CAD Document number*** in the **Document Number** cell.

Note: The Document Number is the only required CAD Document property for you to provide. An error appears when you try to save a CAD Document without a Document Number.

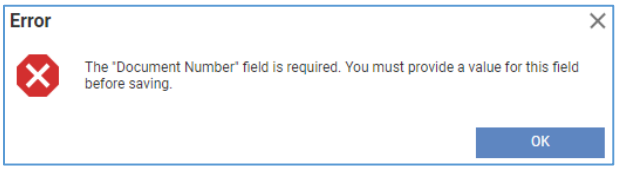

Figure 366.

6. Enter the ***CAD Document name*** in the **Name** cell.
7. Specify the CAD Document type using one of these options:
   a. Click the **ellipsis** button and then select ***the type*** from the **classification** dialog box.
   b. Type ***the file type***, which should exist in Aras Innovator. There is an error tooltip shown if you typed ***the file type*** not existing in Aras Innovator.

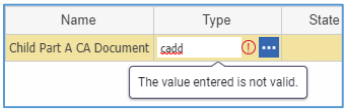

Figure 367.

8. If it is necessary to add a native File:
   a. Click the **link** in the **Native File** cell. The standard dialog for file browsing and selection appears.
   b. Search for and select a file. The **link** is replaced with the **name** of the selected File.

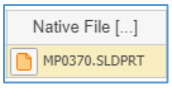

Figure 368.

9. If it is necessary to add a viewable File:
   a. Click the **link** in the **Viewable File** cell. The standard dialog for file browsing and selection appears.
   b. Search for and select a file. The **link** is replaced with the **name** of the selected File.
10. In the **Authoring Tool** drop-down list, select the CAD application used to create the Document.

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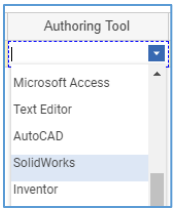

Figure 369.

11. The **Changes** check box is managed by the system. It is automatically checked when the CAD Document is associated with a change item.
12. If the CAD Document follows a standard, select the **Standard** check box.
13. If the CAD Document is a template, select the **Template** check box.
14. Click either **Save** or **Done** on the **Part** toolbar. The new CAD Document is created and attached to the Part.

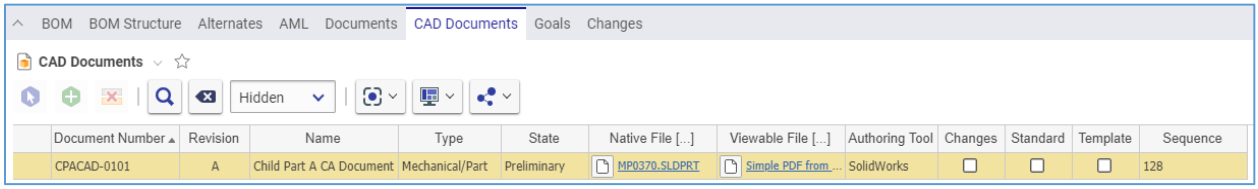

Figure 370.

The CAD Document is now available via search, subject to permissions.

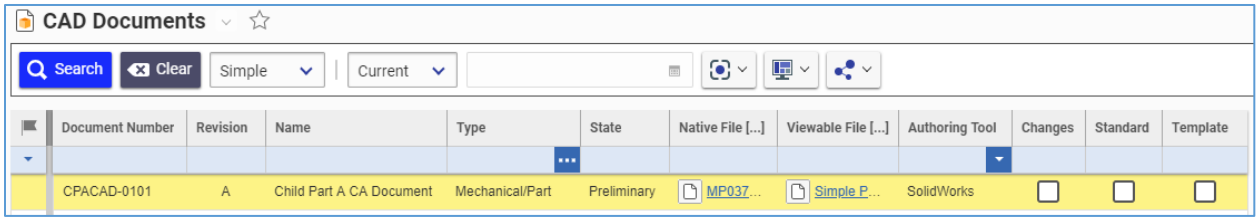

Figure 371.

9.5 Managing CAD Documents in Parts

For a single Part, you can attach, replace, and remove CAD Documents. If you have purchased a third-party integration to a CAD tool, you can attach it to a native file for a Part using the CAD authoring tool as well as a viewable File. This subscription enables you to view and work with native CAD Files in Aras Innovator using views for Parts and CAD Documents.

Note: You cannot attach Parts to a CAD Document.

9.5.1 Attaching CAD Documents to a Part

Use the following procedure to attach an existing CAD document to a Part:

1. Use steps 1-3 of the Creating a CAD Document from a Part procedure.
2. Click **Select Items** on the **CAD Documents** accordion toolbar. The **Search dialog – CAD Document** appears.

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3. Using the standard search procedure, search for and select a CAD Document. The selected CAD Document then appears in the **CAD Documents** grid.

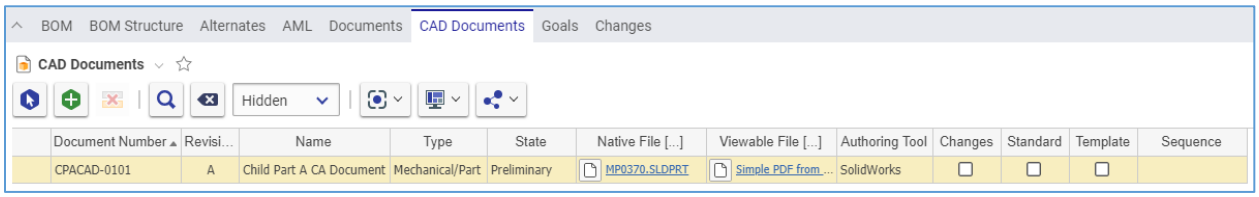

Figure 372.

4. Click either **Done** or **Save** on the **Part** toolbar. The CAD Document is attached to the Part.

9.5.2 Replacing CAD Documents in a Part

Use the following procedure to replace a CAD Document in a Part:

1. Use steps 1-3 of the Creating a CAD Document from a Part procedure.
2. Right-click the **CAD Document** and then click **Replace**. The **Search dialog – CAD Document** appears.
3. Using the standard search procedure, search for and select a CAD Document. The selected CAD Document replaces the **CAD Document** right-clicked.
4. Click either **Save** or **Done** on the **Part** toolbar.

9.5.3 Removing CAD Documents from a Part

Use the following procedure to remove a CAD Document from a Part:

1. Use steps 1-3 of the Creating a CAD Document from a Part procedure.
2. Click the **CAD Document** and then click **Delete Row** on the **CAD Documents** accordion toolbar. The **CAD Document** becomes unavailable.

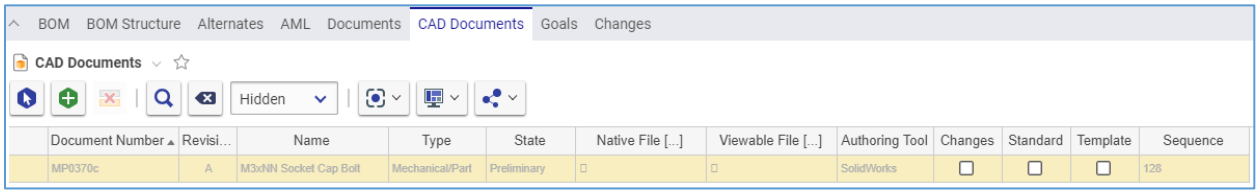

Figure 373.

3. Click either **Save** or **Done** on the **Part** toolbar. The **CAD Document** disappears from the grid.

Note: The **CAD Document** disappears immediately if the Part was not saved after it was added.

9.5.4 Working with CAD Documents from a Part

If you have purchased a third-party integration to a CAD authoring tool, you can attach a native CAD File to a Part for viewing and working in Aras Innovator.

Once the integration license is used, the Part view gets the Sidebar on its left side.

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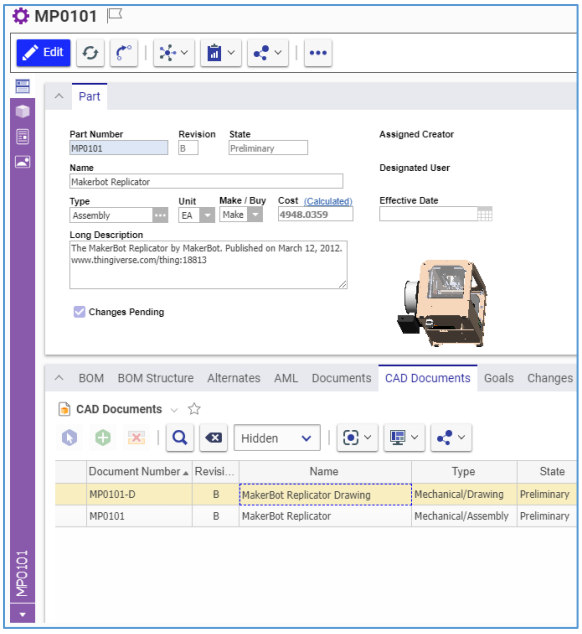

Figure 374.

The Sidebar displays icons that provide access to the tools for viewing and working with the CAD Files and images attached to a Part. The Sidebar contents depend on your license, CAD authoring tool, as well as the CAD and other Files attached to a Part. The most used tabs are as follows:

- **Form** shows the Part view.

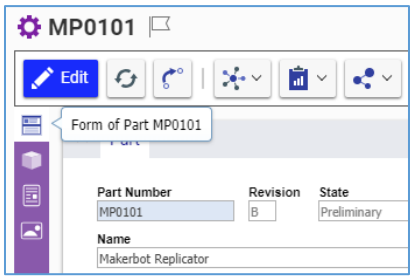

Figure 375.

- **CAD** is a simple tool for viewing and working with 3D CAD models. For more details, refer to section *9.10 Working with CAD Files*.

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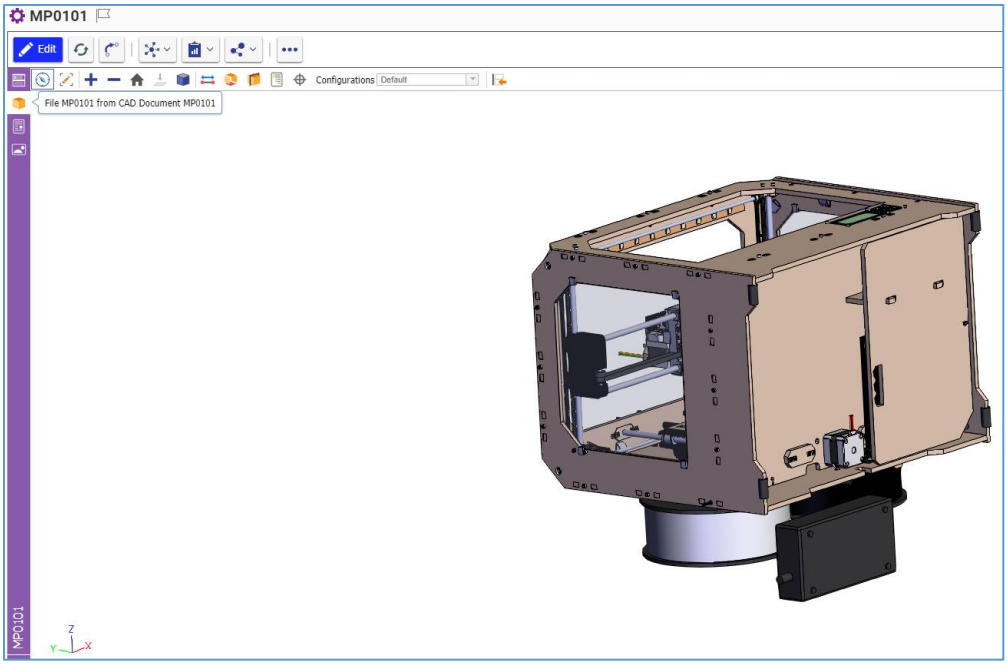

Figure 376.

- **PDF Viewer** displays the 3D PDF file.

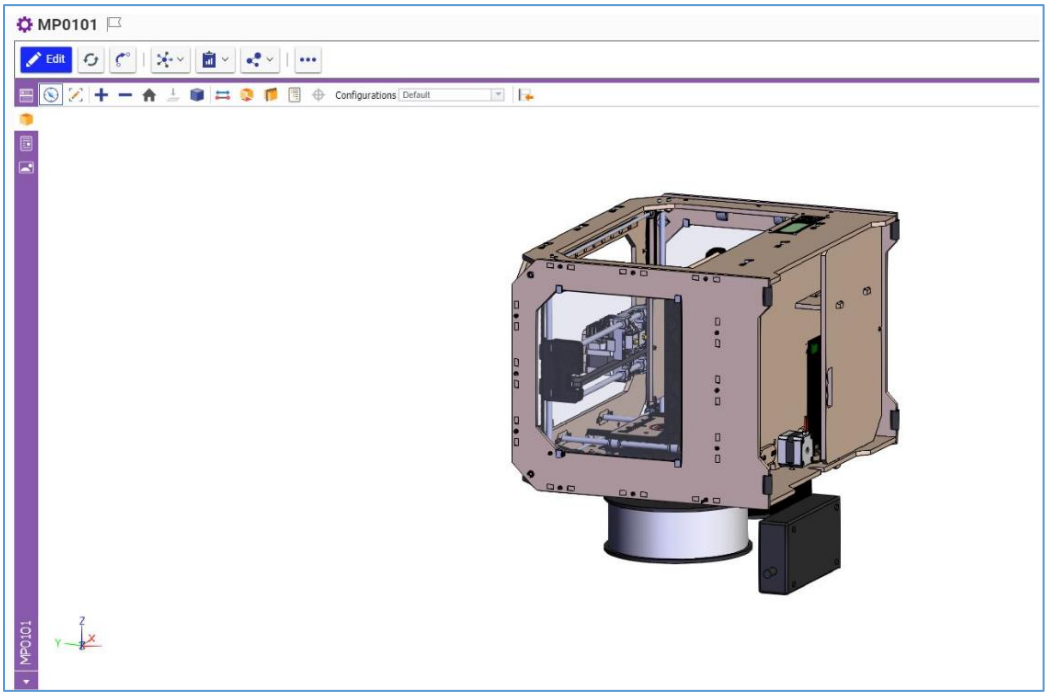

Figure 377.

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- **Image Viewer**.

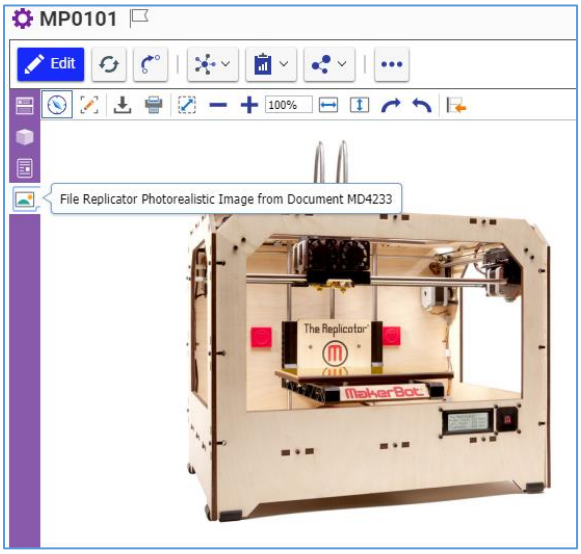

Figure 378.

If there are several Files of the same type, you are prompted to choose one.

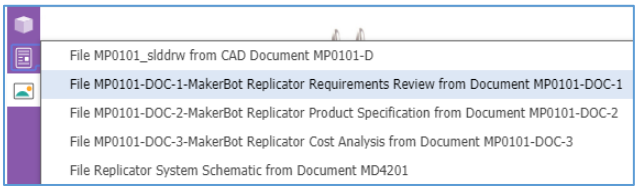

Figure 379.

There is another way to navigate the Sidebar:

1. Click the **bottom** button. The list of all possible navigation options appears. This list includes the Part Form view. It is possible to view Files attached to the Part. The blue circle marks your current position.

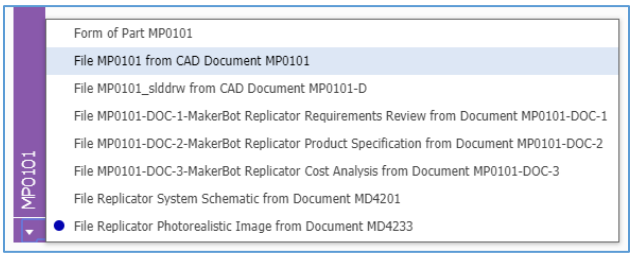

Figure 380.

2. Click the option you want to use.

Aras Innovator returns an error if you try to use a tool that is not integrated.

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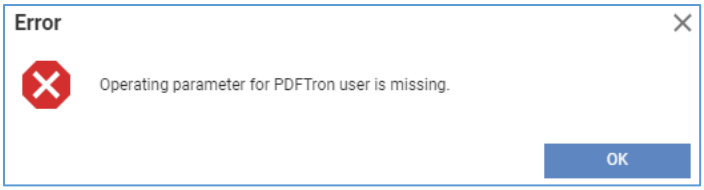

Figure 381.

9.6 Hierarchy of CAD Documents

If you have purchased a third-party integration to a CAD authoring application, you can import Part families to Aras Innovator that were created with this CAD application. The Product Engineering (PE) application capabilities enable you to manage the imported Part families as well as to create new ones.

A Part family is a multi-level hierarchy of CAD Documents that consists of single-level CAD Documents Relationships. The PE application supports the management of multi-level CAD Documents hierarchies through creating, replacing, and removing single-level CAD Documents Relationships. A single-level CAD Documents Relationship is a Parent-Child relationship between two CAD Documents. If a Parent has a Child that is also a Parent, it is a multi-level CAD Documents hierarchy.

If you add a CAD Document to another CAD Document, you create a Parent-Child relationship between them. If the Parent had no Children before, then a new hierarchy of CAD Documents is created and vice versa. If you remove a CAD Document from another CAD Document, you delete a Parent-Child relationship between them. If the removed Child was the last one, then the hierarchy of CAD Documents is deleted.

A multi-level hierarchy of CAD Documents can represent a proper BOM hierarchy.

There are two ways to set up a multi-level hierarchy of CAD Documents:

- Add existing Children to a Parent. This approach is used when building a new assembly using existing CAD Documents. For more details on this approach, refer to section *9.6.1 Creating a CAD Documents Relationship*.
- Create new Children while adding them to a Parent. This approach is convenient for populating nested CAD Documents or creating hierarchies quickly without getting into the details of each Child. However, it is still necessary to complete each Child later. For more details on this approach, refer to section *9.6.2 Creating a CAD Document from another CAD Document*.

9.6.1 Creating a CAD Document Relationship

If you add a CAD Document to another CAD Document, you create a Parent-Child relationship. If the Parent had no Children before, then a new hierarchy of CAD Documents is created.

Use the following procedure to add an existing CAD Document to another CAD Document:

1. Open the view of a Parent CAD Document.
2. Click **Edit** on the **Parent** toolbar.
3. Go to the **Structure** accordion tab.

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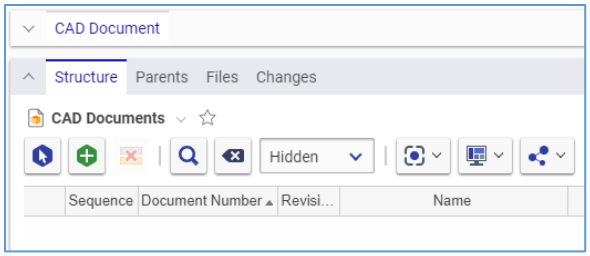

Figure 382.

4. Click **Select Items** on the **Parent** accordion toolbar. The **Search dialog – CAD Document** dialog appears.
5. Using the standard search procedure, search for and select a CAD Document. The selected CAD Document then appears in the **Structure** grid.

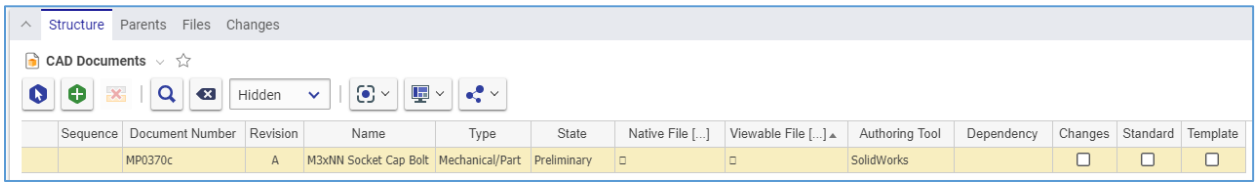

Figure 383.

6. If it is necessary to specify the dependency type between the CAD Documents, use one of the following options:
   a. Click the **ellipsis** button and then select ***the type*** in the **classification** dialog.

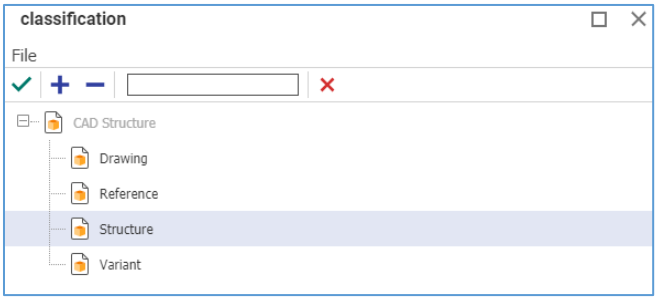

Figure 384.

   b. Enter ***the dependency type***, which should exist in Aras Innovator. An error tooltip appears if you enter a ***dependency type*** that does not exist in Aras Innovator.

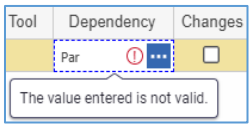

Figure 385.

7. Click either **Save** or **Done** on the **Parent** toolbar. The Parent-Child relationship between the CAD Documents is created.

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9.6.2 Creating a CAD Document from another CAD Document

If you add a CAD Document to another CAD Document, you create a Parent-Child relationship between them. If the Parent had no Children before, then a new hierarchy of CAD Documents is created.

Use the following procedure to create a new CAD Document and add it to another CAD Document:

1. Use steps 1-3 of the Creating a CAD Documents Relationship procedure.
2. Click **Create Item** in the **Structure** accordion toolbar. A new row appears at the bottom of the **CAD Documents** grid.

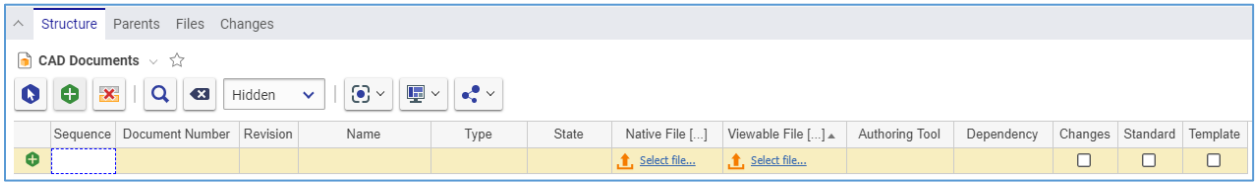

Figure 386.

3. Enter the ***CAD Document number*** in the **Document Number** cell.

Note: The Document Number is the only required CAD Document property for you to provide. An error appears when you try to save a CAD Document without a Document Number.

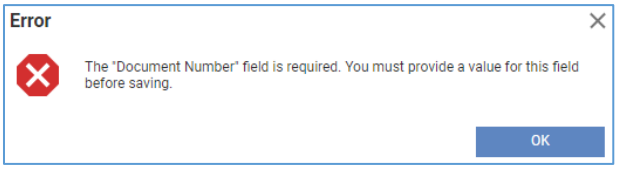

Figure 387.

4. Enter the ***CAD Document name*** in the **Name** cell.
5. Specify the CAD Document type using one of these options:
   a. Click the **ellipsis** button and then select the ***type*** in the **classification** dialog that appears.
   b. Select the ***file type***, which should exist in Aras Innovator. An error message appears if you enter a ***file type*** that does not exist in Aras Innovator.

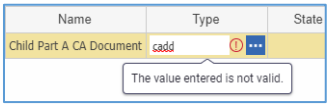

Figure 388.

6. If it is necessary to add a native File:
   a. Click the **link** in the **Native File** cell. The standard dialog for file browsing and selection appears.
   b. Search for and select a file. The **link** is replaced with the **name** of the selected File.

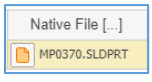

Figure 389.

7. If it is necessary to add a viewable File:

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a. Click the **link** in the **Viewable File** cell. The standard dialog for file browsing and selection appears.

b. Search for and select a file. The **link** is replaced with the **name** of the selected File.

8. In the **Authoring Tool** drop-down list, select the CAD application used to create the Document.

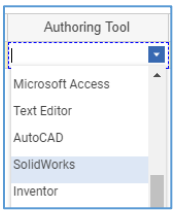

Figure 390.

9. Use step 6 of the Creating a CAD Documents Relationship procedure.

The **Changes** check box is managed by the system. It is automatically checked; when the CAD Document is associated with a change item.

10. If the CAD Document follows a standard, select the **Standard** check box.
11. If the CAD Document is a template, select the **Template** check box.
12. Click either **Save** or **Done** on the **Parent** toolbar. The new CAD Document is created and attached to the Parent CAD Document.

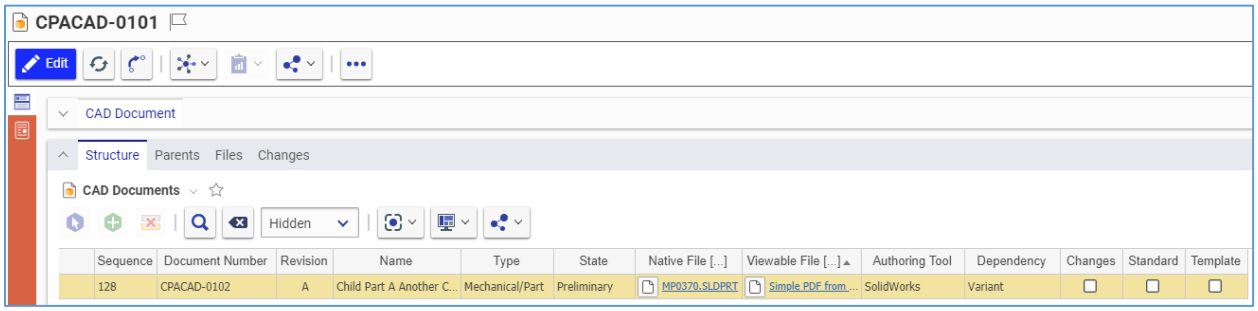

Figure 391.

The new CAD Document is now available via search, subject to permissions.

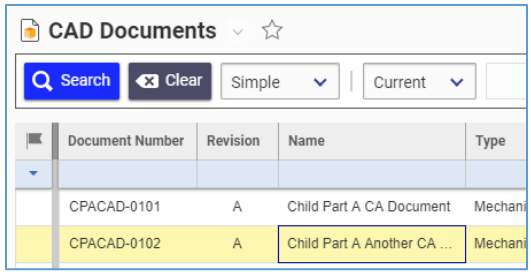

Figure 392.

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9.6.3 Replacing a CAD Documents Relationship

Use the following procedure to replace a Child CAD Document in a CAD Document Relationship:

1. Use steps 1-3 of the Creating a CAD Documents Relationship procedure.
2. Right-click the **Child CAD Document** and then click **Replace**. The **Search dialog – CAD Document** appears.
3. Using the standard search procedure, search for and select a replacement CAD Document. The selected CAD Document replaces the existing **CAD Document**.
4. Click either **Save** or **Done** on the **Parent** toolbar.

9.6.4 Removing a CAD Documents Relationship

If you remove a CAD Document from another CAD Document, you delete that Parent-Child relationship. If the removed Child was the last one, then the hierarchy of CAD Documents is deleted.

Use the following procedure to remove a Child CAD Document from a Parent CAD Document:

1. Use steps 1-3 of the Creating a CAD Document from a Part procedure.
2. Click **CAD Document** and then click **Delete Row** on the **Structure** accordion toolbar. The **CAD Document** becomes unavailable.

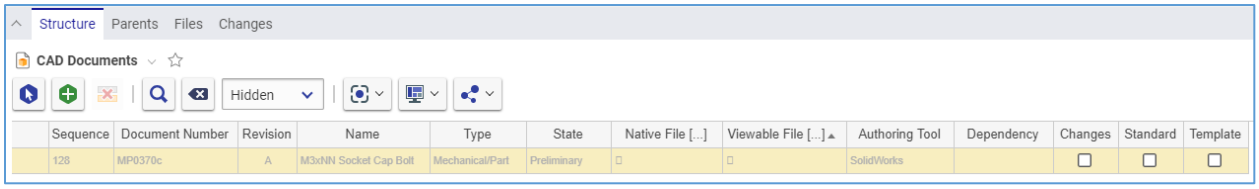

Figure 393.

3. Click either **Save** or **Done** on the **Parent** toolbar. The **CAD Document** disappears from the grid.

Note: The **CAD Document** disappears immediately if the Parent was not saved after it was added.

9.7 Finding Where a CAD Document is Used

There are several methods of finding where a CAD Document is used:

- The **Parents** accordion tab.
- Parts Associated with a CAD Document.
- The **Where Used** browser.

9.7.1 CAD Document Parents

The **Parents** accordion tab of the CAD Document view shows a read-only list of direct Parents of a given CAD Document.

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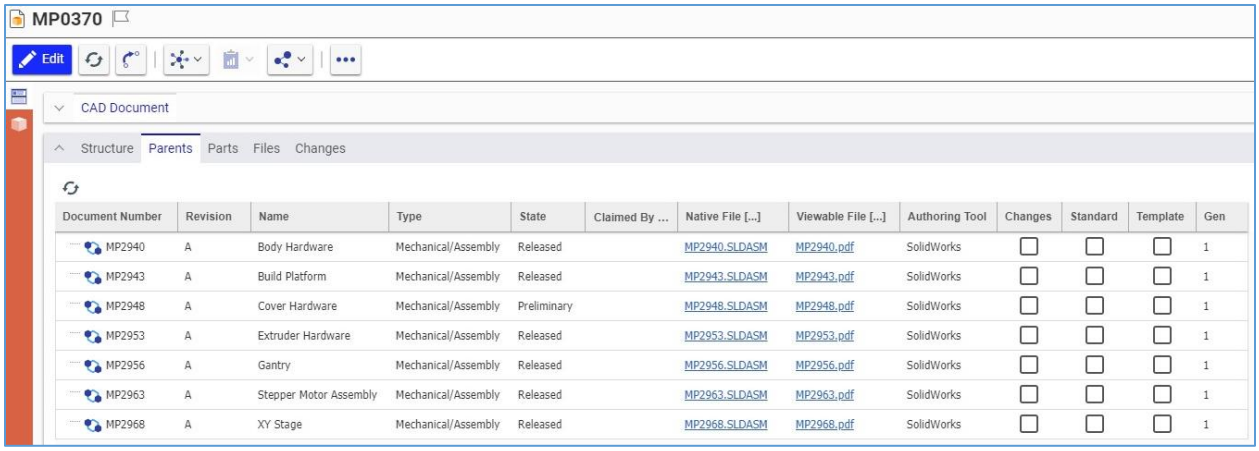

Figure 394.

1. Right-click a **Parent** and then click **View** to go to this Parent's view.
2. Click a link to a native or viewable File to download it.

9.7.2 Parts Associated with a CAD Document

CAD Documents can be attached to a Part, but Parts cannot be attached to a CAD Document.
You can use the view of a CAD Document to explore which Parts include this Document as an attachment:

- If the CAD Document is not attached anywhere, there are no **Part** link or **Part** accordion tabs.

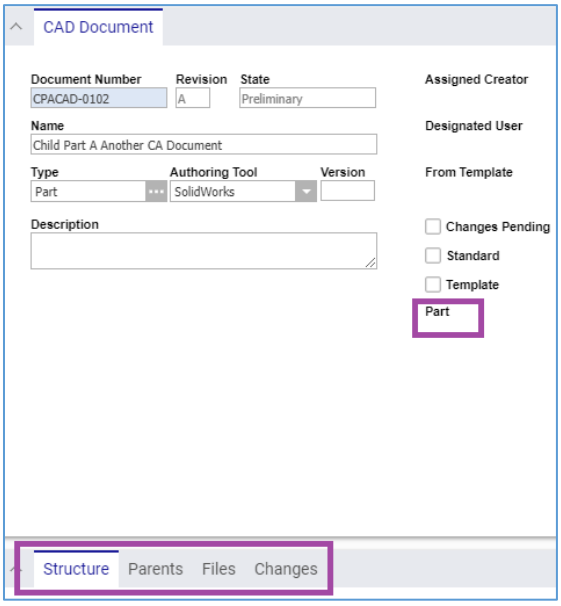

Figure 395.

- If the CAD Document is attached to one Part, there is a **Part** link to this Part but there is no **Part** accordion tab.

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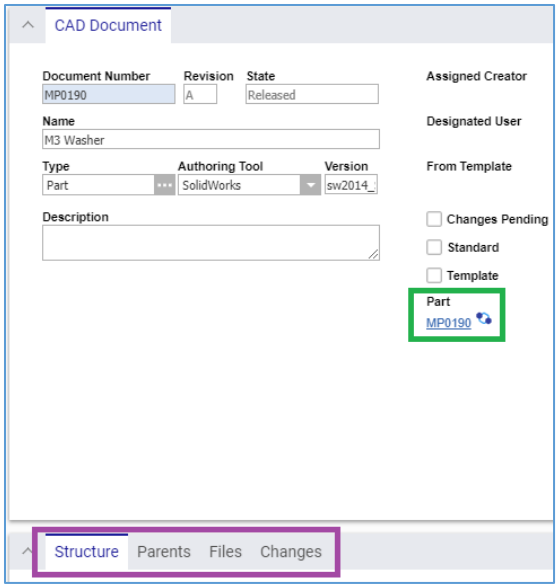

Figure 396.

- If the CAD Document is attached to several Parts, the **Part** link and the **Part** accordion tab appear. This link is to this tab. Right-click a **Part** in the **Parts** grid and then click **View** to go to this Part's view.

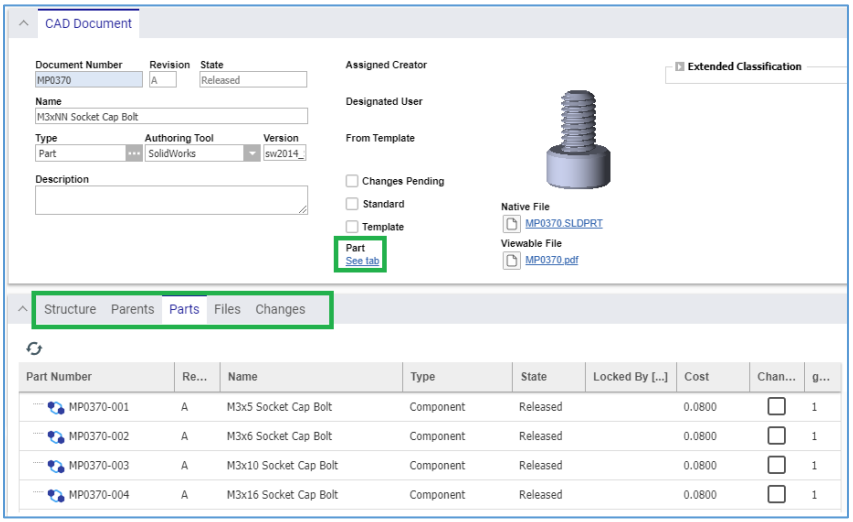

Figure 397.

- If a previous (not the latest) revision of a CAD Document is attached to a Part, the **Part** link is displayed as broken.

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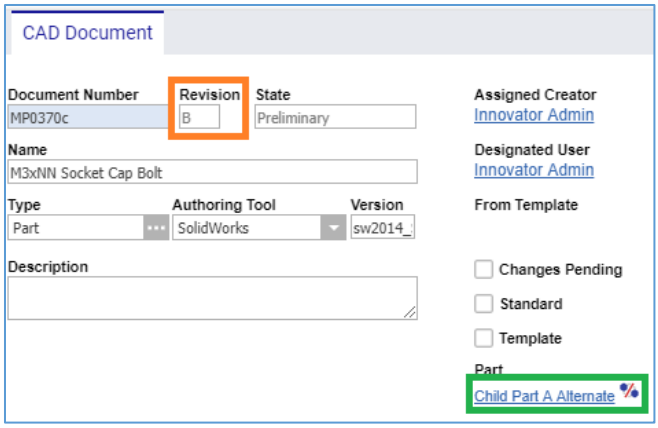

Figure 398.

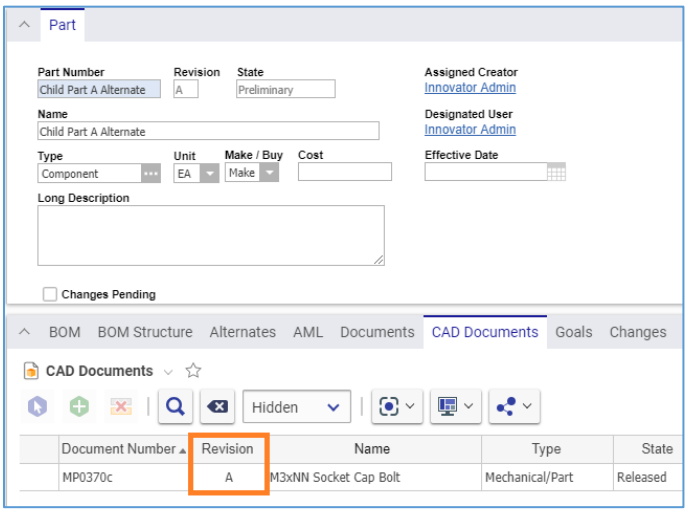

Figure 399.

9.7.3 Using Where Used CAD Document Browser

Aras Innovator offers the Where Used feature to show a tree grid that includes the CAD Document and its corresponding BOM hierarchies. Refer to section *11.1 Finding Where an Item is Used* on details how to find out where a CAD Document is used. All examples in that section are applicable to CAD Documents.

9.8 Comparing CAD Documents

To compare complex multi-level hierarchies of CAD Documents side-by-side, Aras Innovator offers the Structure Browser. Refer to section *11.2 Comparing Items* on details how to compare CAD Documents. All examples in that section are applicable to CAD Documents.

9.9 Managing CAD Files

If you have purchased a third-party integration to a CAD tool, you can attach, download, replace and remove the following types of files for a single CAD Document:

- One file native to the CAD Document type.

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- One viewable representation of the CAD Document.
- Many of other files.

CAD Document Files are kept in the Aras Innovator Vault.

This subscription also enables you to view and work with native CAD Files in Aras Innovator views for Parts and CAD Documents.

In Aras Innovator 12, CAD Files and Files are not versionable item types, but CAD Documents are. Whenever you make an action with a CAD Document File, a new version of the CAD Document is created. Old versions of the CAD Document keep old Files. For example, if you replaced File A with File B, the previous version of the CAD Document has File A, and the current one has File B. To access the old Files, you need to go to the view of an appropriate version of the CAD Document. For details about how to access CAD Document versions, refer to section *4.1.1 Versions Exploration*.

9.9.1 Attaching Native and Viewable CAD Files to a CAD Document

For a single CAD Document, you can attach only one native and one viewable CAD File using the following procedure:

1. Open the **CAD Document** view.
2. Click **Edit** on the **CAD Document** toolbar.
3. Click the **Select file** link under **Native file**. The standard dialog of your operating system for file browsing and selection appears.

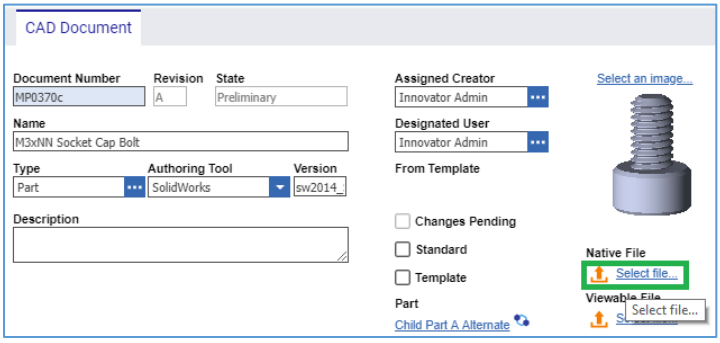

Figure 400.

4. Search for and select a Native CAD File. The **Select file** link is replaced with the **name** of the selected Native CAD File.

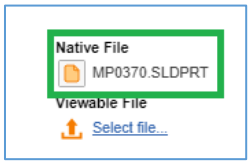

Figure 401.

5. Click the **Select file** link under **Viewable file**. The standard dialog of your operating system for file browsing and selection appears.

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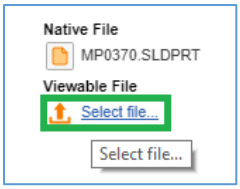

Figure 402.

6. Search for and select a viewable representation of the Native CAD File. The **Select file** link is replaced with the **name** of the selected Viewable File.

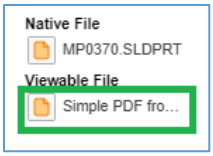

Figure 403.

7. Click either **Save** or **Done** on the **CAD Document** toolbar. The names of the selected Files become links. These Files are attached to the CAD Document.

Figure 404.

9.9.2 Attaching Other Files to a CAD Document

Use the following procedure to attach additional Files to a CAD Document:

1. Open the **CAD Document** view.
2. Click **Edit** on the **CAD Document** toolbar.
3. Go to the **Files** accordion tab.
4. Click **Add Row** on the **Files** accordion toolbar. A new row appears at the bottom of the **Files** grid.

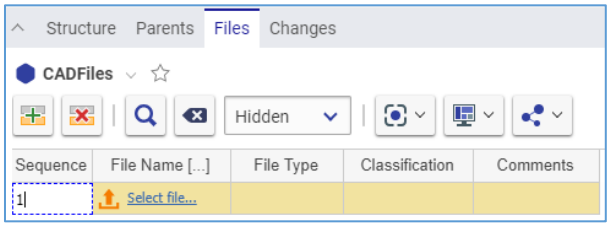

Figure 405.

5. Click the **Select file** link in the **File Name** cell. The standard dialog of your operating system for file browsing and selection appears.
6. Search for and select the File. The **Select file** link is replaced with the **name** of the File selected.

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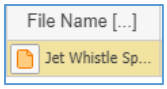

Figure 406.

Note: Aras Innovator will automatically provide a file type to the **File Type** cell depending on the File's extension when you save the CAD Document.

7. Click the **Classification** cell, which becomes editable and gets the **ellipsis** button.
8. Click the **ellipsis** button. The **classification** dialog appears displaying the Classification tree for CAD Files.

Note: The following is the Classification tree for CAD Files in Aras Innovator. It can be extended, as needed, by an administrator.

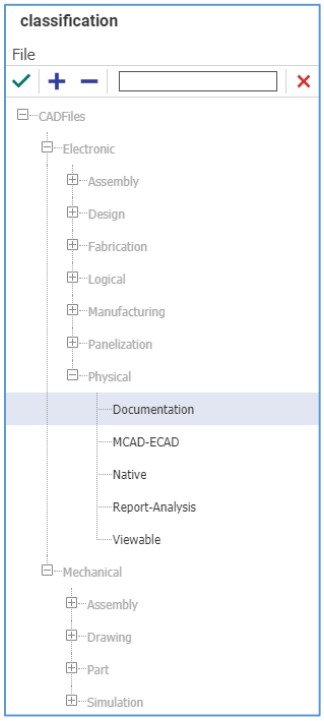

Figure 407.

9. If it is necessary to provide additional information about the File, enter it in the **Comments** cell.
10. Click either **Save** or **Done** on the **Document** toolbar. The additional File is attached to the CAD Document.

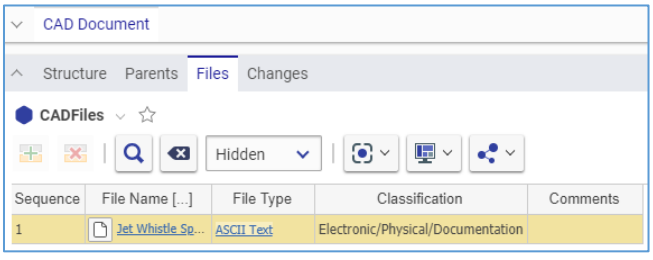

Figure 408.

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9.9.3 Downloading Native and Viewable CAD Files from a CAD Document

You can download native and viewable CAD Files using one of the following methods:

- A link in the CAD Document view
- The **Manage file property** dialog.

Use the following procedure for the first method:

1. Go to the **CAD Document** view.
2. Click the **link with *file name*** under **Native file**. The downloading process of your operating system starts.

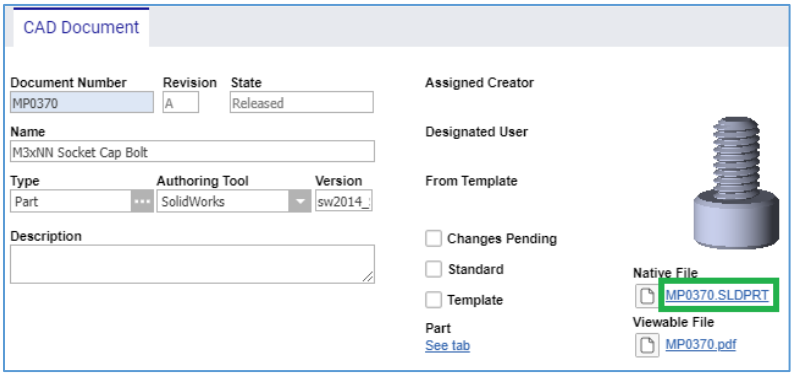

Figure 409.

3. Click the **link with *file name*** under **Viewable file**.

Figure 410.

A new browser window appears showing the viewable file and providing functionality for viewing and downloading.

Note: The view of a viewable file and functionality available to you depend on your browser.

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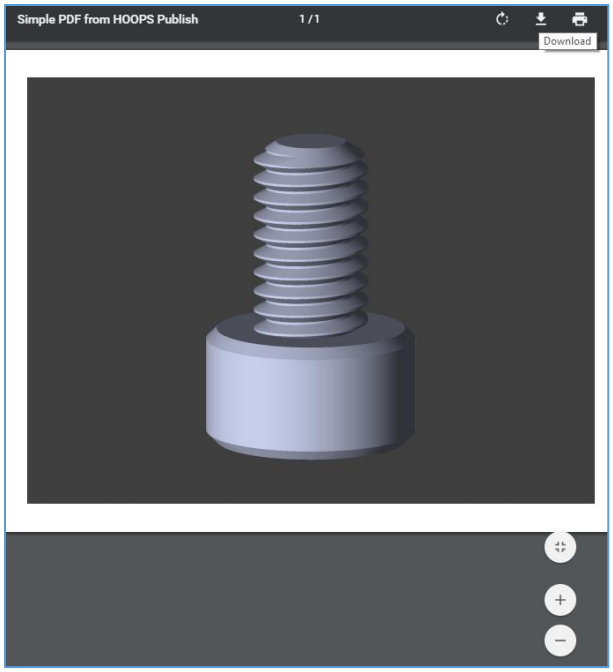

Figure 411.

4. Use the file download procedure of your browser.
5. Close the browser window with the viewable file.

Use the following procedure for the second method:

1. Go to the **CAD Document** view.
2. Click the **Manage file property** button under **Native file**.

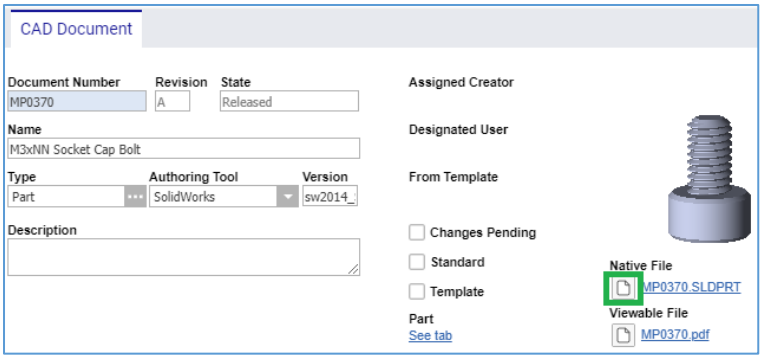

Figure 412.

The **Manage file property** dialog appears.

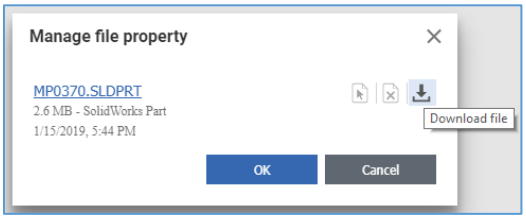

Figure 413.

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3. Use one of these options:
   a. Click ***a file name link***.
   b. Click the ***Download file*** button.

The downloading process of your operating system starts.

4. Close the **Manage file property** dialog.
5. Click the **Manage file property** button under **Viewable file**. The **Manage file property** dialog appears.

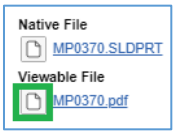

Figure 414.

6. Use one of these options:
   a. Click ***a file name link***. A new browser window appears showing the viewable file and providing functionality for viewing and downloading.
   b. Click the ***Download file*** button. The downloading process of your operating system starts.
7. If you took step 6.a, use these steps:
   a. Use the file download procedure of your browser.
   b. Close the browser window with the viewable file.
8. Close the **Manage File** dialog.

9.9.4 Downloading Other Files from a CAD Document

You can download additional Files from a CAD Document using one of two methods:

1. A link in the Files grid.
2. The **Manage file property** dialog.

Use the following procedure for the first method:

1. Open the **CAD Document** view.
2. Go to the **Files** accordion tab.
3. Click the ***link*** in the **File Name** cell. The downloading process of your operating system starts.

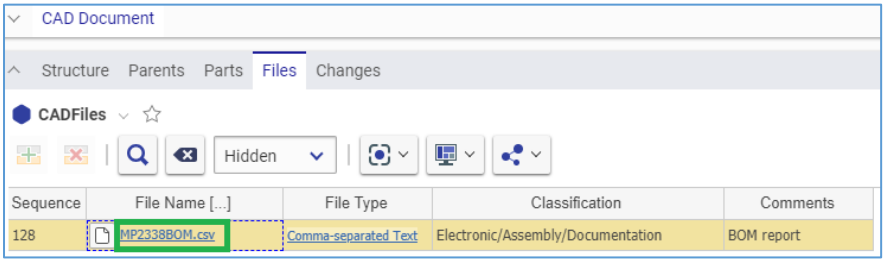

Figure 415.

Note: If you click a link in the **File Type** cell, the view of this file type appears.

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Use the following procedure to download a File using the second method:

1. Use steps 1-2 of the previous procedure.
2. Click the **Manage file property** button in the **File Name** cell.

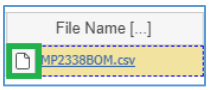

Figure 416.

The **Manage File** dialog appears.

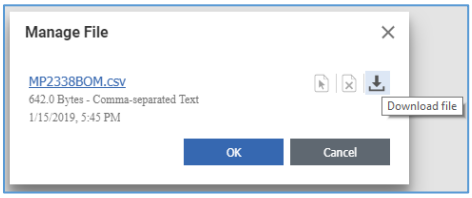

Figure 417.

3. Use one of these options
   a. Click ***a file name link***.
   b. Click the ***Download file*** button.

The downloading process of your operating system starts.

4. Close the **Manage File** dialog.

If you are downloading a viewable file, like PDF, instead of starting the downloading process of your operating system, a new browser window appears showing the viewable file and providing functionality for viewing and downloading. Then, use the file download procedure of your browser, and close the browser window with the viewable file when completed.

9.9.5 Replacing Native and Viewable CAD Files in a CAD Document

Use the following procedure to replace native and viewable CAD Files in a CAD Document:

1. Open the **CAD Document** view.
2. Click **Edit** on the **CAD Document** toolbar.
3. Click the **Manage file property** button under **Native file**.

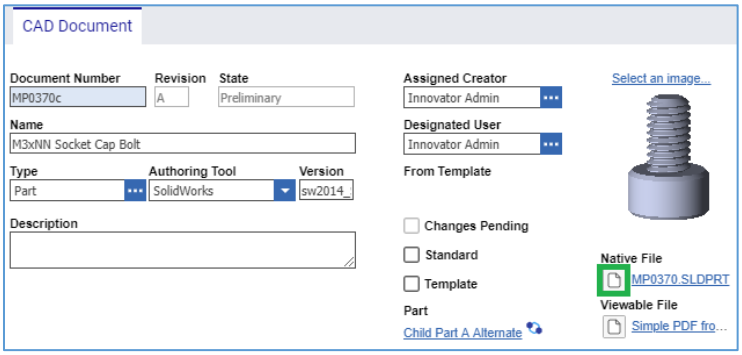

Figure 418.

The **Manage file property** dialog appears.

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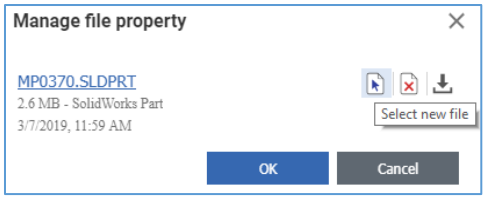

Figure 419.

4. Click the **Select new file** button. The standard dialog of your operating system for file browsing and selection appears.
5. Search for and select the replacement native File. In the **Manage file property** dialog, a **link with the name** of the old native File is replaced with the **name** of the new native File. There is no information on the new native File.

Figure 420.

6. Click **OK**. In the **CAD Document** view, a **link with the name** of the old native File is replaced with the **name** of the new native File.

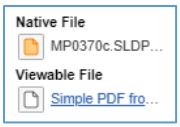

Figure 421.

7. Click the **Manage file property** button under **Viewable file**. The **Manage file property** dialog appears.

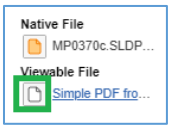

Figure 422.

8. Click the **Select new file** button. The standard dialog of your operating system for file browsing and selection appears.
9. Search for and select the replacement viewable File. In the **Manage file property** dialog, a **link with the name** of the old viewable File is replaced with the **name** of the new viewable File.
10. Click **OK**. In the **CAD Document** view, a **link with the name** of the old viewable File is replaced with the **name** of the new viewable File.

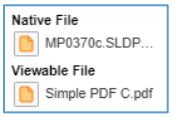

Figure 423.

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11. Click either **Save** or **Done** on the **CAD Document** toolbar. The names of the replacement Files become links. These Files are attached to the CAD Document.

Figure 424.

9.9.6 Replacing Other Files in a CAD Document

Use the following procedure to replace additional Files in a CAD Document:

1. Use steps 1-3 of the Attaching Other Files to a CAD Document procedure.
2. Click the **Manage file property** button in the **File Name** cell.

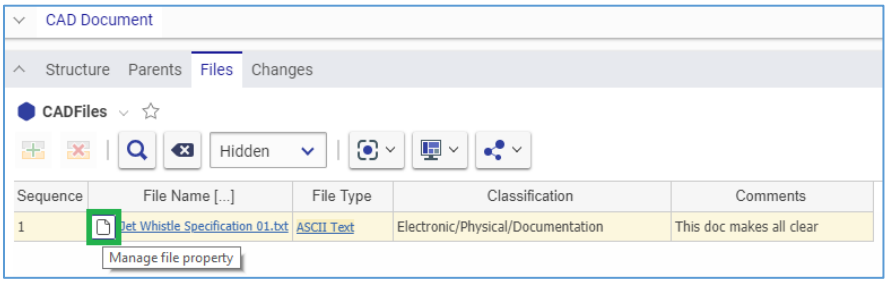

Figure 425.

The **Manage File** dialog appears.

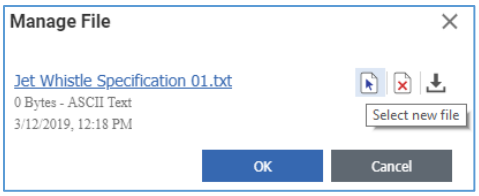

Figure 426.

3. Click the **Select new file** button. The standard dialog of your operating system for file browsing and selection appears.
4. Search for and select the replacing File. In the **Manage file property** dialog, the **link with the name** of the old File is replaced with the **name** of the new File.

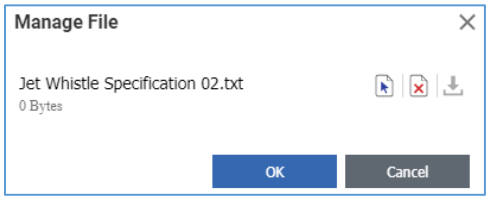

Figure 427.

5. Click **OK**. In the **File Name** cell, the ***link with the name*** of the old File is replaced with the ***name*** of the new File. The rest of the information on the old File is kept.

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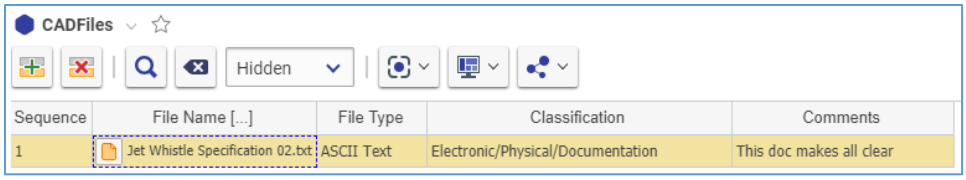

Figure 428.

6. Click either **Save** or **Done** on the **CAD Document** toolbar. In the **File Name** cell, the ***name*** of the new File becomes a link to it. The Files are replaced, and the File Type is updated

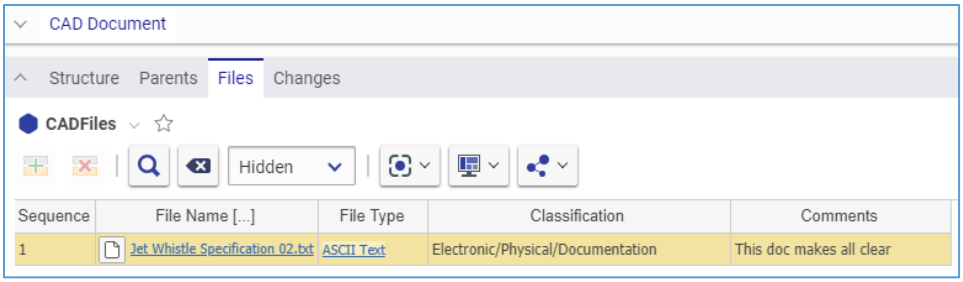

Figure 429.

9.9.7 Removing Native and Viewable CAD Files from a CAD Document

Use the following procedure to remove native and viewable CAD Files from a CAD Document:

1. Open the **CAD Document** view.
2. Click **Edit** on the **CAD Document** toolbar.
3. Click the **Manage file property** button under **Native file**.

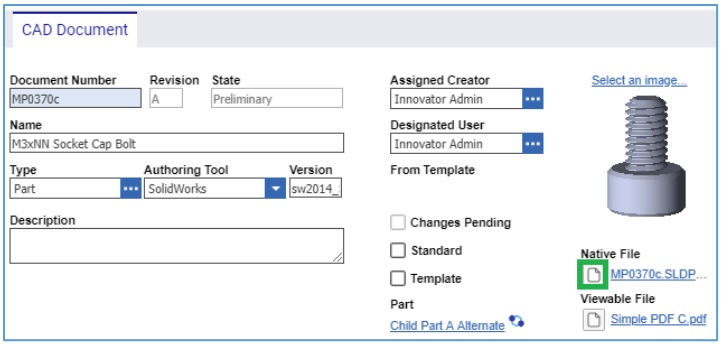

Figure 430.

The **Manage file property** dialog appears.

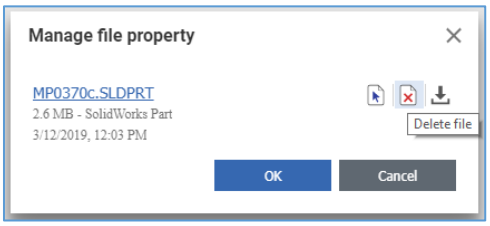

Figure 431.

4. Click the **Delete file** button. A notification dialog appears.

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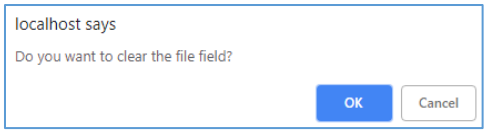

Figure 432.

5. Click **OK** in the notification dialog. The **Select File** link replaces the **link to the native File**.

Figure 433.

6. Click the **Manage file property** button under **Viewable file**. The **Manage file property** dialog appears.

Figure 434.

7. Click the **Delete file** button. A notification dialog appears.
8. Click **OK** in the notification dialog. The **Select File** link replaces the **link to the viewable File**.

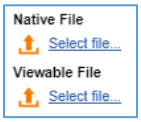

Figure 435.

9. Click either **OK** or **Done** on the **CAD Document** toolbar. The native and viewable Files are removed from the CAD Document.

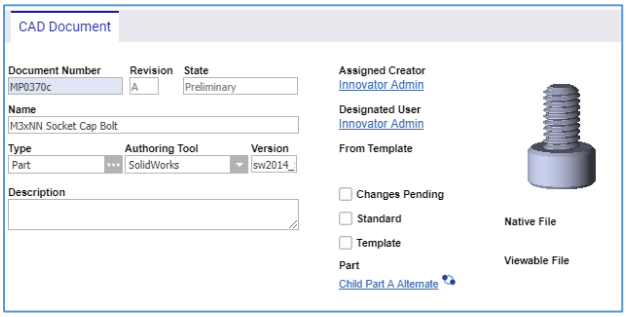

Figure 436.

9.9.8 Removing Other Files from a CAD Document

Use the following procedure to remove a File from a Document:

1. Use steps 1-3 of the Attaching Other Files to a CAD Document procedure.
2. Click the **File** row and then click **Delete Row** on the **Files** accordion toolbar. The **File** becomes unavailable.

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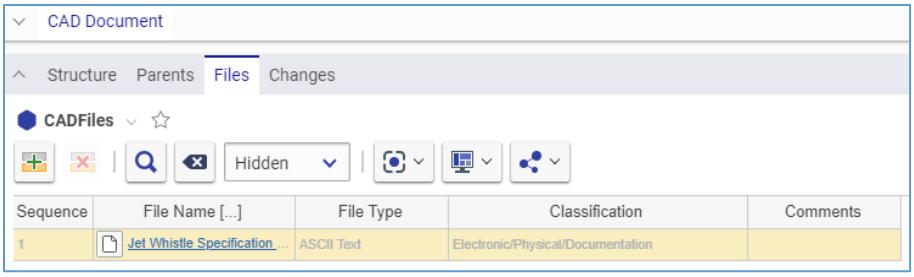

Figure 437.

3. Click either **Save** or **Done** on the **CAD Document** toolbar. The **File** disappears from the grid.

Note: The **File** disappears immediately if the CAD Document was not saved after it was added.

9.10 Working with CAD Files

If you have purchased a third-party integration to a CAD tool, you can attach a CAD file to a Part with the Part 3D Model native to a CAD authoring tool you use. This subscription also enables you to view and work with native CAD Models in Aras Innovator right from the corresponding CAD Document.

9.10.1 Accessing CAD Models from CAD Documents

Once the integration license is obtained, the CAD Document view gets the Sidebar on its left side.

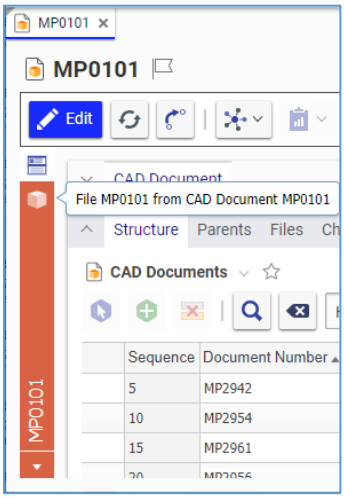

Figure 438.

The Sidebar hosts tabs that provide access to the tools for viewing and working with CAD Models, PDF files and images attached to the CAD Document. The Sidebar contents depend on your license, CAD authoring tool, CAD and other Files attached to a CAD Document. The most used tabs are as follows:

- **Form** shows the CAD Document view.

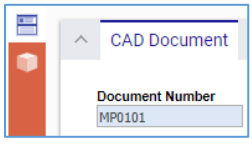

Figure 439.

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- **CAD** is a simple tool for viewing and working with 3D CAD models.

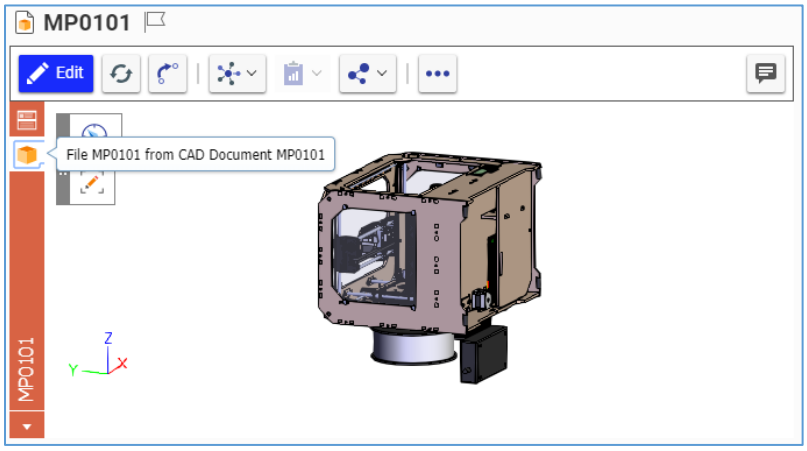

Figure 440.

- **PDF Viewer** displays the 3D PDF file.

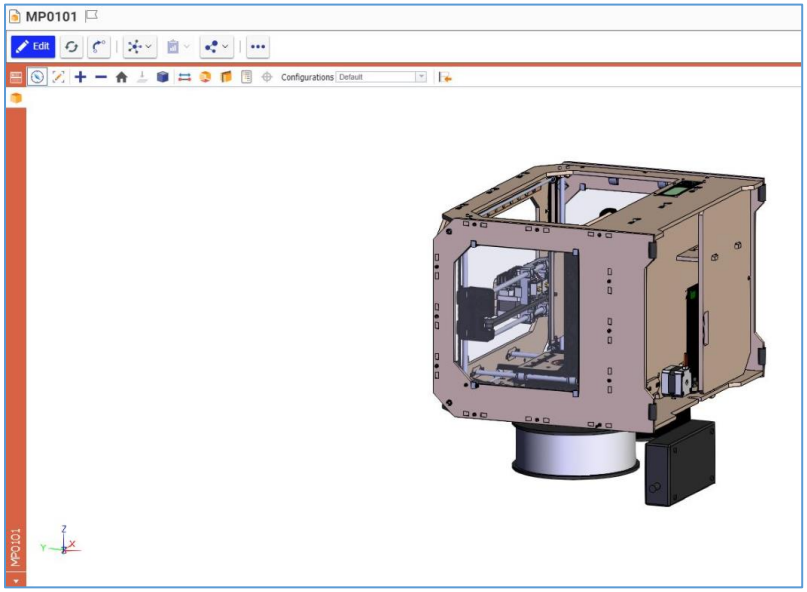

Figure 441.

There is another way to navigate the Sidebar:

1. Click the **bottom** button. The list of all possible navigation options appears. This list includes the CAD Document Form view. It is possible to view Files attached to the CAD Document. The blue circle marks your current position.

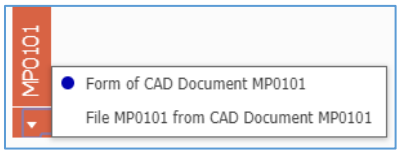

Figure 442.

2. Click the option you want to use.

Aras Innovator returns an error if you try to use a tool that is not integrated.

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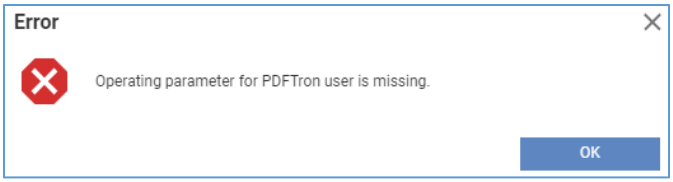

Figure 443.

Later in this section, it is assumed that you accessed a CAD Model.
When accessed, a CAD Model appears as a view.

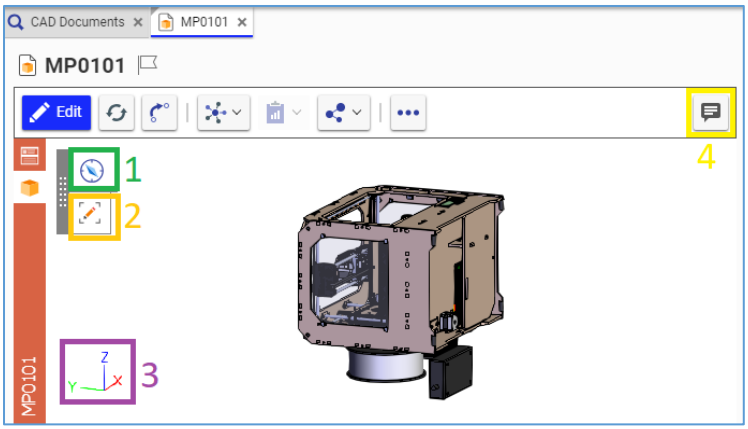

Figure 444.

The view includes the following functionality:

1. The **View** toolbar button
2. The **Markup** toolbar button
3. The **Model Orientation** indicator
4. The **Discussion** button

Note: As the **Discussion** button is on the CAD Document toolbar, it can be accessed from anywhere in the CAD Document. However, it is most convenient to use it from the CAD Files view because you can add snapshots of the CAD Model.

9.10.2 Viewing CAD Models

You can view a CAD Model from different sides by clicking and dragging at any place on the Model canvas. The **Model Orientation** indicator tells you which side is toward you and where the other sides are.

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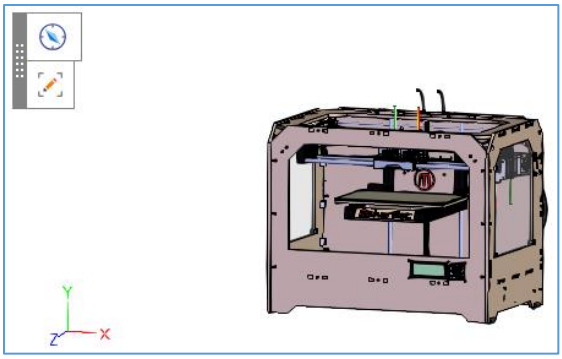

Figure 445.

Use a **Viewing** toolbar and Model action menu for advanced viewing.

9.10.2.1 Using the Viewing Toolbars

Click the **View** toolbar button to launch the viewing mode and to access the **Basic Viewing** toolbar that displays the following buttons:

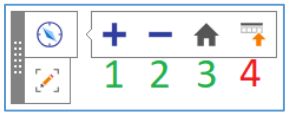

Figure 446.

1. **Zoom Up** increases the CAD Model size on the screen.
2. **Zoom Down** decreases the CAD Model size on the screen.
3. **Reset View** sets the default CAD Model orientation and size on the screen.
4. **Switch To Standard Toolbar** shows the **Standard Viewing** toolbar.

The **Standard Viewing** toolbar includes the same buttons with the exception of the **Switch To Standard Toolbar** button. The **Switch To Basic Toolbar** button appears instead. There are additional features on the **Standard Viewing** toolbar:

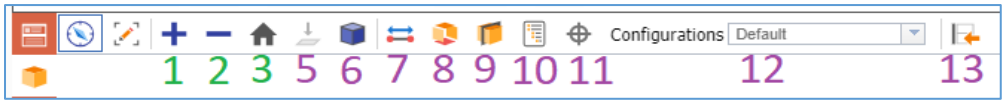

Figure 447.

5. **Orient to Face** shows the CAD Model oriented to you with the surface (part) selected.
6. **Set Display Style** shows/hides a toolbar with options on how to display the CAD Model.
7. **Measure** shows/hides a toolbar with options for measuring the CAD Model.
8. **Exploded View** shows/hides the toolbar with the exploding slider.
9. **Cross Section** shows/hides a toolbar with options for cross-section viewing of the CAD Model.
10. **Model Browser** shows/hides viewing options as trees.
11. **Product Manufacturer Information** displays annotations and attributes contained in a 3D solid model that complement the geometric definition and complete the digital data set.
12. **Configurations** is the list of configurations available within the CAD Model.
13. **Switch to Basic Toolbar** shows the **Basic Viewing** toolbar.

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Complex features are discussed in the following subsections, which assume that you have accessed the corresponding feature.

9.10.2.2 Using the CAD Model Action menus

Right-click the **CAD Model** to access its action menu:

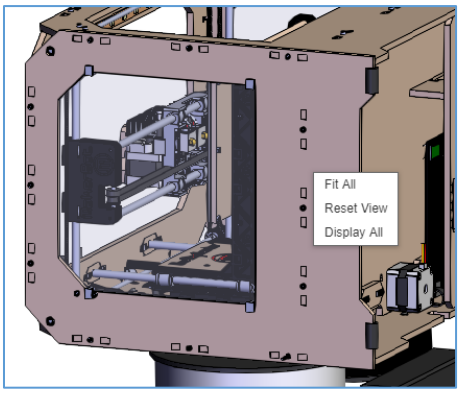

Figure 448.

- **Fit All** sets the CAD Model size so that all parts are shown on the screen.
- **Reset View** sets the default CAD Model orientation and size on the screen.
- **Display All** shows all the Model parts.

Click a **part** and then right-click to access the part action menu:

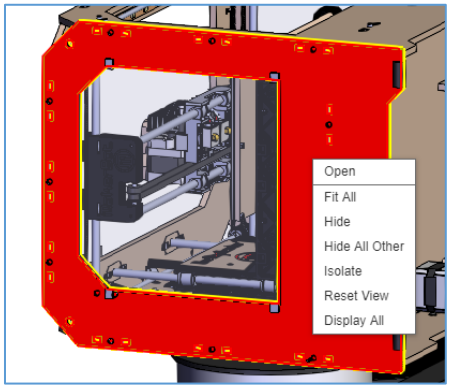

Figure 449.

- **Open** opens the CAD Document view of the selected part.
- **Fit All** sets the CAD Model size so that all parts are shown on the screen.
- **Hide** hides the selected part from showing on the screen.
- **Hide All Other** hides everything appearing on the screen except the selected part.
- **Isolate** makes everything transparent except the selected part.
- **Reset View** sets the default CAD Model orientation and size on the screen.
- **Display All** shows all the Model parts.

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9.10.2.3 Setting the CAD Model Display Style

The **Display Style** toolbar provides the following display options for the CAD Model. Refer to section *9.10.2.1 Using the Viewing Toolbars* to access the button.

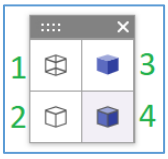

Figure 450.

1. **Wireframe** displays wireframes of the CAD Model assembly and all its parts. Surfaces are transparent.

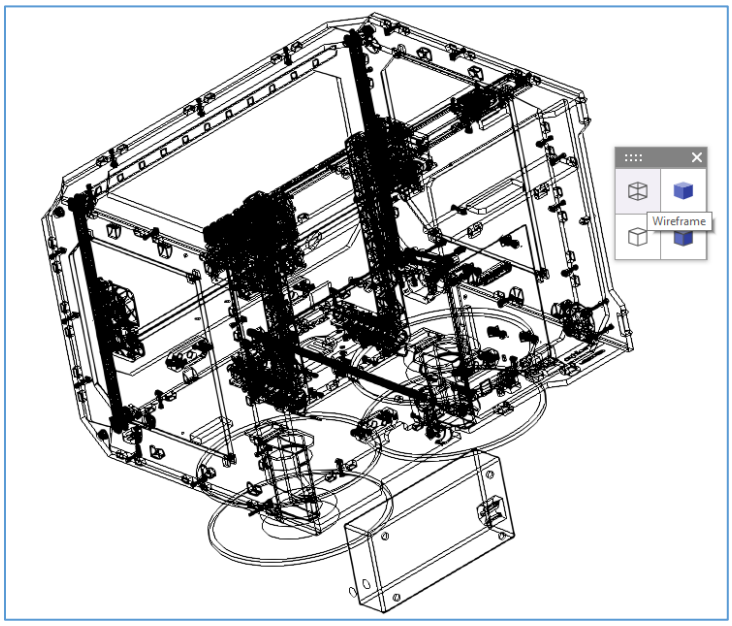

Figure 451.

2. **Hidden Line** displays the white surfaces and black edges of the CAD Model assembly.

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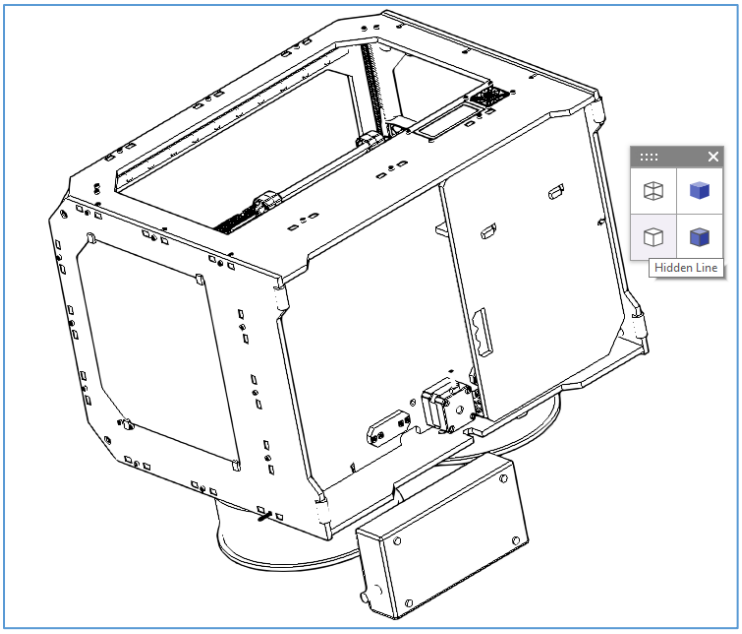

Figure 452.

3. **Shaded** displays the CAD Model assembly surfaces in color.

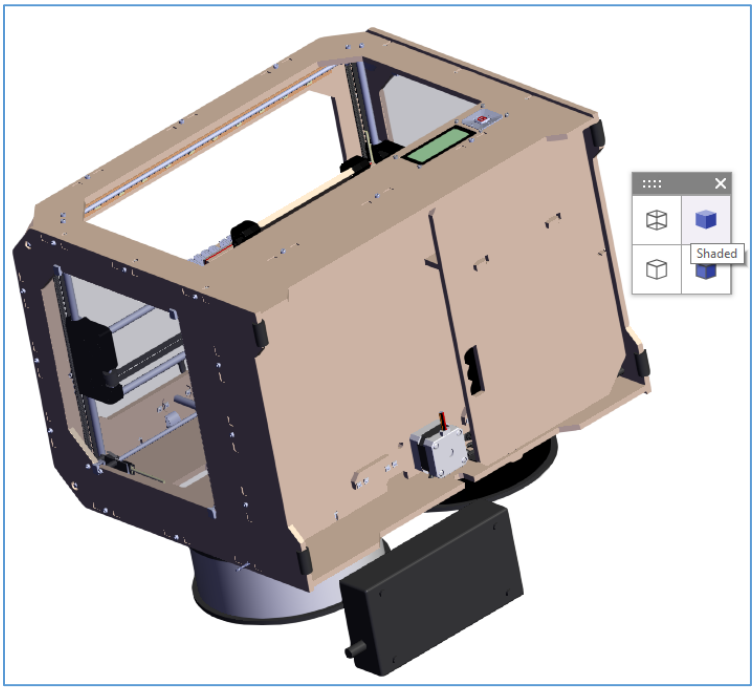

Figure 453.

4. **Wireframe on Shaded** displays the CAD Model assembly with both wireframes and colored surfaces. This is the default display style.

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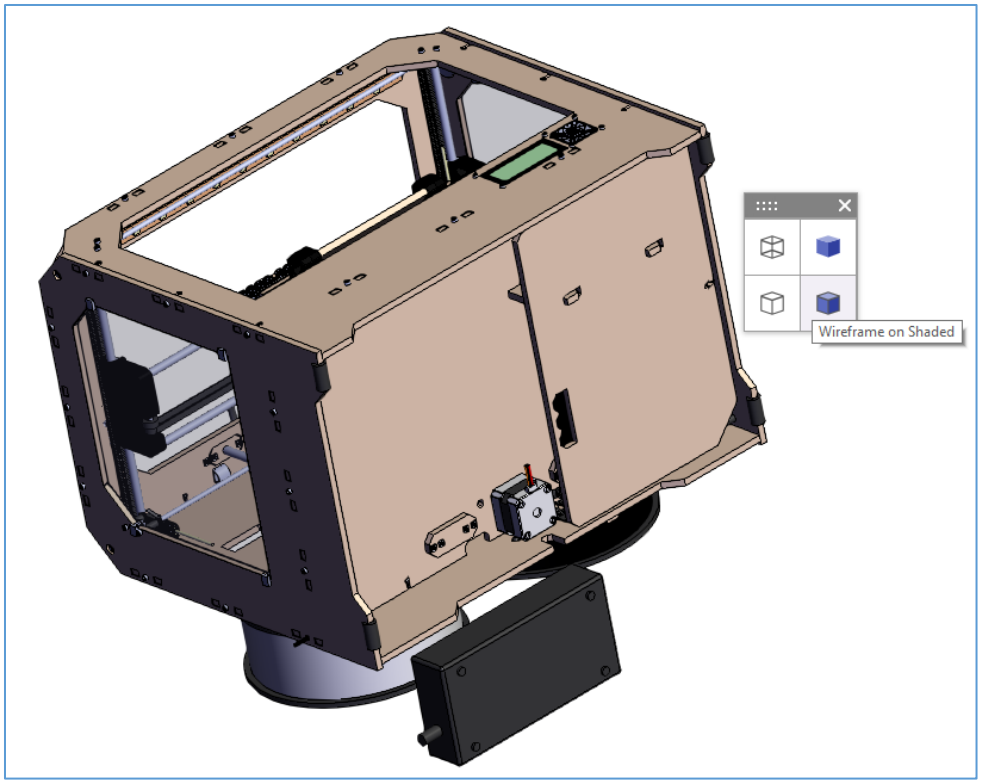

Figure 454.

9.10.2.4 Measuring CAD Models

The **Measure** toolbar enables you to specify the type of measurement to use for the CAD Model. Refer to section *9.10.2.1 Using the Viewing Toolbars* to access the button.

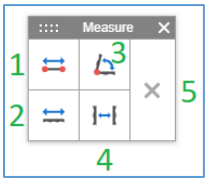

Figure 455.

1. **Measure Point to Point** shows in millimeters the distance between two arbitrary points. Click this button and then click the CAD Model to set these points and measure the distance between them.

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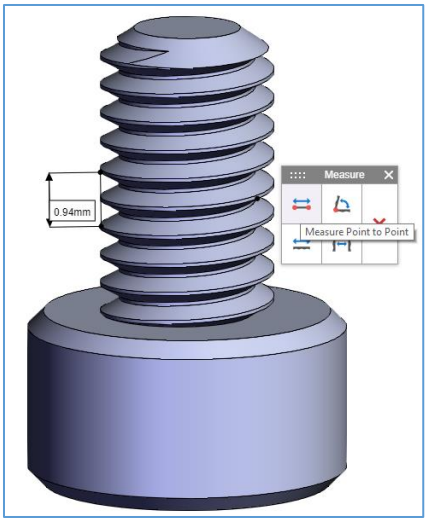

Figure 456.

2. **Measure Edges** shows in millimeters the length or radius of an arbitrary edge depending on the edge type. Click this button and then click an edge to measure it. The measured edges are bolded.

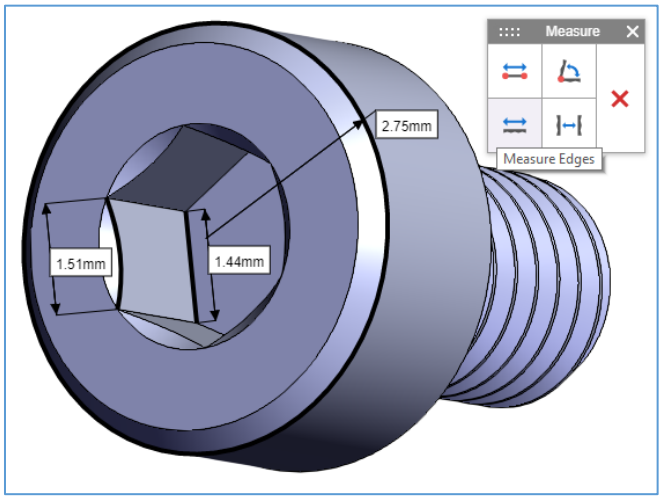

Figure 457.

3. **Measure Angle Between Faces** shows the angle in grades between two arbitrary surfaces of the CAD Model assembly. Click this button and then click the appropriate surfaces to measure them.

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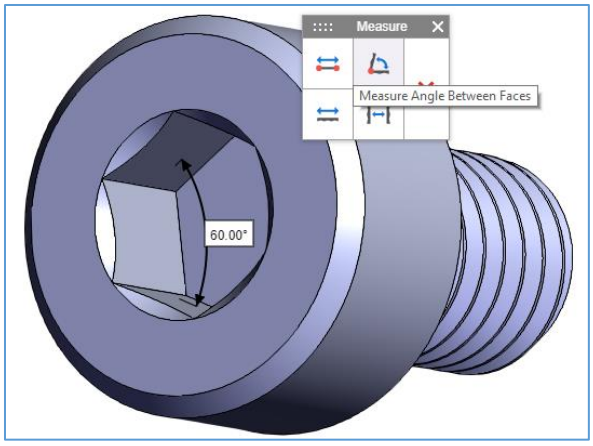

Figure 458.

4. **Measure Distance Between Faces** shows in millimeters the distance between two arbitrary surfaces of the CAD Model assembly. Click this button and then click the appropriate surfaces to measure the distance between them.

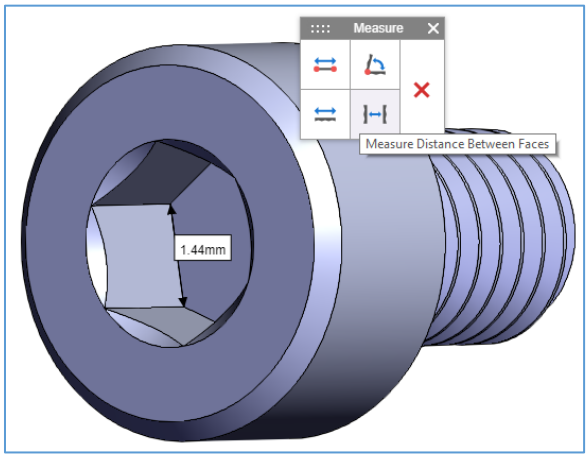

Figure 459.

5. Click **Delete All** to clear all measurements from the CAD Model.

9.10.2.5 Exploding CAD Models

The **Exploded View** toolbar enables you to view assemblies as a set of separated parts to be fitted. Drag the **slider.** As you move it to the right, the more separated the parts become. Refer to section *9.10.2.1 Using the Viewing Toolbars* to access the button.

You can use other viewing and markup features, like measure or labels, in the exploded view.

To quit the exploded view, you can click the **Reset View** button on the viewing toolbar or action menu.

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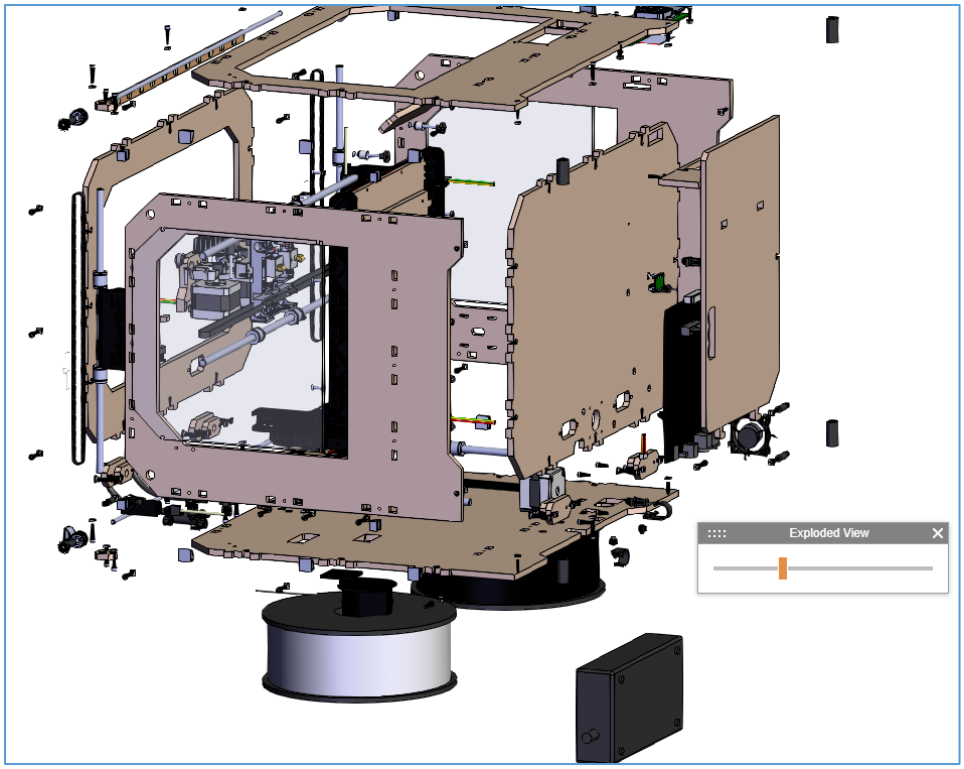

Figure 460.

9.10.2.6 Cross Section Viewing of the CAD Model

The **Cross Section** toolbar enables you to view the CAD Model in sections providing the following features. Refer to section *9.10.2.1 Using the Viewing Toolbars* to access the button.

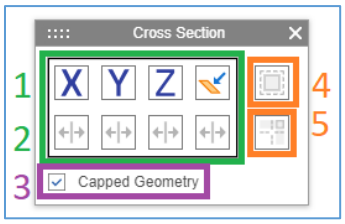

Figure 461.

1. Use the **set of plane buttons** to specify cutting planes for the CAD Model. The **X**, **Y**, and **Z** buttons set the cutting planes according to the Model coordinate system. The **Pick Plane** button sets an arbitrary cutting plane: click a surface and then click this button. To cut the CAD Model in sections, drag the cutting planes.

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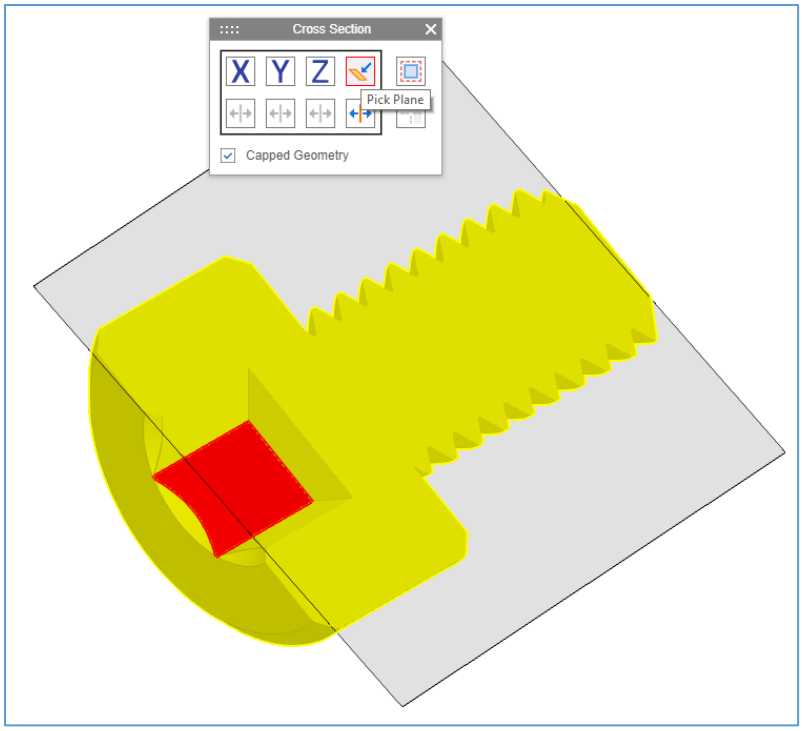

Figure 462.

2. Each **plane** button includes an **Invert Section** button. Click this button to determine which of the cut sections is visible.

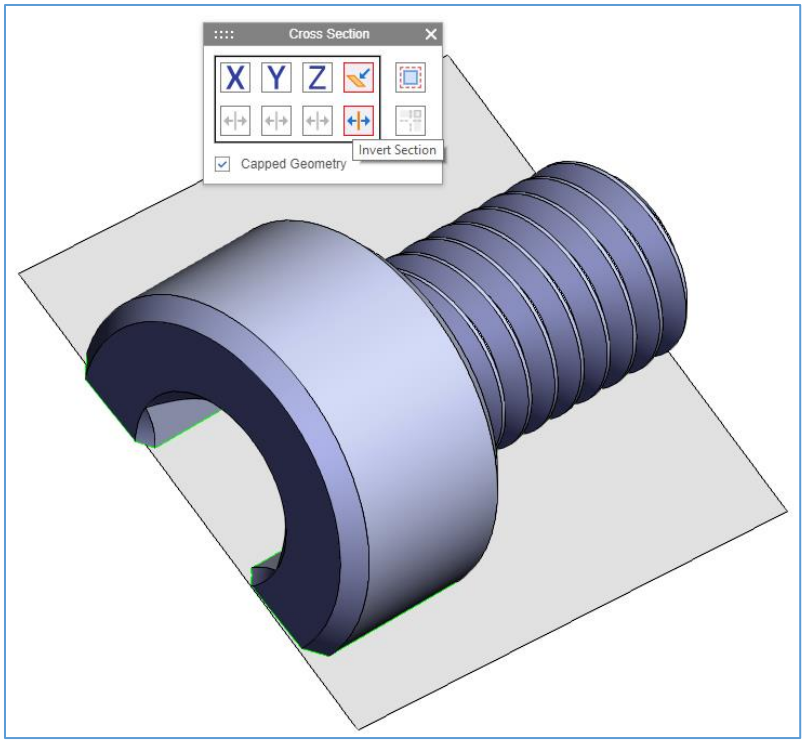

Figure 463.

3. Click the **Capped Geometry** check box to display the cut section in green.

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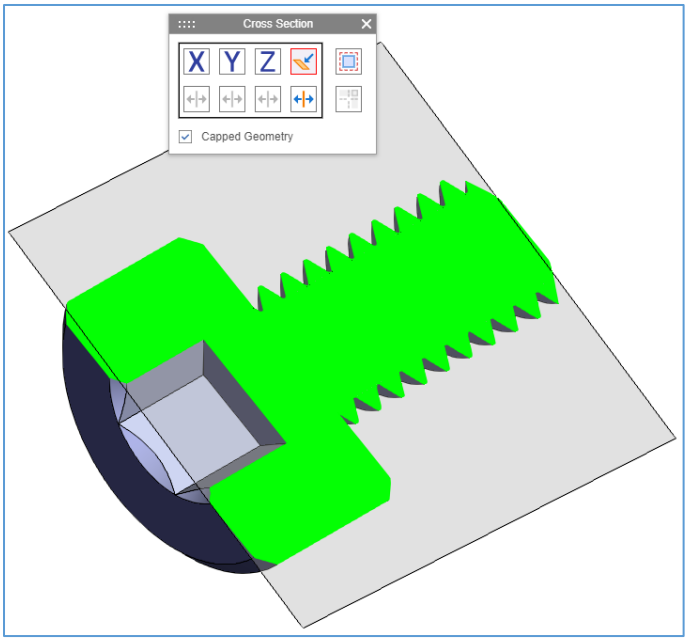

Figure 464.

If you do not select the checkbox, the cut section is hollow.

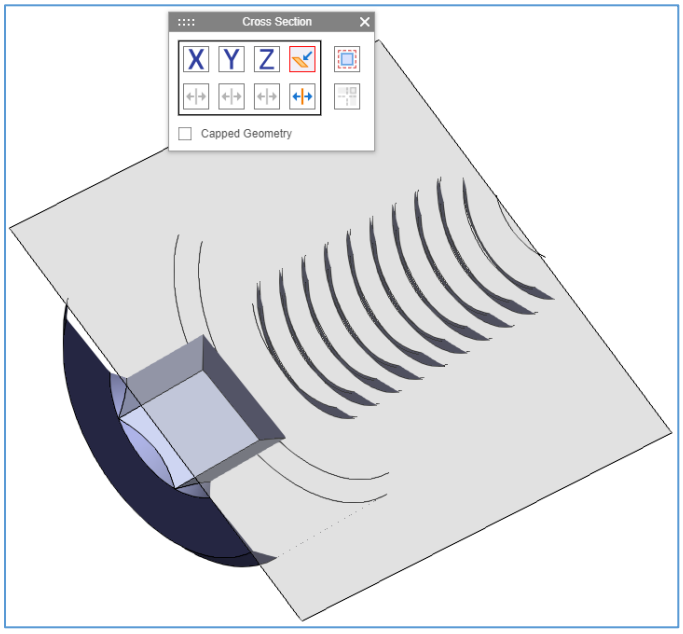

Figure 465.

4. Click the **Toggle Cutting Plane Display** button to hide/show the cutting planes.

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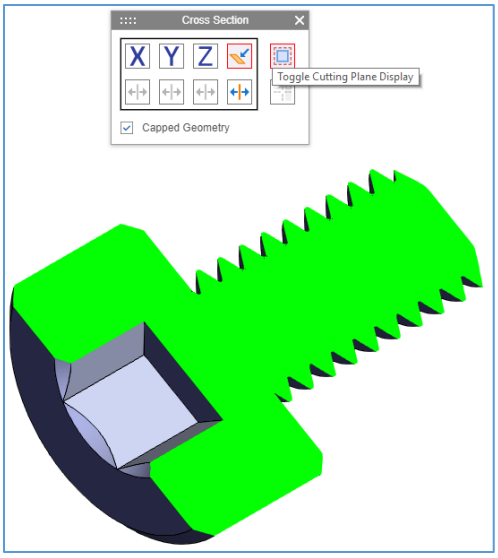

Figure 466.

5. When using several cutting planes, the **Toggle Cross Section** button becomes available, enabling you to select which sides of the planes can cut.

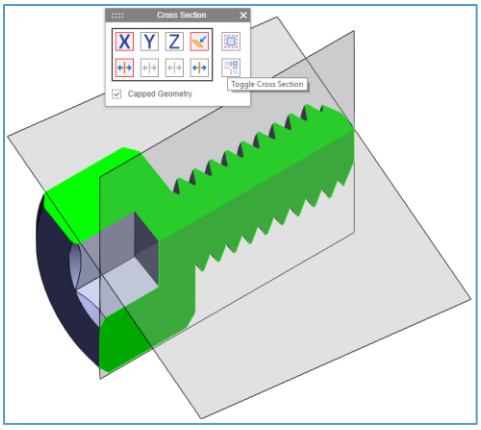

Figure 467.

Click the **Toggle Cross Section** button to toggle the cutting sides of the planes. You can combine this button with the **Invert Section** buttons of these planes.

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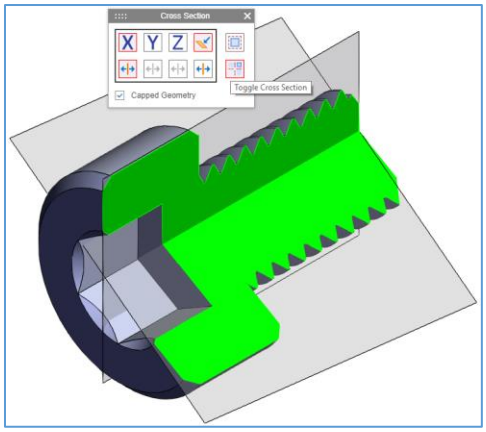

Figure 468.

To enable other viewing and markup functionality in the exploded view, hide the cutting planes.

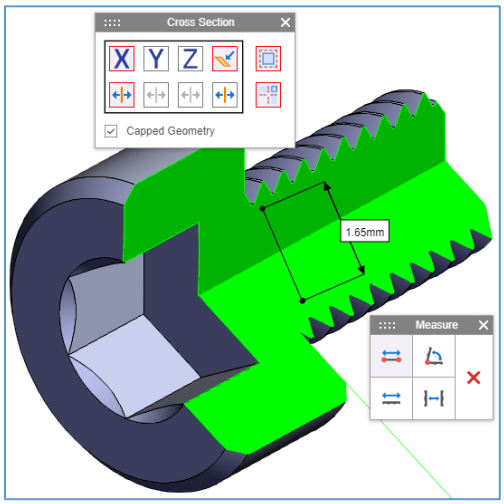

Figure 469.

To quit the cross-section view of a Model, close the **Cross Section** toolbar.

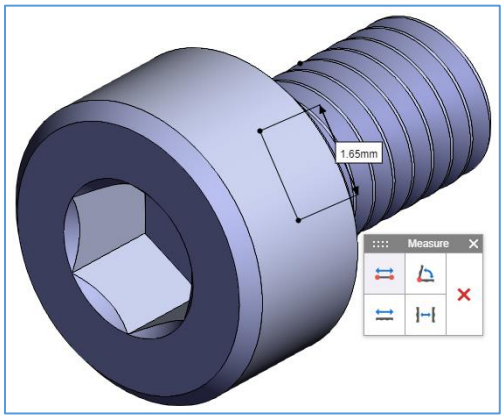

Figure 470.

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9.10.2.7 Browsing the CAD Model

You can use the **Model Browser** to switch quickly between CAD Model viewing positions. The **Model Browser** appears at the left side with the **Views** tab. It displays viewing positions options specific to the CAD Model. Click an option to apply its view. Refer to section *9.10.2.1 Using the Viewing Toolbars* to access the button.

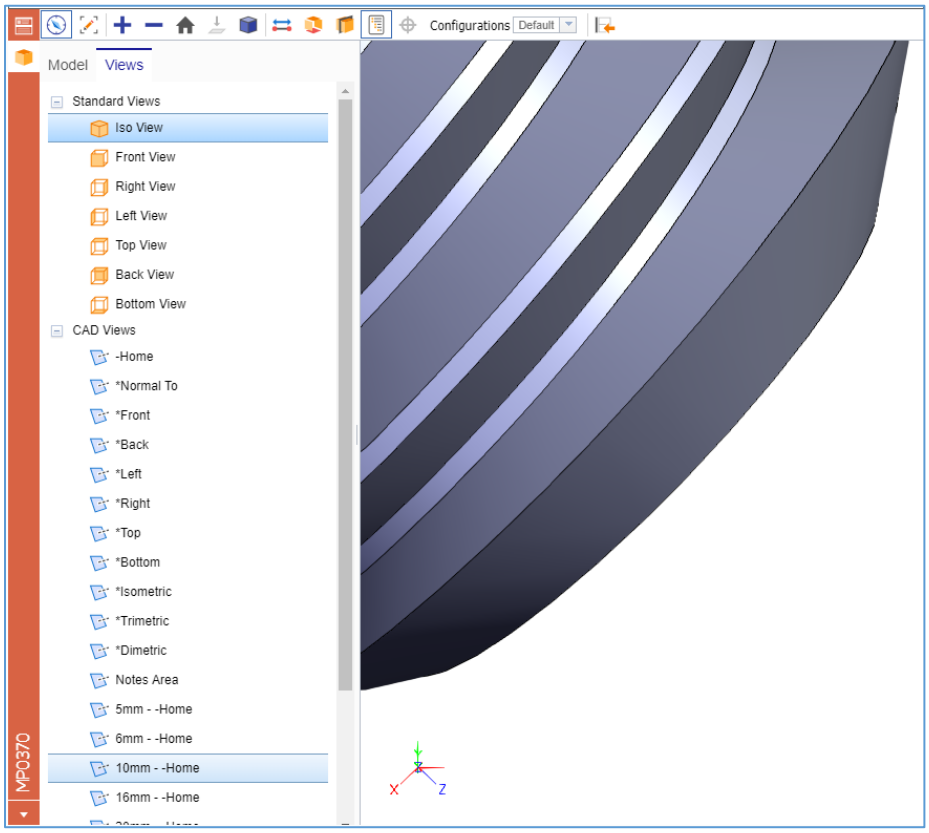

Figure 471.

For assemblies, the **Model Browser** provides the **Model** tab for quick navigation through the assembly structure. It appears as a tree of CAD Documents. Click a part on the CAD Model, and its CAD Document is highlighted in the tree. You can also click a CAD Document in the tree, and its part is highlighted on the CAD Model.

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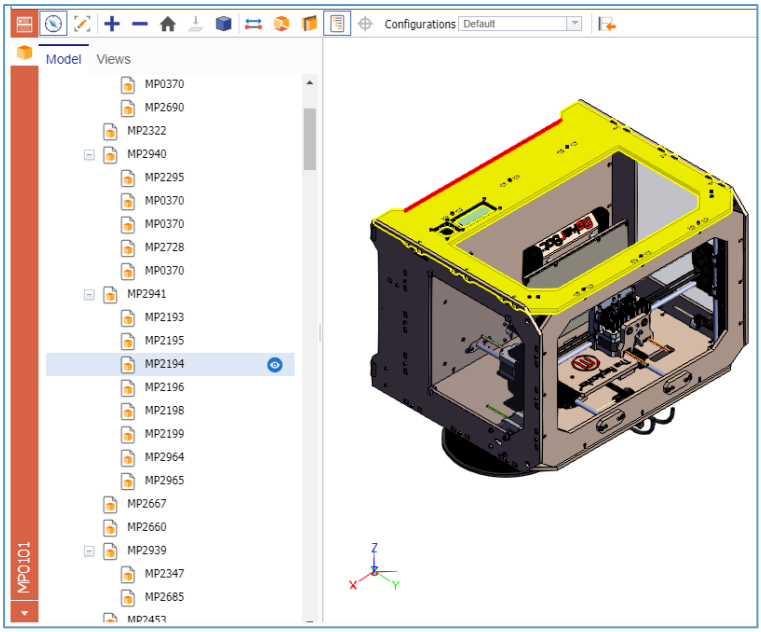

Figure 472.

Each CAD Document has the **Toggle Part Display** button that enables you to hide/show this part on the CAD Model. Hidden parts in the CAD Documents appear light grey in the tree.

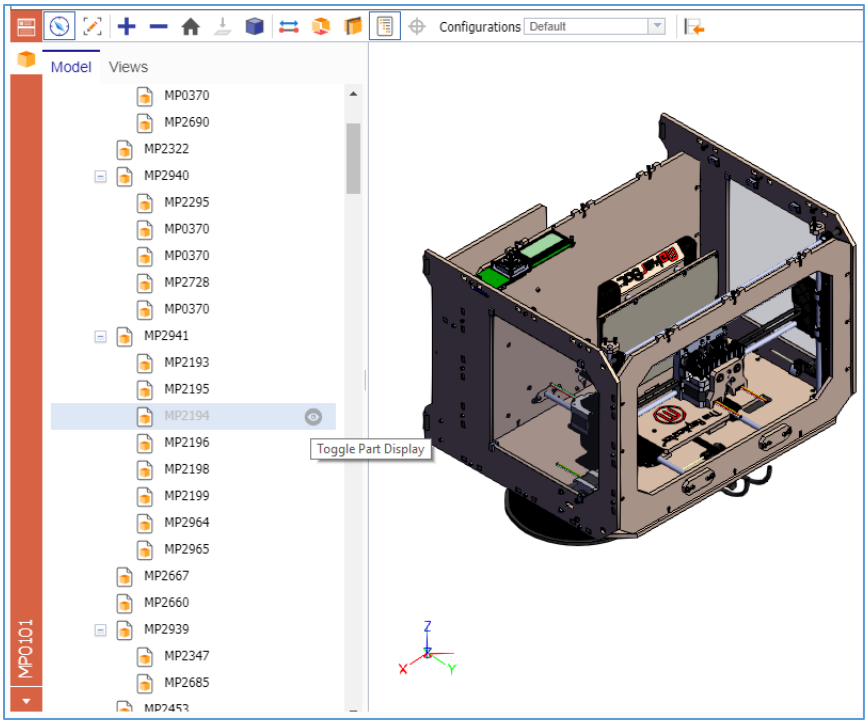

Figure 473.

The action menu is available for CAD Document in the tree.

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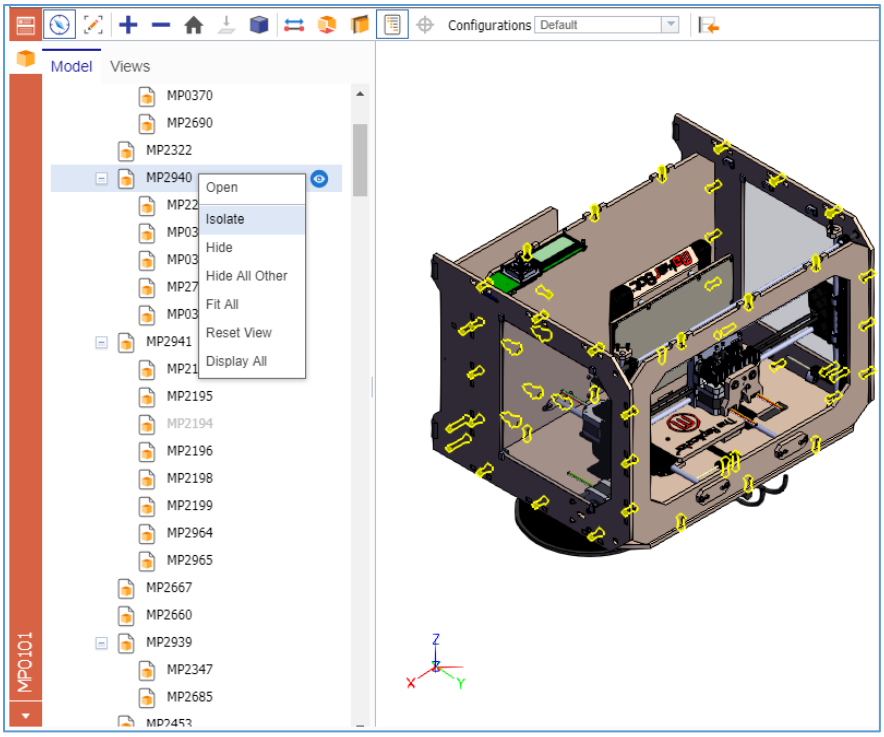

Figure 474.

Click the **Model Browser** button on the **Standard Viewing** toolbar to quit the Model Browser.

To show hidden parts, click **Display All** in the action menu.

9.10.3 Marking up CAD Models

The CAD integration subscription enables you to mark areas of interest on CAD Models right in Aras Innovator. To do so, position the CAD Model appropriately and then use a **Markup** toolbar as described in the following subsections. The Model action menu and viewing functionality are not available in markup mode. To use them, launch viewing mode.

9.10.3.1 Using the Markup Toolbars

Click the **Markup** toolbar button to launch markup mode and access the **Basic Markup** toolbar. The following buttons appear:

Figure 475.

1. **Scribble** shows/hides a toolbar that enables you to draw arbitrary lines on the CAD Model.
2. **Highlight** shows/hides a toolbar that enables you to draw rectangular areas on the CAD Model.
3. **Label** shows/hides a toolbar that enables you to add labels to the CAD Model.
4. **Delete** removes selected markup items from the CAD Model.
5. **Switch To Standard Toolbar** displays the **Standard Markup** toolbar.

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The **Standard Markup** toolbar includes the same buttons with the exception of the **Switch To Standard Toolbar** button. The **Switch To Basic Toolbar** button appears instead. There are additional buttons on the **Standard Markup** toolbar:

Figure 476.

1. **Select** selects markups on the CAD Model.
2. **Download File** downloads a .jpg image of the CAD Model.
3. **Print** uses the standard browser print function for CAD Model images. Depending on the browser and your specific configuration, various print choices, such as printing to a printer or saving to PDF, are available.
4. **Switch to Basic Toolbar** shows the **Basic Markup** toolbar.

Unlike the **Basic Markup** toolbar, the **Standard Markup** toolbar is dynamic. The **Standard Markup** toolbar does not show/hide an additional toolbar containing functionality for a selected markup feature (buttons 1-3), it displays functionality for the selected markup feature. The selected feature and functionality options are enclosed by blue boxes. To hide the functionality options, click the selected feature.

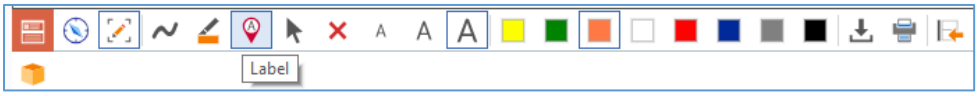

Figure 477.

Markup features discussed in the following subsections assume that you have accessed the corresponding feature.

9.10.3.2 Drawing on CAD Models

You can draw arbitrary lines on a CAD Model using the scribble feature. Refer to section *9.10.3.1 Using the Markup Toolbars* to access the button.

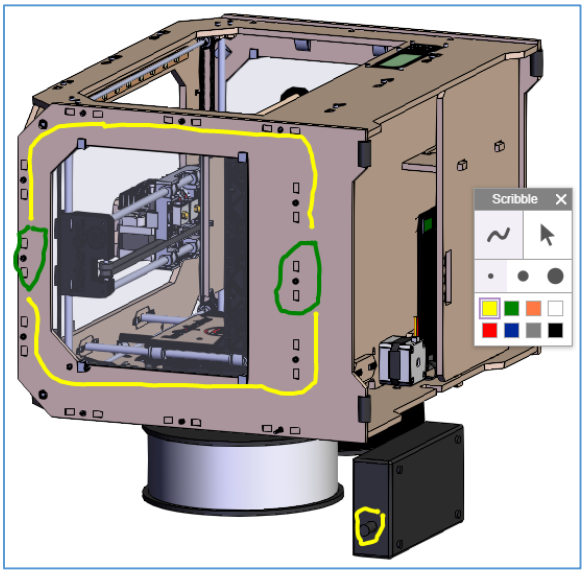

Figure 478.

When accessed from the **Basic Markup** toolbar, the scribble feature appears as the **Scribble** toolbar.

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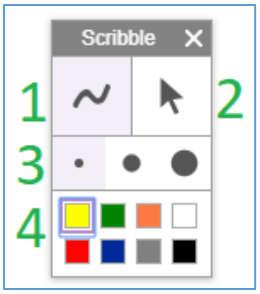

Figure 479.

When accessed from the **Standard Markup** toolbar, the scribble feature is hosted on this toolbar.

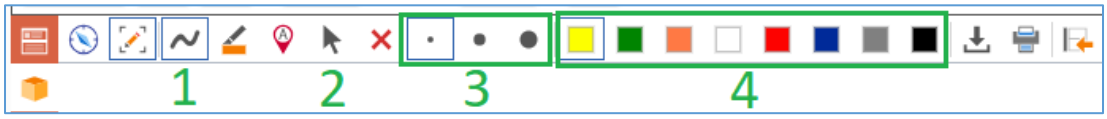

Figure 480.

The scribble feature provides the following functionality:

1. **Scribble** draws arbitrary lines on the CAD Model.
2. **Select** selects markups on the CAD Model.
3. You can select one of the following line widths: **Small**, **Medium**, and **Large**.
4. You can select one of the colors displayed on the toolbar.

Click a feature or option to use it.

Click **Select** and then click a line to select it. When selected, the line has **blue edges with circles**. You cannot reposition selected lines.

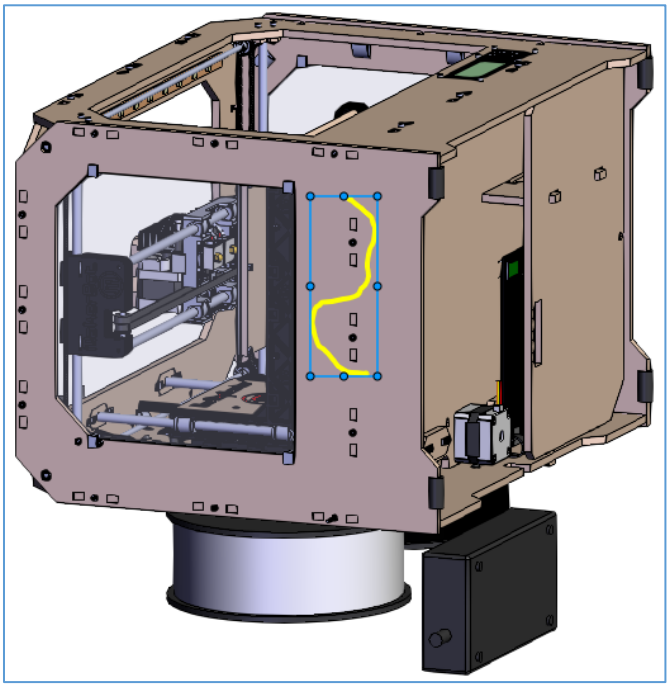

Figure 481.

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9.10.3.3 Highlighting Areas on CAD Models

You can specify arbitrary rectangular areas on a CAD Model using the highlighting feature. Refer to section *9.10.3.1 Using the Markup Toolbars* to access the button.

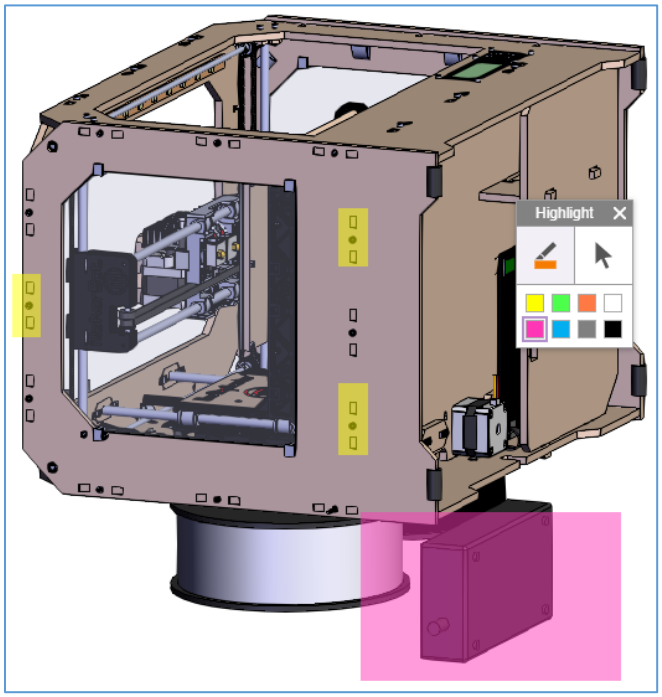

Figure 482.

When accessed from the **Basic Markup** toolbar, the highlighting feature appears as the **Highlight** toolbar.

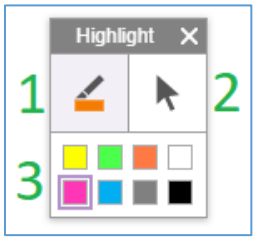

Figure 483.

When accessed from the **Standard Markup** toolbar, the highlighting feature is hosted on this toolbar.

Figure 484.

The highlighting feature provides the following functionality:

1. **Highlight** draws arbitrary rectangles on the CAD Model.
2. **Select** selects markups on the CAD Model.
3. A set of rectangle colors.

Click a feature or option to use it.

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Click **Select** and then click a rectangle area to select this area. When selected, the rectangle area has **blue edges with circles**.

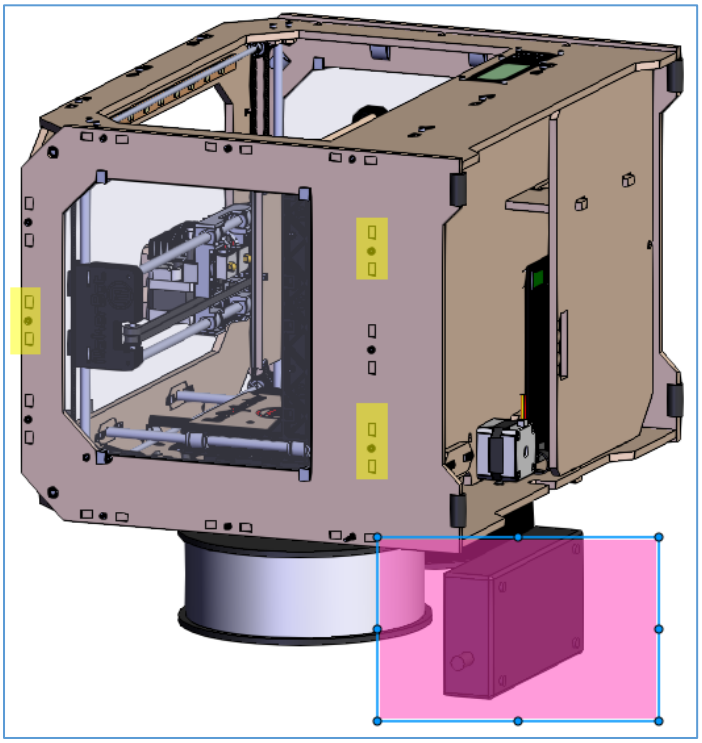

Figure 485.

Drag the **blue circles** on the selected rectangle **edges** to reposition the rectangle.

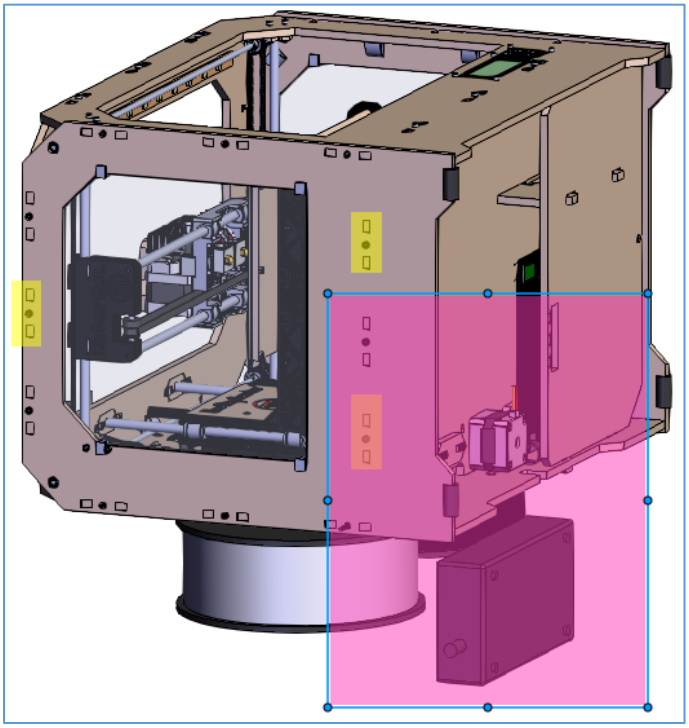

Figure 486.

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9.10.3.4 Putting Labels on CAD Models

You can label parts of a CAD Model using the label feature. Refer to section *9.10.3.1 Using the Markup Toolbars* to access the button.

When accessed from the **Basic Markup** toolbar, the label feature appears as the **Label** toolbar.

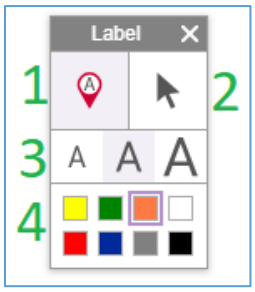

Figure 487.

When accessed from the **Standard Markup** toolbar, the label feature appears on this toolbar.

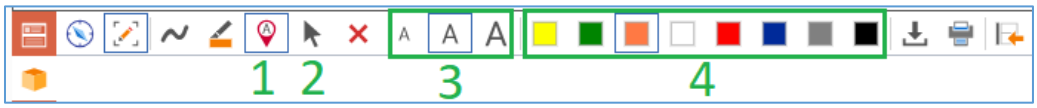

Figure 488.

The label feature provides the following functionality:

1. **Label** adds labels to the CAD Model.
2. **Select** selects markup items on the CAD Model.
3. A set of font sizes: **Small**, **Medium**, and **Large**.
4. A set of label frame colors.

Click a feature or option to use it.

To create a label:

1. Click the **Label** button.
2. Click on the area of the CAD Model that you want to label.
3. Enter the appropriate text inside the label.

Click **Select** and then click a label to select it. When selected, the label has **blue edges with a circle at the bottom**.

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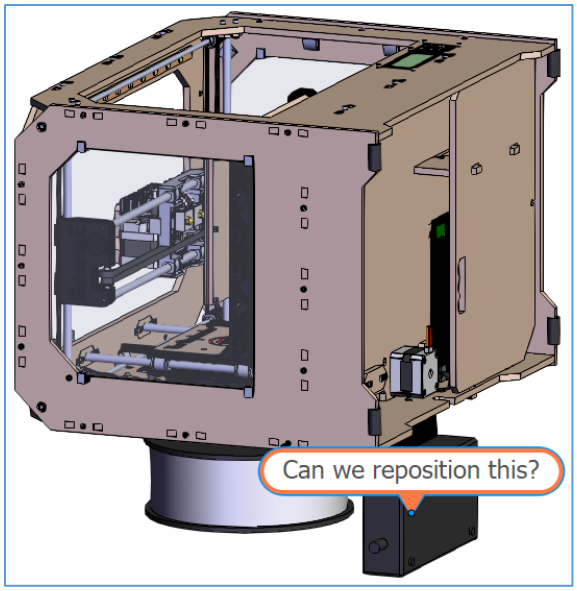

Figure 489.

To reposition a label, select and drag **its colored frame from right above the blue bottom circle** to the appropriate position on the CAD model.

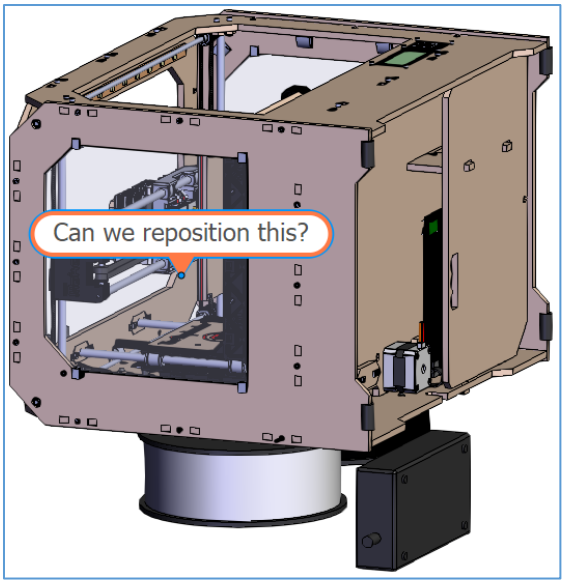

Figure 490.

To change where a label points to, select the label, and drag **the blue bottom circle**.

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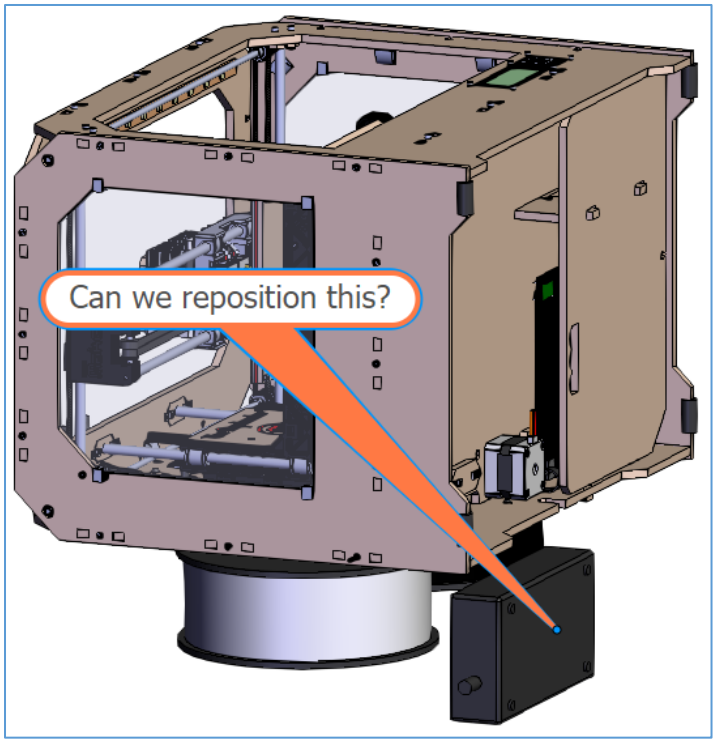

Figure 491.

To enter or change the label text, click inside the label, and edit the text.

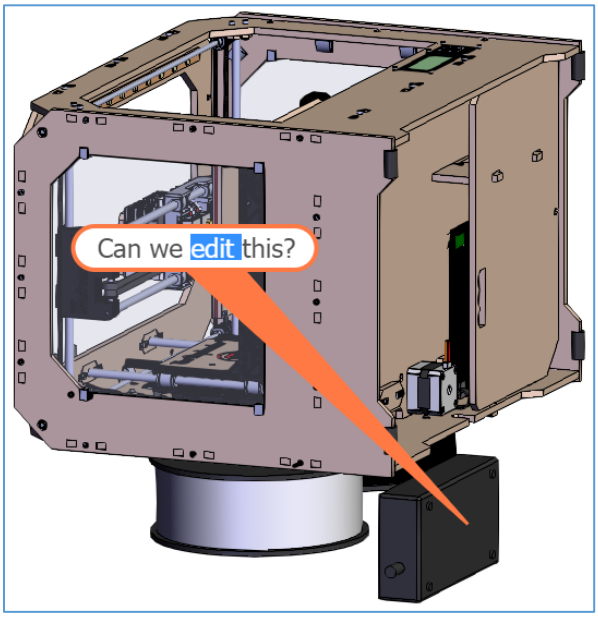

Figure 492.

9.10.3.5 Selecting Markups on CAD Models

You can select a single or several markup items for further actions. Selected items have **bold blue edges** with **circles**. Further actions, position and number of the **circles** depend on the markup type of each item.

To select a single markup item, click **Select** on a **Markup** toolbar and then click the **item**.

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To select several markup items, click **Select** on a **Markup** toolbar and drag the cursor to specify the rectangular selecting area.

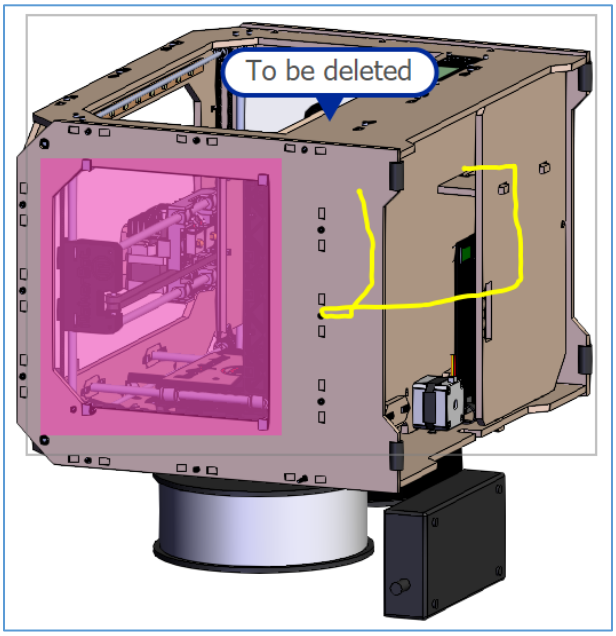

Figure 493.

All the markup items within the selected area become selected.

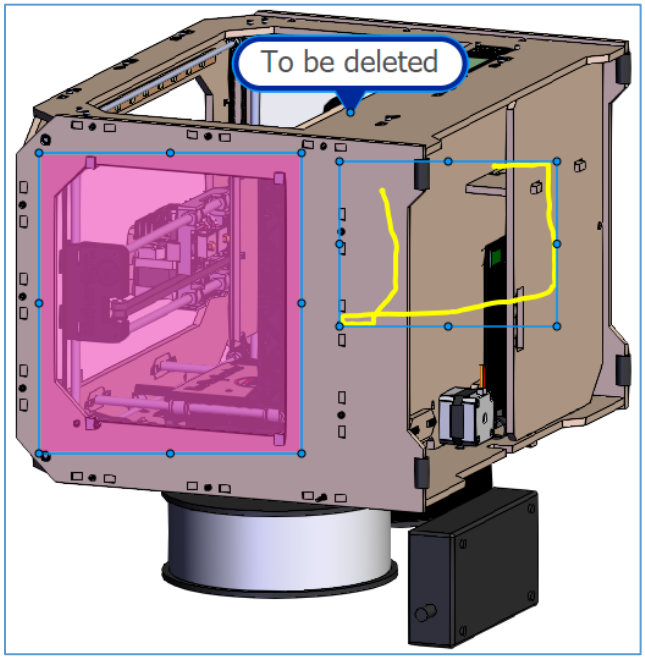

Figure 494.

9.10.3.6 Deleting Markups on CAD Models

To delete markup items, select them and then use one of the following options:

- Click **Delete** on a **Markup** toolbar.
- Press **Delete** on your keyboard.

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9.10.4 Downloading CAD Models

Click **Download File** on the **Standard Markup** toolbar. The standard downloading process of your browser saves a .jpg image of the CAD Model representation on your local machine. Refer to section *9.10.3.1 Using the Markup Toolbars* to access the button.

9.10.5 Printing CAD Models

Click **Print** on the **Standard Markup** toolbar. The standard print function of your browser starts. Depending on the browser and your specific configuration, various print choices, such as printing to a printer or saving to PDF, are available. Refer to section *9.10.3.1 Using the Markup Toolbars* to access the button.

9.11 Deleting CAD Documents

It is possible to delete all or some versions of a CAD Document. In the former case, the CAD Document is deleted from Aras Innovator completely. For details on the latter case, refer to section *4.1.2 Version Deletion*.

To delete a CAD Document completely, you must have **Delete** rights granted in Permissions for all Life Cycle states associated with that CAD Document. For example, if the new CAD Document revision is currently in the Preliminary state, but has Released revisions, you must have the **Delete** rights granted in Permissions for both life cycle states. For details on access rights, refer to section *3. Item Permissions*. This subsection assumes that you have all necessary rights.

You cannot delete a CAD Document, which is attached to a Part or another CAD Document.

Note: A claimed CAD Document cannot be deleted.

You can delete a CAD Document either from its view or from using the action menu in the CAD Documents Search Page.

Use the following procedure to delete a CAD Document from its view:

1. Go to the **CAD Document** view.
2. On the **CAD Document** toolbar, click **More**, select **Delete**, and click **Delete All Versions**.

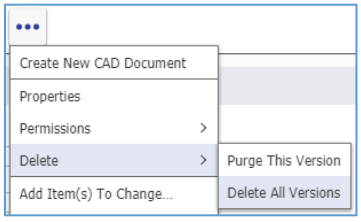

Figure 495.

A notification dialog appears.

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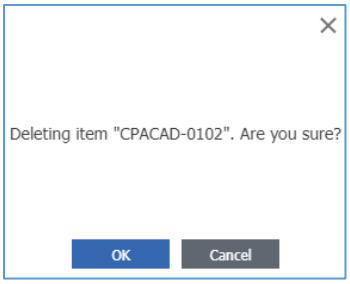

Figure 496.

3. Click **OK**.

The CAD Document is deleted.

Use the following procedure to delete a Document from its action menu:

1. Go to the Documents Search Grid.
2. Right-click the **CAD Document** and then click **Delete All Versions**. A notification dialog appears.

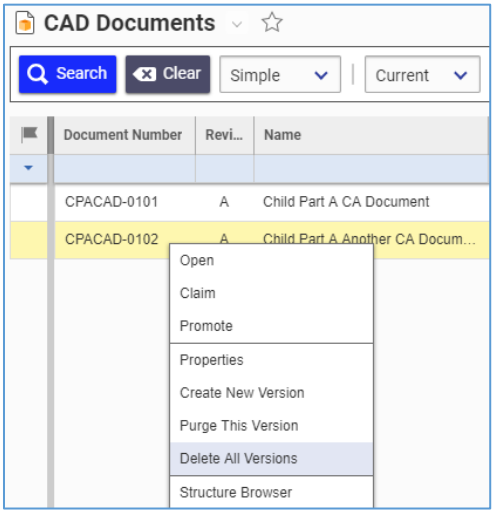

Figure 497.

3. Click **OK**. The CAD Document is deleted.

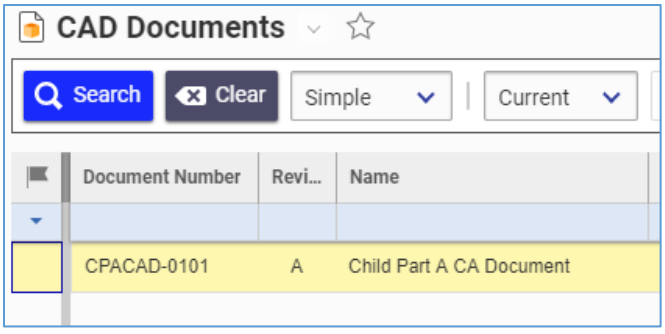

Figure 498.

Aras Innovator returns an error if you try to delete a CAD Document and do not have **Delete** rights granted for at least one Permission for any Life Cycle state the CAD Document revisions have. For details, refer to section *3 Item Permissions*.

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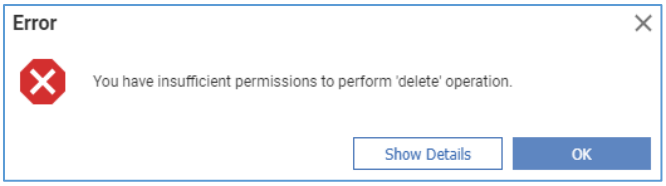

Figure 499.

Aras Innovator returns an error if you try to delete a CAD Document assigned to a Part. You need to remove the CAD Document from a Part first if allowed. For details, refer to section *9.5.3 Removing CAD Documents from a Part*.

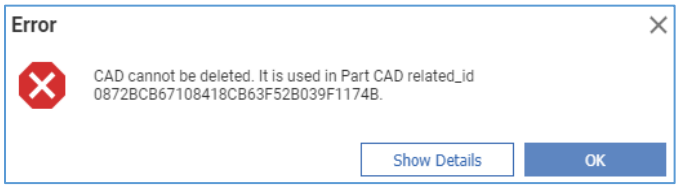

Figure 500.

Aras Innovator returns an error if you try to delete a CAD Document used in a CAD Document structure. You need to remove the CAD Document from its Parent first if allowed. For details, refer to section *9.6.4 Removing a CAD Documents Relationship*.

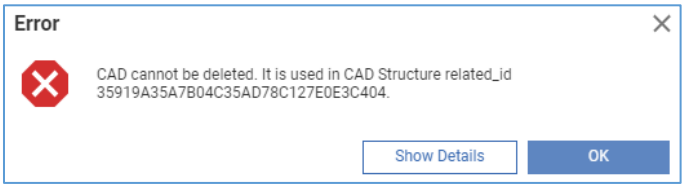

Figure 501.

If a CAD Document has only one version, you can delete it using the **Purge This Version** feature. For details about this feature, refer to section *4.1.2 Version Deletion*. For details about how to find out whether the current version is the only one, refer to section *4.1.1 Versions Exploration*.

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10 Product

A Product is an additional item type that represents something that a customer will buy from your company. A Product is related to one or more models, which are then related to a parent Part item that contains the top-level BOM for the Product Model. Products may or may not be useful in your organization depending on your requirements and are not necessary for release or modification of Parts. As the Product is not directly under change management control, it has no Life Cycle.

10.1 Creating a Product

Use the following procedure to create a Product:

1. Go to **Contents --> Design --> Products**.
2. Click **Create New Product**. The new Product view appears.

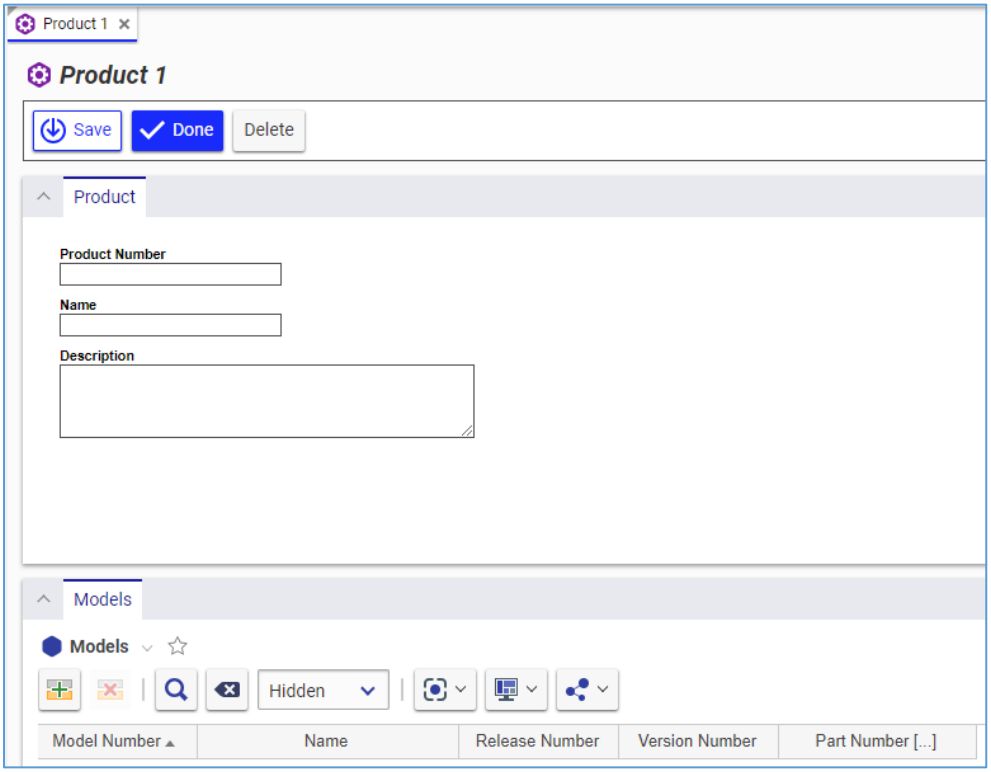

Figure 502.

3. Enter ***the Product number*** in the **Product Number** text box.
4. Enter ***the name of the Product*** in the **Name** text box.
5. If it is necessary, provide additional information about the Product in the **Description** field.
6. Add Models as described in section *10.2 Adding Models to a Product*.
7. Click either **Save** or **Done** on the **Product** toolbar. The Product is created.

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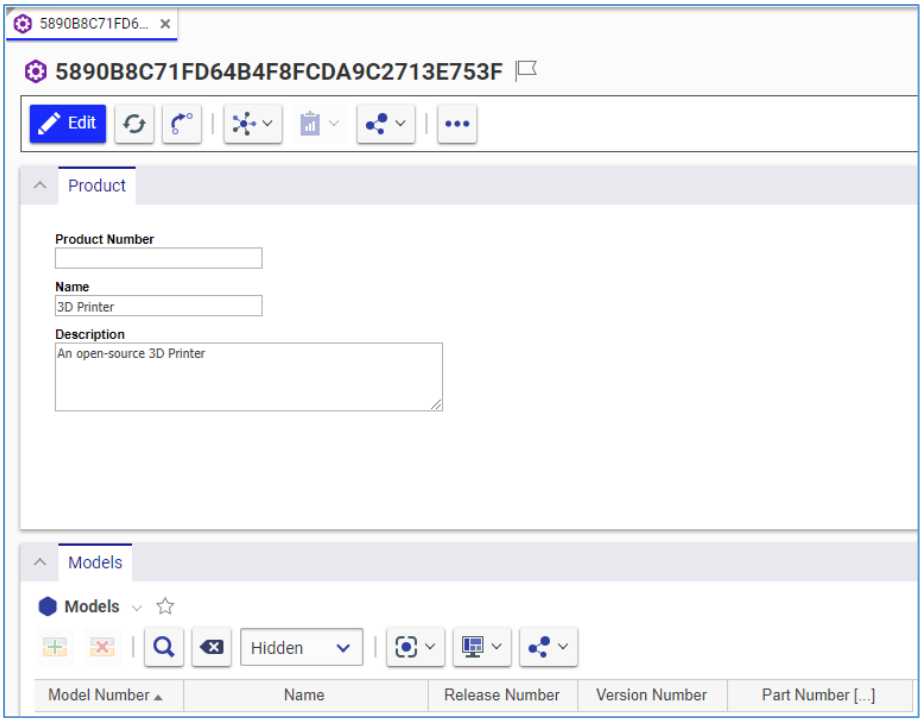

Figure 503.

The Product is now available via search, subject to permissions.

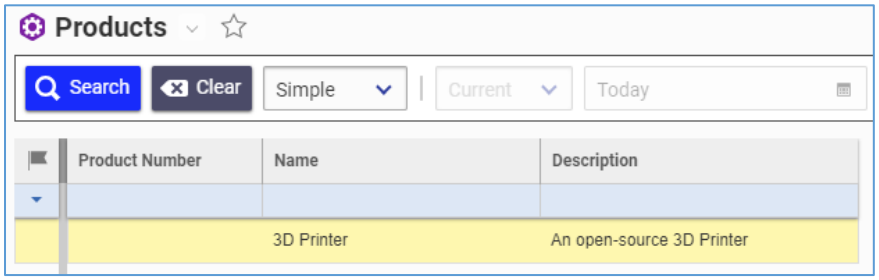

Figure 504.

10.2 Adding Models to a Product

Use the following procedure to add a Model to a Product:

1. Open the **Product** view.
2. Click **Edit** on the **Product** toolbar.
3. Go to the **Models** accordion tab.
4. Click **Add Row** on the **Models** accordion toolbar. A new row appears at the bottom of the **Models** grid.

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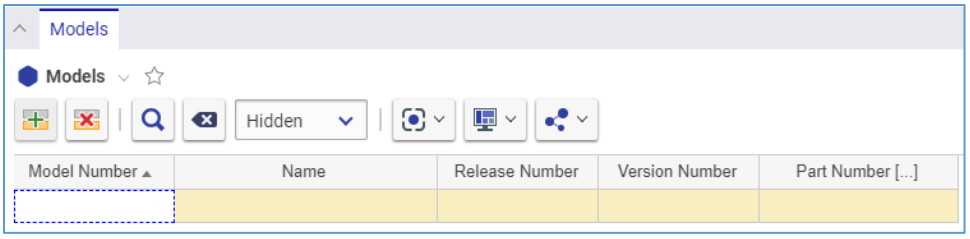

Figure 505.

5. Enter ***the Model number*** in the **Model Number** cell.
6. Enter ***the Model name*** in the **Name** cell.
7. For software products, enter ***the appropriate number*** in the **Release Number** cell.
8. For software products, enter ***the appropriate number*** in the **Version Number** cell.
9. Click the **ellipses** button in the **Part Number** cell. The **Search dialog – Part** appears.
10. Using the standard search procedure, search for and select a Part representing this Model. The **Number** of the selected Part appears in the **Part Number** cell.
11. Click either **Done** or **Save** on the **Product** toolbar. The Model is attached to the Part.

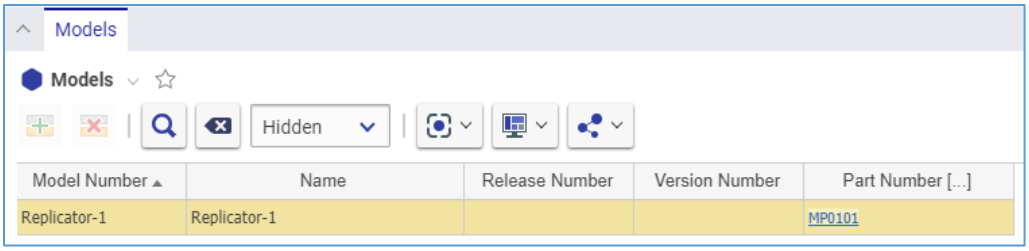

Figure 506.

10.3 Removing Models from a Product

Use the following procedure:

1. Follow steps 1-3 of the Adding Models to a Product procedure.
2. Click the **Model** and then click **Delete Row** on the **Models** accordion toolbar. The **Model** becomes unavailable.

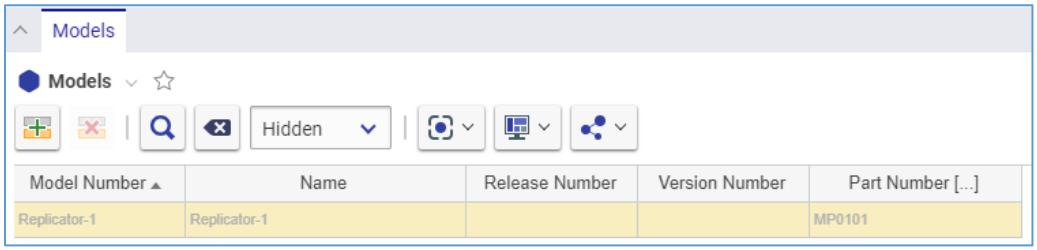

Figure 507.

3. Click either **Save** or **Done** on the **Product** toolbar. The **Model** disappears from the grid.

Note: The **Model** disappears immediately if the Product was not saved after it was added.

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10.4 Deleting a Product

You can delete a Product either from its view or by using the action menu in the Product Search Page.

Note: A claimed Product cannot be deleted.

To delete a Product using its view, follow this procedure:

1. Go to the **Product** view.
2. On the **Product** toolbar, click **More**, select **Delete**, and click **Delete**.

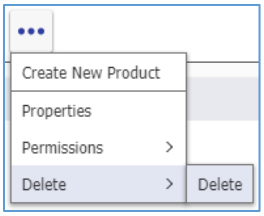

Figure 508.

A notification dialog appears.

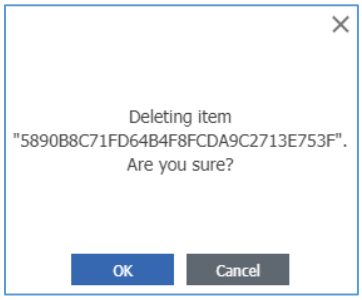

Figure 509.

3. Click **OK**.

The Product is deleted.

Use the following procedure to delete a Product using the action menu:

1. Go to the Products Search Grid Page.
2. Right-click the **Product** and then click **Delete All Versions**. A notification dialog appears.

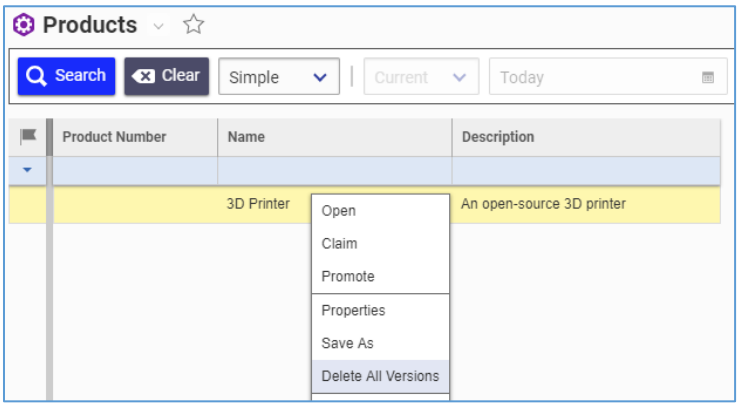

Figure 510.

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3. Click **OK**. The Product is deleted.

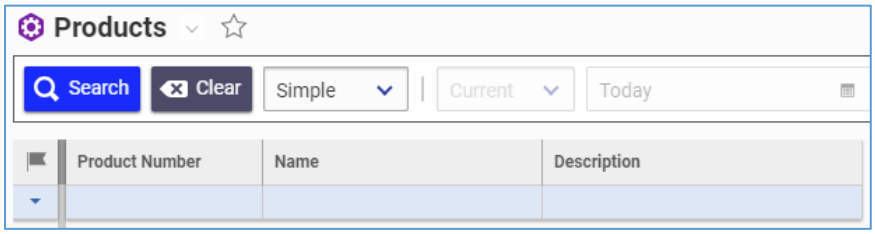

Figure 511.

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11 Exploring Usage and Comparing Items

The Product Engineering application features the Where Used and Structure browsers to explore and compare items and their structures.

In this section, the term *Item* means an item of explorable item types: Parts, Manufacturers, Manufacturer Parts, Vendors, Documents, and CAD Documents. Examples shown on Parts are generic and applicable to other Items. However, detailed information on an Item depends on its type. The appropriate subsections of item types provide additional information or features for explorations specific to these item types.

11.1 Finding Where an Item is Used

The **Where Used** browser shows upside-down trees of the Item and corresponding hierarchies where the given item is on the top with its Parents under, if any, and each branch represents a separate usage of the given Item including associated and related Items. There are also separate branches for single versions of each Item.

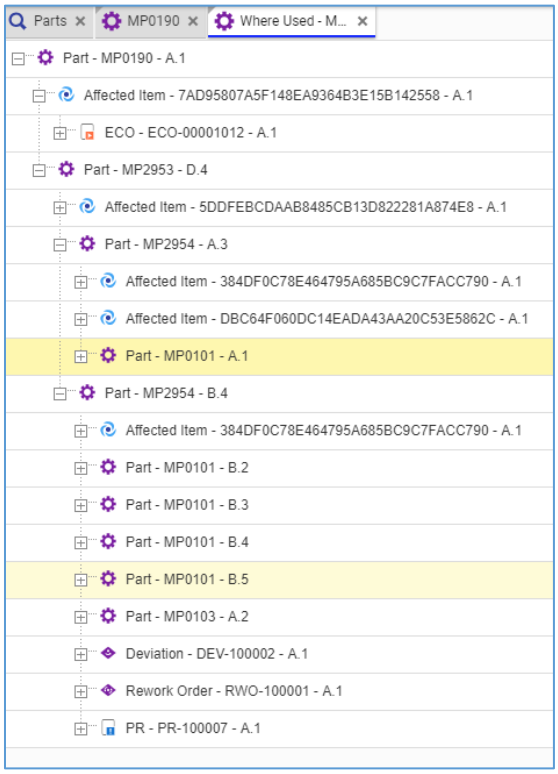

Figure 512.

To access the **Where Used** browser for an Item, use one of the following methods:

- Go to the Item Search Grid Page, right-click the **Item**, and then click **Where Used**.

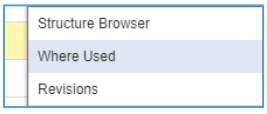

Figure 513.

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- Open the Item view, click **Navigate** on the **Item** toolbar, and then click **Where Used** in the drop-down menu.

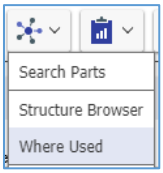

Figure 514.

When you access the **Where Used** browser, it appears as a new Aras Innovator view.

To quit the **Where Used** Browser, close its view in Aras Innovator.

11.2 Comparing Items

To compare side-by-side complex multi-level hierarchies of Items, Aras Innovator offers the Structure Browser. You can also use it to explore the usage of a single Item.

There are several ways to access the Structure Browser:

- Go the Item Search Grid Page, right-click an **Item** to be compared, and then click **Structure Browser**.

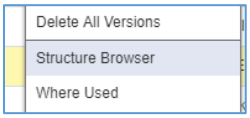

Figure 515.

- Open the view of an Item to be compared. Click **Navigate** on the **Item** toolbar, and then click **Structure Browser**.

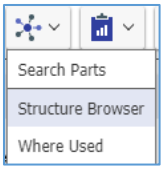

Figure 516.

Later in this section, it is assumed that you have accessed the Structure Browser.

When you access the Structure Browser, it appears as a new Aras Innovator view showing the Item hierarchy tree where you can see the Number and Revision for each Item.

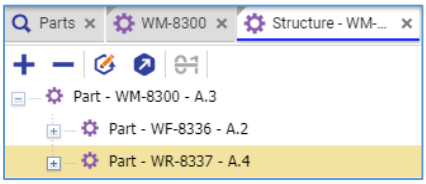

Figure 517.

In addition to the standard tree navigation features, there are the following buttons in the **Structure Browser** toolbar:

- **Expand All**, which opens the whole hierarchy tree.

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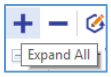


Figure 518.

- **Collapse All**, which closes the whole hierarchy tree.

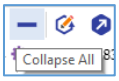


Figure 519.

To quite the Structure Browser, close its view.

11.2.1 Comparing Different Item Versions

Use the following procedure to compare the current version of an Item with an older one:

1. Click **Side-by-side with other Version** on the Structure Browser toolbar.

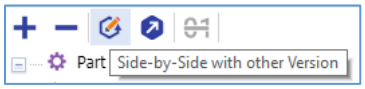
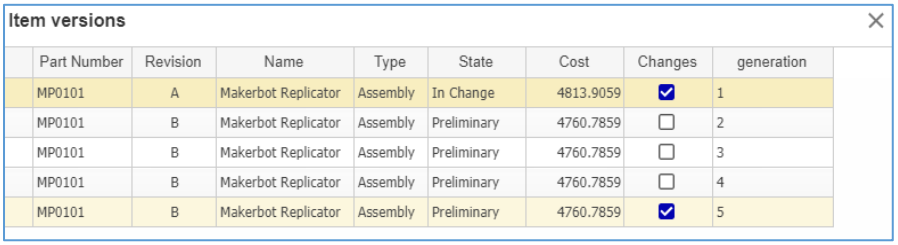


Figure 520.

The **Item versions** dialog appears.



Part Number	Revision	Name	Type	State	Cost	Changes	generation
MP0101	A	Makerbot Replicator	Assembly	In Change	4813.9059	☑	1
MP0101	B	Makerbot Replicator	Assembly	Preliminary	4760.7859	☐	2
MP0101	B	Makerbot Replicator	Assembly	Preliminary	4760.7859	☐	3
MP0101	B	Makerbot Replicator	Assembly	Preliminary	4760.7859	☐	4
MP0101	B	Makerbot Replicator	Assembly	Preliminary	4760.7859	☑	5

Figure 521.

2. Double-click the **version** to be compared. The hierarchy tree of the selected Item version appears on the right side of the Structure Browser, and the **Highlight** button becomes available on the **Structure Browser** toolbar.

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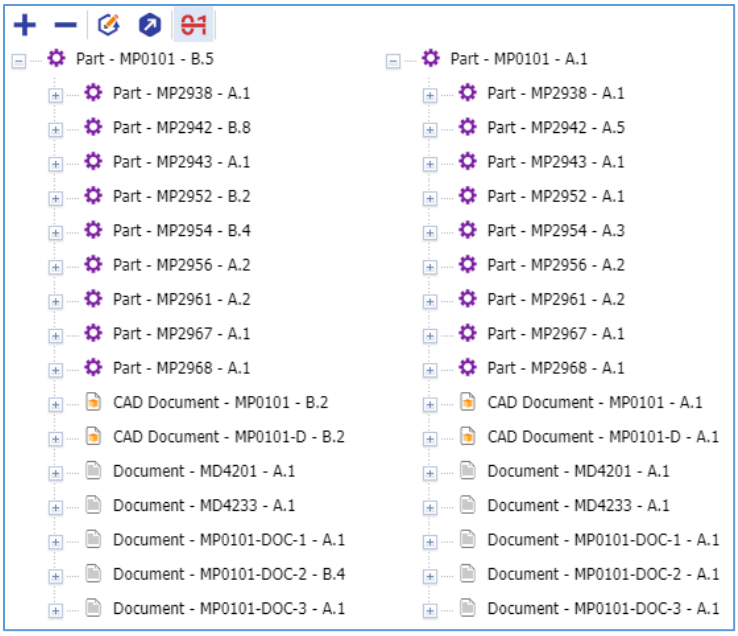

Figure 522.

3. Click **Highlight** on the **Structure Browser** toolbar.

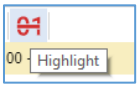

Figure 523.

The **trees** open. Differences are highlighted.

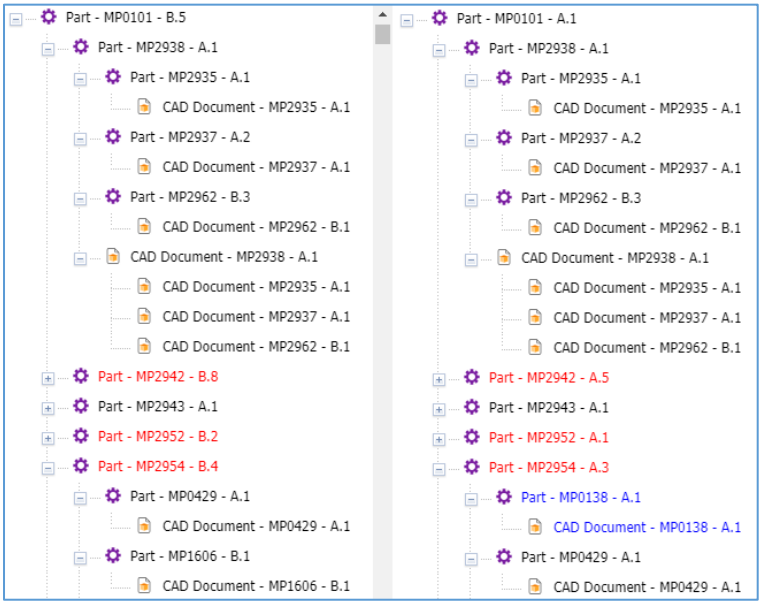

Figure 524.

4. View the comparison of the Item versions, where each Item is color-highlighted:
   - Black means that both Item versions use the same version of this Item.

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- Red means that both Item versions have different versions of this Item.
- Blue means that this Item does not exist in the opposite Item version.

5. If it is necessary to view detailed information on an Item version, double-click this **Item**, to open its view.
6. Repeat this procedure if you need to compare with another version.

Note: You cannot compare more than two versions of an Item in one Structure Browser tab.

11.2.2 Comparing Different Items

Use the following procedure to compare the hierarchies of two different CAD Documents:

1. Click **Side-by-Side with other *Item Type*** in the Structure Browser toolbar. The **Search dialog - *Item Type*** appears.

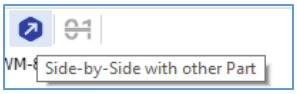

Figure 525.

2. Using the standard search procedure, search for and select the Item to be compared. The tree of the selected Item hierarchy appears on the right side of the Structure Browser, and the **Highlight** button becomes available on the **Structure Browser** toolbar.

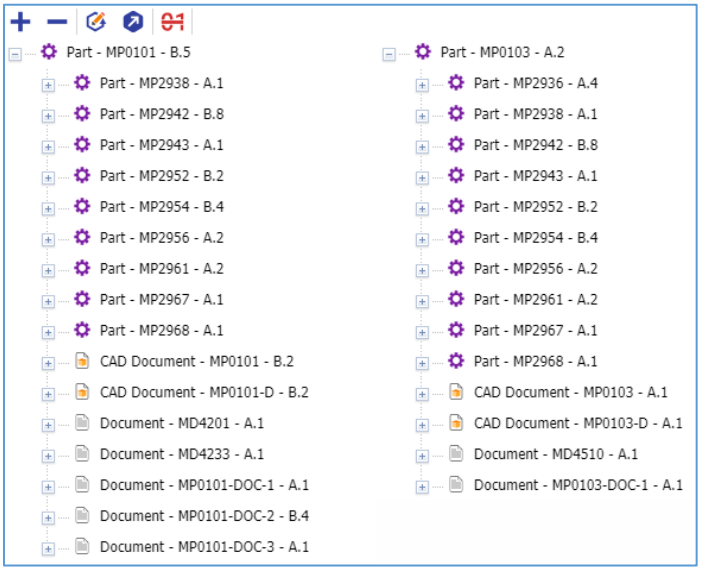

Figure 526.

3. Click **Highlight** in the **Structure Browser** toolbar. The **trees** appear with differences highlighted.

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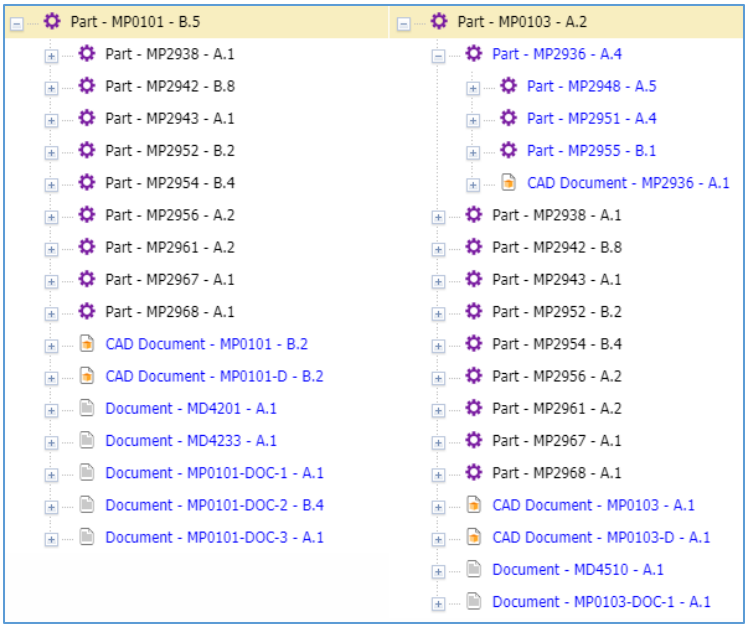

Figure 527.

4. View the comparison of the Items, where each Item is color-highlighted:
   - Black means that both Item hierarchies use the same version of this Item.
   - Red means that both Item hierarchies have different versions of this Item.
   - Blue means that this Item does not exist in the opposite Item hierarchy.
5. If it is necessary to view detailed information on an Item, double-click this **Item**, to open its view.
6. Repeat this procedure if you need to compare it with another Item hierarchy.

Note: You cannot compare more than two Item hierarchies in one Structure Browser tab.

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12 Visual Collaboration for Discussing Items

You can discuss Parts, Documents, CAD Documents, CAD Models, etc. with your team right in Aras Innovator. To do so, use the discussion feature as described in the following subsections.

In this section, the term *Item* means an item of discussable item types: Parts, Documents, CAD Documents, CAD Models, etc. Examples shown on CAD Documents and CAD Models are generic and applicable to other Items.

To access the discussion feature, click the **Discussion** button on the right of the **Item** toolbar:

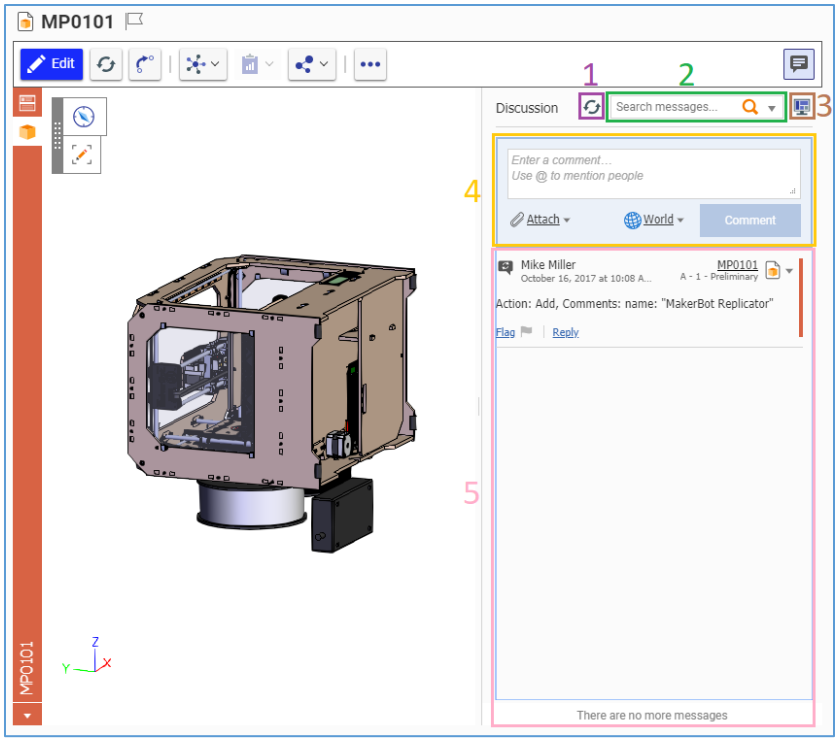

Figure 528.

1. Click the **Refresh** button to see the latest changes in the discussion.
2. Use the **Search** box to search for comment messages in the discussion.
3. Click the **Display Settings** button to change the discussion view.
4. Compose a message in the **Comment** field and click the **Comment** button to post it as part of a discussion.
5. The **Discussion** box displays all comment messages that are part of a discussion.

12.1 Searching Comments

You can use the **Search** box for simple and advanced searching of specific comment messages in a discussion. You can combine these two methods.

For a simple search, type your keywords in the **Search** box and press Enter on your keyboard.

For advanced search, click the **drop-down arrow** in the **Search** box and specify your search criteria in the following fields:

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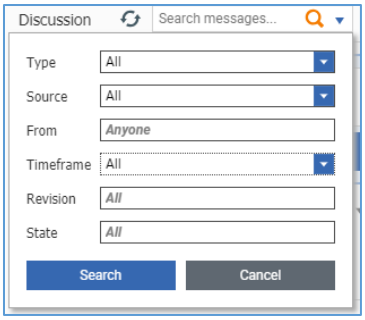

Figure 529.

- **Type** displays a drop-down list of comment message types: **All**, **All Comments**, **Text Comments Only**, **Snapshot Comments Only**, **Audio Comments Only**, **Video Comments Only**, **Automated Messages Only**.

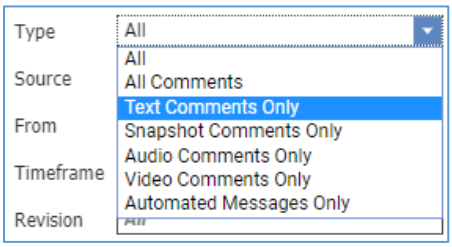

Figure 530.

- **Source** displays a drop-down list of comment messages: **All**, **This Item Only**.

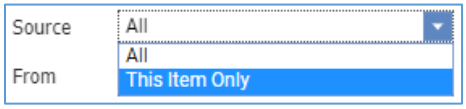

Figure 531.

- **From** displays the author name associated with the comment messages.
- **Timeframe** displays a drop-down list to enables you to specify the timeframe during which comment messages were created: **All**, **Within the Last**, **Date Range**.

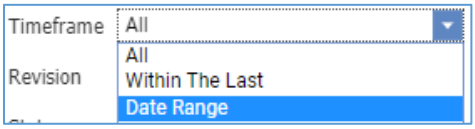

Figure 532.

- **Revision** enables you to specify a Revision value of the item for search.
- **State** enables you to specify a life cycle state for search.

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12.2 Setting up the Discussion Display

The **Display Settings** button enables you to configure the view of information that appears in a discussion.

Figure 533.

- **Show by** is a drop-down list to specify the order of comment messages: **Conversation**, **Thread Date**, **Message Date**.

Figure 534.

- **Display** is a drop-down list to specify the display type: **Standard**, **Review**.

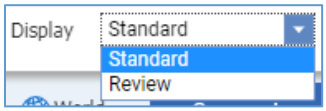

Figure 535.

12.3 Managing Your Comments

You can use the **Comment** box for composing messages and posting them in the discussion of an Item. To post one, enter your message in the text box and click **Comment**. You can also use the @ sign to send the message to specific people.

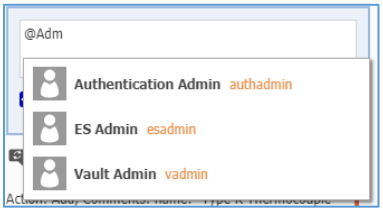

Figure 536.

By default, everyone can see a comment thread, including the message and all replies to it. An initial comment message has the **World** link when created. To change this accessibility, click the **World** link and then click the person you want to share the comment thread.

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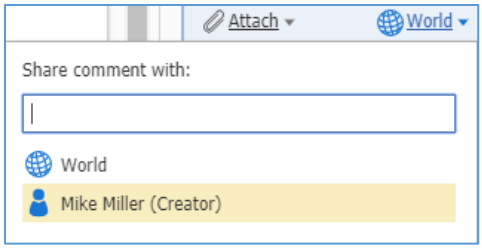

Figure 537.

The person's **name** replaces the **Word** link. Only you and this person can see this comment thread.

Figure 538.

If you want to add an image to your message, use the **Attach** link to attach the image file and click **Comment**. The **Attach** link displays the following options:

Note: You need to purchase a subscription for viewing and working with native CAD Models in Aras Innovator right from the corresponding Item and the discussion feature. Without this subscription, drawing and images are not available.

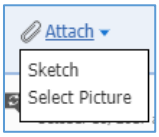

Figure 539.

- **Sketch** makes a snapshot of an Item view if you check the **Include snapshot** check box.

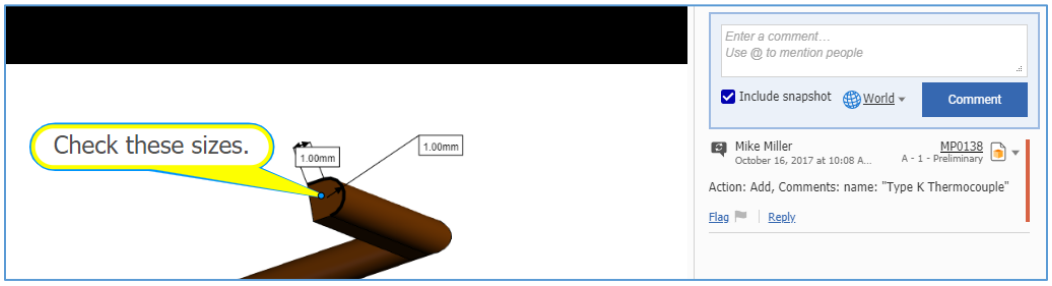

Figure 540.

Even if an Item has no 3D Model attached, you can use this feature to draw an arbitrary sketch using the markup tools.

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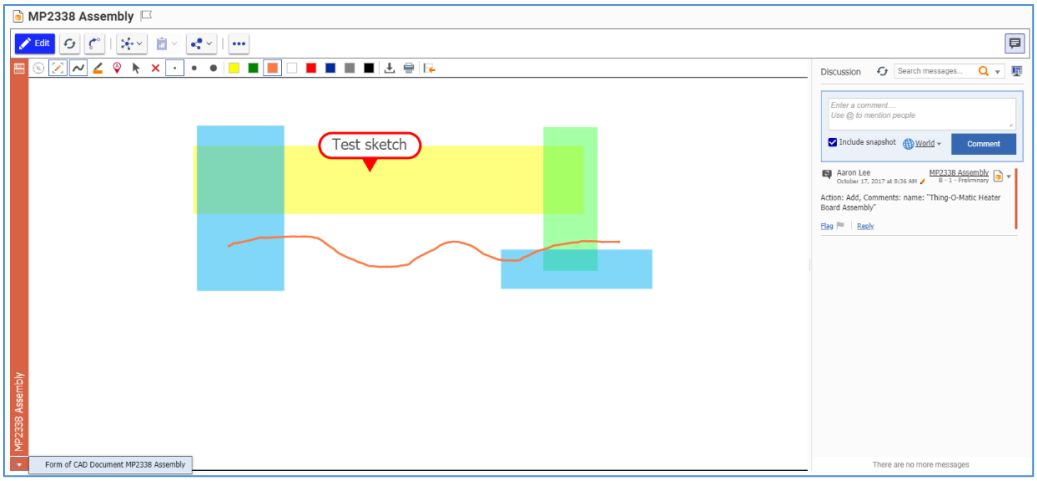

Figure 541.

- **Select Picture** opens the standard dialog of your operating system for file browsing. Search for and select an image. The uploaded image appears in the image view. You can draw on the uploaded image using the markup tools.

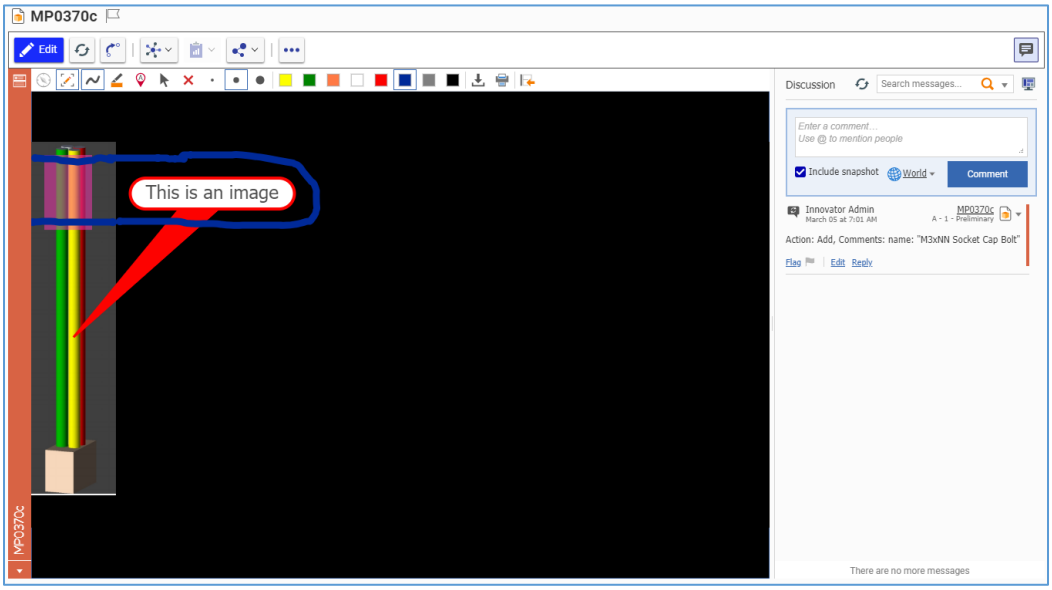

Figure 542.

Aras Innovator returns an error if a file selected for uploading is not a PNG, GIF, or JPEG image type.

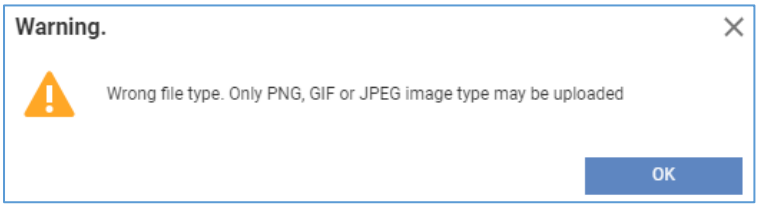

Figure 543.

When attached, the image appears as a thumbnail in a comment message.

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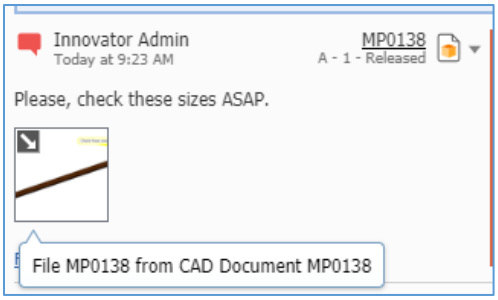

Figure 544.

Click the thumbnail, and the image appears in the Item view.

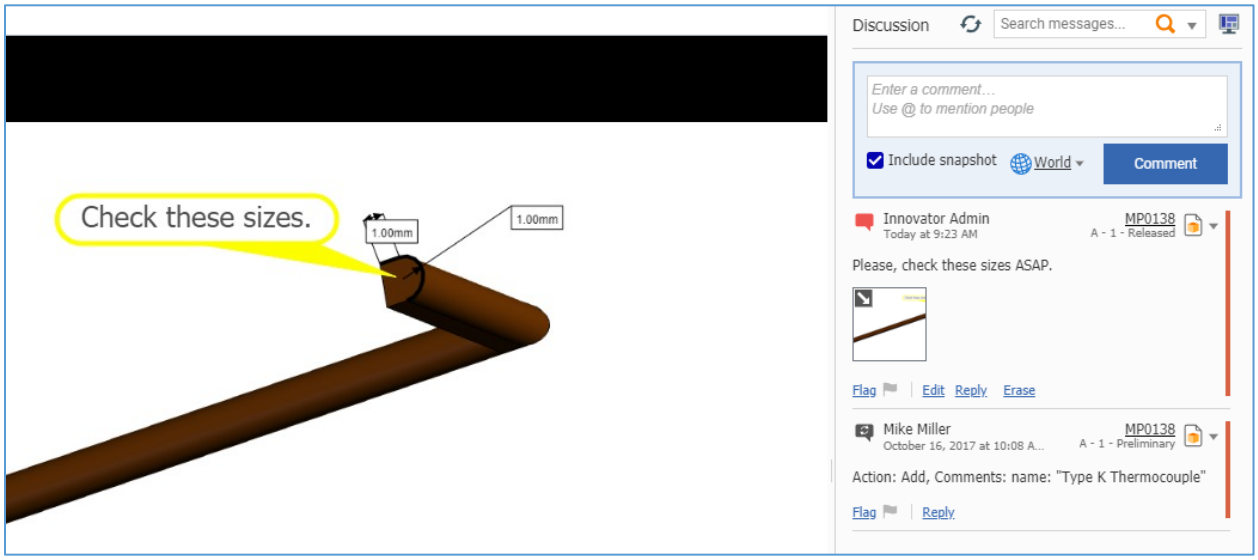

Figure 545.

If you need to edit your message, click the **Edit** link at the bottom of your comment, edit the message text, and click **Save**.

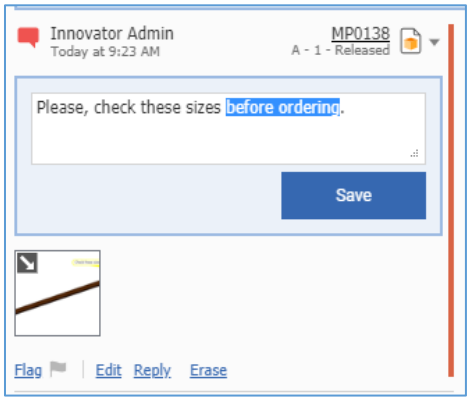

Figure 546.

You cannot edit or remove attached images. You can draw with the markup tools on the attached images. To save the changes, you need to attach the changed image as a snapshot to a new comment. To keep a history of changes, you can attach the changed snapshot as a reply to your own comment.

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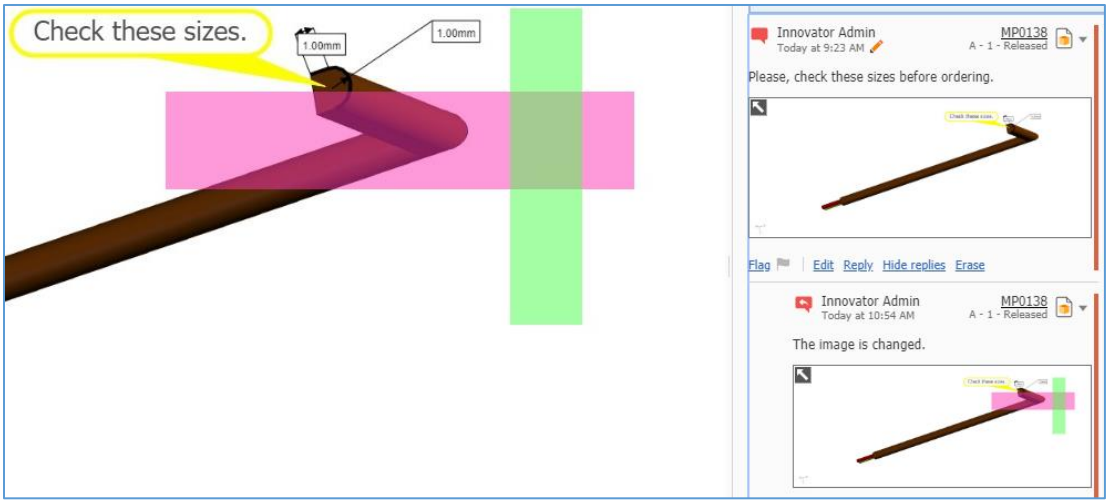

Figure 547.

To enlarge or reduce a thumbnail, click the **arrow** button at the top left corner of the thumbnail.

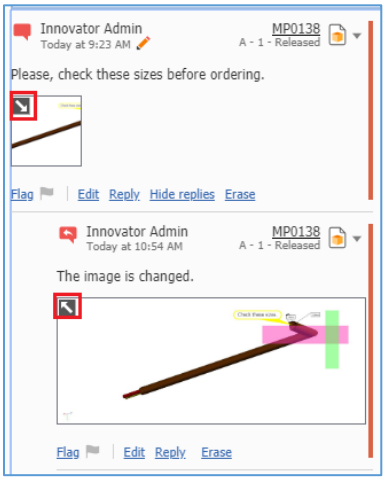

Figure 548.

You can mark important messages with the **Flag** link. For a comment with flags, click the **number** link after the flag icon to see who flagged the comment.

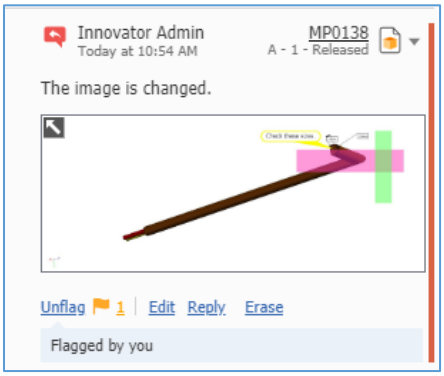

Figure 549.

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Click the **Erase** link that appears at the bottom of the Comment box to delete your comment message in a discussion. You can only delete your own messages and attached files. You cannot delete other's messages. The discussions keep a history of changes; metadata for erased messages is always available. This metadata provides the following information about a deleted message: author, when it was erased, related CAD Document, CAD Document version and state.

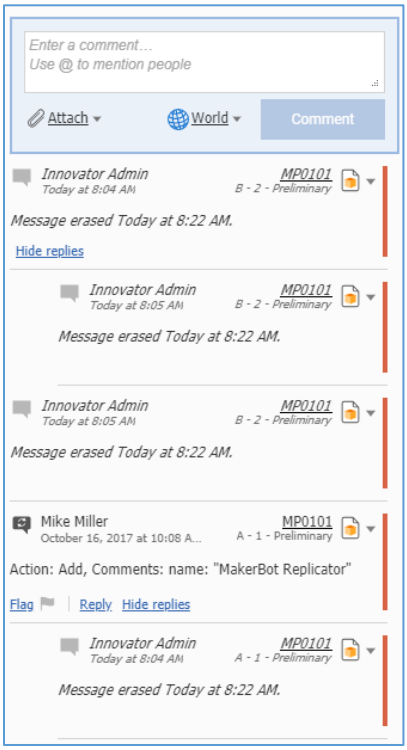

Figure 550.

You can quickly navigate through Item versions in discussions. Click the **drop-down arrow** after the displayed version that appears in the top right corner of a comment message. A drop-down list appears with the following options: **View This Version**, **View Current Version**, **Edit Current Version**, **Add Item to Bookmarks**. When selected, the view of a corresponding Item version appears.

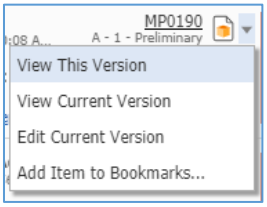

Figure 551.

Aras Innovator returns an error if you click **Edit Current Version** without proper rights granted.

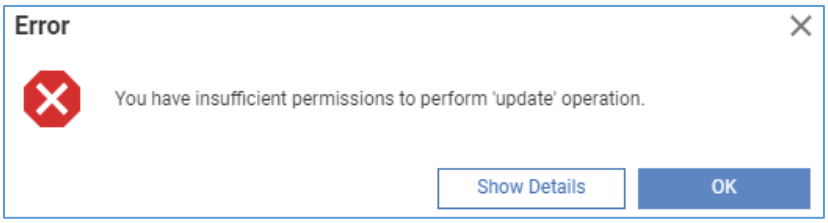

Figure 552.

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12.4 Replying to Other's Comments

Use the following procedure:

1. Click the **Reply** link at the bottom of the **Comment** box. The **Reply** box appears.

Figure 553.

2. Enter your comment.
3. If necessary, attach an image as described in section *12.3 Managing Your Comments*.
4. Click **Reply**.

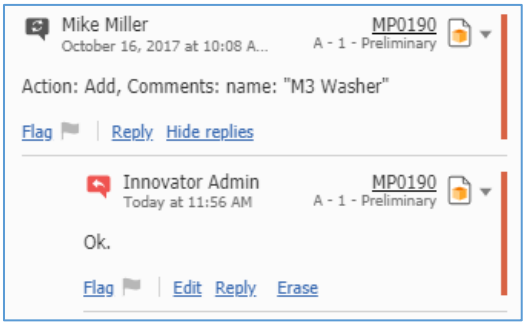

Figure 554.

You can edit and delete only your replies as described in section *12.3 Managing Your Comments*.

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13 Change Management

Change management is the process by which any required changes to Items are initiated, designed, reviewed, and implemented. In this section, the term *Item* means an item under direct change management control. In the Product Engineering (PE) solution, these Items are Parts, Documents, and CAD Documents.

The PE solution has three built-in processes to manage Item release, modification, and obsolescence:

- **CMII Process** — The Institute of Configuration Management developed the CMII change management process. It is a rigorous definition of how change management should be implemented throughout an organization to achieve better control over operations. You can use the CMII principles immediately out of the box or customize them to match your organization's specific requirements.
- **Simple Change Management** — This is a less rigorous process for organizations that do not require the entire CMII standard. Simple change management involves fewer steps and resources but still controls change in an organization based on a set of standard processes.
- **Express Change Management** — This is a streamlined process with a built-in Impact Matrix utility that quickly shows you how the change will affect other Items dependent on a changed Part or Document.

Aras Innovator can be configured to allow one or more of these processes to run in parallel depending on the complexity of the Parts and Documents involved and the requirements of the organization.

Note:	You may be required to enter your password and e-signature to complete some of the CM assignment activities. This ensures that you are indeed the specified user required to perform this operation. The workflow administrator can set this feature on any workflow assignment.

13.1 CMII Change Management

The CMII Process uses three different item types to manage changes:

- The **Problem Report** (**PR**) is used for logging problems found with an Item. The PR does not force a resolution; it is a tool to track a problem, which may need to be addressed.
- The **Engineering Change Request** (**ECR**) is used for requesting a change to Items where a problem occurs or will occur if no action is taken. An ECR is usually created after one or more PRs have been filed and verified that a problem does exist.
- The **Engineering Change Notice** (**ECN**) is an authorization to make changes to an Item based on an approved ECR. It is also used for notifying the appropriate users that the Item is changed. Once an ECN has been approved and completed, a new Item is released, modified, or obsoleted depending on the actions taken.

13.1.1 Problem Report (PR)

A Problem Report (PR) is a report about a problem that has been found. It does not force any resolution or initiate a corrective process. It is a simple notification that a problem with an Item has been discovered. The reported problem is the subject of further review, verification, and approval/rejection.

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Anyone who has access to the Item in question can create a PR. An initiator can be a company employee or customer. For example, at a software company, a PR could be a new issue that has been reported by the helpdesk. At a services company, it could be a complaint call from a customer.

13.1.1.1 Understanding the PR Process

The PR workflow has the following roles:

- A PR Creator is a user who initially created the PR in the system. This may or may not be the same person as other roles.
- A PR Owner (**Assigned Creator**) is an engineer responsible for the research, identification, and verification of the problem. The Owner must verify the problem and provide detailed information about its origin as well as any possible corrective actions.
- A Change Specialist I (CSI) coordinates PRs and ECRs through the analysis phase preparing for and conducting the Change Review Board meetings.
- The Configuration Management (CM) group.

A PR moves through various states during its life cycle as shown in the following figure.

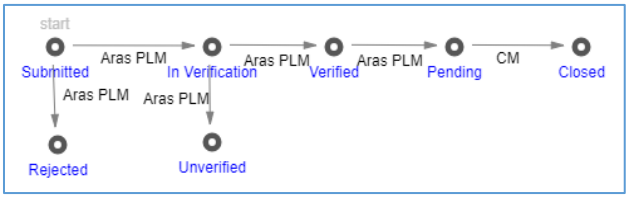

Figure 555.

The PR workflow together with the PR life cycle produces the following scenario:

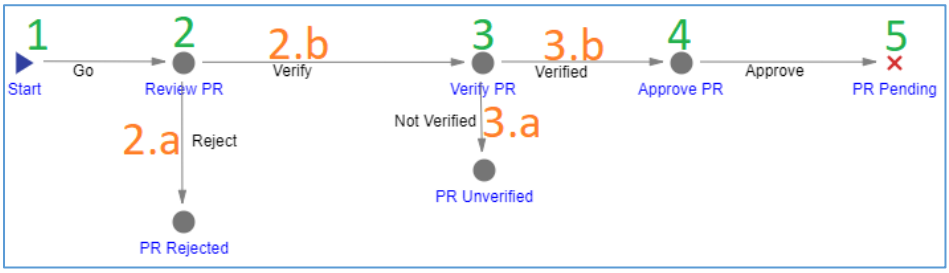

Figure 556.

1. A new PR is **Submitted** by a Creator.
2. A CSI **reviews the PR** to determine whether it should be:
   a. In the **Rejected** state.
   b. In the **In Verification** state. The CSI **identifies a PR Owner** and **sends the PR** to this identity for verification.
3. The PR Owner **verifies the PR** to determine whether it should be:
   a. In the **Unverified** state. In this case, the PR Owner rejects the PR.
   b. In the **Verified** state. Once the PR Owner has verified the PR, it goes to the CSI for approval.
4. The CSI checks the PR form. Once it is ensured that all the necessary information has been entered in the PR, **the CSI approves** the PR, promoting it to **Pending**.

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5. A member of the CM group starts a further CMII process according to the PR results and closes the PR.

A CSI has access to and controls all PRs in the system regardless of their creator, activity, or state. For example, several PRs may be pending until they are all incorporated into one ECR. Therefore, when the final action does take place, the CSI needs to update the Final Action field with this information.

The following table shows the PR lifecycle and workflow in terms of Roles and Permissions.

Table 12: The PR lifecycle and workflow in Roles and Permissions

Life Cycle State	Workflow Activity	Can Add	Get	Update	Delete	Change access	Can be promoted	Update responsible
Submitted	Review PR	World	All employees, CM, Creator	All employees, CM, Creator		CM	Yes	CSI
Rejected	PR Rejected		All employees, CM	CM		CM	No, a final state	
In Verification	Verify PR		All employees, CM, Creator	All employees, CM, Creator		CM	Yes	Owner
Unverified	PR Unverified		All employees, CM	CM		CM	No, a final state	
Verified PR	Approve PR		All employees, CM	CM		CM	Yes	CSI
Pending	PR Pending		All employees, CM, Creator	CM		CM	Yes	CM
Closed			All employees, Creator				No, a final state	

The final PR states (Rejected, Unverified, Closed) are used to classify PRs in the system and in reports.

There are the following PR reports:

- PR Log Report is a list of all the PRs. For details, refer to section *13.1.1.6 PR Log Report*.
- PR Report is a printable PR form. For details, refer to section *13.1.1.7 PR Report*.

13.1.1.2 Submitting a PR

A PR is a complex document that is filled in by different roles in the system. A PR creator is not expected to fill in the PR completely. This section defines the types of information that must be included in a newly created PR.

Use the following procedure to create and submit a Problem Report:

1. Go to **Contents --> Change Management --> PRs**.
2. Click **Create New PR**. The view of a new PR appears.

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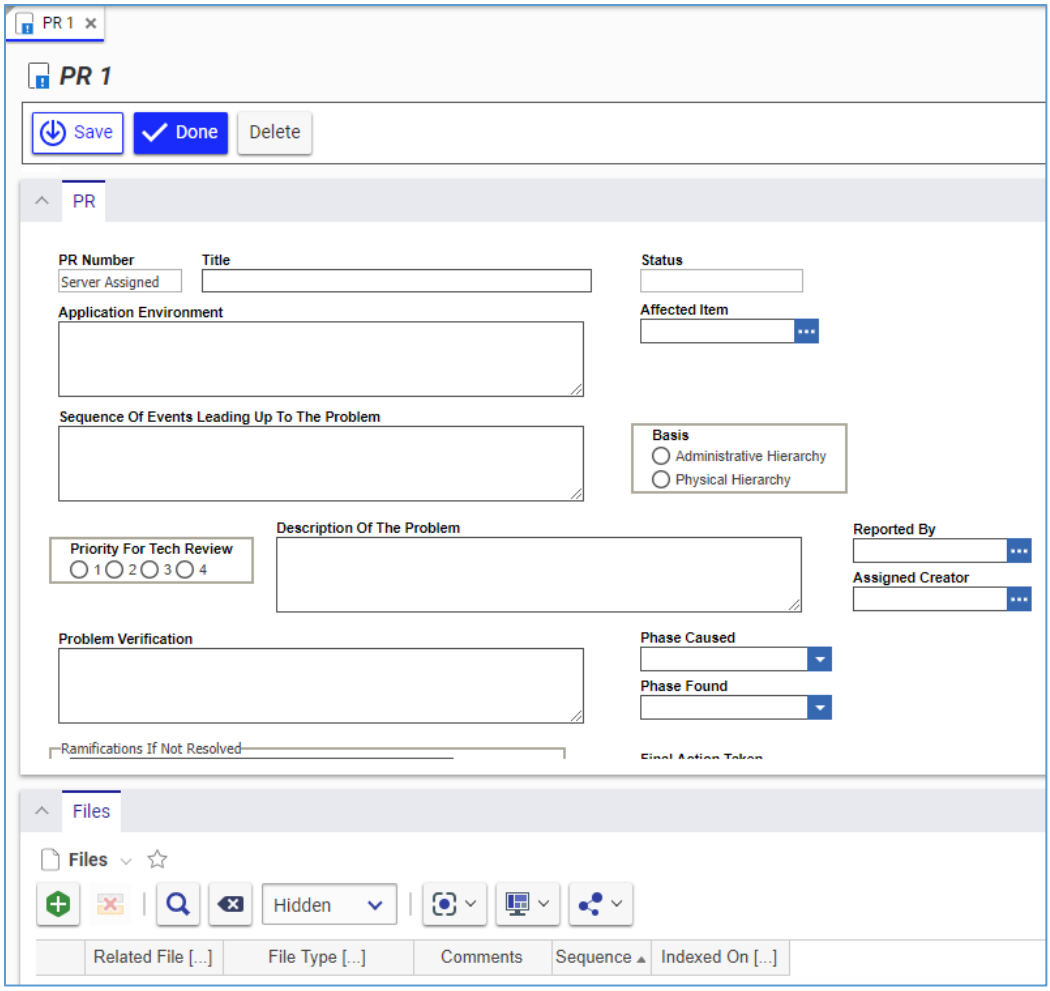

Figure 557.

3. Enter the appropriate title In the **Title** field, making sure that the title is as descriptive as possible.
4. Enter the background information about the product and/or any related problems In the **Application Environment** field. For example, it could be the version or the server used for a software product, or it could be the temperature and the humidity level for an automotive part.
5. Enter the exact steps taken that led to the problem in the **Sequence Of Events Leading Up To The Problem** field.
6. Describe the problem as precisely as possible in the **Description Of The Problem** text box.
7. Click the **ellipses** button In the **Affected Item** box. The **Search dialog – Change Controlled Item** appears.
8. Using the standard search procedure, search for and select the affected Item.
9. Select the proper hierarchy in the **Basis** field:
   - **Physical hierarchy** refers to the Item (Part) itself and any Document associated with it. A bug in software would be classified as a physical hierarchy.
   - **Administrative hierarchy** refers to anything related to the process of running the business. An error in an expense report procedure would be classified as an administrative hierarchy.

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10. Click **Done** on the **PR** toolbar. The PR is created and submitted for a CSI's decision.

13.1.1.3 Reviewing a PR

A CSI receives a **Submitted** PR to decide whether to reject or review it. This section defines which pieces of information the CSI must provide when the decision is made to review the PR.

Use the following procedure to review a Problem Report:

1. Open the **PR** view.
2. Click **Edit** on the **PR** toolbar.
3. Specify the priority number in the **Priority For Tech Review** field. The higher the priority, the lower the number selected.
4. Enter the name of the person who reported the problem in the **Reported By** text box. This identity may not be the same person who created the PR in the system (the Creator).
5. Enter the name of the PR Owner in the **Assigned Creator** text box.
6. Click **Done** on the **PR** toolbar.
7. Go to **Contents --> My Innovator --> My InBasket --> Search My InBasket**.
8. Go to the **Workflow Activity Completion** dialog for the PR.

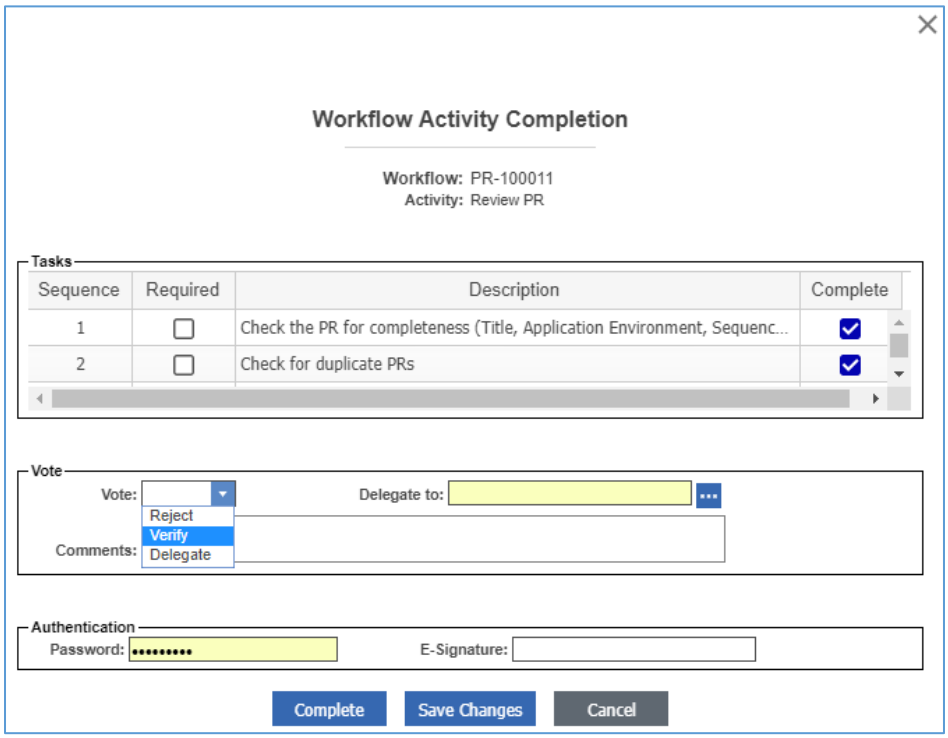

Figure 558.

9. Mark the tasks you completed in the **Tasks** field.
10. Select **Verify** in the **Vote** list.
11. Click **Complete**.

The PR awaits a decision of the PR Owner.

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13.1.1.4 Verifying a PR

A PR Owner receives a PR **In Verification** to decide whether to reject or verify it. This section defines which pieces of information the PR Owner must provide when verifying the PR.

Use the following procedure to verify a Problem Report:

1. Open the **PR** view.
2. Click **Edit** on the **PR** toolbar.
3. Enter the steps that were taken to verify the problem as well as any special conditions or descriptions of the problem in the **Problem Verification** text box.
4. Enter an assessment of what would happen if this problem was not corrected in the **Ramifications If Not Resolved text** box
5. Assess the severity of the issue in the **Severity** box. The higher the severity; the lower the number selected.
6. Specify the product development phase where the problem occurred in the **Phase Caused** list.

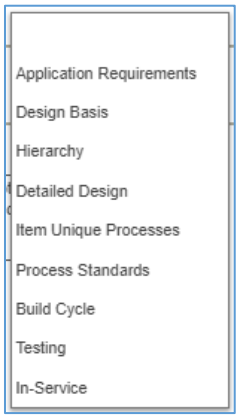

Figure 559.

7. Select the product development phase where the problem was found in the **Phase Found** list.
8. Click **Done** on the **PR** toolbar.
9. Go to **Contents --> My Innovator --> My InBasket --> Search My InBasket**.
10. Go to the **Workflow Activity Completion** dialog for the PR.

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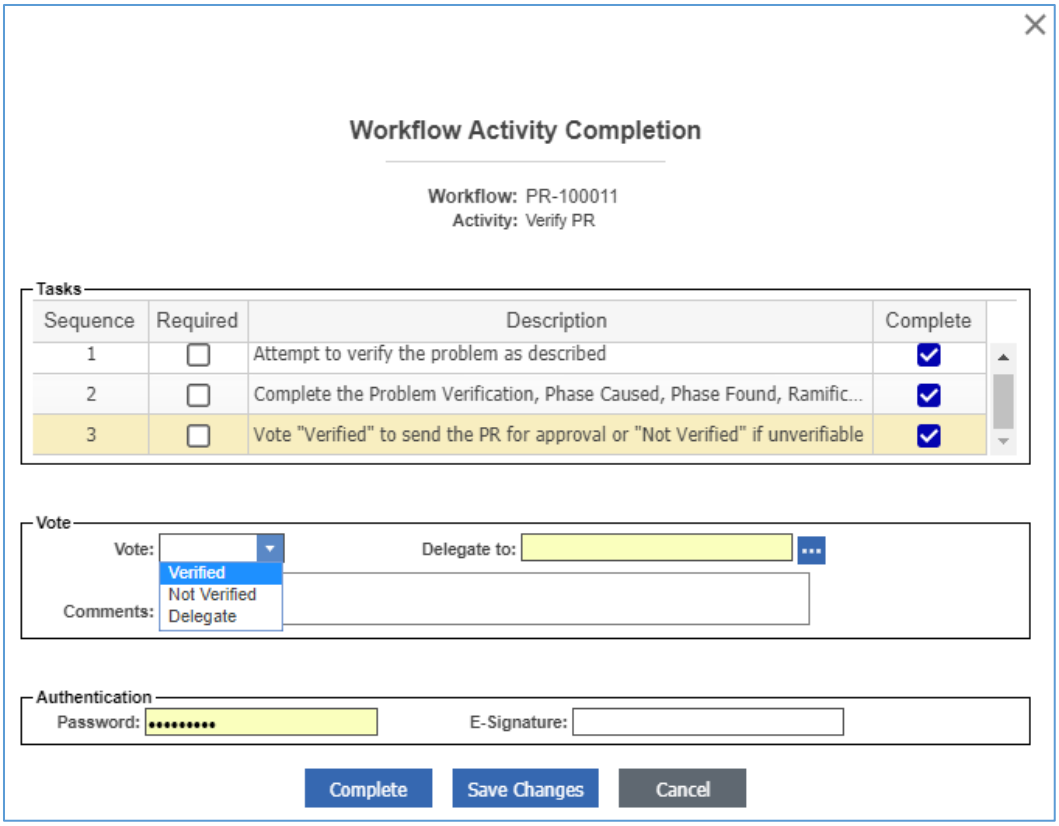

Figure 560.

11. Mark the tasks you completed in the **Tasks** field.
12. Select **Verified** in the **Vote** list.
13. Click **Complete**.

The Approve PR activity starts. The PR awaits a CSI's decision.

13.1.1.5 Approving a PR

A CSI is responsible for the final approval of all PRs in the system regardless of their creator, activity, or state.

Use the following procedure to approve a Problem Report:

1. Open the **PR** view.
2. Check that all necessary information is present.
3. If it is necessary to correct the PR:
   a. Click **Edit** on the **PR** toolbar.
   b. If any final action takes place, enter information about it in the **Final Action** text box.
   c. Provide any missing information.
   d. Correct wrong information if any exists.
   e. Attach auxiliary files if any exist.
   f. Click **Done** on the **PR** toolbar.
4. Go to the **Workflow Activity Completion** dialog for the PR.

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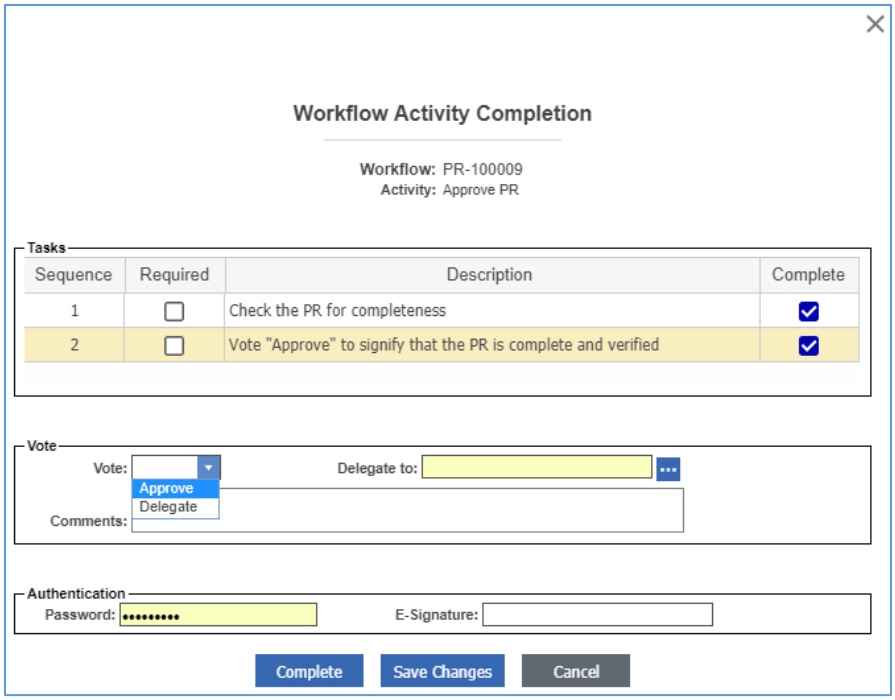

Figure 561.

5. Select the tasks you completed in the **Tasks** field.
6. Select **Approve** in the **Vote** list.

13.1.1.6 PR Log Report

You can get quick information about all the PRs submitted to Aras Innovator with the PR Log Report.

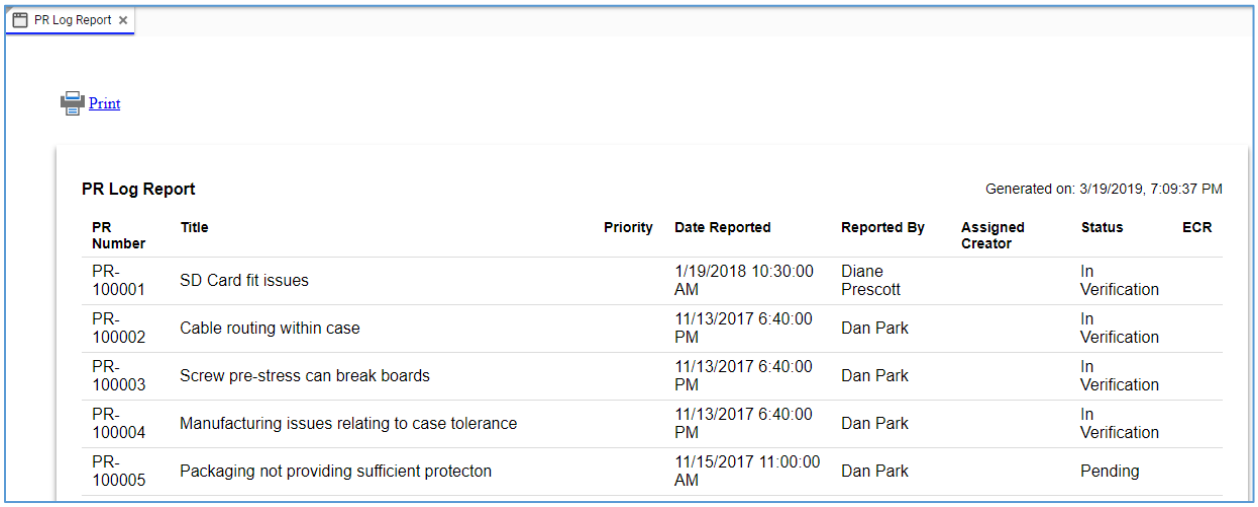

Figure 562.

There are several ways to access the PR Log Report:

- Go to **Contents --> Change Management --> PRs**, right-click any **PR**, and then click **PR Log Report**.

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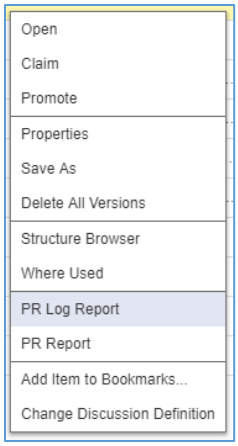

Figure 563.

- Open the view of any PR, on the **PR** toolbar, click **Reports**, and then click **PR Log Report**.

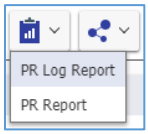

Figure 564.

To quit a Report, close its view in Aras Innovator.

At the top left corner of the PR Log Report view, there is a **Print** button, which uses the standard browser print function. Depending on the browser and your specific configuration, various print choices, such as printing to a printer or saving to PDF, are available.

13.1.1.7 PR Report

You can print or share a PR using the PR Report.

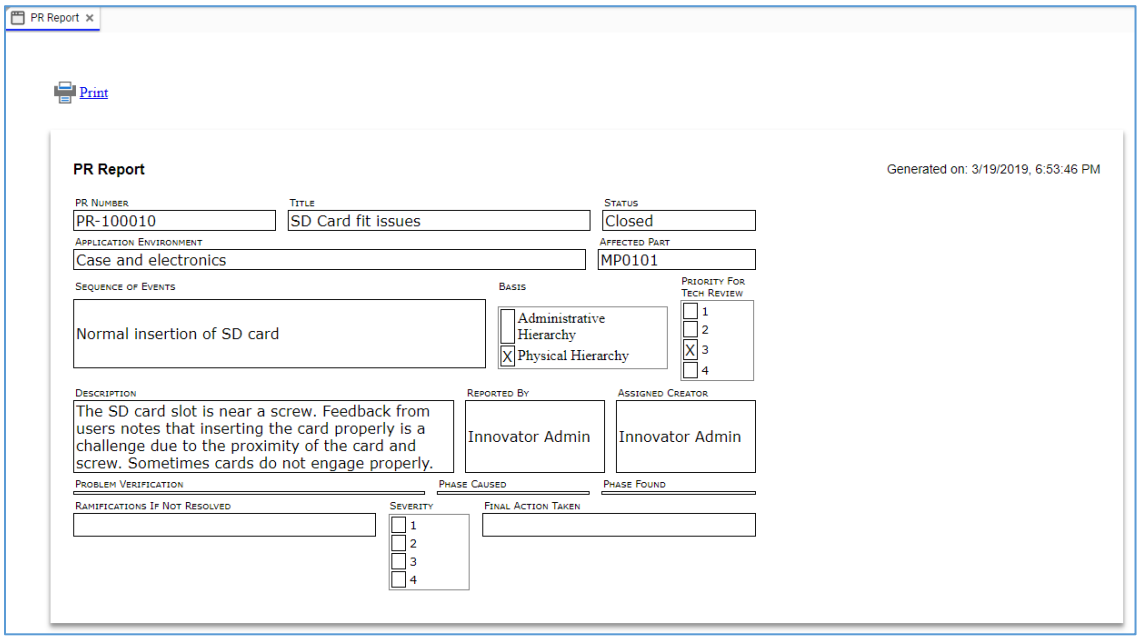

Figure 565.

There are several ways to access the PR Report:

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- Go to **Contents --> Change Management --> PRs**, right-click a **PR** to be reported, and then click **PR Report**.

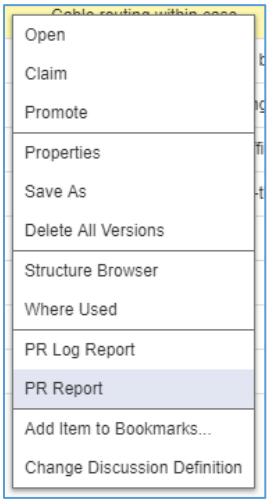

Figure 566.

- Open the view of a PR. On the **PR** toolbar, click **Reports**, and then click **PR Report**.

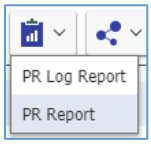

Figure 567.

To quit a Report, close its view in Aras Innovator.

At the top left corner of the PR Report view, there is a **Print** button, which uses the standard browser print function. Depending on the browser and your specific configuration, various print choices, such as printing to a printer or saving to PDF, are available.

13.1.2 Engineering Change Request (ECR)

An Engineering Change Request (ECR) is a request initiating a corrective process in response to some PRs or because of a potential problem identified through proactive thinking. An ECR is submitted to request a change to Items where a problem occurs or will occur if no action is taken.

An ECR may be quickly processed in the system using the Fast Track approach when the ECR is submitted to correct a small or local problem that does not have far-reaching consequences.

13.1.2.1 Understanding the ECR Process

The ECR workflow has the following roles:

- An ECR Creator is a user who initially created the ECR in the system. This may or may not be the same person as other roles.
- An ECR Owner (**Assigned Creator**) is a person responsible for the technical review of the ECR. This person must be able to identify and verify the problem itself and to see the ramifications of both the problem and the solution.
- A Change Specialist I (CSI) coordinates PRs and ECRs through the analysis phase preparing for and conducting the Change Review Board meetings.
- The Change Review Board (CRB).

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- The Configuration Management (CM) group.

An ECR moves between various states during its life cycle as shown in the following figure.

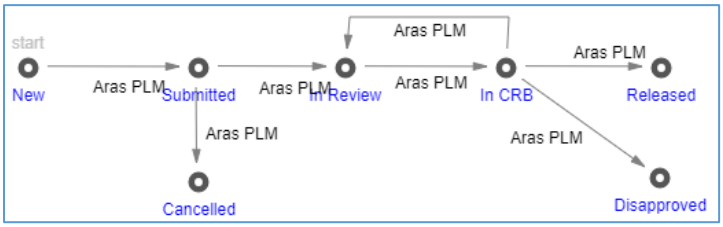

Figure 568.

The ECR workflow together with the ECR life cycle produces the following scenario:

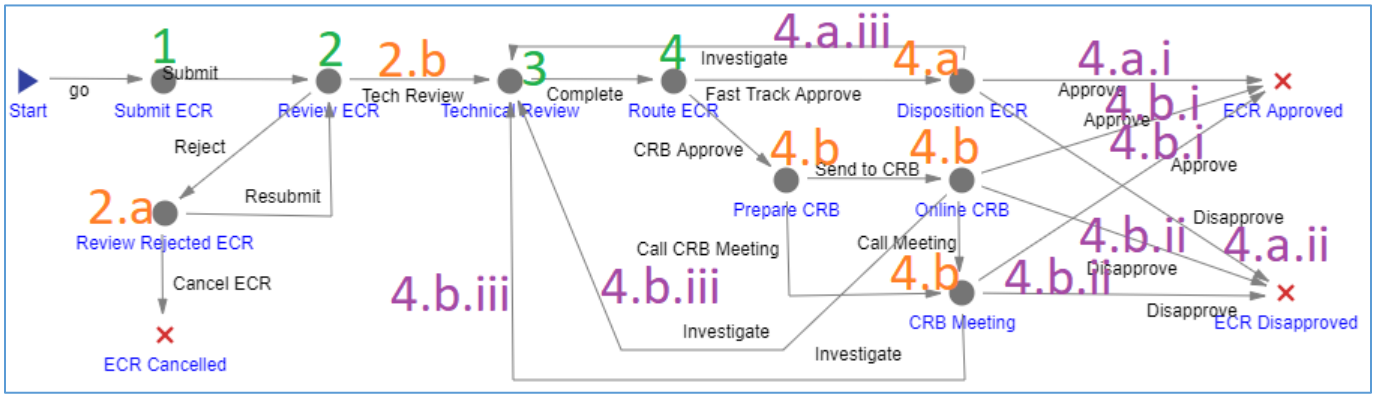

Figure 569.

1. After a new ECR is created, an ECR Creator must declare that the ECR is ready for review voting **Submit the ECR**.
2. The ECR enters the **Review ECR** activity **assigned to the CSI**. The CSI reviews the ECR thoroughly, and decides to either:
    a. **Reject the ECR**. The ECR goes **back to the creator**, who either resubmits or cancels the ECR. In the former case, the creator corrects the ECR according to CSI's comments for rejection.
    b. **Submit the ECR** for the technical review. The CSI assigns an Owner to the ECR.
3. The ECR enters the **Technical Review** activity **assigned to the Owner**. The Owner conducts the technical review and provides data, comments, and recommendations. Once the Owner votes **Complete**, the ECR goes further.
4. The ECR enters the **Route ECR** activity **assigned to the CSI**. The CSI must decide how to route the ECR. Different companies have different criteria for making this decision based on the cost estimates, time, and the nature of the problem itself. The CSI has the authority to vote either:
    a. **Fast Track Approve** for a fast track ECR. The ECR enters the **Disposition ECR** activity **assigned to the Owner**. The Owner votes either:
        i. **ECR Approved** to approve the ECR.
        ii. **ECR Disapproved** to reject the ECR.
        iii. **Investigate** to send the ECR back for more investigation.

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b. **CRB Approve** for full CRB involvement. The ECR enters the **Prepare CRB** activity **assigned to the CSI**. The CSI defines the meeting type either through an in-person **CRB Meeting** or through an **Online CRB**. The CSI also prepares all the necessary information to present to the CRB. Regardless of the meeting type, the CRB votes either:

   i. **ECR Approved** to approve the ECR.

   ii. **ECR Disapproved** to reject the ECR.

   iii. **Investigate** to send the ECR back for more investigation.

The following table shows the ECR lifecycle and workflow in terms of Roles and Permissions.

Table 13: The ECR lifecycle and workflow in Roles and Permissions

Life Cycle State	Workflow Activity	Can Add	Get	Update	Delete	Change access	Can be promoted	Update responsible
New		World	All employees, Creator, CM	Creator, CM		CM		Automatic
Submitted	Submit ECR		All employees, Creator, CM	Creator, CM		CM	Yes	Creator
In Review	Review ECR		All employees, CM	CM			Yes	CSI
In Review	Review Rejected ECR		All employees, CM	CM			Yes	Creator
In Review	Technical Review		All employees, CM	CM			Yes	Owner
In Review	Route ECR		All employees, CM	CM			Yes	CSI
Cancelled	ECR Cancelled		All employees				No, a final state	
In CRB			All employees, CM	CM				
In CRB	Disposition ECR		All employees, CM	CM			Yes	Owner
In CRB	Prepare CRB		All employees, CM	CM			Yes	CSI
In CRB	Online CRB		All employees, CM	CM				CRB
In CRB	CRB Meeting		All employees, CM	CM			Yes	CSI
Disapproved	ECR Disapproved		All employees				No, a final state	

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Life Cycle State	Workflow Activity	Can Add	Get	Update	Delete	Change access	Can be promoted	Update responsible
Released	ECR Approved		All employees				No, a final state	

The final ECR states (Cancelled, Disapproved, Released) are used to classify ECRs in the system and in reports.

The ECR reports are:

- ECR Log Report is a list of all the ECRs. For details, refer to section *13.1.2.10 ECR Log Report*.
- ECR Report is a printable form of an ECR. For details, refer to section *13.1.2.11 ECR Report*.

13.1.2.2 Submitting an ECR

An ECR is a complex document that is filled in by more than one person. An ECR creator is not supposed to fill in the ECR completely. This section defines the information an ECR must have to be submitted.

Use the following procedure to create and submit an Engineering Change Request:

1. Go to **Contents --> Change Management --> ECRs**.
2. Click **Create New ECR**. The view of a new ECR appears.

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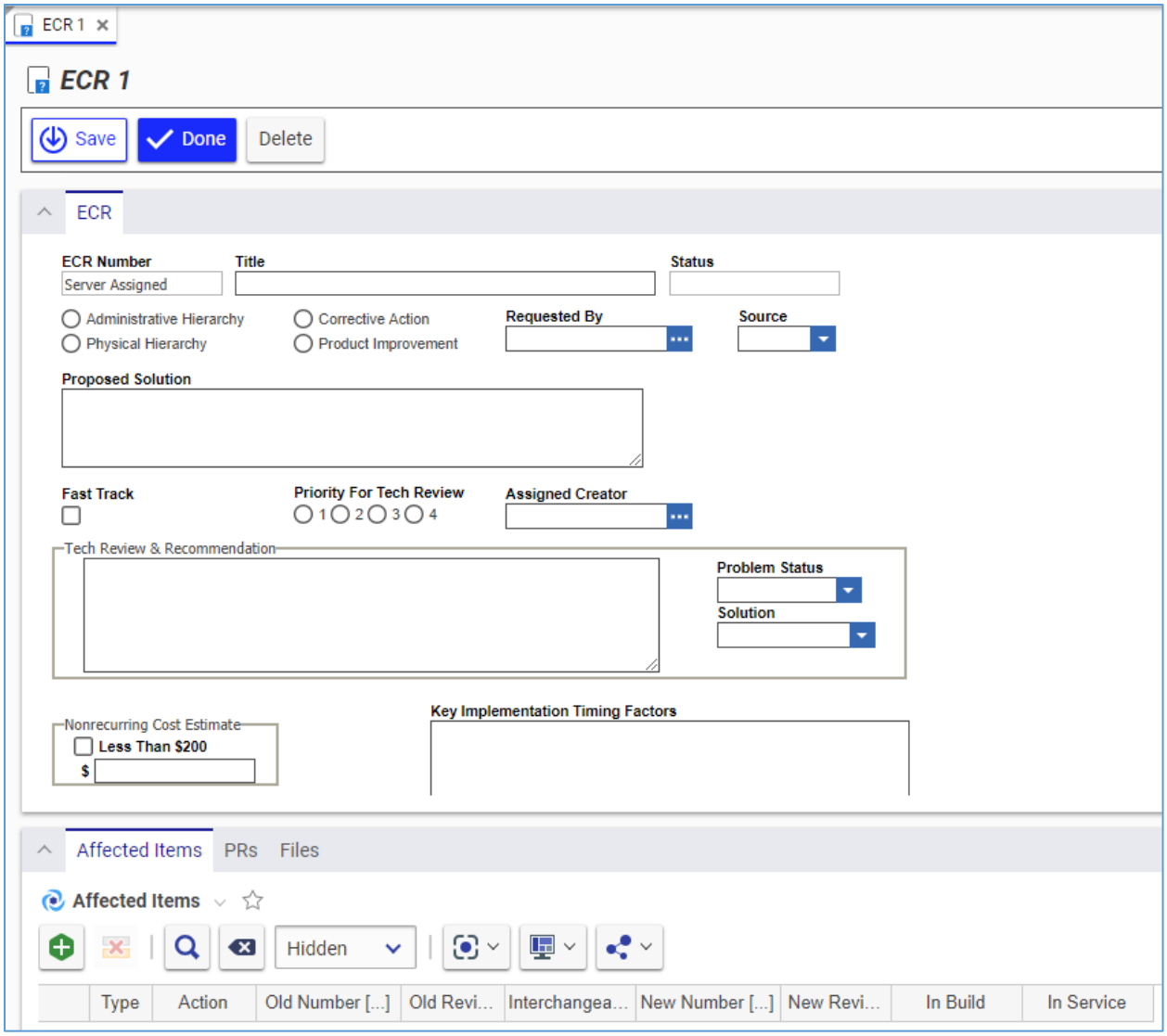

Figure 570.

3. Enter the ***ECR title*** In the **Title** text box, making it as descriptive as possible.
4. Select the appropriate hierarchy:
   - **Physical hierarchy** refers to the Item (Part) itself and any Document associated with it. A bug in software would be classified as a physical hierarchy.
   - **Administrative hierarchy** refers to anything related to the process of running the business. An error in an expense report procedure would be classified as an administrative hierarchy.
5. Specify the ECR intent:
   - **Corrective Action** if the ECR corrects an already occurring problem.
   - **Product Improvement** if the ECR prevents a possible problem or improves the product.
6. Enter the name of the person who requested the change in the **Requested By** text box.
7. Specify the source of the ECR by selecting one of the following from the **Source** list: **Internal**, **Customer**, or **Supplier**.

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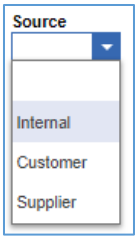

Figure 571.

8. Describe the solution proposed by the ECR Creator as precisely as possible in the **Proposed Solution** text box.
9. Go to the **Affected Items** accordion tab to specify which Items are affected by the ECR.
10. If the ECR should request adding Items, use the procedure described in section *13.1.2.3 Adding an Item with an ECR*.
11. If the ECR should request changing Items, use the procedure described in section *13.1.2.4 Changing Items with an ECR*.
12. If the ECR should request deleting Items, use the procedure described in section *13.1.2.5 Deleting an Item with an ECR*.
13. Go to the **Files** accordion tab to attach all the files concerning this ECR.

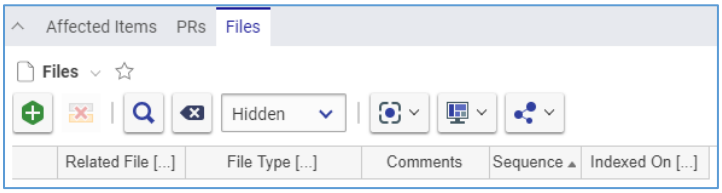

Figure 572.

14. Click **Create Item** on the **Files** accordion toolbar. The standard operating system dialog for file browsing and selection appears.
15. Search for and select a file. A new row appears in the **Files** grid with the file attached.

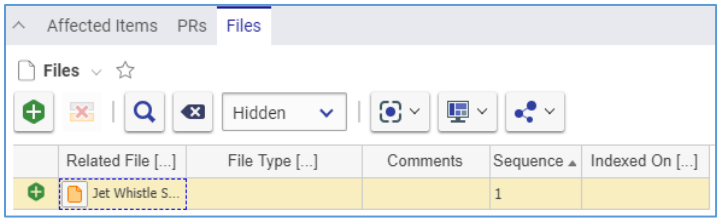

Figure 573.

16. This step is recommended. In the **File Type** cell, specify the file type using one of these options:

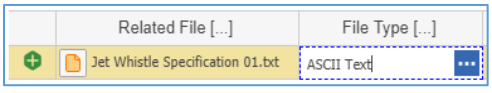

Figure 574.

   a. Click the **ellipsis** button and then select ***the file type*** in the **Search dialog – File Type** field.

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b. Enter ***the file type***, which should exist in Aras Innovator. An error tooltip appears if you entered *a* ***file type*** that does not exist in Aras Innovator.

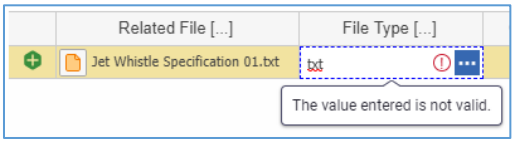

Figure 575.

Note: You can leave the **File Type** cell empty, omitting step 16. Aras Innovator will automatically assign a file type depending on File's extension when you save the ECR.

17. If it is necessary to provide additional information about the File, enter it in the **Comments** cell.
18. Repeat steps 14-17 for other files related to this ECR.
19. Click **Done** on the **ECR** toolbar. The ECR is created. The automatic ECR properties get their values.

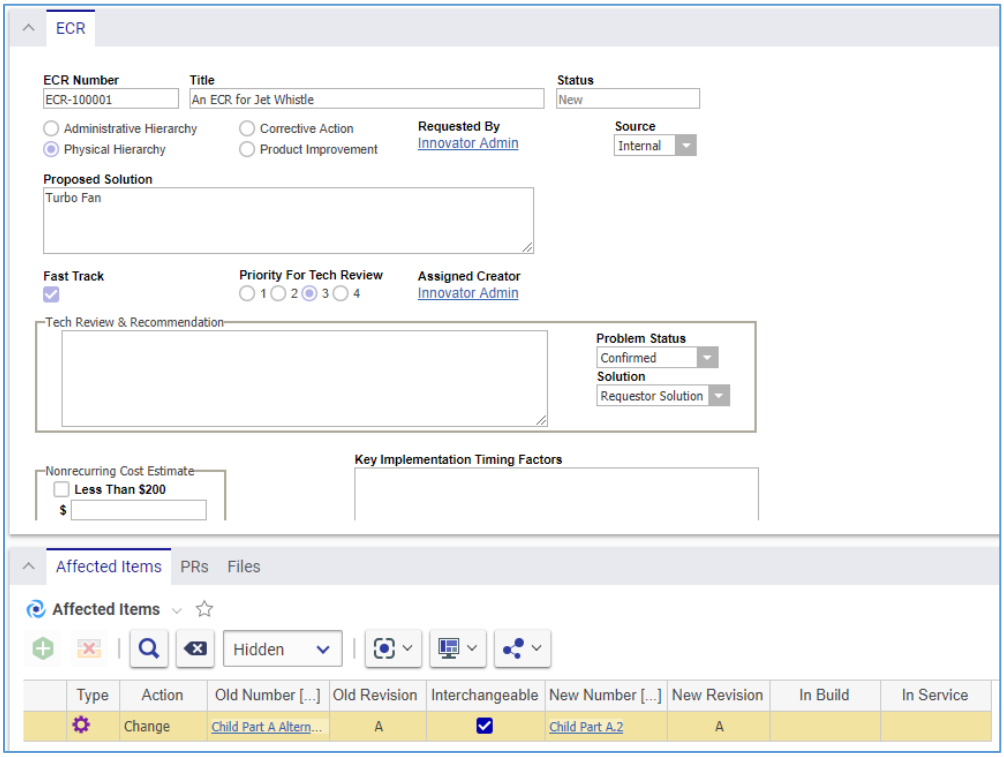

Figure 576.

20. Go to **Contents --> My Innovator --> My InBasket --> Search My InBasket**.
21. Go to the **Workflow Activity Completion** dialog for the ECR.

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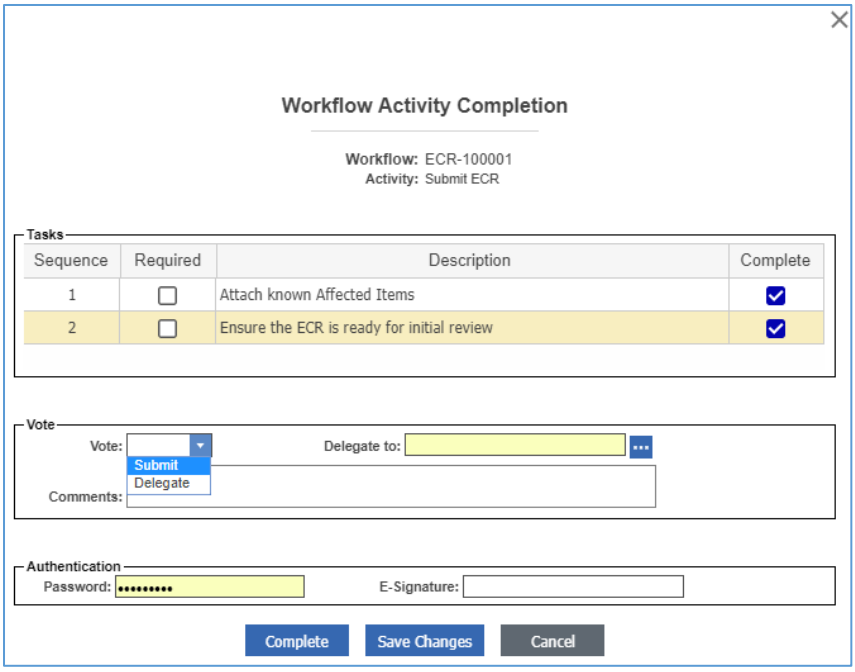

Figure 577.

22. Mark the tasks you completed in the **Tasks** field.
23. Select **Submit** in the **Vote** list.
24. Click **Complete**.

The ECR enters the **Review ECR** activity and awaits the decision of the CSI.

13.1.2.3 Adding an Item with an ECR

Use the following procedure to request add and release of an affected Item with an Engineering Change Request:

1. Open the **ECR** view.
2. Click **Edit** on the **ECR** toolbar.
3. Go to the **Affected Items** accordion tab.
4. Click **Create Item** on the **Affected Items** accordion toolbar. A new row appears at the bottom of the **Affected Items** grid.

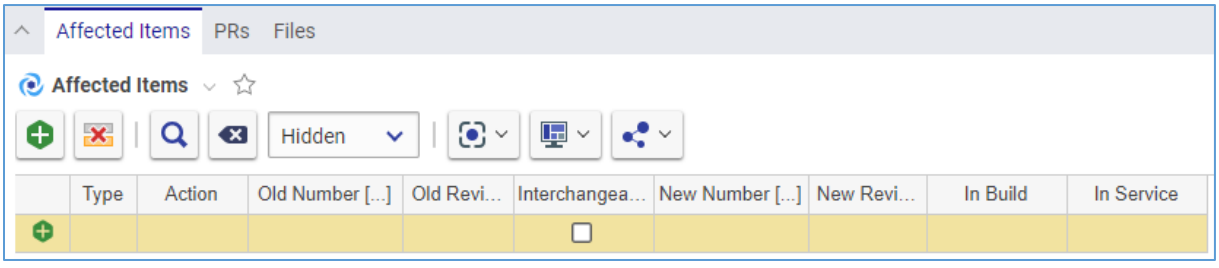

Figure 578.

5. Select **Add** in the **Action** cell.

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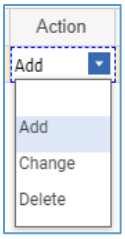

Figure 579.

6. Click the **ellipsis** button in the **New Number** cell. The **Search dialog – Change Controlled Item** appears.
7. Using the standard search procedure, search for and select the new affected Item. The affected Item populates the **New Number** cell.

Figure 580.

8. Click either **Save** or **Done** on the **ECR** toolbar. The ECR now has an affected Item that needs to be added and released.

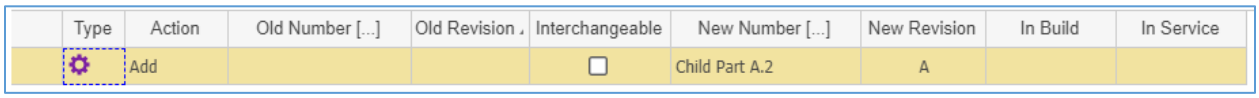

Figure 581.

13.1.2.4 Changing an Item with an ECR

Use the following procedure to request changing an existing affected item with an Engineering Change Request:

1. Follow steps 1-4 of the Adding an Item within an ECR procedure.
2. Select **Change** in the **Action** cell.

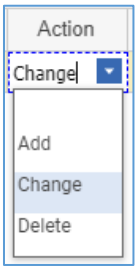

Figure 582.

3. Click the **ellipsis** button in the **Old Number** cell. The **Search dialog – Change Controlled Item** dialog box appears.
4. Using the standard search procedure, search for and select the affected Item to be changed. The selected Item populates the **Old Number** cell.

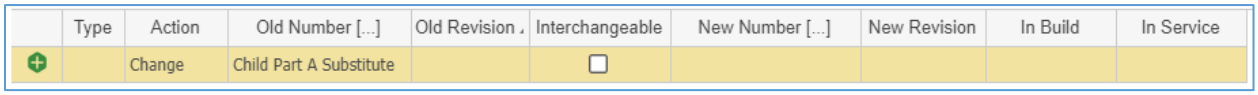

Figure 583.

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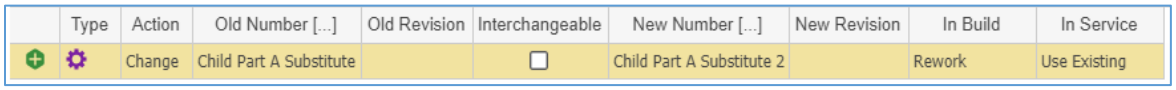
5. Select the **Interchangeable** cell check box if the old and new Items are interchangeable. The new Item version can be replaced or modified without causing any change in functionality to the surrounding Items. When selected, the same Item number is retained. Otherwise, a new Item number will need to be assigned.
6. If the **Interchangeable** cell is not selected (the old and new Items are not interchangeable), select the replacing new Item:
   a. Click the **ellipsis** button in the **New Number** cell. The **Search dialog – Change Controlled Item** appears.
   b. Using the standard search procedure, search for and select the new affected Item. The new affected Item populates the **New Number** cell.

	Type	Action	Old Number [...]	Old Revision	Interchangeable	New Number [...]	New Revision	In Build	In Service
		Change	Child Part A Substitute		☐	Child Part A Substitute 2			

Figure 584.

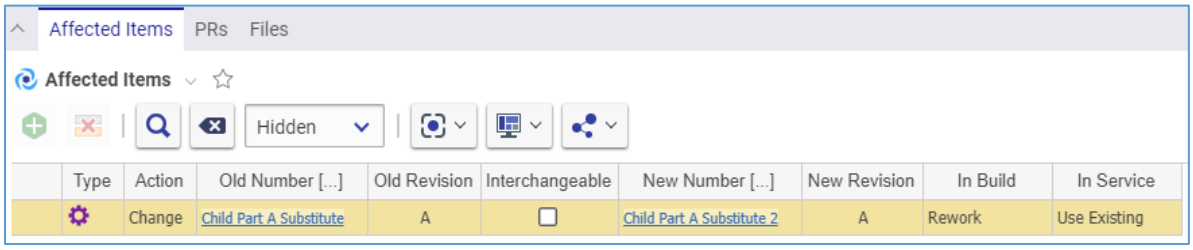
7. Click **Save** two times on the **ECR** toolbar.
8. Select the action to take for the Items that are being built in the **In Build** cell: **Use Existing**, **Rework**, or **Scrap**.
9. Select the action to take for the Items that are currently in service in the **In Service** cell: **Use Existing**, **Rework**, or **Scrap**.



	Type	Action	Old Number [...]	Old Revision	Interchangeable	New Number [...]	New Revision	In Build	In Service
		Change	Child Part A Substitute		☐	Child Part A Substitute 2		Rework	Use Existing

Figure 585.

10. Click either **Save** or **Done** on the **ECR** toolbar. The ECR has an affected Item requested for changing.



	Type	Action	Old Number [...]	Old Revision	Interchangeable	New Number [...]	New Revision	In Build	In Service
		Change	Child Part A Substitute	A	☐	Child Part A Substitute 2	A	Rework	Use Existing

Figure 586.

13.1.2.5 Deleting an Item with an ECR

Use the following procedure to request superseding of an existing affected Item with an Engineering Change Request:

1. Follow steps 1-4 of Adding an Item within an ECR procedure.
2. Select **Delete** in the **Action** cell.

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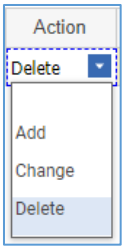

Figure 587.

3. Click the ellipsis button in the Old Number cell. The **Search dialog – Change Controlled Item** appears.
4. Using the standard search procedure, search for and select the affected Item. The old affected Item populates the **Old Number** cell.

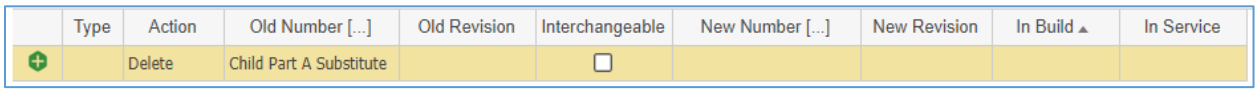

Figure 588.

5. Click **Save** two times on the **ECR** toolbar.
6. Select the action to take for the Items that are being built in the **In Build** cell: **Use Existing**, **Rework**, or **Scrap**.
7. Select the action to take for the Items that are currently in service in the **In Service** cell: **Use Existing**, **Rework**, or **Scrap**.

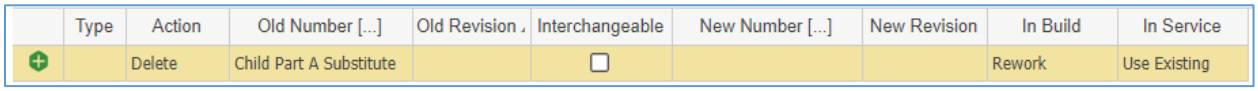

Figure 589.

8. Click either **Save** or **Done** on the **ECR** toolbar. The ECR has an affected Item assigned for deletion.

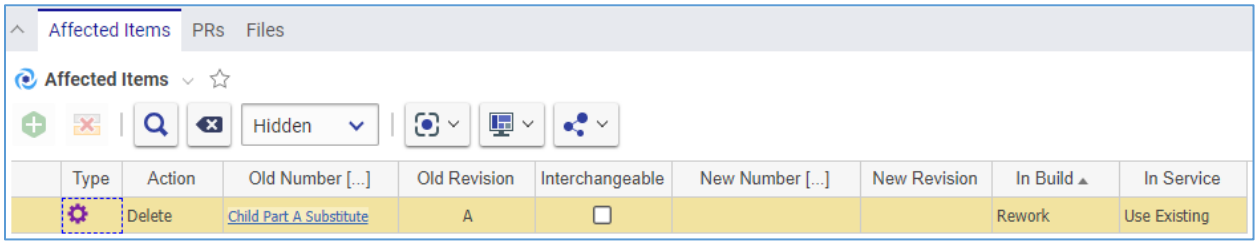

Figure 590.

13.1.2.6 Removing an Affected Item from an ECR

Use the following procedure:

1. Follow steps 1-3 of the Adding an Item within an ECR procedure.
2. Click the **Affected Item** and then click **Delete Row** on the **Affected Items** accordion toolbar. The **Affected Item** becomes unavailable.

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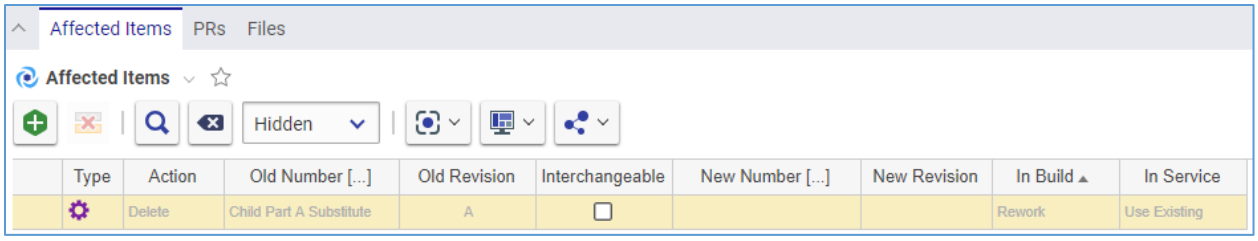

Figure 591.

3. Click either **Save** or **Done** on the **ECR** toolbar. The **Affected Item** disappears from the grid.

Note: The **Affected Item** disappears immediately if the ECR was not saved after it was added.

13.1.2.7 Reviewing an ECR

A CSI receives a **Submitted** ECR to decide whether to reject it or to submit it for technical review. This section defines the information the CSI must provide when the decision is made to submit the PR.

Use the following procedure to review an Engineering Change Request and submit it for technical review:

1. Open the **ECR** view.
2. Click **Edit** on the **ECR** toolbar.
3. Specify the tech review priority number in the **Priority For Tech Review** field. The higher the priority of the tech review, the lower the number selected.
4. Specify the ECR Owner in the **Assigned Creator** text box.
5. Verify that the information entered by a Creator is correct.
6. Verify that the **Affected Items** accordion tab contains all the Items affected by the ECR.
7. Verify that the **Files** accordion tab has all the necessary files attached.
8. If this ECR is based on a PR:
   a. Go to the **PRs** accordion tab.

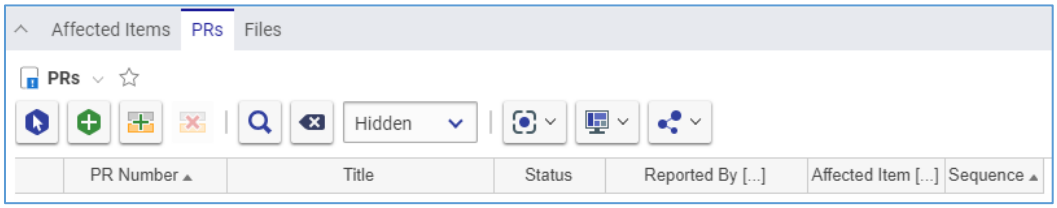

Figure 592.

   b. Click **Select Items**. The **Search dialog – PR** appears.
   c. Using the standard search procedure, search for and select the initiating PR. The selected PR appears as a bottom row in the PRs grid.

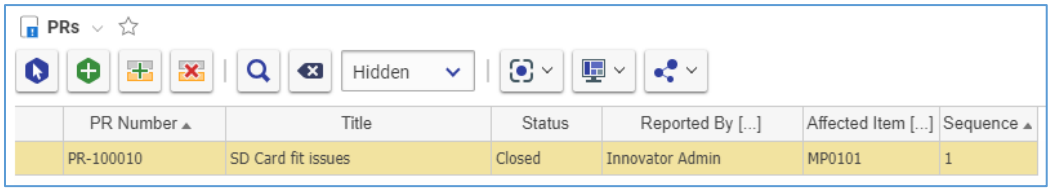

Figure 593.

9. Click **Done** on the **ECR** toolbar.

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10. Go to **Contents --> My Innovator --> My InBasket --> Search My InBasket**.
11. Go to the **Workflow Activity Completion** dialog for the ECR.

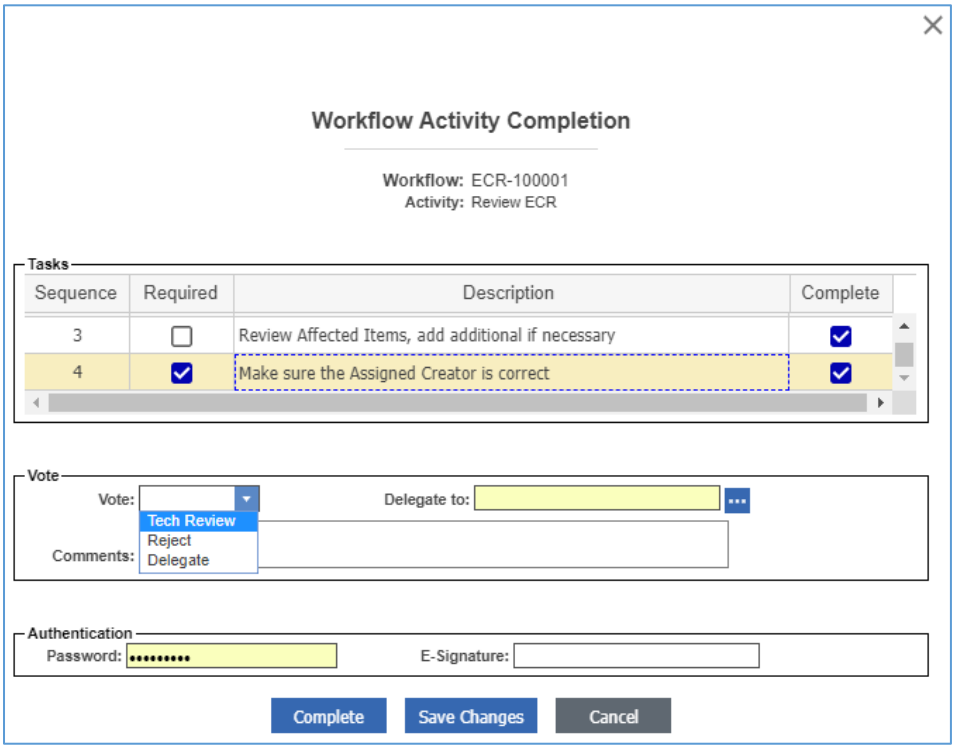

Figure 594.

12. Mark the tasks you completed in the **Tasks** field.
13. Select **Tech Review** in the **Vote** list.
14. Click **Complete**.

The ECR enters the **Technical Review** activity and awaits technical review by the ECR Owner.

13.1.2.8 Technical Review of an ECR

An ECR Owner reviews an ECR and provides data, comments, and recommendations. The Owner does this job according to the company's policies and procedures. This section defines the information an ECR Owner must provide to comply with the CMII process requirements.

Use the following procedure to conduct a technical review of an Engineering Change Request:

1. Open the **ECR** view.
2. Click **Edit** on the **ECR** toolbar.
3. Verify that the information already entered in the ECR is correct.
4. Select the proper value in the **Problem Status** list: **Confirmed**, **Not Confirmed**, or **Another Problem**.

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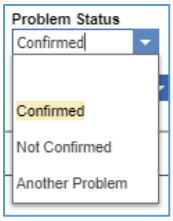

Figure 595.

5. Select the proper value in the **Solution** list: **Requestor Solution** or **Another Solution**.

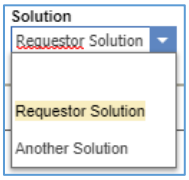

Figure 596.

6. If the estimation is less than $200, select the check box in the **Nonrecurring Cost Estimate** field and enter the estimation value in the accompanying text box. This is a one-time cost estimation of the ECR solution implementation.

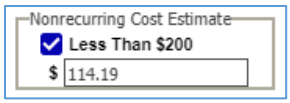

Figure 597.

7. Enter the recurring cost estimation in the **Recurring Cost Estimate** text box. This is the difference in the unit cost of the Item as a result of the change. Select **Up** or **Down** in the accompanying list to indicate whether the unit cost went up or down as a result of the ECR.

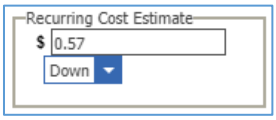

Figure 598.

8. Enter the key timing factors for the implementation of the ECR in the **Key Implementation Timing Factors** text box.
9. Enter additional information in the **Comments** text box.
10. Click **Done** on the **ECR** toolbar.
11. Go to **Contents --> My Innovator --> My InBasket --> Search My InBasket**.
12. Go to the **Workflow Activity Completion** dialog for the ECR.

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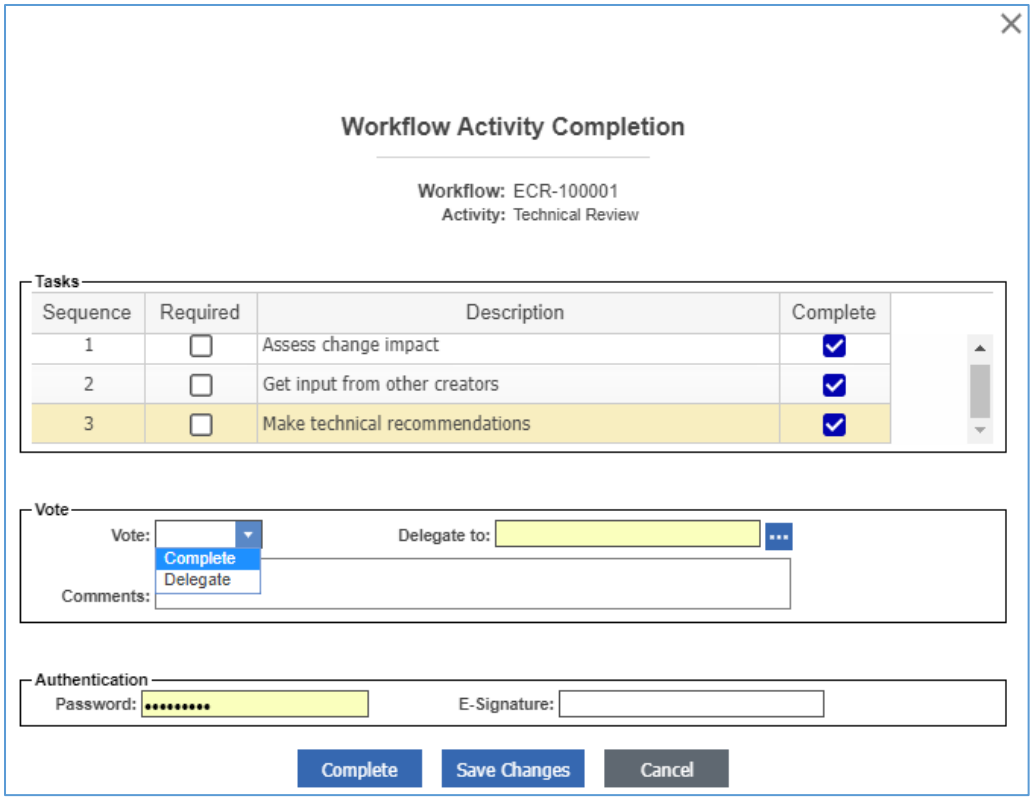

Figure 599.

13. Mark the tasks you completed in the **Tasks** field.
14. Select **Complete** in the **Vote** list.
15. Click **Complete**.

The ECR enters the **Route ECR** activity and awaits a decision of the CSI.

13.1.2.9 Routing an ECR

A CSI receives an ECR to decide how to route the ECR: either **Fast Track Approve** for a fast track ECR or **CRB Approve** for full Change Review Board (CRB) involvement. The CSI makes this decision according to the company's policies and procedures. This section defines which pieces of information the CSI must provide to comply with the CMII process requirements when routing the ECR.

Use the following procedure to route an Engineering Change Request:

1. Open the **ECR** view.
2. Click **Edit** on the **ECR** toolbar.
3. Verify that the information already entered in the ECR is correct.
4. Double-check the **Key Implementation Timing Factors** text box to make sure it contains the correct data.
5. Specify the implementation priority number in the **Priority** field. The higher the priority, the lower the number selected.

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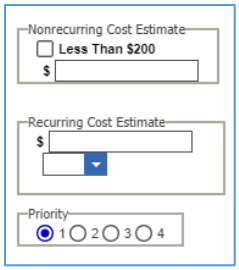

Figure 600.

6. Click **Done** on the **ECR** toolbar.
7. Go to **Contents --> My Innovator --> My InBasket --> Search My InBasket**.
8. Go to the **Workflow Activity Completion** dialog for the ECR.

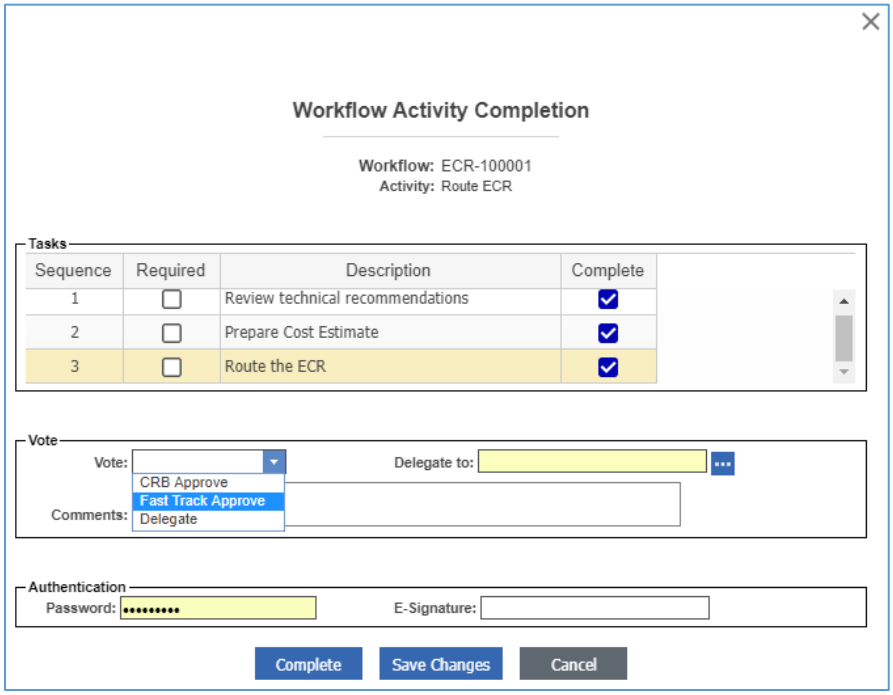

Figure 601.

9. Mark the tasks you completed in the **Tasks** field.
10. Select either **CRB Approve** or **Fast Track Approve** in the **Vote** list depending on your decision.
11. Click **Complete**.

The ECR now awaits the final decision to be either **ECR Approved** or **ECR Disapproved**.

13.1.2.10 ECR Log Report

You can get quick information about all the ECRs submitted to Aras Innovator with the ECR Log Report.

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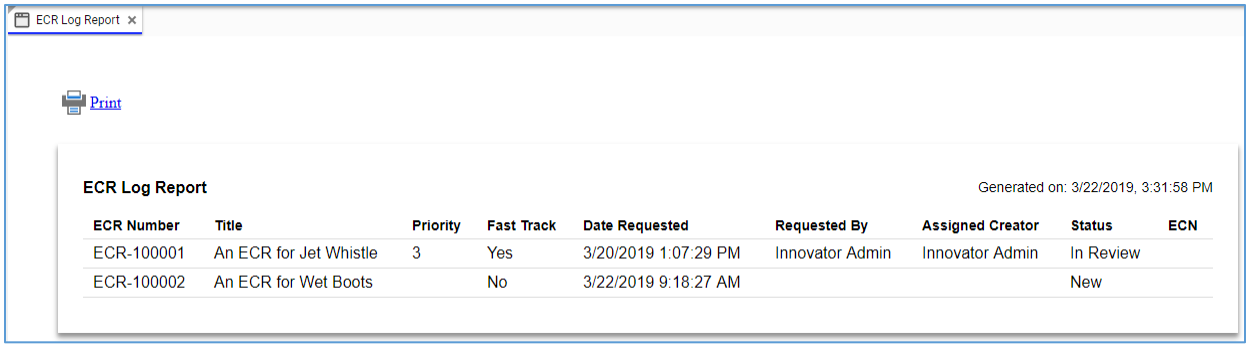

Figure 602.

There are several ways to access the ECR Log Report:

- Go to **Contents --> Change Management --> ECRs**, right-click any **ECR**, and then click **ECR Log Report**.

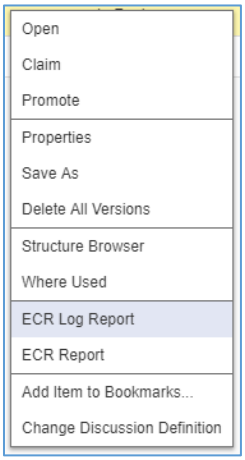

Figure 603.

- Open the view of any ECR. On the **ECR** toolbar, click **Reports**, and then click **ECR Log Report**.

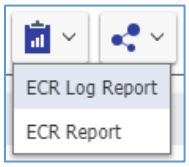

Figure 604.

To quit a Report, close its view in Aras Innovator.

At the top left corner of the ECR Log Report view, there is a **Print** button, which uses the standard browser print function. Depending on the browser and your specific configuration, various print choices, such as printing to a printer or saving to PDF, are available.

13.1.2.11 ECR Report

You can print or share an ECR using the ECR Report.

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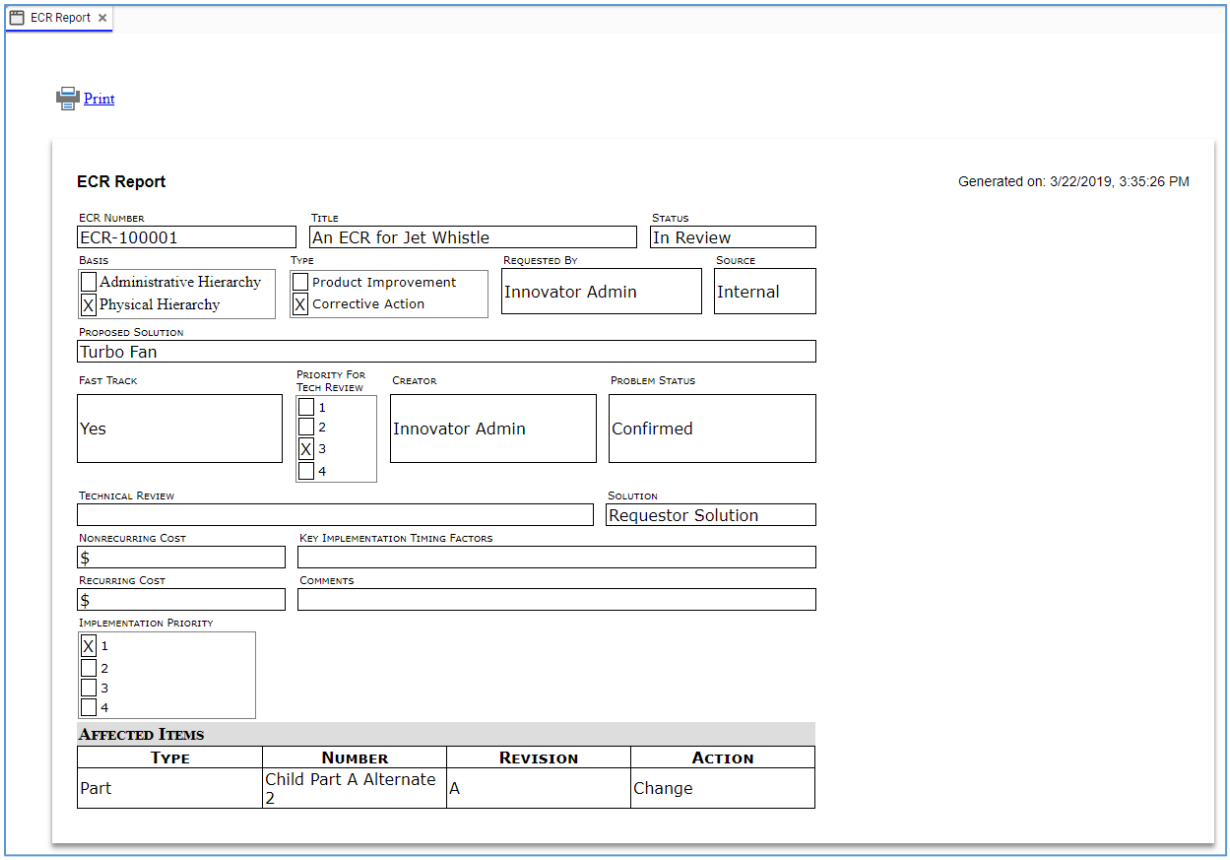

Figure 605.

There are several ways to access the ECR Report:

- Go to **Contents --> Change Management --> ECRs**, right-click an **ECR** to be reported, and then click **ECR Report**.

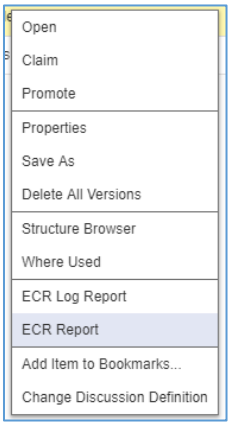

Figure 606.

- Open the view of an ECR. On the **ECR** toolbar, click **Reports**, and then click **ECR Report**.

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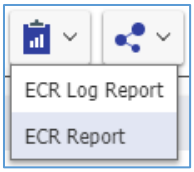

Figure 607.

To quit a Report, close its view in Aras Innovator.

At the top left corner of the ECR Report view, there is a **Print** button, which uses the standard browser print function. Depending on the browser and your specific configuration, various print choices, such as printing to a printer or saving to PDF, are available.

13.1.3 Engineering Change Notice (ECN)

An Engineering Change Notice (ECN) is a process for implementing changes within an organization.

There are three types of change Actions for an affected Item in the ECN process:

- **Add** — A new affected Item becomes **Released**.
- **Change** — An affected existing Item is modified. The Item becomes **Superseded**, **Obsolete**, or incremented to a new revision level to allow modification.
- **Delete** — An existing affected Item is obsolete. The Item becomes **Superseded** or **Obsolete**.

13.1.3.1 Understanding the ECN Process

The ECN workflow has the following roles:

- An ECN Creator is the user who initially created the ECN in the system. This may or may not be the same person as other roles.
- An ECN Owner (**Assigned Creator**), is the engineer or technical person responsible for the technical implications of the change and its ramifications.
- A Change Specialist II (CSII) prepares ECNs for implementing approved ECRs as well as the ECN impact information for the change review board to develop a detailed implementation plan.
- A Change Specialist III (CSIII) audits the ECN implementation using ECNs and detailed implementation plans as checklists.
- The Configuration Management (CM) group.

An ECN traverses between various states during its life cycle depicted in the following figure.

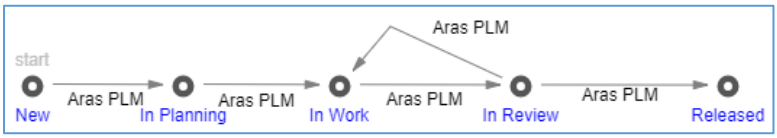

Figure 608.

The ECN workflow together with the ECN life cycle produces the following scenario:

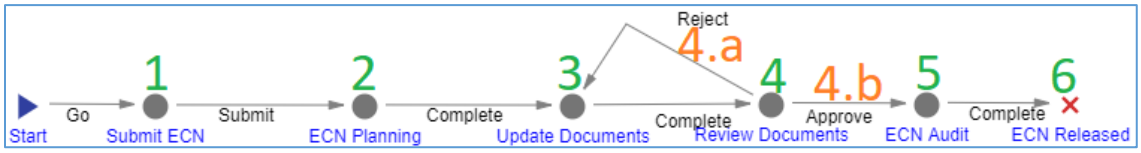

Figure 609.

1. A member of the CM group creates and submits the ECN.

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2. The ECN enters the **ECN Planning** activity **assigned to the CSII**. According to the company's rules and policies, the CSII reviews the ECN, assigns an Owner to it, and makes decisions and recommendations about the propagation of the Item change. For example, the CSII can decide whether a part should have a new revision or an entirely new part number. Also, the CSII checks whether a changed part leads to a change of revision or part number of assemblies containing this part. Once the CSII votes **Complete**, the ECN moves further.
3. The ECN enters the **Update Documents** activity **assigned to the Owner**. The Owner is responsible for updating the Item documentation affected by this change, including BOMs, specifications, drawings, and any other documents. The affected Items requiring the change of documentation may include only the items being changed directly but also hierarchies containing these Items. Once the Owner votes **Complete**, the ECN moves further.
4. The ECN enters the **Review Documents** activity **assigned to the CSII**. The CSII decides to either:
   a. **Reject** — The ECN goes back to the **Update Documents** activity.
   b. **Approve** — The ECN goes further.
5. The ECN enters the **ECN Audit** activity **assigned to the CSIII**. Once the CSIII votes **Complete**, the ECR goes further.
6. The ECN becomes **Released**. The life cycle states of the affected Items are automatically updated.

The following table shows the ECN lifecycle and workflow in terms of Roles and Permissions.

Table 14: The ECN lifecycle and workflow in Roles and Permissions

Life Cycle State	Workflow Activity	Can Add	Get	Update	Delete	Change access	Can be promoted	Update responsible
New	Submit ECN	CM	All employees, Creator, Owner CM	Creator, Owner CM	CM	CM	Yes	Creator
In Planning	ECN Planning		All employees, Creator, Owner CM	Creator, Owner CM	CM	CM	Yes	CSII
In Work	Update Documents		All employees				Yes	Owner
In Review	Review Documents		All employees				Yes	CSII
In Review	ECN Audit						Yes	CSIII
Released	Released		All employees				No, a final state	

There is the ECN report, which is a printable form of an ECN. For details, refer to section *13.1.3.9 The ECN Report*.

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13.1.3.2 Creating an ECN

Because an ECN can be used to add, change, or delete affected Items, the ECN creation process can be conventionally divided into general and specific procedures. This section defines the general steps a member of the CM group should use for creating an ECN. The specific procedures are outlined in sections *13.1.3.3 Adding an Item within an ECN*, *13.1.3.4 Changing Items within an ECN*, and *13.1.3.5 Deleting an Item within an ECN*.

Use the following procedure to create an Engineering Change Notice:

1. Go to **Contents --> Change Management --> ECNs**.
2. Click **Create New ECN**. The view of a new ECN appears.

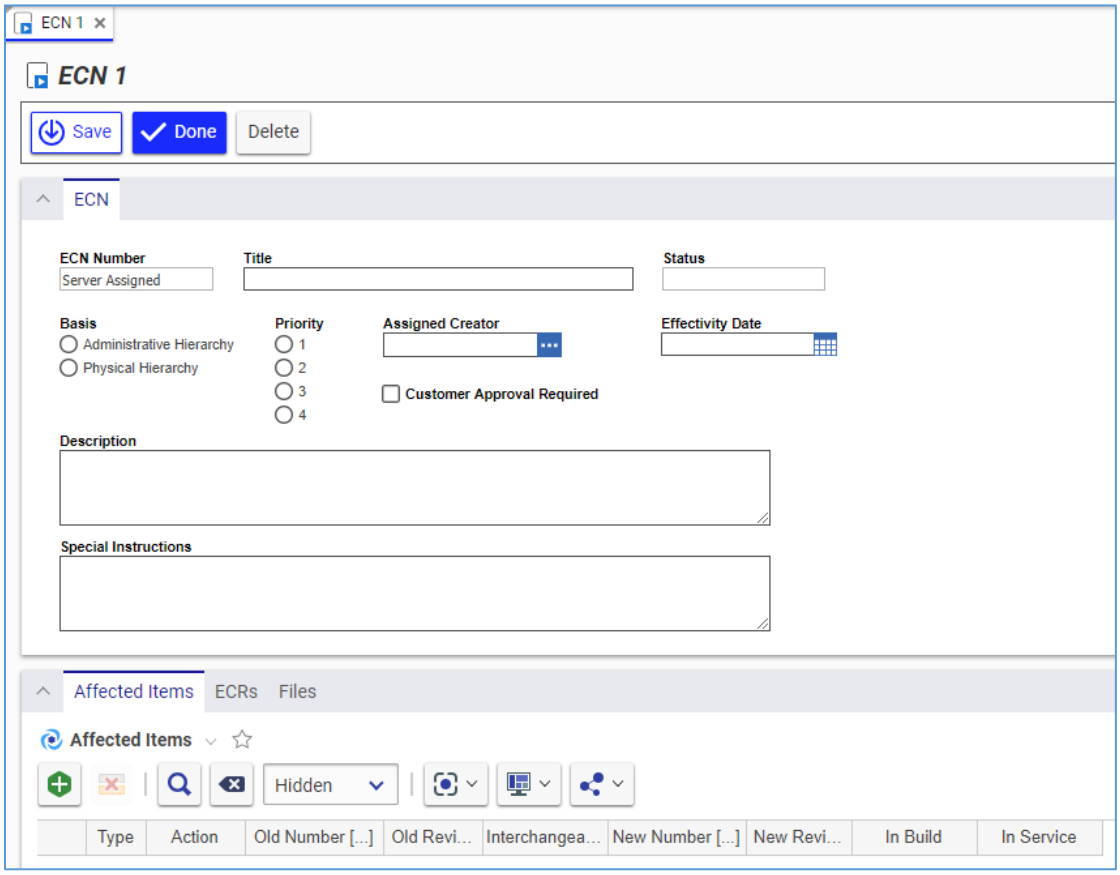

Figure 610.

3. Enter the ***ECR title*** In the **Title** text box, making it as descriptive as possible.
4. Select the appropriate hierarchy for **Basis**:
   - **Administrative hierarchy** refers to anything related to the process of running the business. An error in an expense report procedure would be classified as an administrative hierarchy.
   - **Physical hierarchy** refers to the Item (Part) itself and any Document associated with it. A bug in software would be classified as a physical hierarchy.
5. Specify the change priority number in the **Priority** field. The higher the priority of the change, the lower the number selected.
6. Specify the ECN Owner in the **Assigned Creator** text box.

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7. Specify the date on which the ECN goes into effect in the **Effective Date** box. If left blank, it is automatically set to the Item release date.
8. If the change requires customer approval, select the **Customer Approval Required** check box.
9. Describe the change as precisely as possible in the **Description** text box.
10. If there are any special instructions for the change, enter them as precisely as possible in the **Special Instructions** text box.
11. Go to the **ECRs** accordion tab to attach all the ECRs included in this ECN for tracking and reporting.

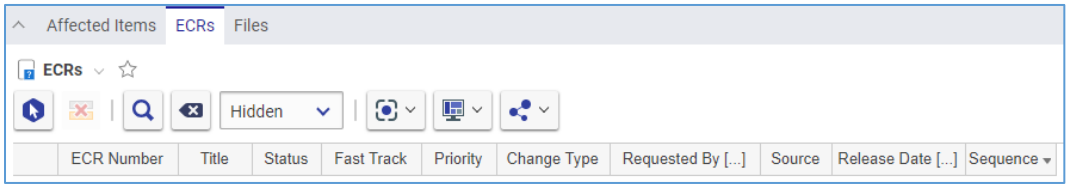

Figure 611.

12. Click **Select Items** on the **ECRs** accordion toolbar. The **Search dialog – ECR** appears.
13. Using the standard search procedure, search for and select the ECRs combined or included in this ECN. The selected ECRs appear as new rows at the bottom of the **ECRs** grid.

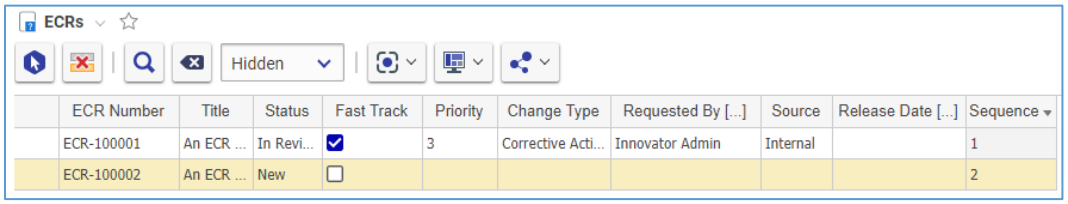

Figure 612.

14. Go to the **Files** accordion tab to attach all the files concerning this ECN.

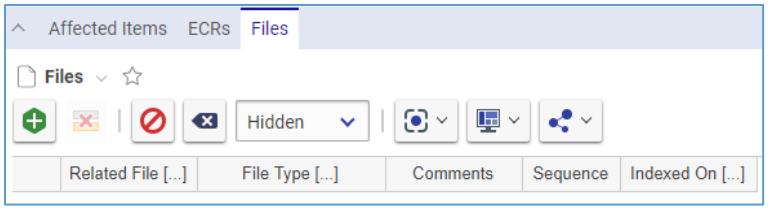

Figure 613.

15. Click **Create Item** on the **Files** accordion toolbar. The standard operating system dialog for file browsing and selection appears.
16. Search for and select a file. A new row appears in the **Files** grid with the file attached.

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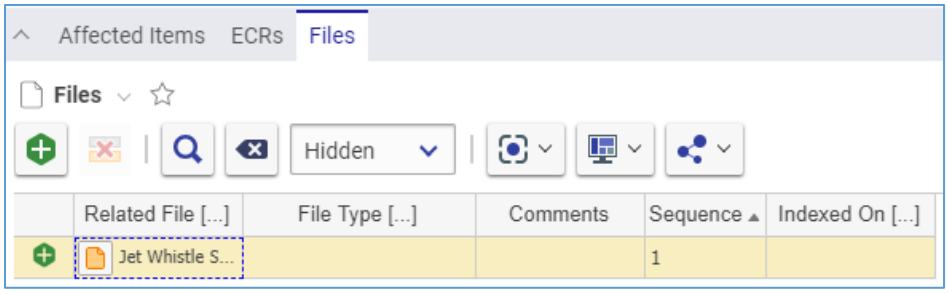

Figure 614.

17. This step is recommended. In the **File Type** cell, specify the file type using one of these options:

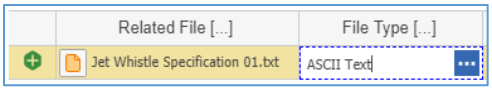

Figure 615.

a. Click the **ellipsis** button and then select ***the file type*** in the **Search dialog – File Type** cell.

b. Enter ***the file type***, which should exist in Aras Innovator. An error tooltip appears if you entered a ***file type*** that does not exist in Aras Innovator.

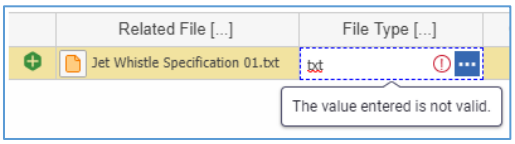

Figure 616.

Note: You can leave the **File Type** cell empty, omitting step 17. Aras Innovator will automatically assign a file type depending on File's extension when you save the ECN.

18. If it is necessary to provide additional information about the File, enter it in the **Comments** cell.
19. Repeat steps 15-18 for other files concerning this ECN.
20. If you need to add Items with the ECN, use the procedure described in section *12.1.3.3 Adding an Item with an ECN*.
21. If you need to change Items with the ECN, use the procedure described in section *12.1.3.4 Changing Items with an ECN*.
22. If you need to delete Items with the ECN, use the procedure described in section *12.1.3.5 Deleting an Item with an ECN*.
23. Click **Done** on the **ECN** toolbar. The ECN is created and waits to be submitted as defined in the section *12.1.3.6 Submitting an ECN*.

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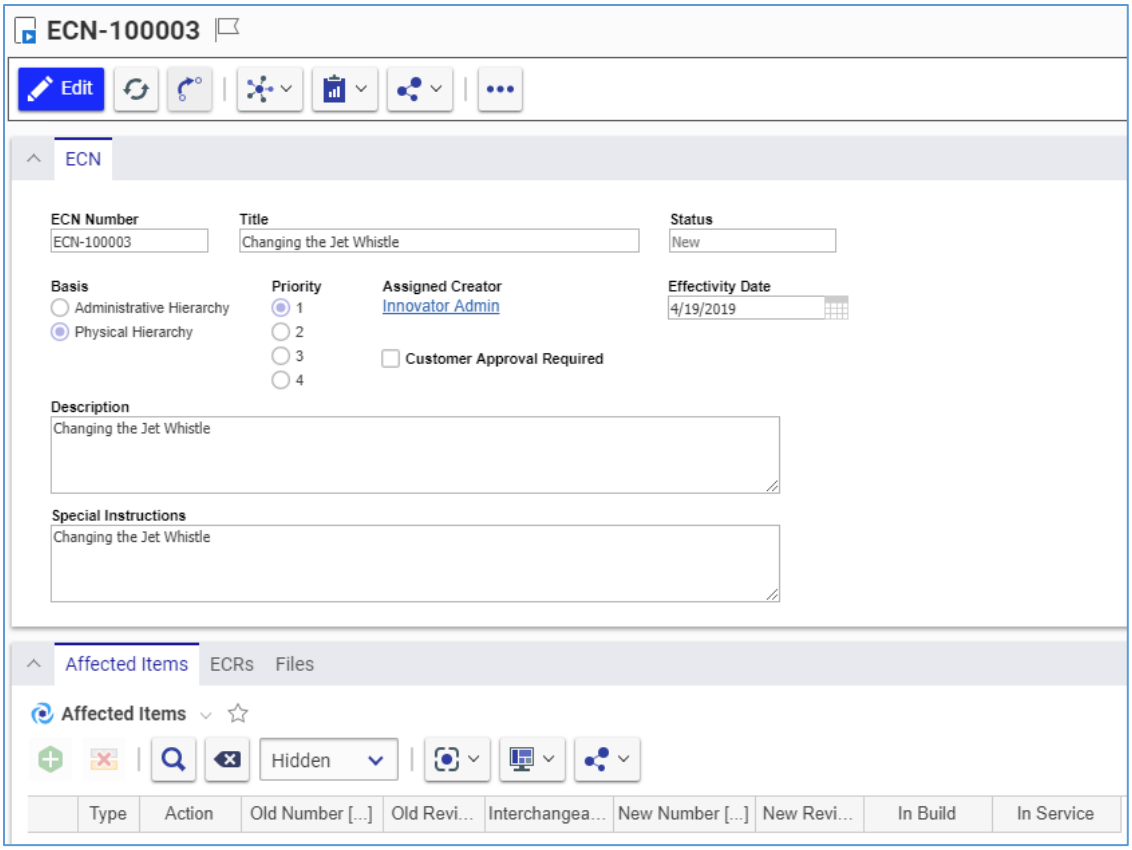

Figure 617.

13.1.3.3 Adding an Item with an ECN

Because an ECN can be used to add, change, or delete affected Items, the ECN creation process can be conventionally divided into general and specific procedures. This section defines the steps a member of the CM group should use for adding affected Items when creating the ECN. Section *13.1.3.2 Creating an ECN* outlines the general procedure. The other specific procedures are outlined in sections *13.1.3.4 Changing Items within an ECN* and *13.1.3.5 Deleting an Item within an ECN*.

A new Item has the **Preliminary** State. An ECN promotes the Item to the **Released** State at the end of the ECN process when it is released.

Use the following procedure to assign a new affected Item to release with an Engineering Change Notice:

1. Open the **ECN** view.
2. Click **Edit** on the **ECN** toolbar.
3. Go to the **Affected Items** accordion tab.
4. Click **Create Item** on the **Affected Items** accordion toolbar. A new row appears at the bottom of the **Affected Items** grid.

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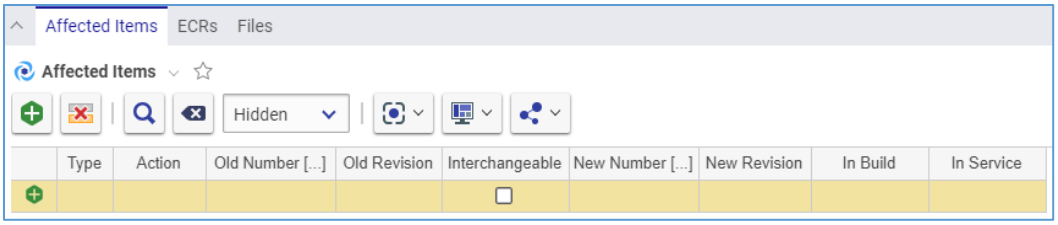

Figure 618.

5. Select **Add** in the **Action** cell.

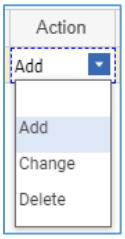

Figure 619.

6. Click the **ellipsis** button in the **New Number** cell. The **Search dialog – Change Controlled Item** appears.
7. Using the standard search procedure, search for and select the new affected Item. The affected Item populates the **New Number** cell.

Figure 620.

8. Click either **Save** or **Done** on the **ECN** toolbar. The ECN has an affected Item assigned for adding.

Figure 621.

13.1.3.4 Changing Items with an ECN

Because an ECN can be used to add, change, or delete affected Items, the ECN creation process can be conventionally divided into general and specific procedures. This section defines the steps a member of the CM group should use for changing affected Items when creating the ECN. Section *13.1.3.2 Creating an ECN* outlines the general procedure. The other specific procedures are outlined in sections *13.1.3.3 Adding an Item within an ECN* and *13.1.3.5 Deleting an Item within an ECN*.

A change for an already Released Item can be either:

- **Interchangeable**, the Released Item is automatically revised during the ECN process to create a new Preliminary Item version to keep changes. When the ECN is released at the end of the ECN process, this new Item version is Released.
- **Non-Interchangeable**, During the ECN process, any necessary changes are made to a new Preliminary Item. When the ECN is released at the of the ECN process, the new Item is Released, and the old affected Item is Superseded.

Use the following procedure to assign an existing affected Item to be changed when creating an Engineering Change Notice:

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1. Follow steps 1-4 of the Adding an Item within an ECN procedure.
2. Select **Change** in the **Action** cell.

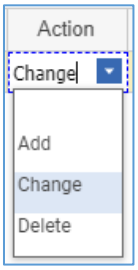

Figure 622.

3. Click the **ellipsis** button in the **Old Number** cell. The **Search dialog – Change Controlled Item** appears.
4. Using the standard search procedure, search for and select the affected Item to be changed. The selected affected Item populates the **Old Number** cell.

Figure 623.

5. Select the **Interchangeable** cell check box if the old and new Items are interchangeable, e.g., if there is no Fit-Form-Function change. The new Item version can be replaced or modified without causing any change in functionality to the surrounding Items. When selected, the same Item number will be retained.
6. If the **Interchangeable** cell is not selected, e.g., the old and new Items are not interchangeable due to a Fit-Form-Function change, select the replacement new Item:
   a. Click the **ellipsis** button in the **New Number** cell. The **Search dialog – Change Controlled Item** appears.
   b. Using the standard search procedure, search for and select the new affected Item. The new affected Item populates the **New Number** cell. This new item must be in the Preliminary state to pass readiness checks during the ECN process.

Figure 624.

7. Click **Save** two times on the **ECN** toolbar.
8. Select the action to take on the Items that are being built in the **In Build** cell: **Use Existing**, **Rework**, or **Scrap**.
9. Select the action to take on the Items that are currently in service in the **In Service** cell: **Use Existing**, **Rework**, or **Scrap**.

Figure 625.

10. Click either **Save** or **Done** on the **ECN** toolbar. The ECN has an affected Item assigned for changing.

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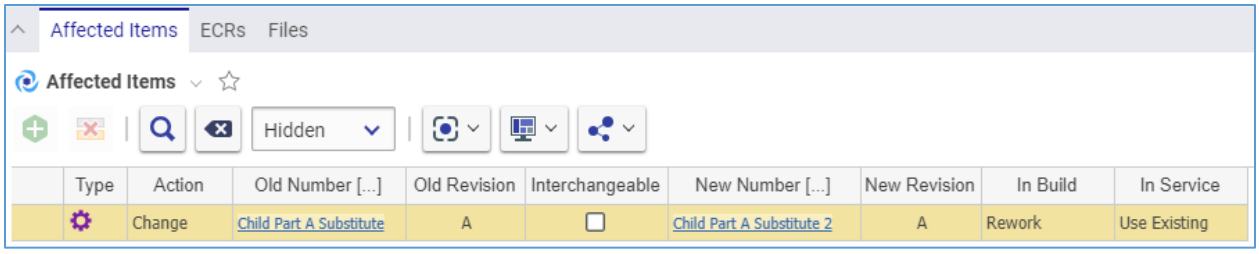

Figure 626.

13.1.3.5 Deleting an Item with an ECN

Because an ECN can be used to add, change, or delete affected Items, the ECN creating process can be conventionally divided into general and specific procedures. This section defines the steps a member of the CM group should use for superseding affected Items with the ECN. Section *13.1.3.2 Creating an ECN* outlines the general procedure. The other specific procedures are outlined in sections *13.1.3.3 Adding an Item within an ECN* and *13.1.3.4 Changing Items within an ECN*.

An already Released item gets Superseded at the end of the ECN process when it is released.

Use the following procedure to assign an existing affected Item to be superseded with an Engineering Change Notice:

1. Follow steps 1-4 of the Adding an Item within an ECN procedure.
2. Select **Delete** in the **Action** cell.

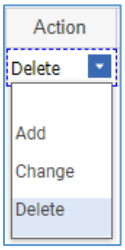

Figure 627.

3. Click the **ellipsis** button in the **Old Number** cell. The **Search dialog – Change Controlled Item** appears.
4. Using the standard search procedure, search for and select the affected Item to be deleted. The selected affected Item populates the **Old Number** cell.

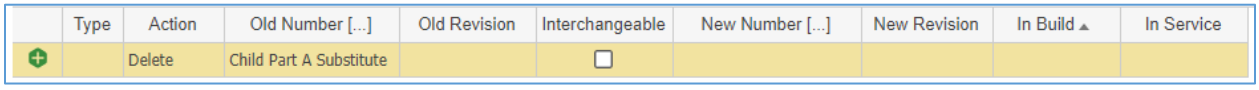

Figure 628.

5. Click **Save** two times on the **ECN** toolbar.
6. Select the action to take on the Items that are being built in the **In Build** cell: **Use Existing**, **Rework**, or **Scrap**.
7. Select the action to take on the Items that are currently in service in the **In Service** cell: **Use Existing**, **Rework**, or **Scrap**.

Figure 629.

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8. Click either **Save** or **Done** on the **ECN** toolbar. The ECN has an affected Item assigned for superseding.

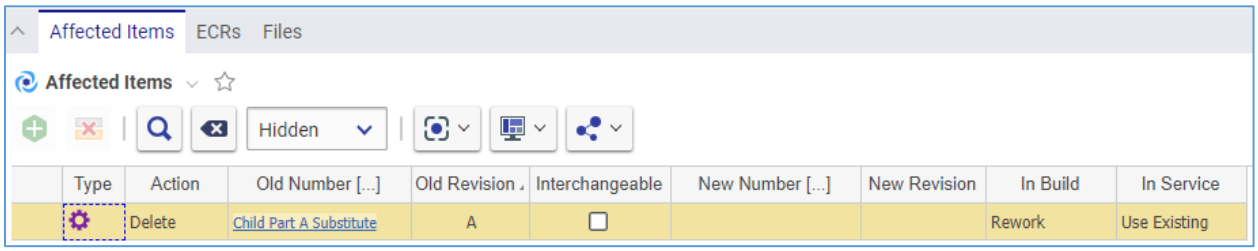

Figure 630.

13.1.3.6 Removing an Affected Item from an ECN

Use the following procedure:

1. Follow steps 1-3 of the Adding an Item within an ECN procedure.
2. Click the **Affected Item** and then click **Delete Row** on the **Affected Items** accordion toolbar. The **Affected Item** becomes unavailable.

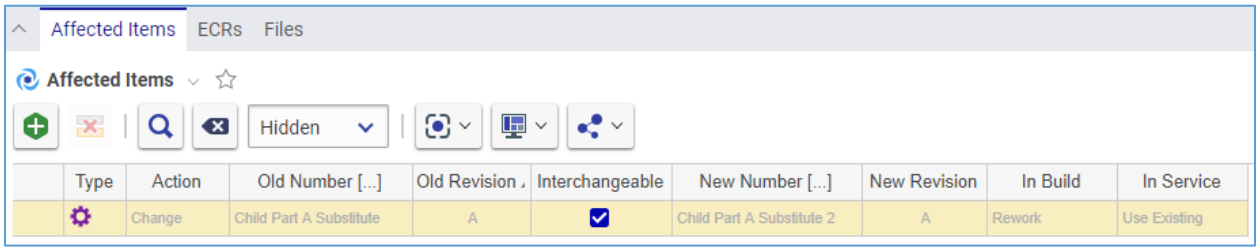

Figure 631.

3. Click either **Save** or **Done** on the **ECN** toolbar. The **Affected Item** disappears from the grid.

Note: The **Affected Item** disappears immediately if the ECN was not saved after it was added.

13.1.3.7 Submitting an ECN

Use the following procedure:

1. Go to **Contents --> My Innovator --> My InBasket --> Search My InBasket**.
2. Go to the **Workflow Activity Completion** dialog for the ECN.

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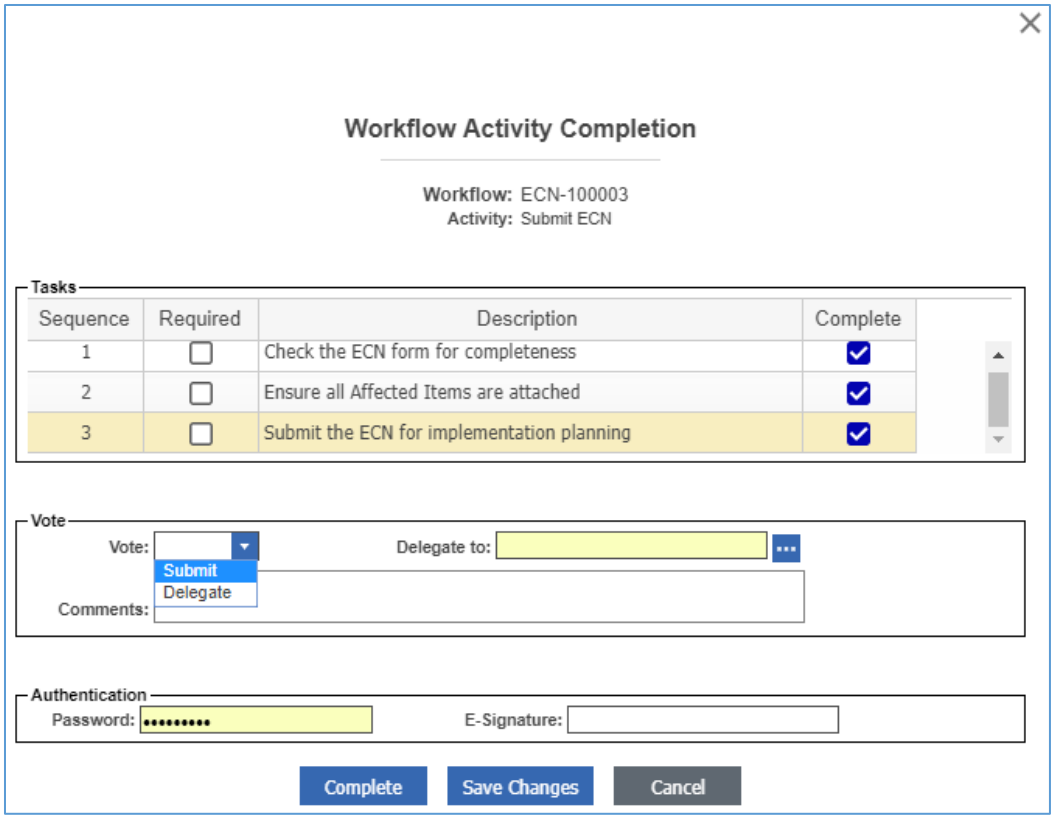

Figure 632.

3. Mark the tasks you completed in the **Tasks** field.
4. Select **Submit** in the **Vote** list.
5. Click **Complete**.

The ECR enters the **ECN Planning** activity assigned to the CSII.

13.1.3.8 ECN Planning

For the **ECN Planning** activity, a CSII makes sure that the planning is accurate and complete by providing all necessary Affected Items information, such as:

- There are new part numbers for the non-interchangeable parts changes.
- The ECN has all other affected items in the hierarchy.
- Affected Items up the hierarchy tree from the actual Item are changed.
- Affected Documents of the parent assemblies (such as BOMs) are changed.

Since each company has its own rules for new part numbers or new revision generation, the CSII is responsible for the accuracy of this information.

13.1.3.9 The ECN Report

You can print or share an ECN using the ECN Report.

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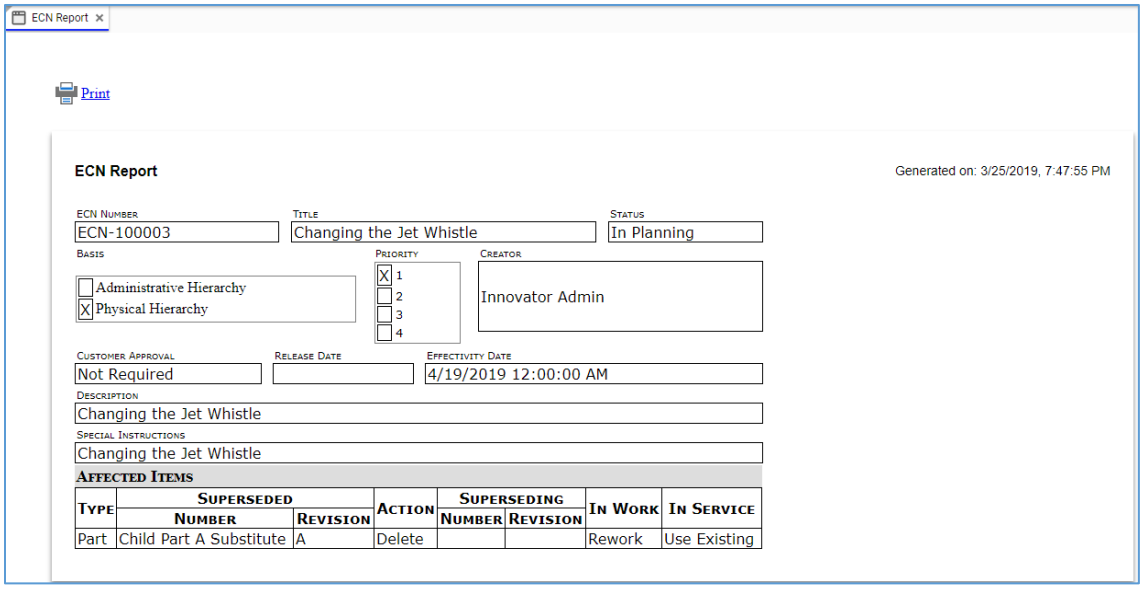

Figure 633.

There are several ways to access the ECN Report:

- Go to **Contents --> Change Management --> ECNs**, right-click an **ECN** to be reported, and then click **ECN Report**.

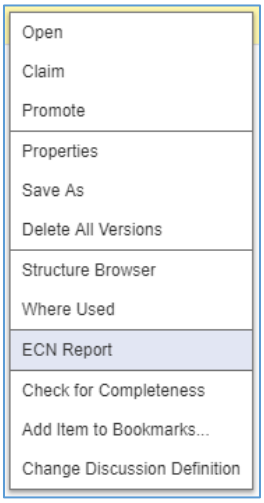

Figure 634.

- Open the view of an ECN to be reported. On the **ECN** toolbar, click **Reports**, and then click **ECN Report**.

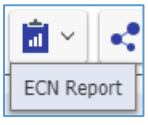

Figure 635.

To quit a Report, close its view in Aras Innovator.

At the top left corner of the ECN Report view, there is a **Print** button, which uses the standard browser print function. Depending on the browser and your specific configuration, various print choices, such as printing to a printer or saving to PDF, are available.

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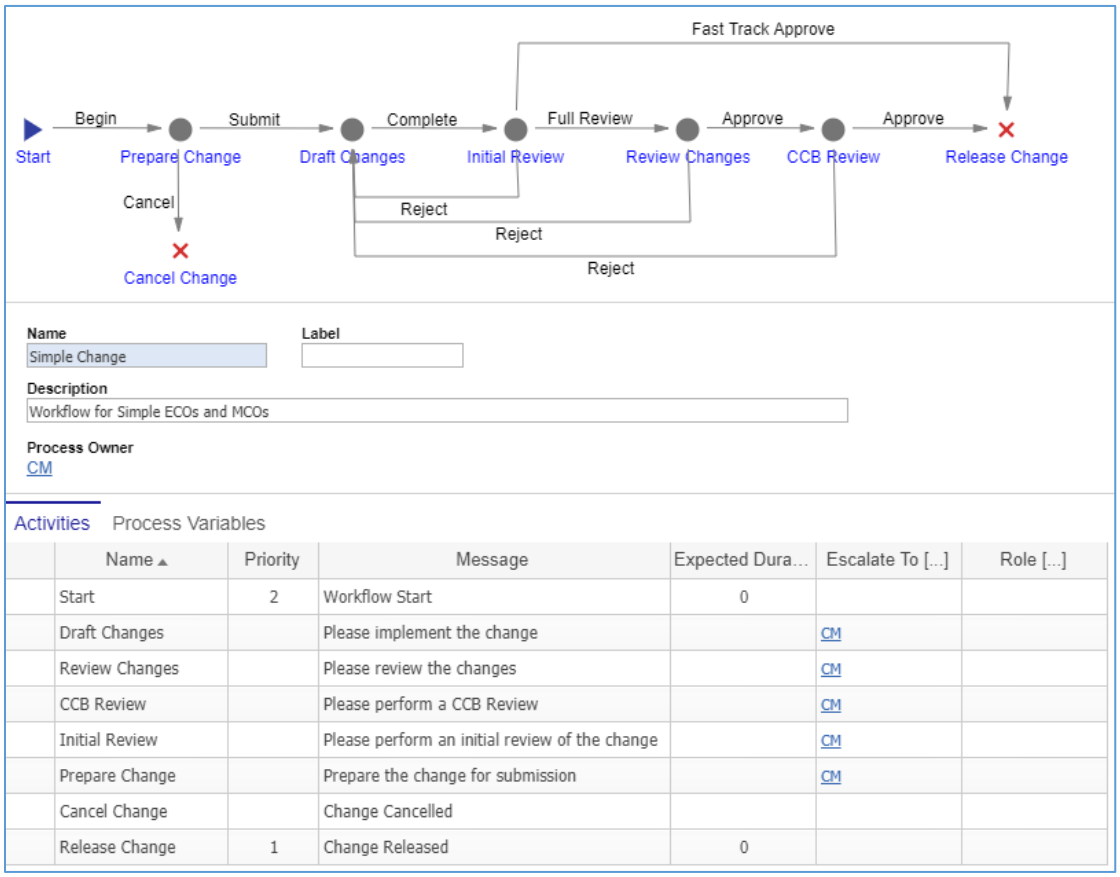
13.2 Simplified Change Management

The Simplified change process uses two different kinds of items to manage changes:

- The **Simple Engineering Change Order (ECO)** is a simplified approach for releasing, modifying, or deleting Items. This process is useful when the full CMII process is not required to add or modify an Item.
- The **Manufacturing Change Order (MCO)** allows modification of a released Part to add a Manufactured Part to the Part's AML. The AML contains a list of Manufactured Parts created by approved Manufacturers and sold by approved Vendors. By using the MCO, the alteration of an AML on a released Part does not require the full CMII process.

Both Items are processed according to the same Simplified Change Management workflow depicted in the following figure.



	Name	Priority	Message	Expected Dura...	Escalate To [...]	Role [...]
	Start	2	Workflow Start	0		
	Draft Changes		Please implement the change		CM	
	Review Changes		Please review the changes		CM	
	CCB Review		Please perform a CCB Review		CM	
	Initial Review		Please perform an initial review of the change		CM	
	Prepare Change		Prepare the change for submission		CM	
	Cancel Change		Change Cancelled			
	Release Change	1	Change Released	0		

Figure 636.

13.2.1 Simple Engineering Change Order (ECO)

A Simple Engineering Change Order (ECO) is a simplified process of implementing changes within an organization.

There are three types of change Actions for an affected Item in the Simple ECO process:

- **Add** — A new affected Item becomes **Released**.

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- **Change** — An affected existing Item is modified. The Item becomes **Superseded**, **Obsolete**, or incremented to a new revision level to allow modification.
- **Delete** — An existing affected Item is obsolete. The Item becomes **Superseded** or **Obsolete**.

13.2.1.1 Understanding the Simple ECO Process

The Simple ECO workflow has the following roles:

- A Simple ECO Creator (**Originator**), which is a user who initially created the Simple ECO in the system. This may or may not be the same person as other roles.
- A Simple ECO Owner (**Assigned Creator**), which is an engineer or technical person responsible for technical implications and ramifications of the change to each affected Item.
- A Change Specialist I (CSI) coordinates and prepares Simple ECOs through the workflow.
- Change Analyst (CA).
- The Configuration Management (CM) group.
- The Change Control Board (CCB), which is responsible for review and final approval of an MCO.

A Simple ECO traverses between various states during its life cycle as depicted in the following figure.

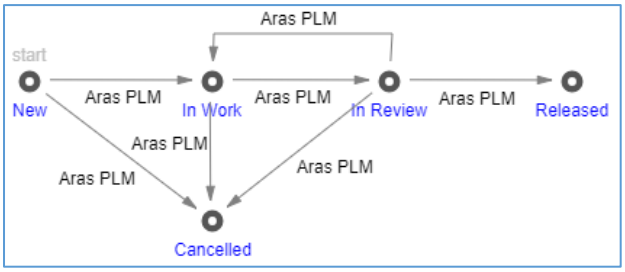

Figure 637.

The Simple Change Management workflow and Simple ECO life cycle together produce the following scenario:

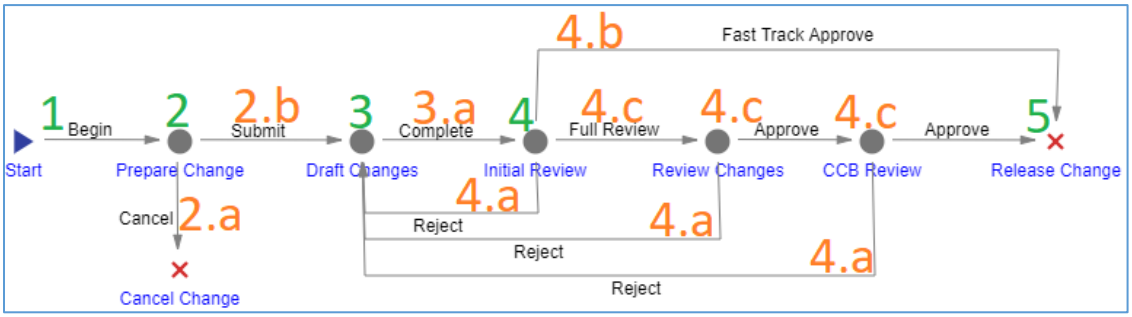

Figure 638.

1. An Aras Innovator user initiates a Simple ECO: creates and saves the Simple ECO. When the Creator saves the Simple ECO, it enters the **In Work** state, and a workflow is automatically started to assign tasks and track the changes to the Simple ECO.
2. The Simple ECO enters the **Prepare Change** activity **assigned to the CSI**. According to the company's rules and policies, the CSI reviews the Simple ECO, assigns an Owner to each Affected Item in the Simple ECO, and makes decisions and recommendations about the propagation of these Item changes. For example, the CSI can decide whether a part should have a new revision or an entirely new part number. Also, the CSI checks whether a changed part leads to a change of revision or part number of assemblies containing this part.

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a. The CSI can **Cancel** the Simple ECO.

b. Once the CSI votes **Submit**, the Simple ECO goes further.

3. The Simple ECO enters the **Draft Changes** activity **assigned to each Owner**. The Owner is responsible for updating the Item documentation affected by this change, like BOMs, specifications, drawings, any other documents. The affected Items requiring the change of documentation may be not only the items being changed directly but also hierarchies containing these Items.

   - Once all the Owners vote **Complete**, the Simple ECO goes further.

4. The Simple ECO enters the **Initial Review** activity **assigned to the CA**. The CA reviews the changes and decides either to:

   a. **Reject** — The Simple ECO goes back to the **Draft Changes** activity. The Owners can modify and resubmit the Simple ECO for the **Initial Review** activity.

   b. **Fast Track Approve** — The Simple ECO is **Approved** and **Released**.

   c. **Full Review** — The Simple ECO enters the **Review Changes** activity **assigned to other team members**. The Simple ECO goes under in-depth formal/informal reviews. Once these reviews are completed, The Simple ECO enters the **CCB Review** activity. Once the CCB audit is completed, the Simple ECO is **Approved** and **Released**. The Simple ECO may also be rejected (4.a) at these activities.

5. Once the Simple ECO is **Released**, the life cycle states of the affected Items are updated.

The following table shows the Simple ECO lifecycle and workflow in terms of Roles and Permissions.

Table 15: The Simple ECO lifecycle and workflow in Roles and Permissions

Life Cycle State	Workflow Activity	Can Add	Get	Update	Delete	Change access	Can be promoted	Update responsible
New	Prepare Change	World	Aras PLM, CM, Creator, Manager, Owner, World	Aras PLM, CM, Creator, Manager, Owner	Aras PLM, CM, Creator, Manager, Owner	Aras PLM, CM, Creator, Manager	Yes	CSI
In Work	Draft Changes		Aras PLM, CM, Manager, Owner, World	Aras PLM, CM, Manager, Owner	Aras PLM, CM	Aras PLM, CM	Yes	Each Owner (Assigned Creator) of all Affected Items
In Review	Initial Review, Review Changes, CCB Review		Aras PLM, World	Aras PLM	Aras PLM	Aras PLM	Yes	CA
Released	Released Change		Aras PLM, World	Aras PLM		Aras PLM	No	
Cancelled	Cancelled Change		Aras PLM, World	Aras PLM		Aras PLM	Yes	

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13.2.1.2 Creating a Simple ECO

Because a Simple ECO can be used to add, change, or delete affected Items, the Simple ECO creation process can be conventionally divided into general and specific procedures. This section defines the general steps you should use for creating a Simple ECO. The specific procedures are outlined in sections *13.2.1.3 Adding an Item within a Simple ECO*, *13.2.1.4 Changing an Item within a Simple ECO*, and *13.2.1.5 Deleting an Item within a Simple ECO*.

Use the following procedure to create a Simple Engineering Change Order:

1. Go to **Contents --> Change Management --> ECOs** (one with the green icon).

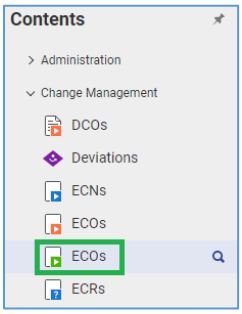

Figure 639.

2. Click **Create New ECO**. The view of a new Simple ECO appears.

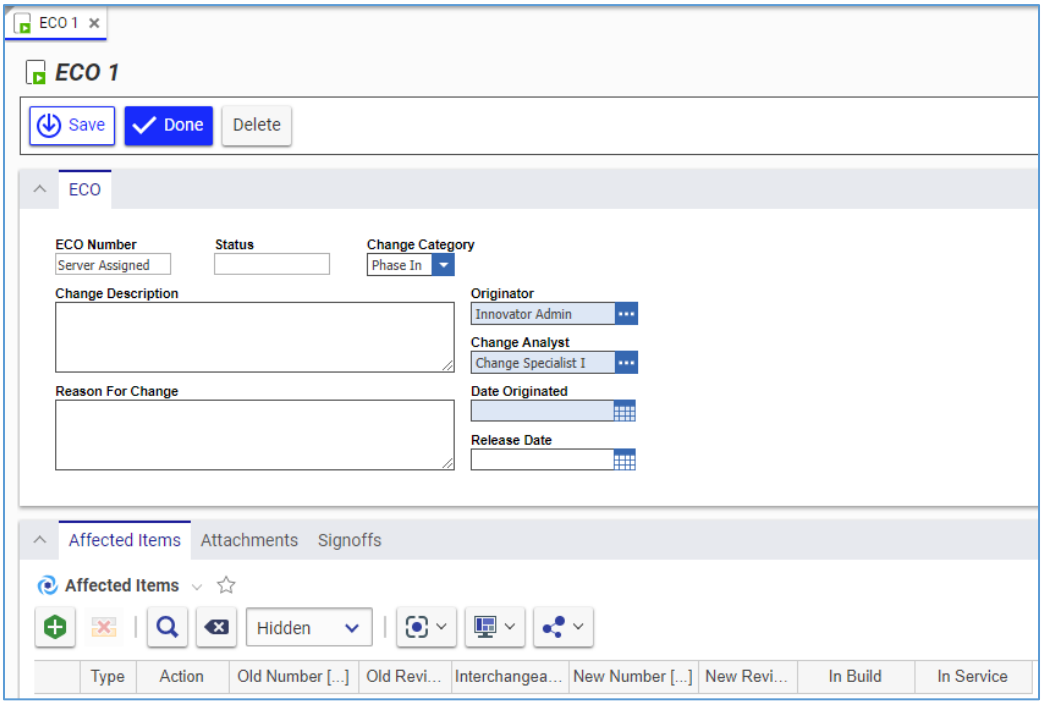

Figure 640.

3. Keep the default **Phase In** value in the **Change Category** list.
4. Describe the change as precisely as possible in the **Change Description** text box.
5. Describe the reason for the change as precisely as possible in the **Reason For Change** text box.
6. Keep the ***default*** value in the **Originator** box. This is the Simple ECO Creator.

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7. Keep the default **Change Specialist I** value in the **Change Analyst** box. This is a person or group assigned to act as a CA in the Simple ECO workflow process.
8. Keep the **Date Originated** box blank. This box is automatically filled with the date on which the Simple ECO is saved.
9. Go to the **Attachments** accordion tab to attach all the files concerning this Simple ECO.

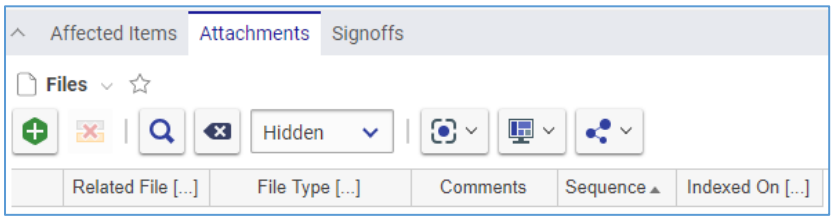

Figure 641.

10. Click **Create Item** on the **Attachments** accordion toolbar. The standard operating system dialog for file browsing and selection appears.
11. Search for and select a file. A new row appears in the **Files** grid with the file attached.

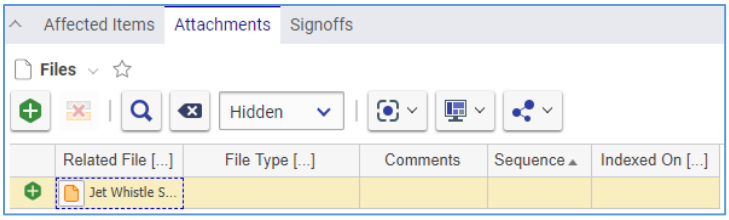

Figure 642.

12. This step is recommended. In the **File Type** cell, specify the file type using one of these options:

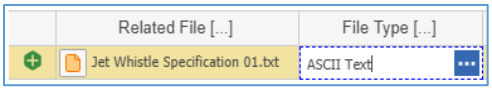

Figure 643.

   a. Click the **ellipsis** button and then select ***the file type*** in the **Search dialog – File Type** dialog box.
   b. Enter ***the file type***, which should exist in Aras Innovator. An error tooltip appears if you entered a ***file type*** that does not exist in Aras Innovator.

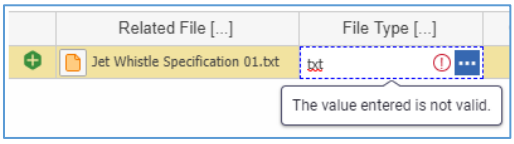

Figure 644.

Note: You can leave the **File Type** cell empty, omitting step 12. Aras Innovator will automatically assign a file type depending on File's extension when you save the ECN.

13. If it is necessary to provide additional information about the File, enter it in the **Comments** cell.
14. Repeat steps 10-13 for other files associated with this Simple ECO.

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15. If you need to add Items with the Simple ECO, use the procedure described in section *13.2.1.3 Adding an Item within a Simple ECO*.
16. If you need to change Items with the Simple ECO, use the procedure described in section *13.2.1.4 Changing an Item within a Simple ECO*.
17. If you need to delete Items with the Simple ECO, use the procedure described in section *13.2.1.5 Deleting an Item within a Simple ECO*.
18. Click **Done** on the **Simple ECO** toolbar. The Simple ECO is created and awaits to be submitted as defined in the section *12.2.1.6 Submitting a Simple ECO*.

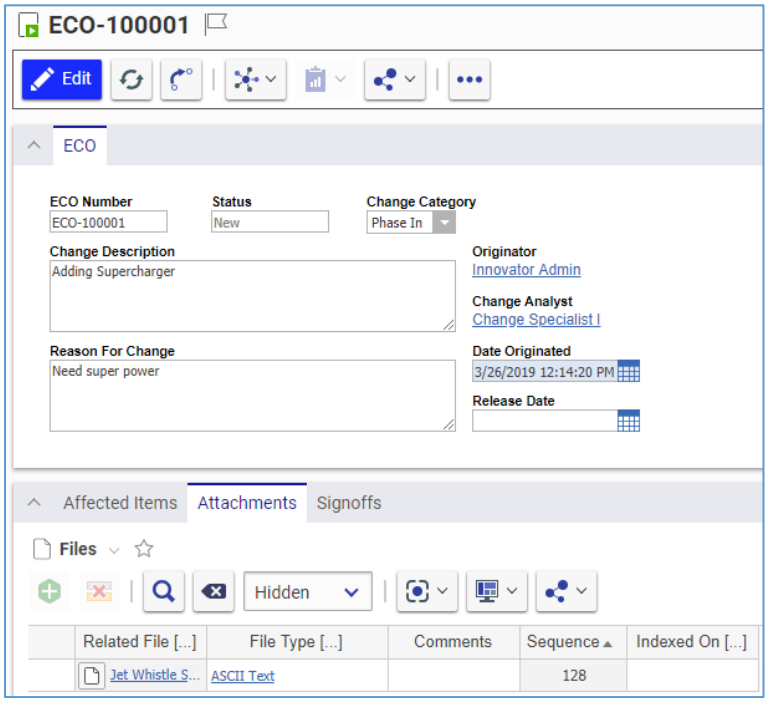

Figure 645.

13.2.1.3 Adding an Item within a Simple ECO

Because a Simple ECO can be used to add, change, or delete affected Items, the Simple ECO creating process can be conventionally divided into general and specific procedures. This section defines the steps you should use for adding affected Items when creating a Simple ECO. Section *13.2.1.2 Creating a Simple ECO* outlines the general procedure. The other specific procedures are outlined in sections *13.2.1.4 Changing an Item within a Simple ECO* and *13.2.1.5 Deleting an Item within a Simple ECO*.

A new Item has the **Preliminary** State. A Simple ECO promotes the Item to the **Released** State at the end of the Simple ECO process when it is released.

Use the following procedure to assign a new affected Item for adding when creating a Simple Engineering Change Order:

1. Open the **Simple ECO** view.
2. Click **Edit** on the **Simple ECO** toolbar.
3. Go to the **Affected Items** accordion tab.
4. Click **Create Item** on the **Affected Items** accordion toolbar. A new row appears at the bottom of the **Affected Items** grid.

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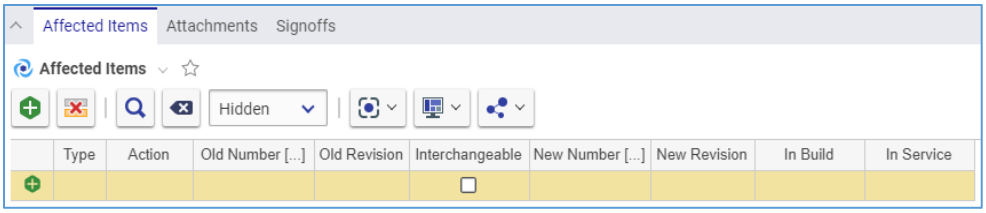

Figure 646.

5. Select **Add** in the **Action** cell.

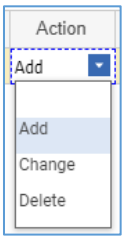

Figure 647.

6. Click the **ellipsis** button in the **New Number** cell. The **Search dialog – Change Controlled Item** appears.
7. Using the standard search procedure, search for and select the new affected Item. The affected Item populates the **New Number** cell.

Figure 648.

8. Click either **Save** or **Done** on the **Simple ECO** toolbar. The Simple ECO has an affected Item assigned for adding.

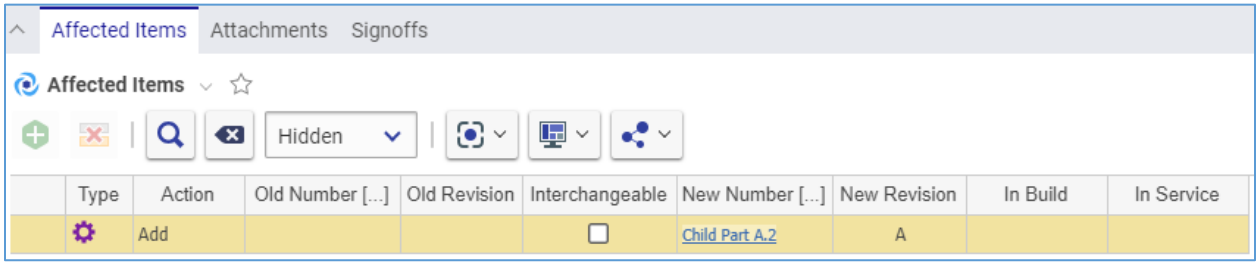

Figure 649.

13.2.1.4 Changing an Item within a Simple ECO

Because a Simple ECO can be used to add, change, or delete affected Items, the Simple ECO creating process can be conventionally divided into general and specific procedures. This section defines the steps you should use for changing affected Items when creating a Simple ECO. Section *13.2.1.2 Creating a Simple ECO* outlines the general procedure. The other specific procedures are outlined in sections *13.2.1.3 Adding an Item within a Simple ECO* and *13.2.1.5 Deleting an Item within a Simple ECO*.

A change for an already Released Item can be either:

- **Interchangeable**, the Released Item is automatically revised during the ECN process to create a new Preliminary Item version to make changes. When the ECN is released at the end of the ECN process, this new Item version is Released.

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- **Non-Interchangeable**, During the ECN process, any necessary changes are made to a new Preliminary Item. When the ECN is released at the of the ECN process, the new Item is Released, and the old affected Item is Superseded.

Use the following procedure to assign an existing affected Item to be changed when creating a Simple Engineering Change Order:

1. Follow steps 1-4 of the Adding an Item within a Simple ECO procedure.
2. Select **Change** in the **Action** cell.

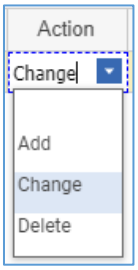

Figure 650.

3. Click the **ellipsis** button in the **Old Number** cell. The **Search dialog – Change Controlled Item** appears.
4. Using the standard search procedure, search for and select the affected Item to be changed. The selected affected Item populates the **Old Number** cell.

Figure 651.

5. Select the **Interchangeable** cell check box if the old and new Items are interchangeable, e.g., if there is no Fit-Form-Function change. The new Item version can be replaced or modified without causing any change in functionality to the surrounding Items. When selected, the same Item number will be retained.
6. If the **Interchangeable** cell is not selected, e.g., the old and new Items are not interchangeable due to a Fit-Form-Function change, select the replacing new Item:
   a. Click the **ellipsis** button in the **New Number** cell. The **Search dialog – Change Controlled Item** appears.
   b. Using the standard search procedure, search for and select the new affected Item. The new affected Item populates the **New Number** cell. This new item must be in the Preliminary state to pass readiness checks during the Simple ECO process.

Figure 652.

7. Click **Save** two times on the **Simple ECO** toolbar.
8. Select the action to take on the Items that are being built in the **In Build** cell: **Use Existing**, **Rework**, or **Scrap**.
9. Select the action to take on the Items that are currently in service in the **In Service** cell: **Use Existing**, **Rework**, or **Scrap**.

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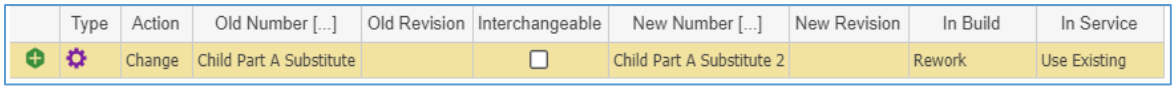

Figure 653.

10. Click either **Save** or **Done** on the **Simple ECO** toolbar. The Simple ECO has an affected Item assigned for changing.

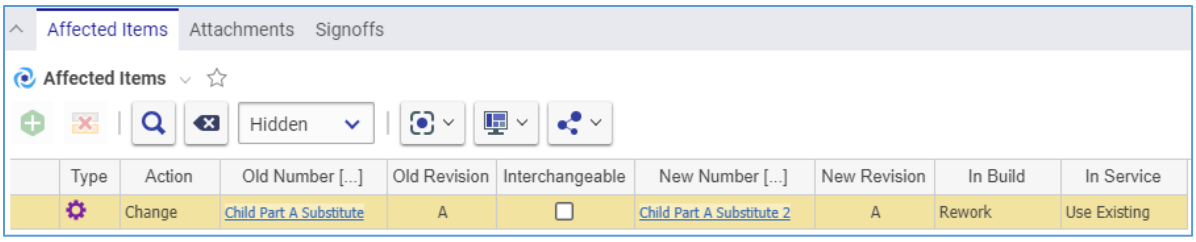

Figure 654.

13.2.1.5 Deleting an Item within a Simple ECO

Because a Simple ECO can be used to add, change, or delete affected Items, the Simple ECO creating process can be conventionally divided into general and specific procedures. This section defines the steps you should use for deleting affected Items when creating a Simple ECO. Section *13.2.1.2 Creating a Simple ECO* outlines the general procedure. The other specific procedures are outlined in sections *13.2.1.3 Adding an Item within a Simple ECO* and *13.2.1.4 Changing an Item within a Simple ECO*.

An already Released item gets Superseded at the end of the Simple ECO process when it is released.

Use the following procedure to assign an existing affected Item to be superseded with a Simple Engineering Change Order:

1. Follow steps 1-4 of the Adding an Item within a Simple ECO procedure.
2. Select **Delete** in the **Action** cell.

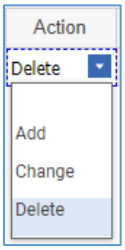

Figure 655.

3. Click the **ellipsis** button in the **Old Number** cell. The **Search dialog – Change Controlled Item** appears.
4. Using the standard search procedure, search for and select the affected Item to be deleted. The selected affected Item populates the **Old Number** cell.

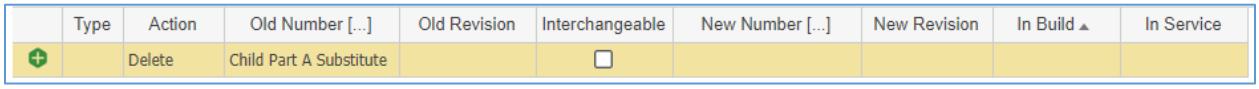

Figure 656.

5. Click **Save** two times on the **Simple ECO** toolbar.
6. Select the action to take on the Items that are being built in the **In Build** cell: **Use Existing**, **Rework**, or **Scrap**.

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7. Select the action to take on the Items that are currently in service in the **In Service** cell: **Use Existing**, **Rework**, or **Scrap**.

Figure 657.

8. Click either **Save** or **Done** on the **Simple ECO** toolbar. The Simple ECO has an affected Item assigned for deleting.

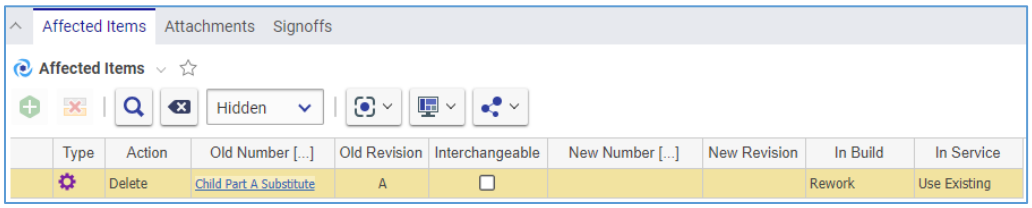

Figure 658.

13.2.1.6 Removing an Affected Item from a Simple ECO

Use the following procedure:

1. Follow steps 1-3 of Adding an Item within a Simple ECO procedure.
2. Click the **Affected Item** and then click **Delete Row** on the **Affected Items** accordion toolbar. The **Affected Item** becomes unavailable.

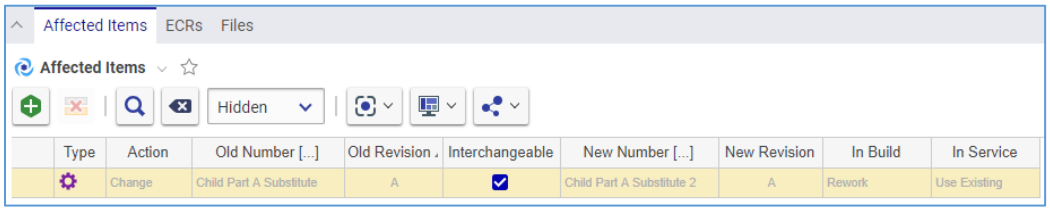

Figure 659.

3. Click either **Save** or **Done** on the **Simple ECO** toolbar. The **Affected Item** disappears from the grid.

Note: The **Affected Item** disappears immediately if the Simple ECO was not saved after it was added.

13.2.1.7 Submitting a Simple ECO

Use the following procedure:

1. Go to **Contents --> My Innovator --> My InBasket --> Search My InBasket**.
2. Go to the **Workflow Activity Completion** dialog for the Simple ECO.

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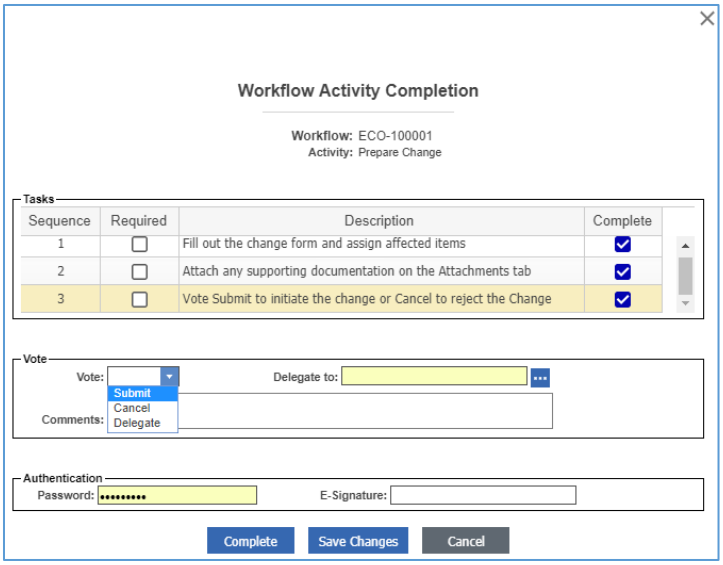

Figure 660.

3. Mark the tasks you completed in the **Tasks** field.
4. Select **Submit** in the **Vote** list.
5. Click **Complete**.

The Simple ECO enters the **Draft Changes** activity assigned to the Assigned Creator.

13.2.1.8 Processing a Simple ECO

Once a Simple ECO is submitted, each Affected Item goes to its Assigned Creator for the **Draft Changes** activity. The Assigned Creator checks and may provide the following information:

- There are new part numbers for the noninterchangeable parts changed.
- The ECN has all other affected items in the hierarchy.
- Affected Items up the hierarchy tree from the actual Item are changed.
- Affected Documents of the parent assemblies (such as BOMs) are changed.
- Etc.

Since each company has its own rules for new part numbers or new revision generation, the Assigned Creator is responsible for entering this information manually.

The only automatic update that Aras Innovator does for the Simplified CM process is a new revision for the interchangeable Items changed. This automatic update takes place once the Simple ECO is released.

13.2.2 Simple Manufacturing Change Order (MCO)

The Simple Manufacturing Change Order (MCO) is a simplified process used for changing an Approved Manufacturer List (AML) for a released Part. The AML modification does not require the full CMII process because this change does not change the Part itself. The MCO process is suitable for this type of modification.

The MCO process is not CMII compliant and modifies a Part without changing the Part revision. A specialized user interface enables you to edit the AML without the ability to edit other Part properties or relationships.

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13.2.2.1 Understanding the MCO Process

The MCO workflow has the following roles:

- An MCO Creator (**Originator**), is the user who initially created the MCO in the system. This may or may not be the same person as other roles.
- An MCO Owner (**Assigned Creator**), is the person responsible for the AML change.
- A Change Specialist I (CSI) coordinates and prepares MCOs through the workflow.
- Change Analyst (CA).
- The Configuration Management (CM) group.
- The Change Control Board (CCB), is responsible for review and final approval of an MCO.

An MCO moves between various states during its life cycle as shown in the following figure.

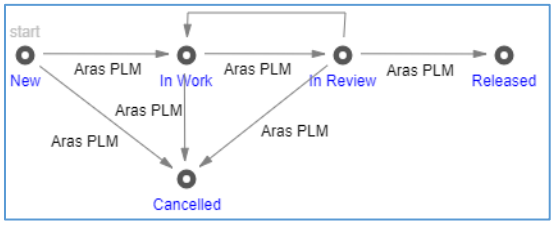

Figure 661.

The Simple Change Management workflow and MCO life cycle produce together the following scenario:

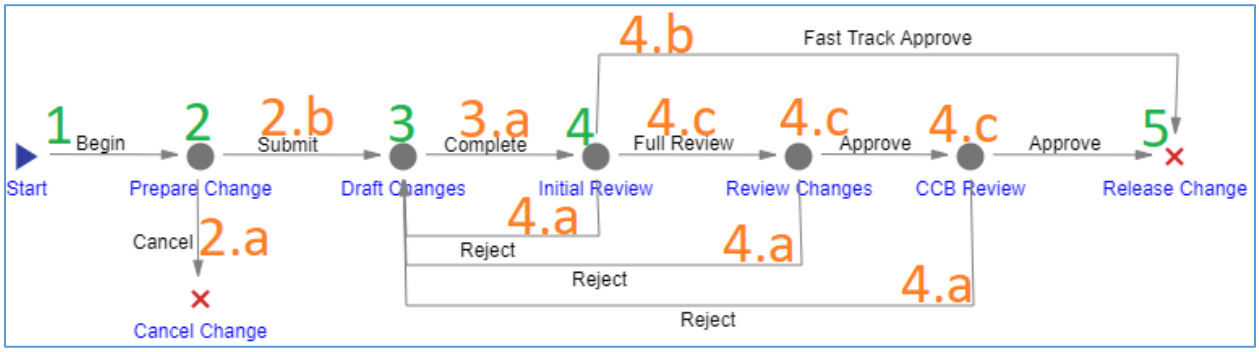

Figure 662.

1. An Aras Innovator user creates and saves the MCO. The creator should assign the Affected Parts to the MCO. When the Creator saves the MCO, it enters the **In Work** state, and a workflow is automatically started to assign tasks and track the changes to the MCO.
2. The MCO enters the **Prepare Change** activity **assigned to the CSI**. According to the company's rules and policies, the CSI reviews the MCO and decides whether to:
    a. **Cancel** the MCO. It cannot be restored in the future.
    b. **Submit** the MCO. It goes further.
3. The MCO enters the **Draft Changes** activity **assigned to an Owner**. The Owner is responsible for updating the AML using the AML editor.
    a. Once the Owner votes **Complete**, the ECR goes further.
4. The MCO enters the **Initial Review** activity **assigned to the CA**. The CA reviews the AML changes and decides either to:

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a. **Reject** — The MCO goes back to the **Draft Changes** activity. The Owner can modify and resubmit the MCO for the **Initial Review** activity.

b. **Fast Track Approve** — The MCO is **Approved** and **Released**.

c. **Full Review** — The MCO enters the **Review Changes** activity **assigned to other team members**. The MCO goes under in-depth formal/informal reviews. Once these reviews are completed, The MCO enters the **CCB Review** activity. Once the CCB audit is completed, the MCO is **Released**. The MCO may also be **Rejected** (4.a) at these activities.

5. Once the MCO is released, the affected Part is updated.

The following table shows the Simple ECO lifecycle and workflow in terms of Roles and Permissions.

Table 16: The MCO lifecycle and workflow in Roles and Permissions

Life Cycle State	Workflow Activity	Can Add	Get	Update	Delete	Change access	Can be promoted	Update responsible
New	Prepare Change	World	Aras PLM, CM, Creator, Manager, Owner, World	Aras PLM, CM, Creator, Manager, Owner	Aras PLM, CM, Creator, Manager, Owner	Aras PLM, CM, Creator, Manager	Yes	CSI
In Work	Draft Changes		Aras PLM, CM, Manager, Owner, World	Aras PLM, CM, Manager, Owner	Aras PLM, CM	Aras PLM, CM	Yes	Owner
In Review	Initial Review, Review Changes, CCB Review		Aras PLM, World	Aras PLM	Aras PLM	Aras PLM	Yes	CA
Released	Released Change		Aras PLM, World	Aras PLM		Aras PLM	No	
Cancelled	Cancelled Change		Aras PLM, World	Aras PLM		Aras PLM	Yes	

13.2.2.2 Creating an MCO

Use the following procedure:

1. Go to **Contents --> Change Management --> MCOs**.
2. Click **Create New MCO**. The view of a new MCO appears.

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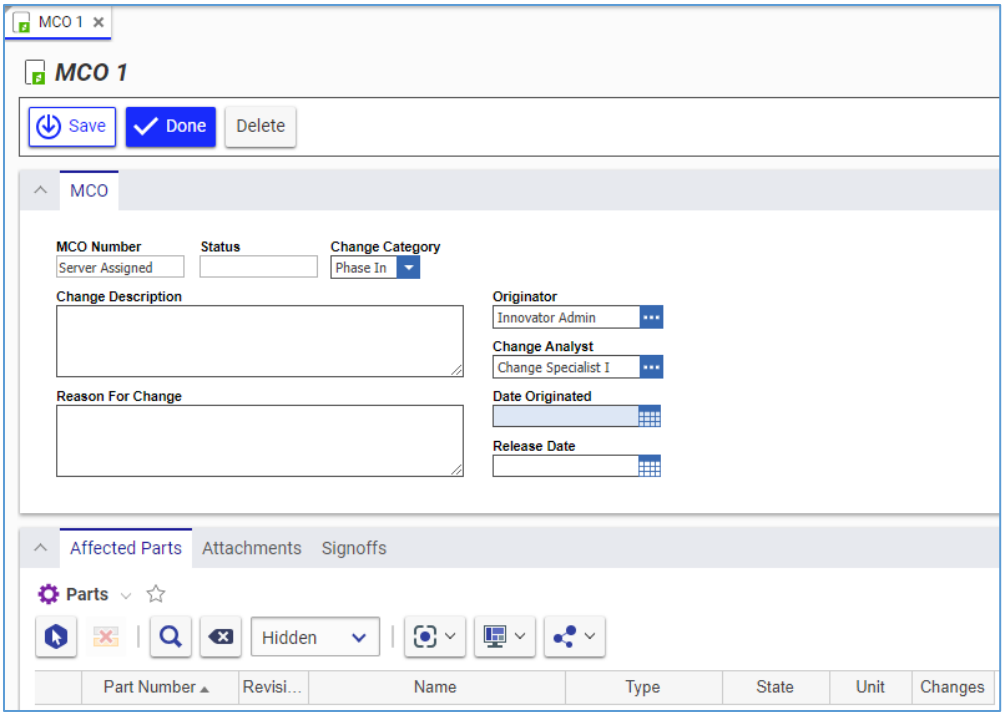

Figure 663.

3. Keep the default **Phase In** value in the **Change Category** list.
4. Describe the change as precisely as possible in the **Change Description** text box.
5. Describe the reason for the change as precisely as possible in the **Reason For Change** text box.
6. Keep the ***default*** value in the **Originator** box. This is the MCO Creator.
7. Keep the default **Change Specialist I** value in the **Change Analyst** box. This is a person or group assigned to act as a CA in the MCO workflow process.
8. Keep the **Date Originated** box blank. This box is automatically filled with the date on which the MCO is saved.
9. Go to the **Attachments** accordion tab to attach all the files concerning this MCO.

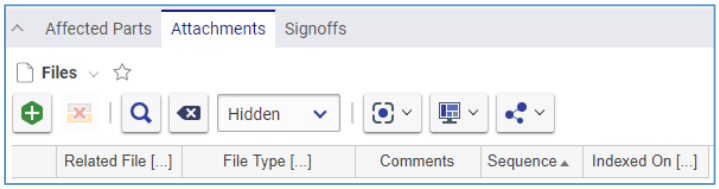

Figure 664.

10. Click **Create Item** on the **Attachments** accordion toolbar. The standard operating system dialog for file browsing and selection appears.
11. Search for and select a file. A new row appears in the **Files** grid with the file attached.

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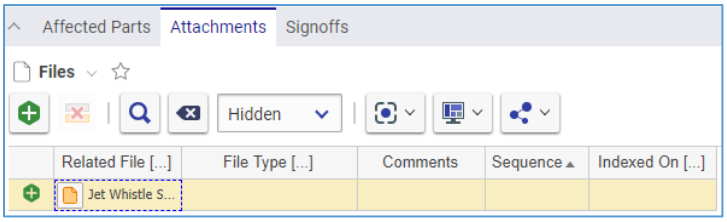

Figure 665.

12. This step is recommended. In the **File Type** cell, specify the file type using one of these options:

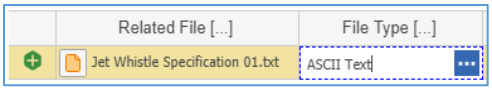

Figure 666.

   a. Click the **ellipsis** button and then select ***the file type*** in the **Search dialog – File Type** appeared.

   b. Enter ***the file type***, which should exist in Aras Innovator. An error tooltip appears if you entered a ***file type*** that does not exist in Aras Innovator.

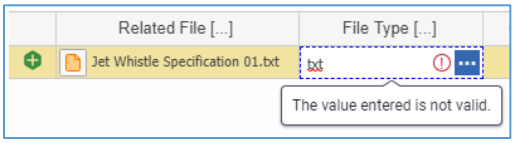

Figure 667.

Note: You can leave the **File Type** cell empty, omitting step 12. Aras Innovator will automatically assign a file type depending on File's extension when you save the ECN.

13. If it is necessary to provide additional information about the File, enter it in the **Comments** cell.
14. Repeat steps 10-13 for other files concerning this MCO.
15. Go to the **Affected Parts** accordion tab to assign Parts with AMLs this MCO should change.

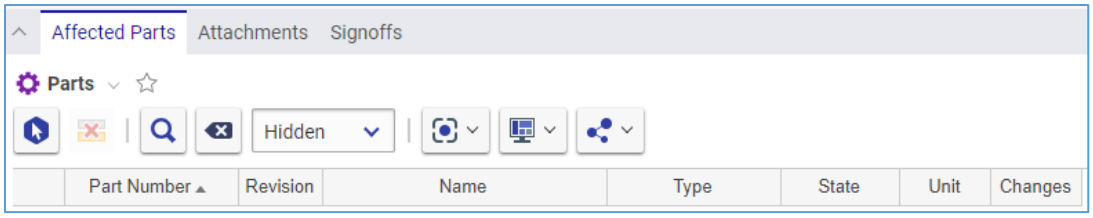

Figure 668.

16. Click **Select Items** on the **Affected Parts** accordion toolbar. The **Search dialog – Part** appears.
17. Using the standard search procedure, search and select Parts with AMLs this MCO should change. The selected Parts appear under **Affected Parts**.

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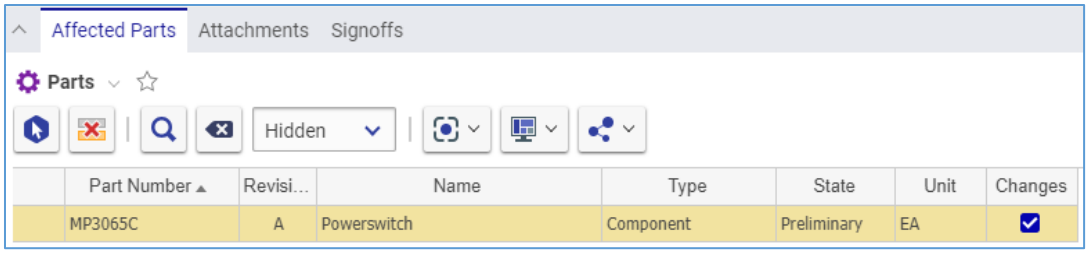

Figure 669.

18. Click **Done** on the **MCO** toolbar. The MCO is created and waits to be submitted as defined in the section *13.2.2.2 Submitting an MCO*.

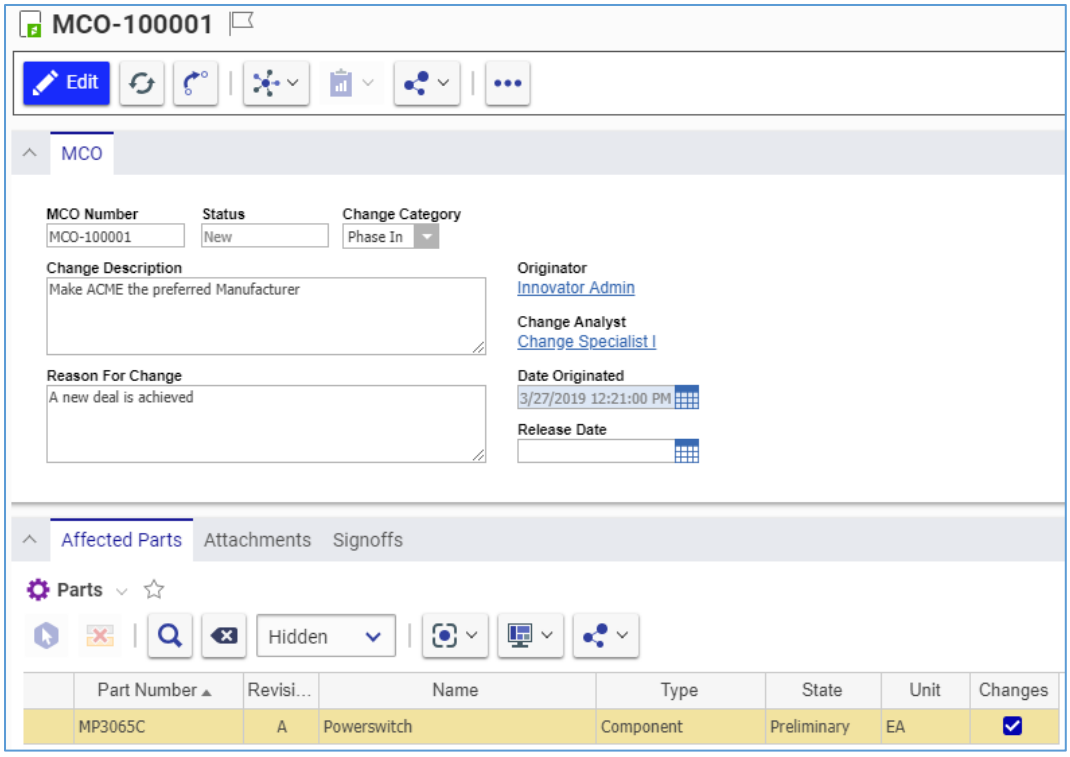

Figure 670.

13.2.2.3 Submitting an MCO

Use the following procedure:

1. Go to **Contents --> My Innovator --> My InBasket --> Search My InBasket**.
2. Go to the **Workflow Activity Completion** dialog for the MCO.

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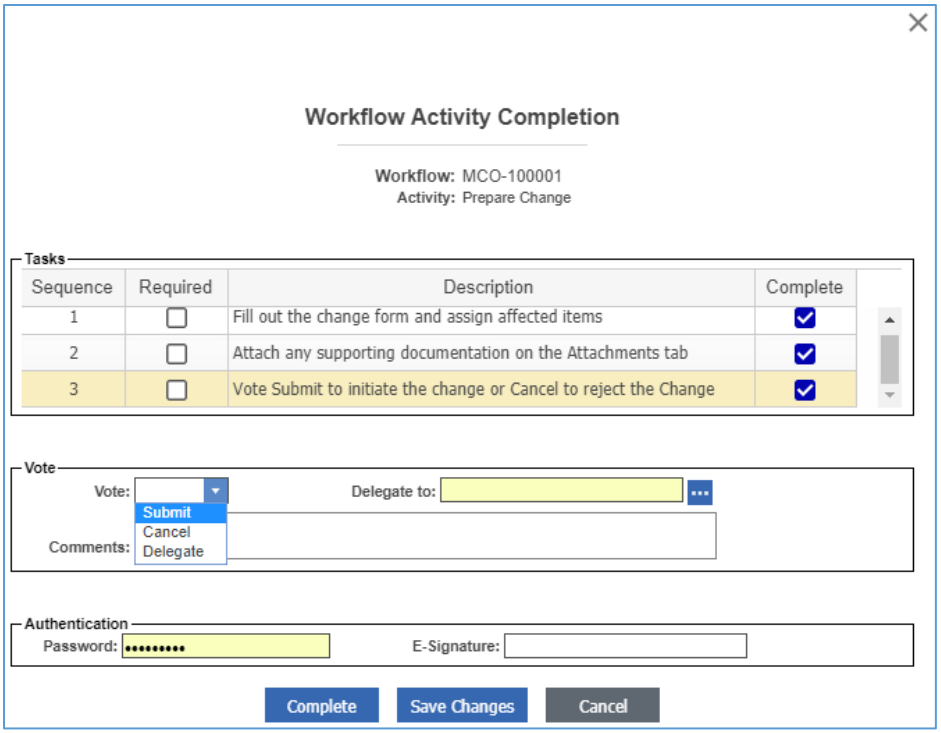

Figure 671.

3. Mark the tasks you completed in the **Tasks** field.
4. Select **Submit** in the **Vote** list.
5. Click **Complete**.

The MCO enters the **Draft Changes** activity assigned to the Owner.

13.2.2.4 Drafting Changes within an MCO

Use the following procedure:

1. Open the **MCO** view.
2. Go to the **Affected Parts** accordion tab.
3. Right-click a **Part** in the **Affected Parts** grid, point to **Actions**, and then click **Launch AML Editor**.

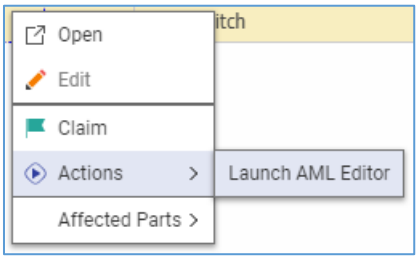

Figure 672.

The AML Editor appears with the AML of the given Part in a separate dialog box.

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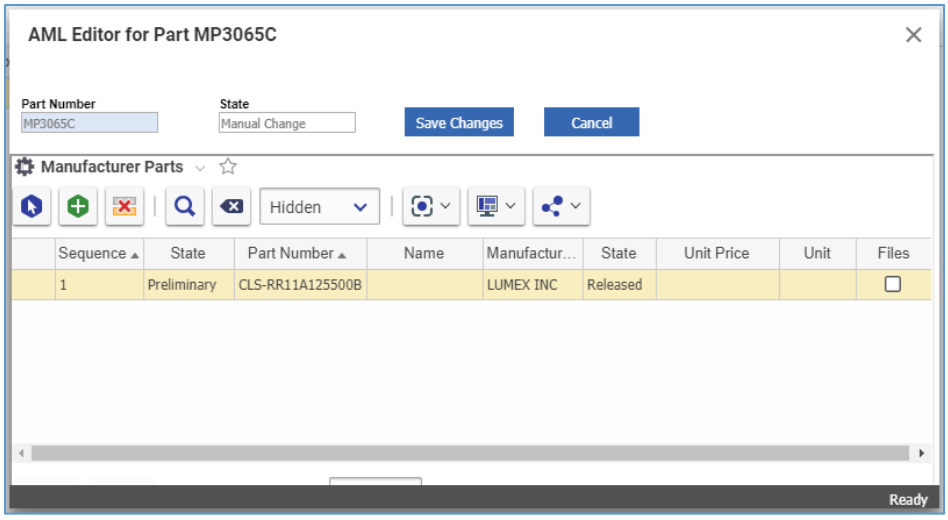

Figure 673.

4. Edit the AML as described in section *7.7 Approved Manufacturer List (AML)*.
5. Click **Save Changes**. The AML Editor disappears. The given Affected Part gets the **Manual Change** State.

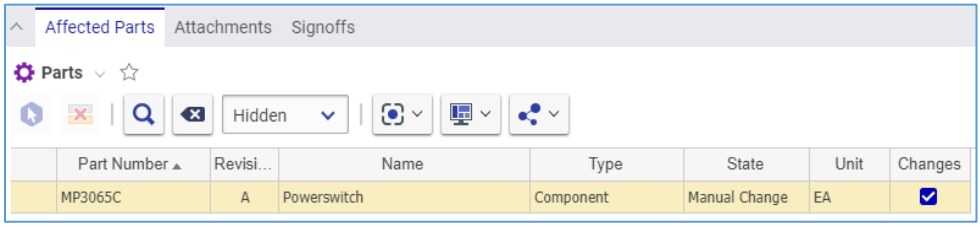

Figure 674.

6. Go to **Contents --> My Innovator --> My InBasket --> Search My InBasket**.
7. Go to the **Workflow Activity Completion** dialog for the MCO.

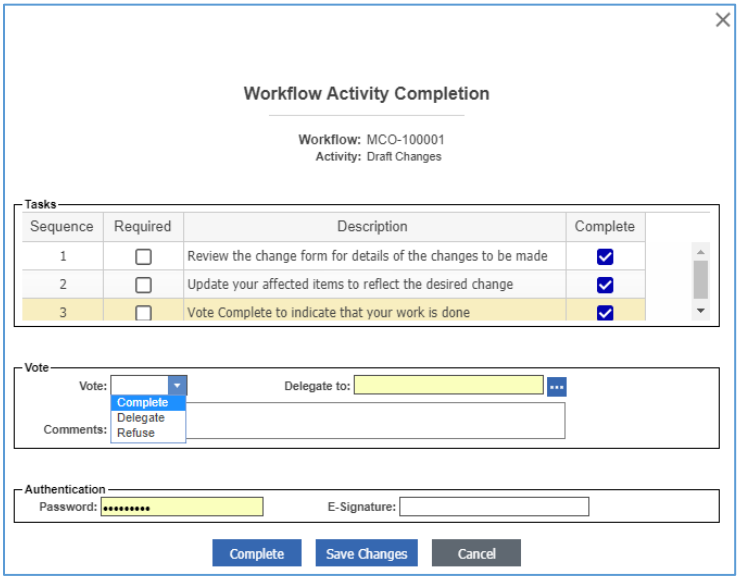

Figure 675.

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8. Mark the tasks you completed in the **Tasks** field.
9. Select **Complete** in the **Vote** list.
10. Click **Complete**.

The MCO enters the **Initial Review** activity assigned to the CA.

13.2.2.5 Initial Reviewing of an MCO

Use the following procedure:

1. Review all changes to the Affected Parts.
2. Ensure each Affected Part assigned to the MCO contains the same information as in the MCO.
3. Go **to Contents --> My Innovator --> My InBasket --> Search My InBasket**.
4. Go to the **Workflow Activity Completion** dialog for the MCO.

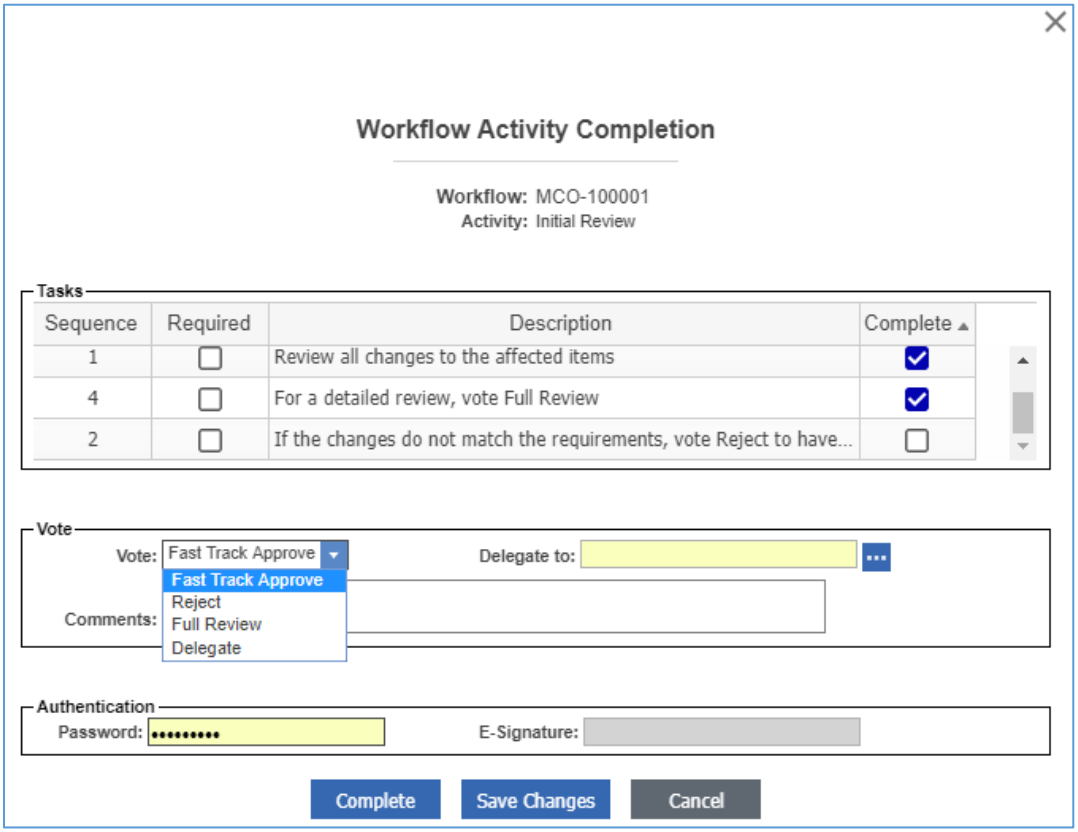

Figure 676.

5. Mark the tasks you completed in the **Tasks** field.
6. Select ***the option*** appropriate for your decision in the **Vote** list: **Fast Track Approve**, **Reject**, **Full Review**, or **Delegate**.
7. Click **Complete**.

The MCO enters the activity according to your decision.

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13.3 Express Change Management

Express Change Management complements the CMII and Simple CM in the PE solution as a more streamlined approach for Change Management items. It is ideal for organizations that may not require all the rigorous steps of the CMII or Simple process. An Express CM process can work in parallel with CMII and Simple CM processes.

Items can be quickly changed because the Express CM processes requires less data, fewer reviewers, and fewer approvers.

The Express CM uses two different kinds of items to manage changes:

- The **Express Engineering Change Order (ECO)** is a streamlined authorization for an actual Part modification. You can use it for adding, changing, deleting, releasing, and revising Parts and BOMs. The Express ECO uses the Impact Matrix that enables you to visualize and review in a quick way how the modification of a Part will affect other Items in a hierarchy.
- The **Express Document Change Order (DCO)** is a process specifically defined for managing the modification of Documents and CAD Documents in the organization. The Express DCO offers a less complex alternative to the full CMII process.

A Team is a defined logical group of users in Aras Innovator. For the Express ECO and DCO, the PE solution comes out-of-the-box with one default **Product** Team, which has the following roles:

- Team
- Team Manager
- Team Member
- Team Guest

Engagement of each role depends on the Express Change item.

Creating and administering Teams is outside the scope of this document.

13.3.1 Express Engineering Change Order (ECO)

An Express Engineering Change Order (ECO) is a quick process of implementing Part and Part BOM relationship changes within an organization using the Impact Matrix.

13.3.1.1 Understanding the Express ECO Process

The **Product** Team roles are engaged in the Express ECO workflow as follows:

- **Team Manager** is assigned to the **Planning** activity and responsible for the Impact Analysis of Affected Parts and setting an effective date.
- **Team Member** is assigned to the **Plan Review** and **Draft Changes** activities for reviewing Impact Matrix and making changes to the Affected Parts and BOMs.

In addition to the **Product** Team, the Express ECO workflow has the following roles:

- An Express ECO Creator is a user who initially created and submitted the Express ECO in the system. This may or may not be the same person as other roles.
- An Express ECO **Change Coordinator** (Owner) is a person responsible for managing the ECO from start to finish.
- The Configuration Management (CM) group.

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- The Change Control Board (CCB) is responsible for review and final approval of an Express ECO.

An Express ECO also traverses between various states during its life cycle depicted in the following figure.

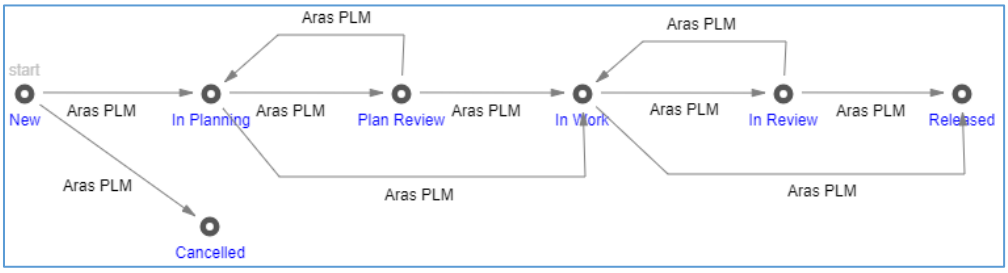

Figure 677.

The Express ECO workflow together with the Express ECO life cycle produces the following scenario:

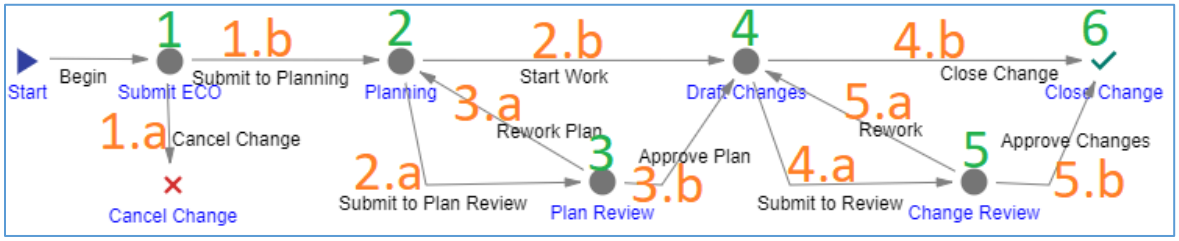

Figure 678.

1. An Aras Innovator user initiates an Express ECO process by creating a new Express ECO. The Creator must review the Express ECO to either:
    a. **Cancel** it. The Express ECO cannot be restored in the future.
    b. **Submit** it. A workflow is automatically started to assign tasks and track the changes to the Express ECO.
2. The Express ECO enters the **Planning** activity **assigned to the Team Manager**. The Team Manager performs an impact analysis and ensures that each Affected Part has an Action set in the Impact Matrix. The Express ECO cannot go to the next activity if its Impact Matrix has any Part with the **Item Action** cell blank or **In Review**. The Team Manager votes either:
    a. **Submit to Plan Review** if the Express ECO needs a further detailed review by a Team Member. The Express ECO goes to the **Plan Review** activity.
    b. **Start Work** if the Express ECO is ready for work. The Express ECO goes to the **Draft Changes** activity.
3. The Express ECO enters the **Plan Review** activity **assigned to the Team Member**. This Team Member must review the Express ECO in details to vote either:
    a. **Rework Plan** if the Express ECO needs its plan reworked by the Team Manager. The Express ECO goes back to the **Planning** activity.
    b. **Approve Plan** if the Express ECO is ready for work. The Express ECO goes to the **Draft Changes** activity.
4. The Express ECO enters the **Draft Changes** activity **assigned to another Team Member**. This Team Member makes changes to the new revisions of Parts and BOMs according to the Express ECO, and, when completed, votes either:

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a. **Submit to Review** if the Express ECO requires the final review by the CCB. The Express ECO goes to the **Change Review** activity.

b. **Close Change** if the Express ECO process is completed and does not require the final review by the CCB. The Express ECO is **Released**.

5. The Express ECO enters the **Change Review** activity **assigned to the CCB**. All the CCB members must conduct the final review of the Express ECO and vote the same decision of either:

   a. **Rework** if the Express ECO needs any further reworking. The Express ECO goes back to the **Draft Changes** activity.

   b. **Approve Changes** if the Express ECO process is completed and does not require any further reworking. The Express is ECO **Released**.

6. Once the Express ECO enters the **Close Change** activity, it becomes **Released**. Each Part is automatically versioned according to the Action specified.

The following table shows the Express ECO lifecycle and workflow in terms of Roles and Permissions.

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Table 17: The Express ECO lifecycle and workflow in Roles and Permissions

Life Cycle State	Workflow Activity	Can Add	Get	Update	Delete	Change access	Can be promoted	Update responsible
New	Start, Submit ECO	World	Team Manager, Team Member, Administrators, Owner, All Employees, Creator	Team Manager, Team Member, Administrators, Owner, Creator	Administrators, Owner, Creator	Administrators	Yes	Creator
Cancelled	Cancel Change		Team Manager, Team Member, Administrators, Owner, All Employees, Creator	Administrators		Administrators	No, a final state	
In Planning	Planning		Team Manager, Team Member, Administrators, Owner, All Employees, Creator	Team Manager, Team Member, Administrators, Owner, All Employees	Administrators	Administrators	Yes	Team Manager
Plan Review	Plan Review		Team Manager, Team Member, Administrators, Owner, All Employees, Creator	Team Manager, Team Member, Administrators, Owner, All Employees	Administrators	Administrators	Yes	Team Member
In Work	Draft Changes		Team Manager, Team Member, Administrators, Owner, All Employees, Creator	Team Manager, Team Member, Administrators, Owner, All Employees	Administrators	Administrators	Yes	Team Member
In Review	Change Review		Team Manager, Team Member, Administrators, Owner, All Employees, Creator	Team Manager, Team Member, Administrators, Owner, All Employees	Administrators	Administrators	Yes	CCB

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Life Cycle State	Workflow Activity	Can Add	Get	Update	Delete	Change access	Can be promoted	Update responsible
Released	Closed Change		Team Manager, Team Member, Administrators, Owner, All Employees, Creator	Administrators		Administrators	No, a final state	

13.3.1.2 Creating an Express ECO

Use the following procedure:

1. Go to **Contents --> Change Management --> ECOs** (one with the orange icon).

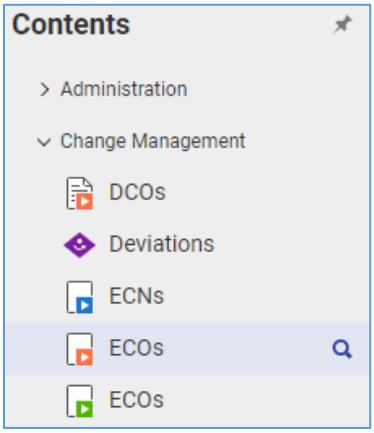

Figure 679.

2. Click **Create New ECO**. The view of a new Express ECO appears.

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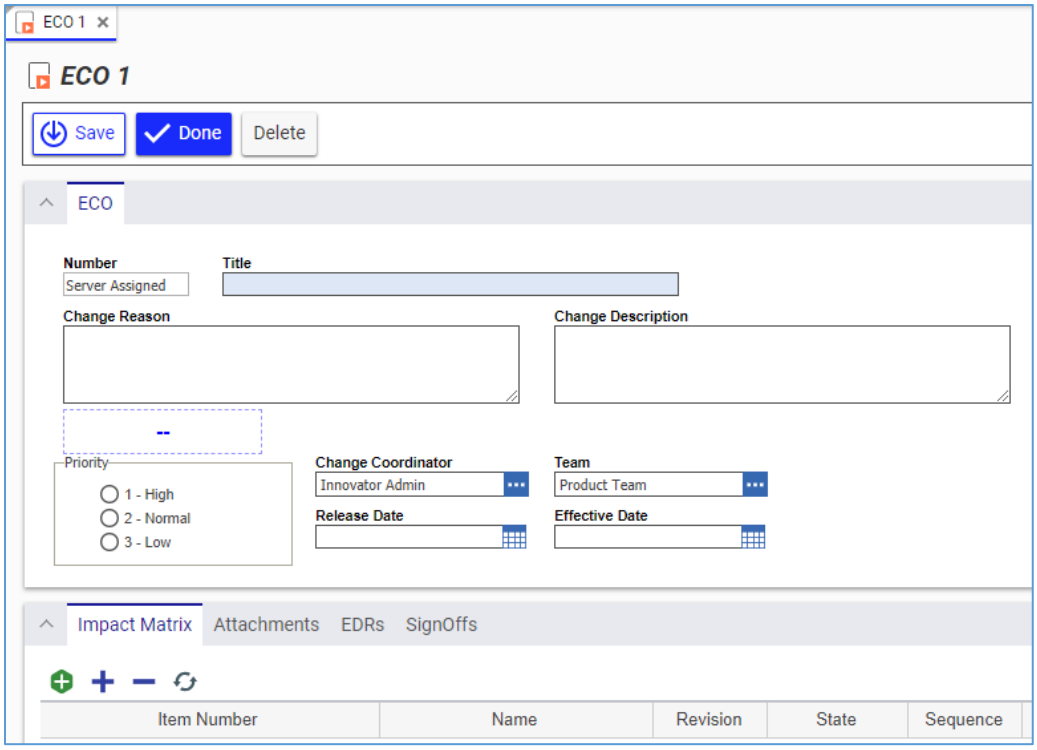

Figure 680.

3. Enter the ***Express ECO title*** as precisely as possible in the **Title** text box.
4. Describe the reason for the change as precisely as possible in the **Change Reason** text box.
5. Describe the change as precisely as possible in the **Change Description** text box.
6. Specify change priority using the **Priority** radio button: **1 – High**, **2 – Normal**, or **3 – Low**.
7. If it is necessary to set an Express ECO Owner other than you:
    a. Click the **ellipses** button In the **Change Coordinator** box. The **Search dialog – Identity** appears.
    b. Using the standard search procedure, search for and select a Team. The selected Team replaces the default identity.
8. If it is necessary to set a Team other than the default:
    a. Click the **ellipses** button In the **Team** box. The **Search dialog – Team** appears.
    b. Using the standard search procedure, search for and select a Team. The selected Team replaces the default identity.
9. Keep the **Release Date** box blank. This box is automatically filled with the date on which the Express ECO is approved and closed.
10. Specify the date change becomes effective in the **Effective Date** box. It is automatically set to the released date if left blank.

Note: The effective date is often when items are put into use based on decisions in the organization.

11. Go to the **Attachments** accordion tab to attach all the files concerning this Express ECO.

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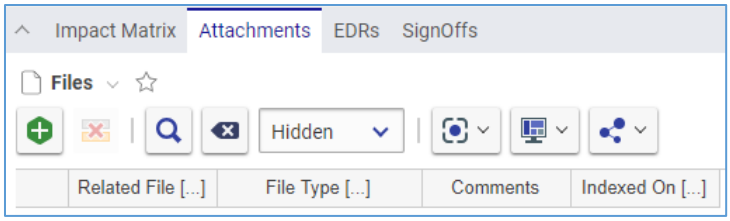

Figure 681.

12. Click **Create Item** on the **Attachments** accordion toolbar. The standard operating system dialog for file browsing and selection appears.
13. Search for and select a file. A new row appears in the **Files** grid with the file attached.

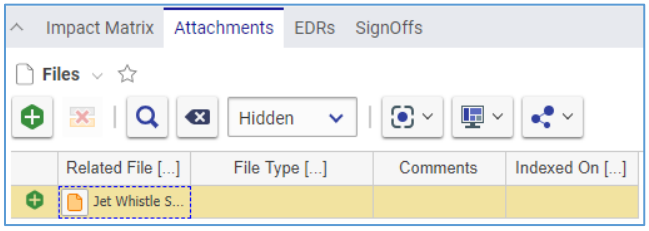

Figure 682.

Note: Aras Innovator will automatically provide a file type to the **File Type** cell depending on the File's extension when you save the Express ECO.

14. If it is necessary to provide additional information about the File, enter it in the **Comments** cell.
15. Attach to the Express ECO Affected Parts, using the procedure described in the section *13.3.1.4 Managing the Impact Matrix*.
16. Click **Done** on the **Express ECO** toolbar. The Express ECO is created and waits to be either submitted or cancelled as defined in the section *13.3.1.3 Voting on an Express ECO*.

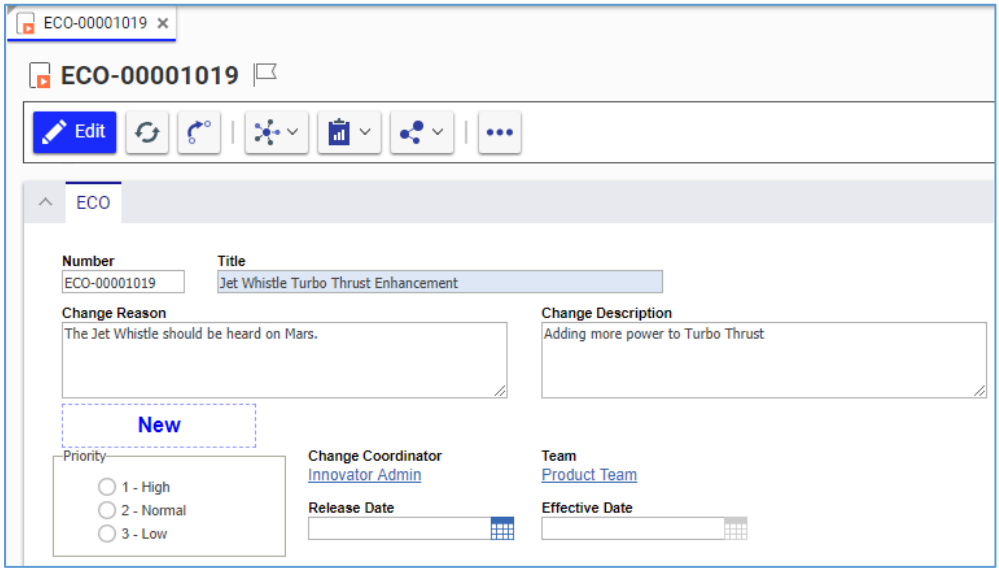

Figure 683.

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13.3.1.3 Voting on an Express ECO

Use the following procedure:

1. Go to **Contents --> My Innovator --> My InBasket --> Search My InBasket**.
2. Go to the **Workflow Activity Completion** dialog for the Express ECO.

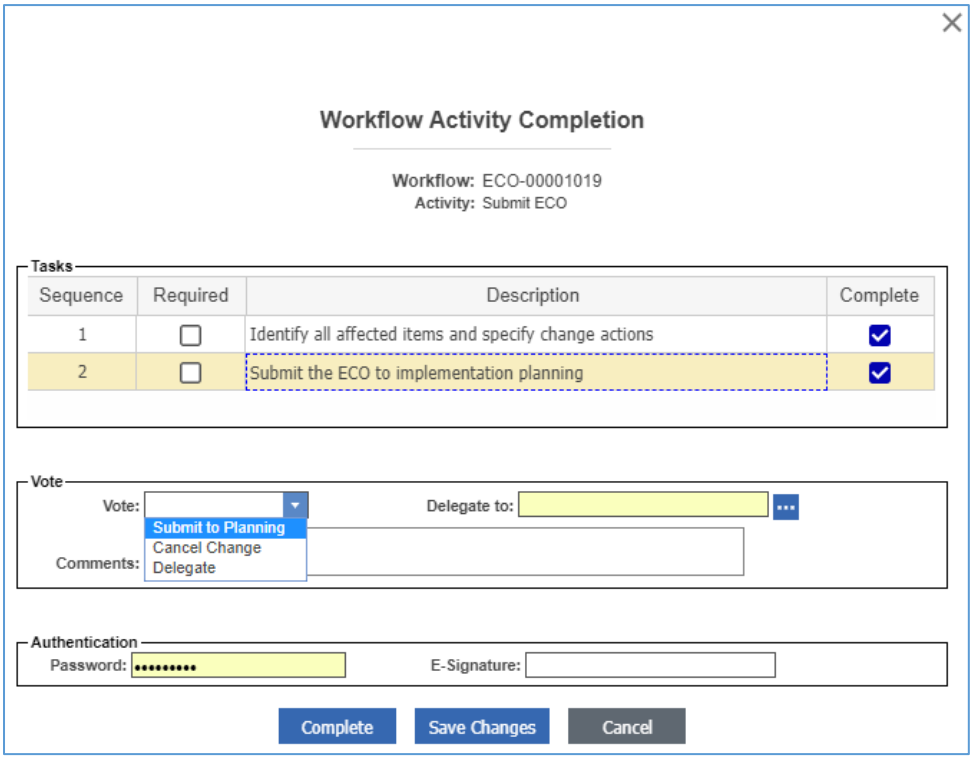

Figure 684.

3. Mark the tasks you completed in the **Tasks** field.
4. Select ***the option*** proper to your decision in the **Vote** list.
5. Click **Complete**.

The Express ECO enters the ***next*** activity as defined in the Express ECO workflow.

13.3.1.4 Managing the Impact Matrix

The Impact Matrix is a tool for Express Change Management of Parts in Express ECOs. For your review, it can also visualize how the modification of an Affected Part will Impact other Items in a hierarchy.

You can manage the change in a quick way using the **Impact Matrix** accordion toolbar and action menu.

The **Impact Matrix** accordion toolbar displays the following buttons:

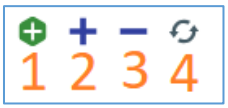

Figure 685.

1. **Add Item** launches the **Search dialog – Change Controlled Item** to add Affected Parts to the Impact Matrix.
2. **Expand All** unfolds all the assembly trees.
3. **Collapse All** folds back all the assembly trees.

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4. **Refresh** shows the latest updates.

The Impact Matrix action menu features:

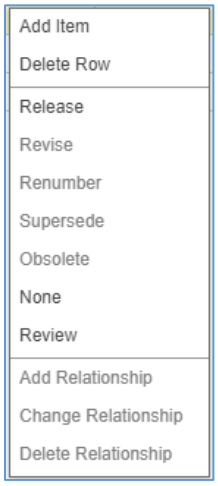

Figure 686.

- Actions for a Part:
  - **Add Item** launches the **Search dialog – Change Controlled Item** to add Affected Parts to the Impact Matrix.
  - **Delete Row** removes the Part from the Impact Matrix.
  - **Release** promotes the Part from the **Preliminary** to **Released** state. This feature works only on Parts with no previously released versions.
  - **Revise** creates a new revision of an existing released Part. The Part will be superseded by a new revision of the Part.
  - **Renumber** replaces an existing Part with its copy. The existing Part is copied as a new Part, which is assigned a new Part number, and released. The copied Part becomes the replacement Part in the BOM in which it is defined and supersedes the old Part.
  - **Supersede** globally replaces one released Part with another released Part. The original Part is superseded.
  - **Obsolete** promotes an existing released or superseded Part to the **Obsolete** state.
  - **Review** puts the Part under **Review**. Action needs to be taken on the Part before the ECO can be processed. The ECO cannot be completed if any Part is under **Review**.
  - **None** states that the Part is explicitly not affected or impacted by the change. No action will be taken on the Part. Under certain circumstances, this action may not be allowed if an Affected Item requires this Part to be modified.
- Actions for a BOM relationship of a previously released Part (each selected action will appear in the **Relationship Action** column of the Impact matrix once the ECO is processed):
  - **Add Relationship** adds another released Part to the BOM of the given released Part.
  - **Modify Relationship** modifies the existing BOM of the given released Part. You can specify a new quantity and adjust the sequence number of the BOM.
  - **Delete Relationship** removes the existing BOM from the given affected released Part.

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The following procedure explains the main Impact Matrix management features:

1. Open the **Express ECO** view.
2. Click **Edit** on the **Express ECO** toolbar.
3. Go to the **Impact Matrix** accordion tab.
4. Click **Add Item** on the **Impact Matrix** accordion toolbar. The **Search dialog – Change Controlled Item** appears.
5. Using the standard search procedure, search for and select an Affected Part. The selected Affected Part and Parts Impacted by this Part appear in the Impact Matrix tree.

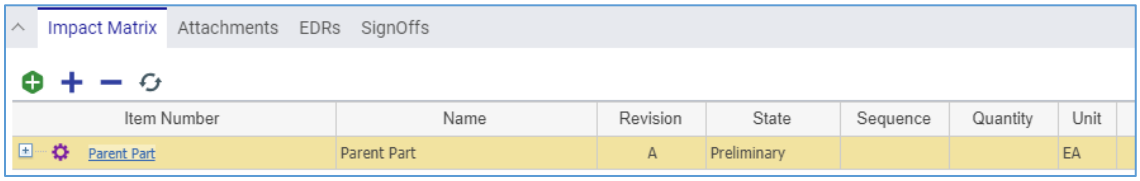

Figure 687.

6. Click **Expand All** on the **Impact Matrix** toolbar. You can see what Parts in assemblies are Impacted when the given Part is changed. The given Part is always violet-highlighted. The given Part's Parents are above the Part. The given Part's Children are below the Part.

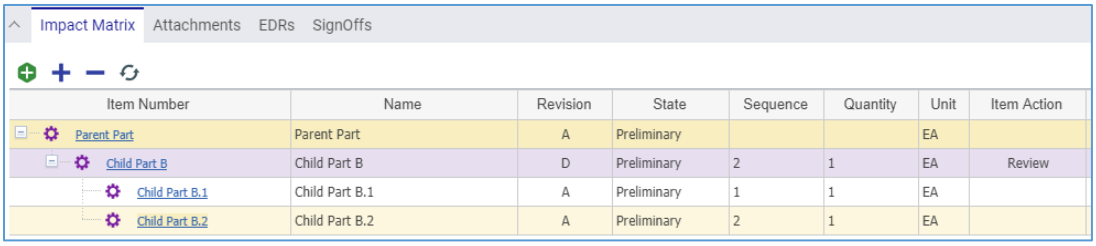

Figure 688.

7. Right-click the **given Part** and then click **Delete Row**. The given Part and its Impacted Parts disappear from the Impact Matrix.

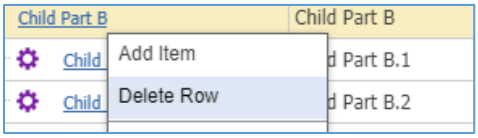

Figure 689.

8. Click either **Save** or **Done** on the **Express ECO** toolbar to save the changes in the Express ECO.

13.3.1.5 Reviewing an Express ECO

When reviewing an Express ECO, you must analyze each Affected and Impacted Part to set Action to it. An Express ECO cannot go any further if any Affected or Impacted Part has no Action set. Some Actions may invalidate the Express ECO.

The following procedure explains the process of reviewing and setting Actions:

1. Open the **Express ECO** view.
2. Click **Edit** on the **Express ECO** toolbar.
3. Go to the **Impact Matrix** accordion tab.
4. Check whether each Part has an Action.

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5. Check set Actions for validity.
6. Right-click a ***Part*** and then click the proper ***Action*** if this Part has no Action or a confronting one. For Actions details, refer to *13.3.1.4 Managing the Impact Matrix*.
7. Click either **Save** or **Done** on the **Express ECO** toolbar to save the changes in the Express ECO.

13.3.1.6 Viewing and Processing an Express ECO Signoff Activities

From the Express ECO view, you can review the current and previous Activities assigned for an Express ECO. You can also vote within an Activity if you have rights.

Use the following procedure:

1. Open the **Express ECO** view.
2. Go to the **SignOffs** accordion tab.

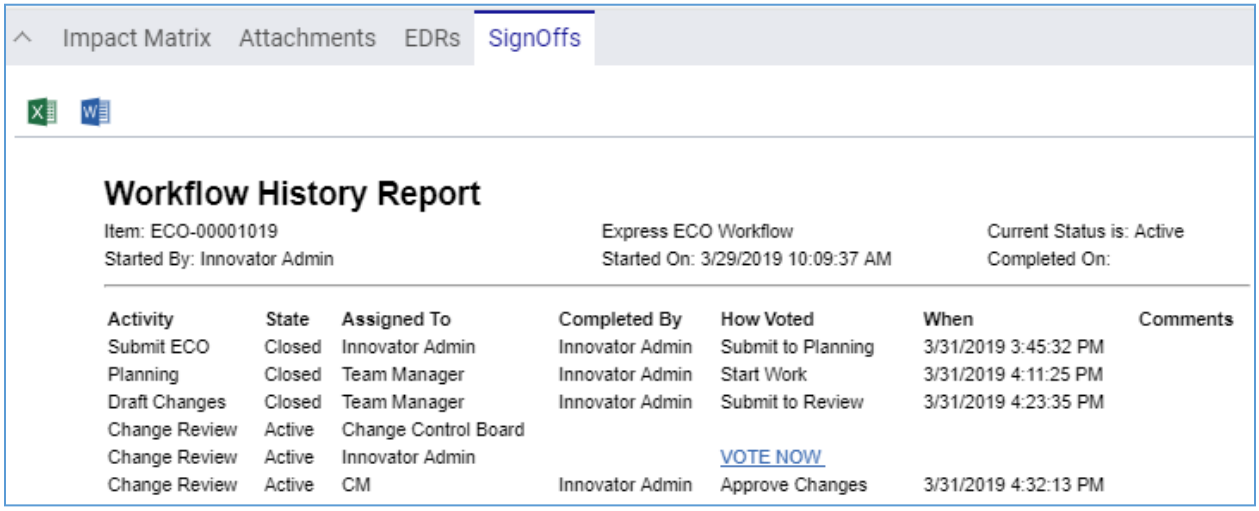

Figure 690.

3. Click the **VOTE NOW** link. The **Workflow Activity Completion** dialog for the Express ECO Activity appears.
4. Use steps 3-5 of the **Voting on an Express ECO** procedure.

13.3.1.7 Checking an Express ECO for Completeness

At any point in an Express ECO process, you can use the **Completeness Check Results** dialog to ensure that the Express ECO has all the required information provided and that each Part has an Action assigned. Using this dialog early avoids resolving errors later during the workflow process when the cause may be more difficult to determine.

There are several ways to access the **Completeness Check Results** dialog for an Express ECO:

- Go to **Contents --> Change Management --> ECOs**, right-click the **Express ECO** to be checked, and then click **Check for Completeness**.

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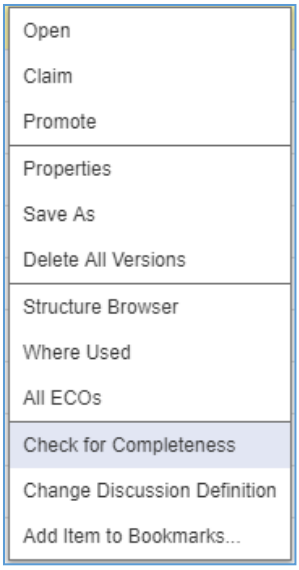

Figure 691.

- Open the view of an Express ECO to be checked, on the **Express ECO** toolbar, click **More**, and then click **Check for Completeness**.

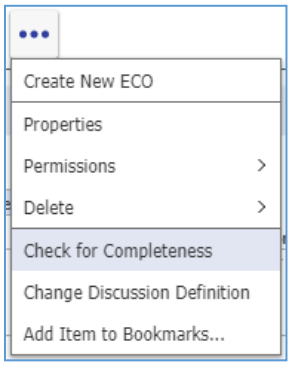

Figure 692.

When accessed, the **Completeness Check Results** dialog shows you checking results:

- If an Express ECO is ready to process, there is the message: “Completeness Check succeeded. Express ECO is ready to move forward.”

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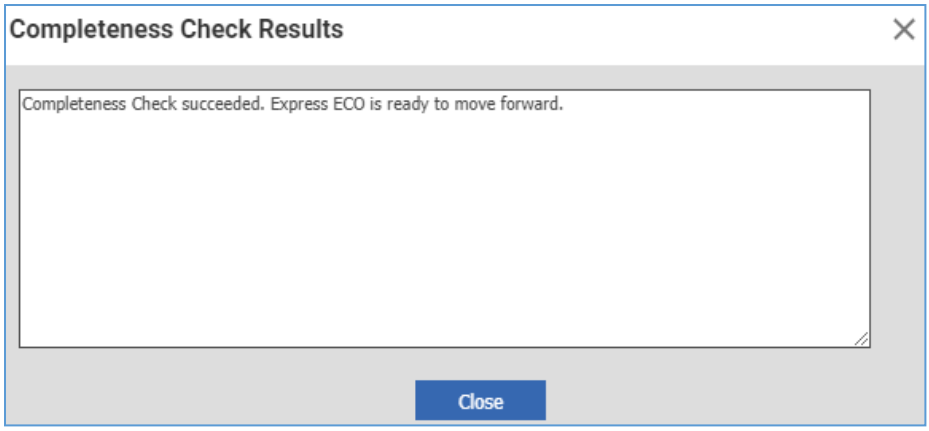

Figure 693.

- If an Express ECO is not ready to process, there are issues preventing the Express ECO from completeness and their sources. Make sure to correct each issue.

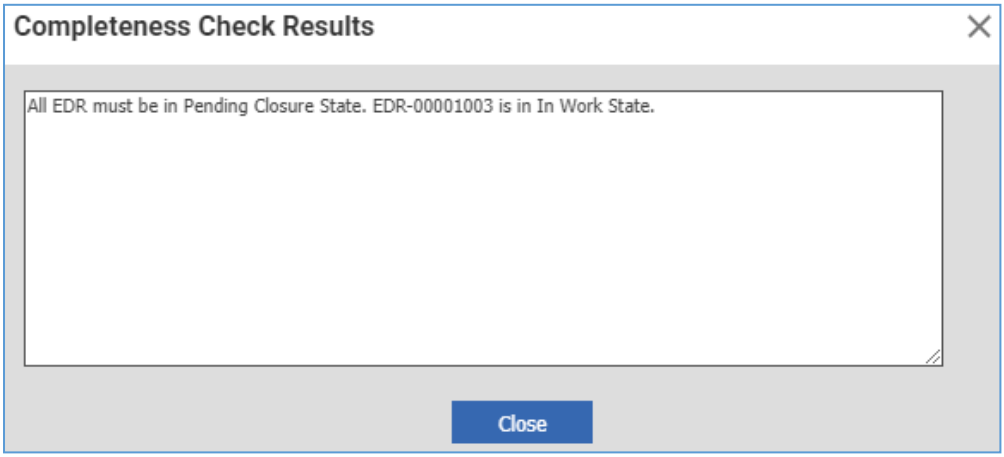

Figure 694.

13.3.1.8 Viewing and Revising Parts Released within an Express ECO

Once the Express ECO workflow is completed, you can search for the released Parts and check that they all are **Released**.

When a released Part must be changed to resolve a problem or provide improvement, an Express ECO is created to apply the change, revise, the Part and review the impact of other Affected Parts in an assembly.

The following procedure explains the Part revising process:

1. Open the **Express ECO** view.
2. Click **Edit** on the **Express ECO** toolbar.
3. Go to the **Impact Matrix** accordion tab.
4. Click **Add Item** on the **Impact Matrix** accordion toolbar. The **Search dialog – Change Controlled Item** appears.
5. Using the standard search procedure, search for and select an Affected Part. The selected Affected Part and Parts Impacted by this Part appear in the Impact Matrix tree.

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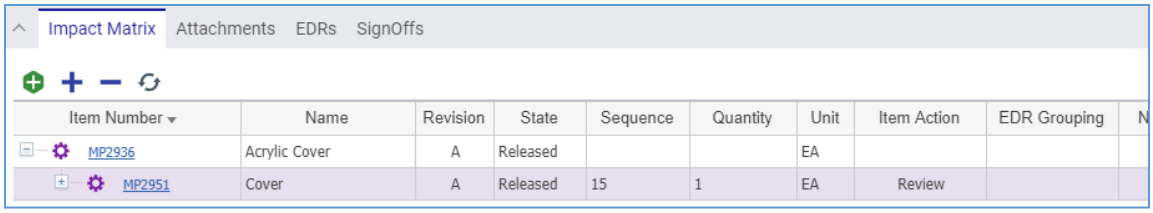

Item Number	Name	Revision	State	Sequence	Quantity	Unit	Item Action	EDR Grouping	N
MP2936	Acrylic Cover	A	Released			EA			
MP2951	Cover	A	Released	15	1	EA	Review		

Figure 695.

6. Right-click each **Part** and click **Review** to see what Parts in assemblies are Impacted when the Part clicked is changed.

Item Number	Name	Revision	State	Sequence	Quantity	Unit	Item Action
MP0103	MakerBot Replicator wi...	A	Preliminary			EA	
MP2936	Acrylic Cover	A	Released	50	1	EA	Review
MP2955	Front Window Panel	B	Released	10	1	EA	Review
MP2951	Cover	A	Released	15	1	EA	Review
MP2948	Cover Hardware	A	Released	5	1	EA	Review
MP2948	Cover Hardware	A	Preliminary	10			
MP2295	M3 Square Nut	A	Released	10	15	EA	
MP0370	M3x16 Socket Cap Bolt	A	Released	5	15	EA	
MP2936	Acrylic Cover	A	Preliminary	10			
MP0102	Cover Option for Maker...	A	Preliminary			EA	
MP2936	Acrylic Cover	A	Released	5	1	EA	Review
MP2955	Front Window Panel	B	Released	10	1	EA	Review
MP2951	Cover	A	Released	15	1	EA	Review
MP2948	Cover Hardware	A	Released	5	1	EA	Review
MP2936	Acrylic Cover	A	Preliminary	10			

Figure 696.

7. Right-click each Affected and Impacted **Part** and then click **Revise**.

Item Number	Name	Revision	State	Sequence	Quantity	Unit	Item Action
MP0103	MakerBot Replicator wi...	A	Preliminary			EA	
MP2936	Acrylic Cover	A	Released	50	1	EA	Revise
MP2955	Front Window Panel	B	Released	10	1	EA	Revise
MP2951	Cover	A	Released	15	1	EA	Revise
MP2948	Cover Hardware	A	Released	5	1	EA	Revise
MP2948	Cover Hardware	A	Preliminary	10			
MP2295	M3 Square Nut	A	Released	10	15	EA	
MP0370	M3x16 Socket Cap Bolt	A	Released	5	15	EA	
MP2936	Acrylic Cover	A	Preliminary	10			
MP0102	Cover Option for Maker...	A	Preliminary			EA	
MP2936	Acrylic Cover	A	Released	5	1	EA	Revise
MP2955	Front Window Panel	B	Released	10	1	EA	Revise
MP2951	Cover	A	Released	15	1	EA	Revise
MP2948	Cover Hardware	A	Released	5	1	EA	Revise
MP2936	Acrylic Cover	A	Preliminary	10			

Figure 697.

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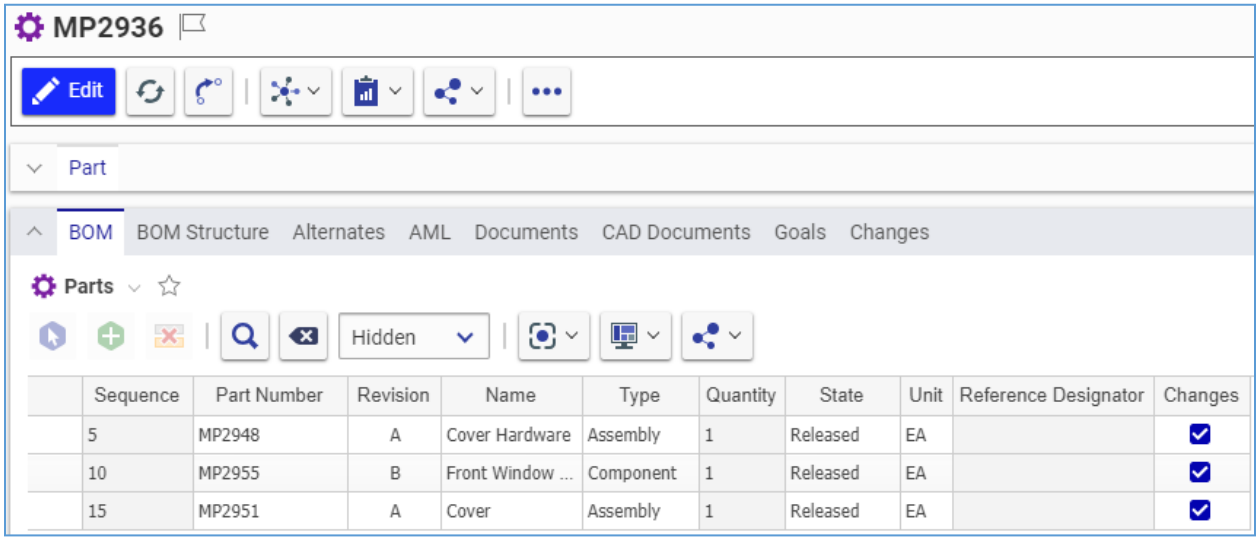
Click **Done** on the **Express ECO** toolbar. The Express ECO is ready for revising Parts.

13.3.1.9 Processing Parts within an Express ECO

This section describes the revision of released Parts as an example of processing Parts within an Express ECO.

To process Parts, follow the Express ECO workflow for a created Express ECO as explained in section *13.3.1.1 Understanding the Express ECO Process* and watch how the state of Parts is changing:

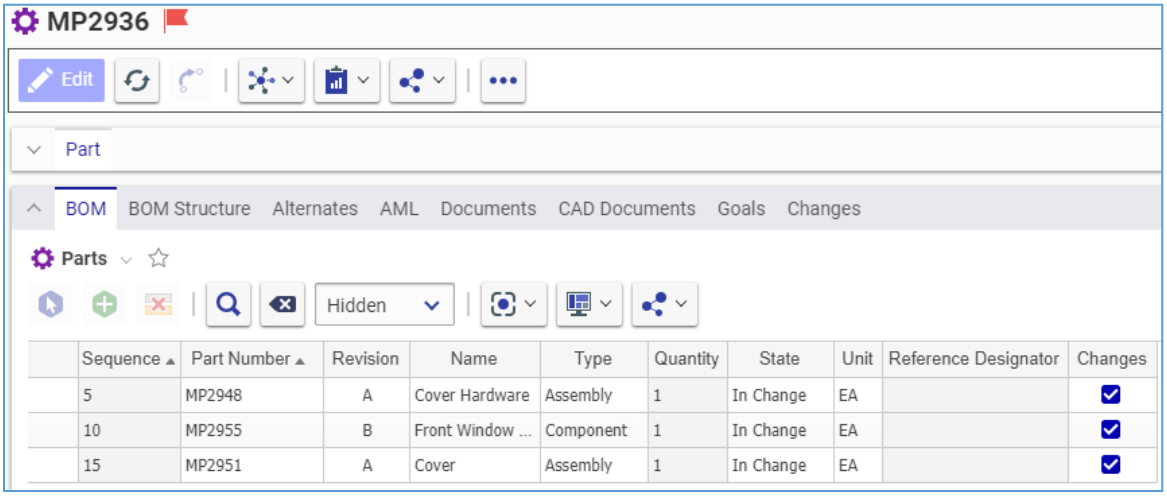
1. **Submit the Express ECO**. The **Changes** check mark is automatically set on each Affected Part to indicate that it is under a change process.



	Sequence	Part Number	Revision	Name	Type	Quantity	State	Unit	Reference Designator	Changes
	5	MP2948	A	Cover Hardware	Assembly	1	Released	EA		☑
	10	MP2955	B	Front Window ...	Component	1	Released	EA		☑
	15	MP2951	A	Cover	Assembly	1	Released	EA		☑

Figure 698.

2. **Planning**. After submission, the Affected Parts are set to the **In Change** state and are not allowed to be edited, note the **red claiming flag**.



	Sequence ▲	Part Number ▲	Revision	Name	Type	Quantity	State	Unit	Reference Designator	Changes
	5	MP2948	A	Cover Hardware	Assembly	1	In Change	EA		☑
	10	MP2955	B	Front Window ...	Component	1	In Change	EA		☑
	15	MP2951	A	Cover	Assembly	1	In Change	EA		☑

Figure 699.

3. **Change Review**. During the review process, the Affected Parts are promoted to the **In Review** state and a new major revision. No edits are allowed.

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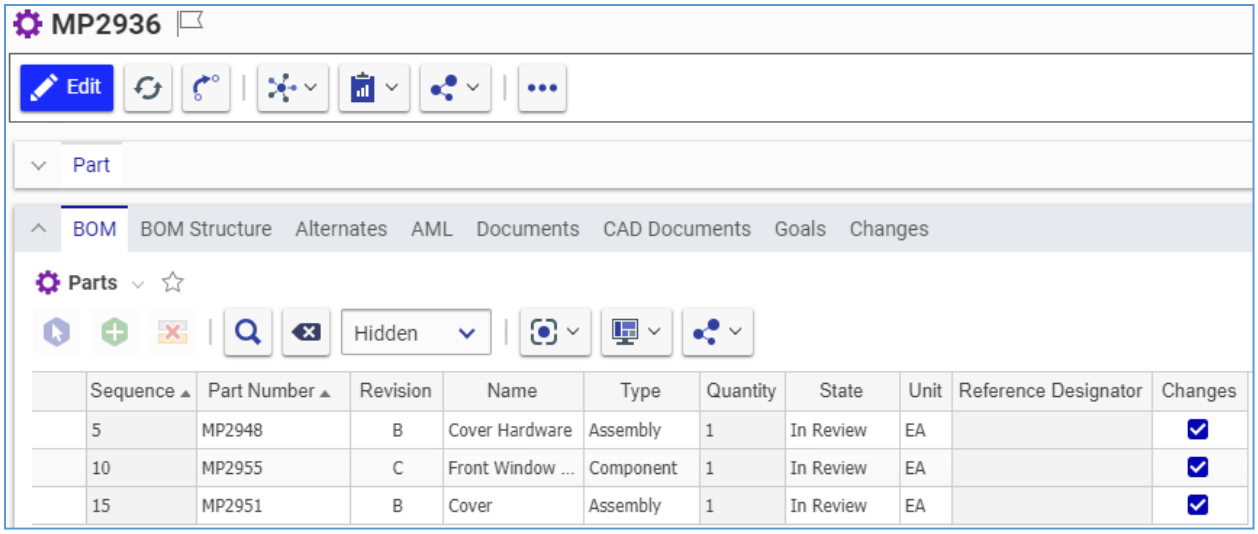
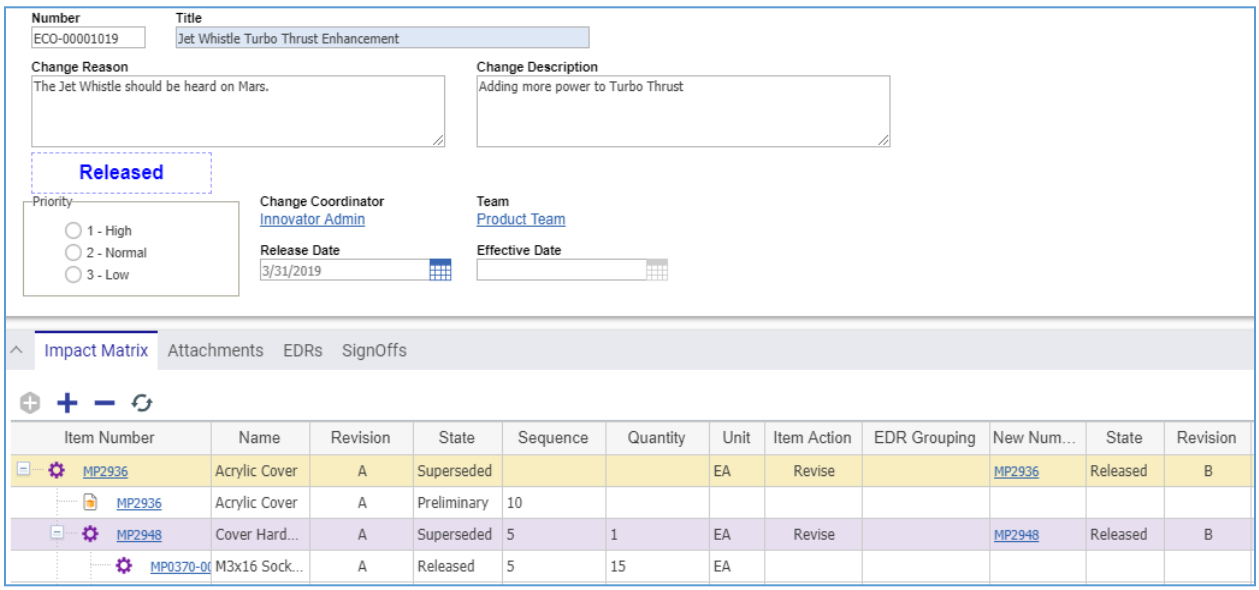


Sequence	Part Number	Revision	Name	Type	Quantity	State	Unit	Reference Designator	Changes
5	MP2948	B	Cover Hardware	Assembly	1	In Review	EA		☑
10	MP2955	C	Front Window ...	Component	1	In Review	EA		☑
15	MP2951	B	Cover	Assembly	1	In Review	EA		☑

Figure 700.

4. **Close Change**. The Express ECO is **Released**.



Item Number	Name	Revision	State	Sequence	Quantity	Unit	Item Action	EDR Grouping	New Num...	State	Revision
MP2936	Acrylic Cover	A	Superseded			EA	Revise		MP2936	Released	B
MP2936	Acrylic Cover	A	Preliminary	10							
MP2948	Cover Hard...	A	Superseded	5	1	EA	Revise		MP2948	Released	B
MP0370-0(	M3x16 Sock...	A	Released	5	15	EA					

Figure 701.

5. The newly revised Parts are **Released** at the new major Revision.

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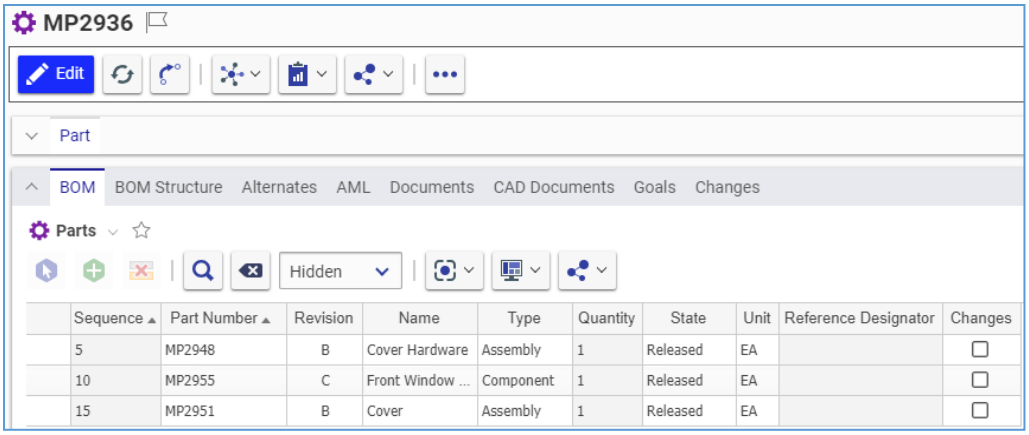

Figure 702.

You can use **Redline View** for displaying the current Part changes in a Parent BOM.

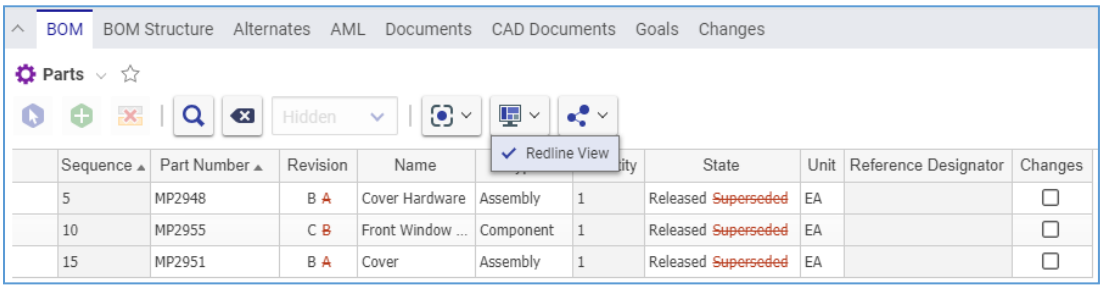

Figure 703.

13.3.1.10 Modifying Part BOM Relationships within an Express ECO

Using specialized Relationship Actions on the Impact Matrix, which are discussed in section *13.3.1.4 Managing the Impact Matrix*, you can add, change, and remove Parts from an existing released BOM, as well as modify information on the BOM Entry itself (e.g., Quantity and Sequence Number).

To modify a BOM, follow the Express ECO workflow for a created Express ECO as explained in section *13.3.1.1 Understanding the Express ECO Process* and watch how the BOM is changing:

1. Create an Express ECO with a Relationship Action.

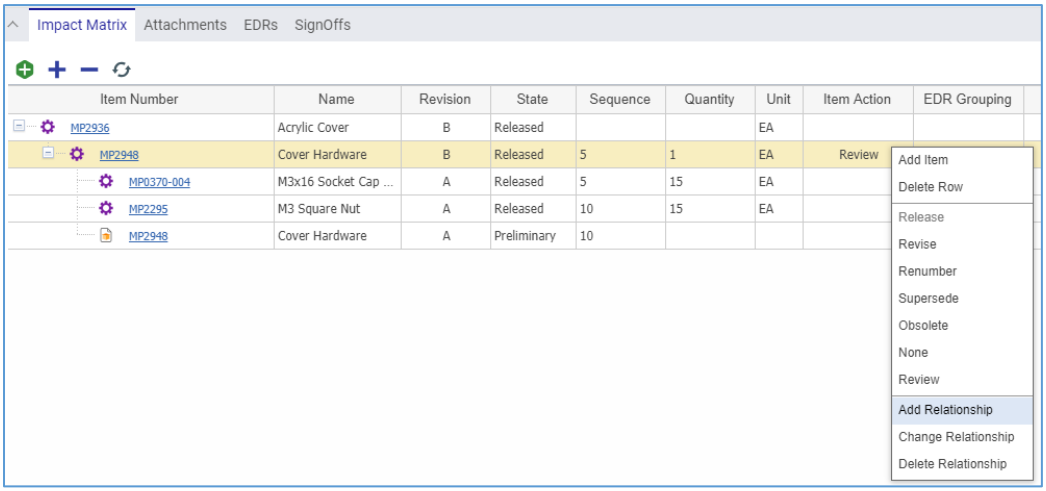

Figure 704.

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2. Select BOM in the **Select Relationship Type** dialog.

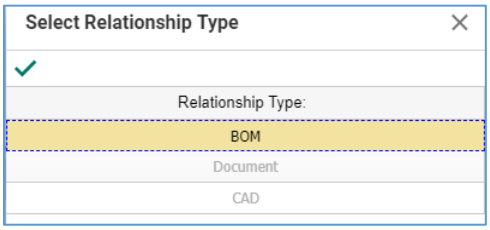

Figure 705.

3. When adding or replacing a Part, select a new Part in the **Search Dialog – Part**. The Affected Parent should have **Revise** action set as its BOM change will create a new Revision. Watch the changes in the Impact Matrix.

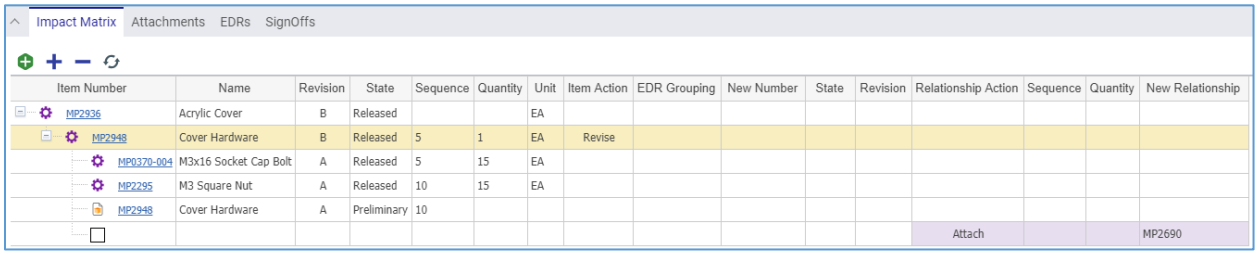

Figure 706.

4. Complete the Express ECO creation. Check the BOM under changes. Note the **red claiming flag**.

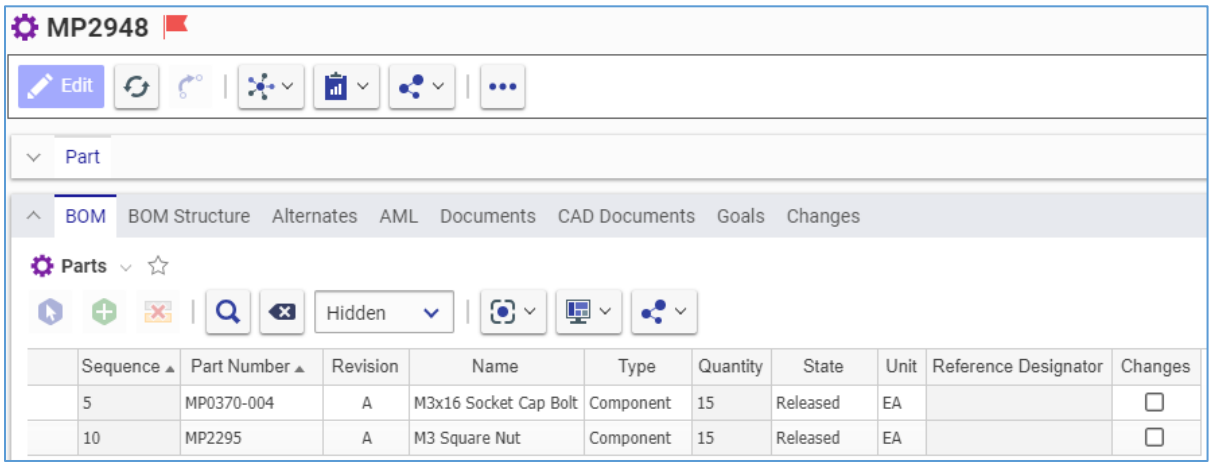

Figure 707.

5. **Submit the Express ECO**. Parts affected by the BOM change have the **Changes** check not set.

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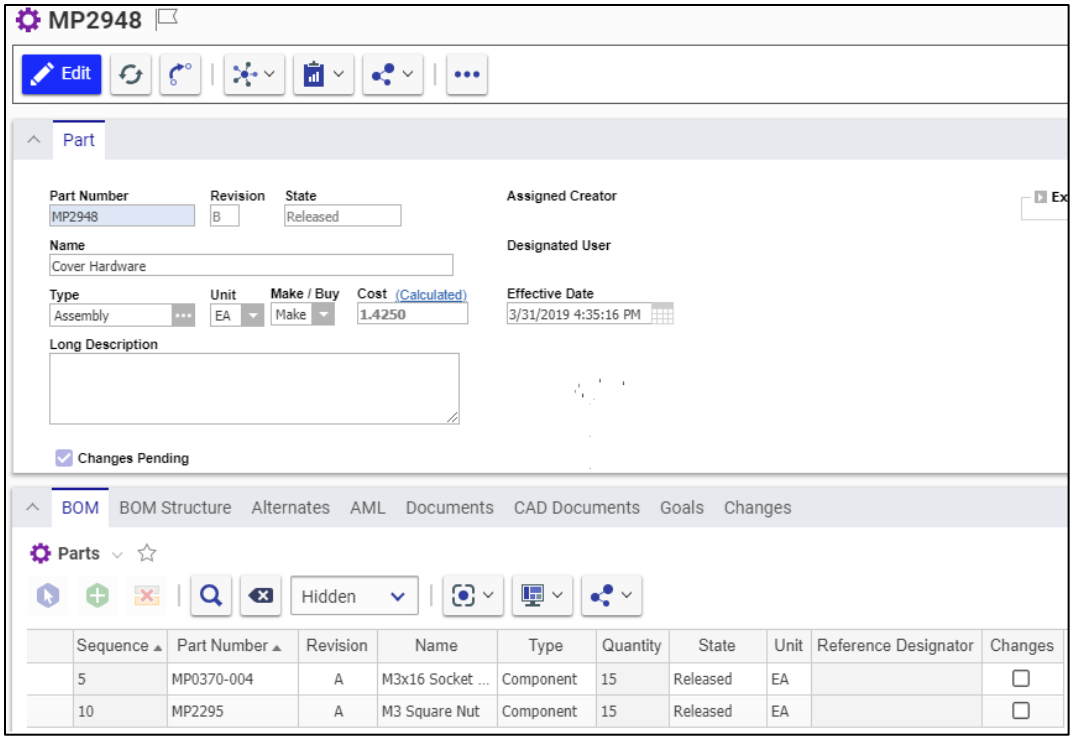

Figure 708.

6. **Planning**. After submission, the Affected Parts are set to the **In Change** state and not allowed to be edited.

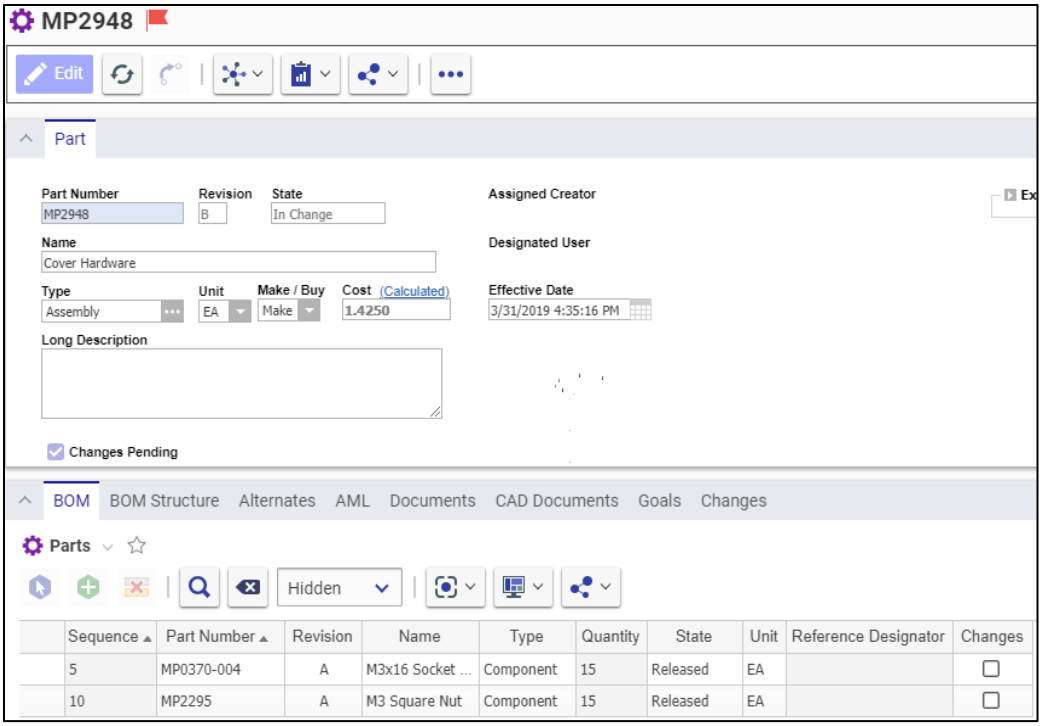

Figure 709.

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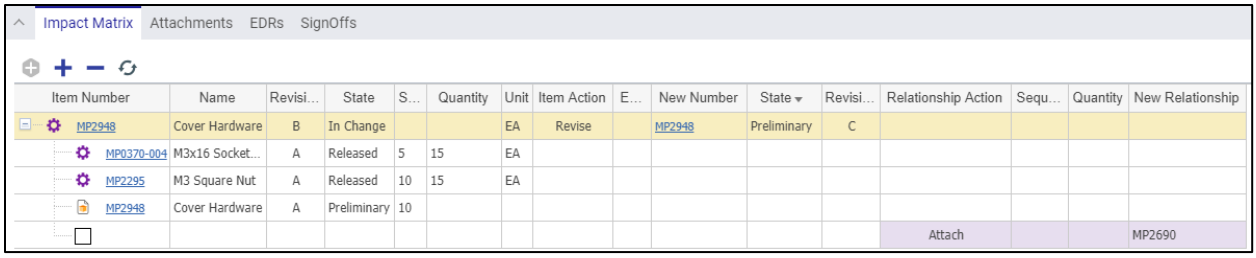

Figure 710.

7. **Change Review**. During the review process, the Affected Parts are promoted to the **In Review** state and a new major revision, which has the new BOM with changes. No edits are allowed.

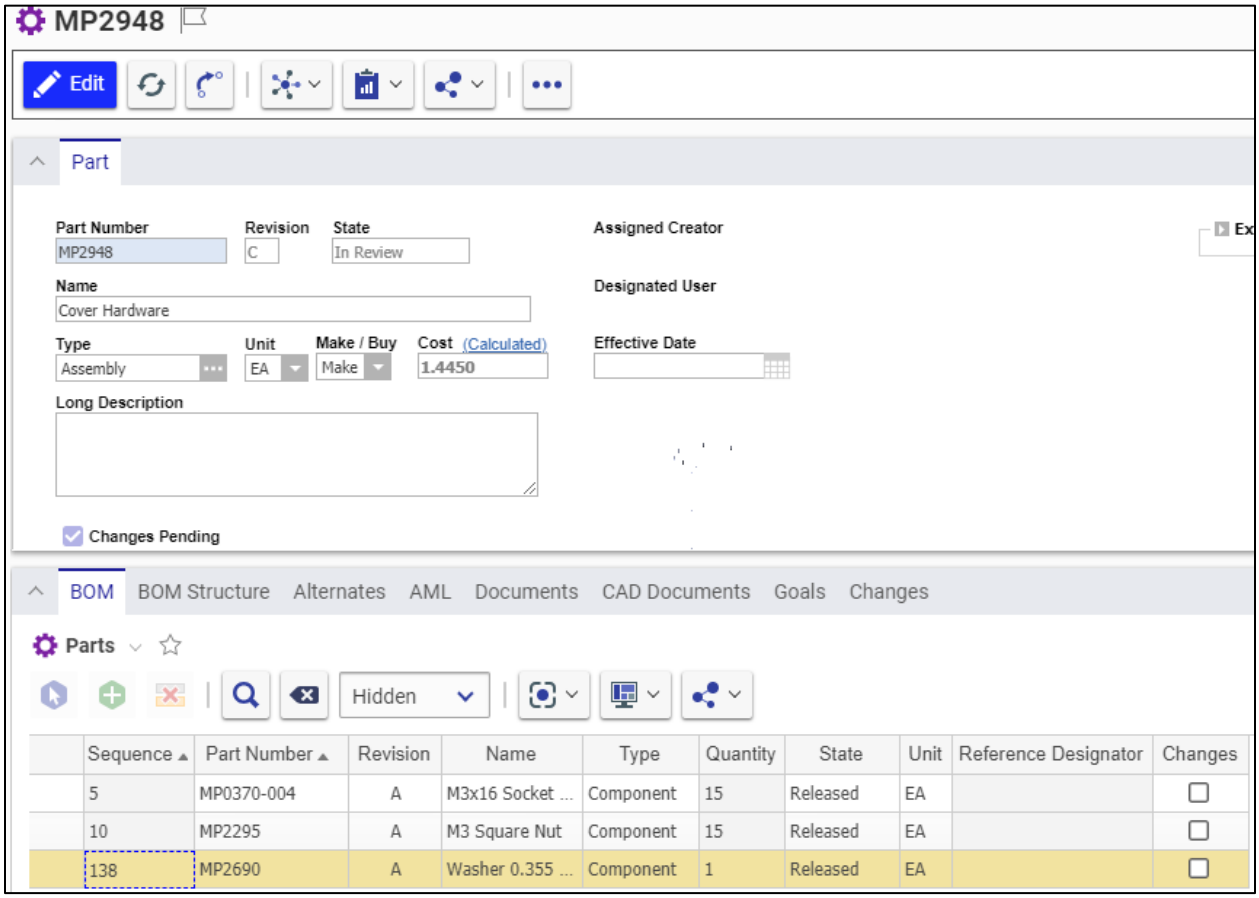

Figure 711.

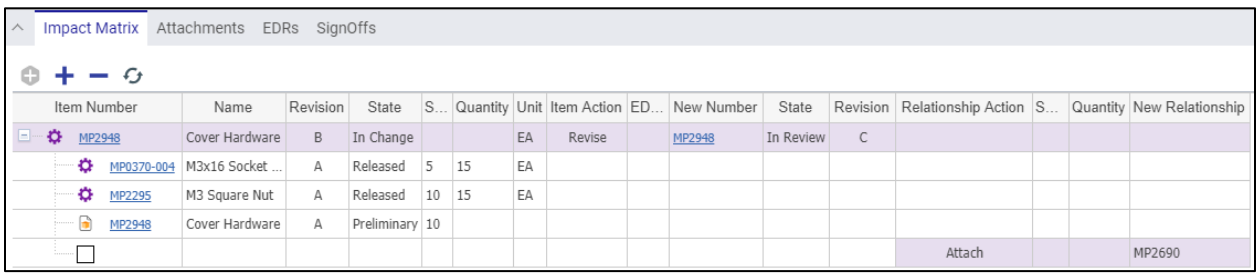

Figure 712.

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8. **Close Change**. The Express ECO is **Released**.

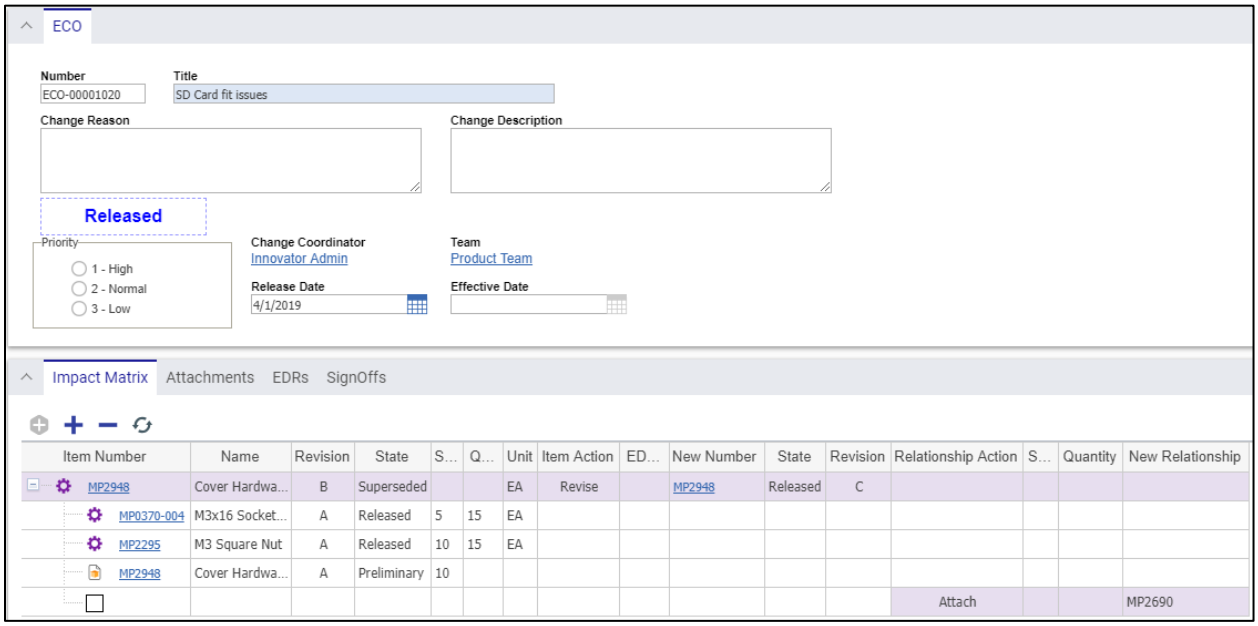

Figure 713.

The newly revised Parts are **Released** at the new major Revision.

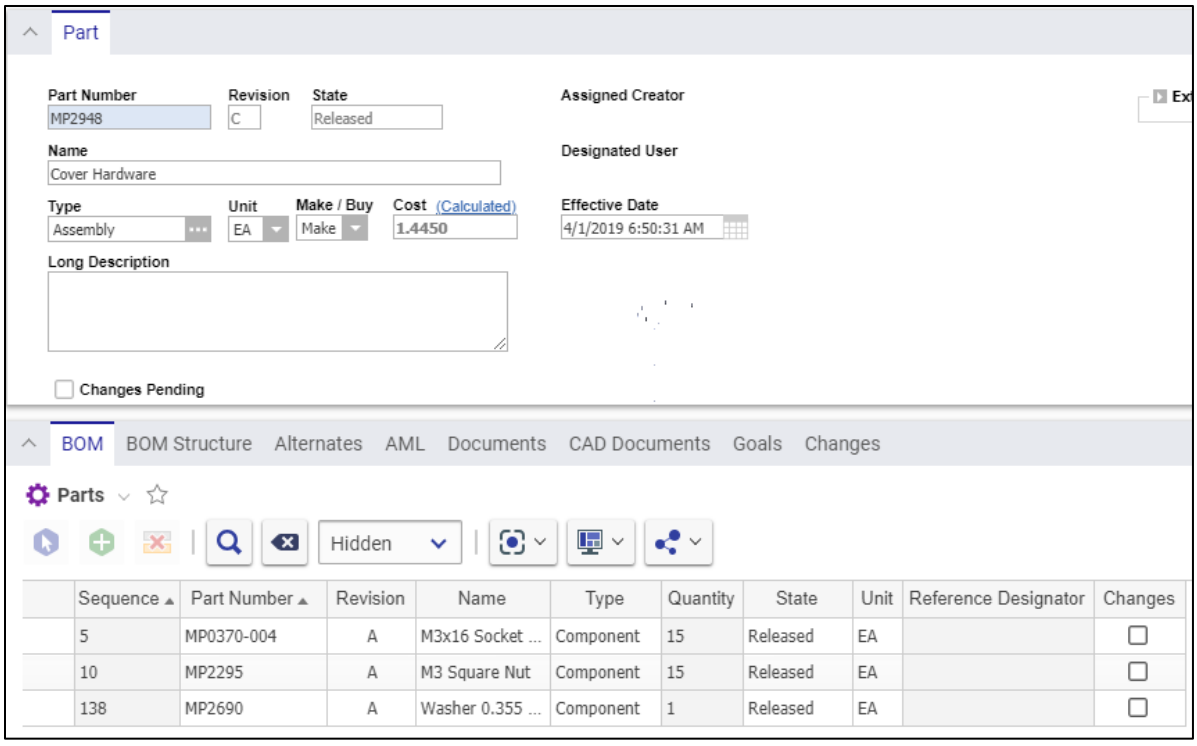

Figure 714.

You can use **Redline View** for displaying the current Part changes in a Parent BOM.

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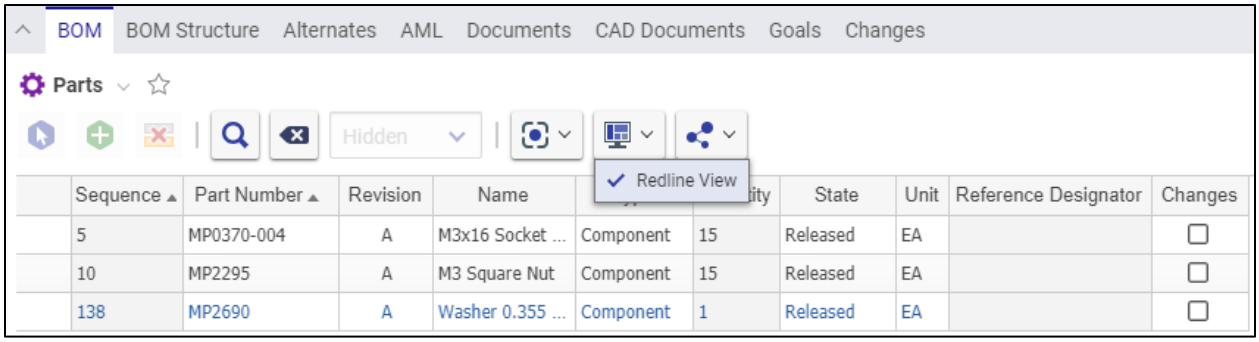

Sequence	Part Number	Revision	Name			State	Unit	Reference Designator	Changes
5	MP0370-004	A	M3x16 Socket ...	Component	15	Released	EA		
10	MP2295	A	M3 Square Nut	Component	15	Released	EA		
138	MP2690	A	Washer 0.355 ...	Component	1	Released	EA		

Figure 715.

13.3.2 Express Document Change Order (DCO)

An Express Document Change Order (DCO) is a quick process for implementing Document and CAD Document changes within an organization. You can quickly release a new Document, change, revise, or obsolete an existing Document. Only certain Identities can make modifications to a created Document under the supervision of a Team Manager.

In this section, the term Document means an item of both Document and CAD Document item types.

13.3.2.1 Understanding the Express DCO Process

The **Product** Team roles are engaged in the DCO workflow as the following:

- **Team Manager** is assigned to the **Planning** and **Initial Review** activities for reviewing Affected Documents and routing DCOs.
- **Team Member** is assigned to the **Draft Changes** for making changes to the Affected Documents.

In addition to the **Product** Team, the Express ECO workflow has the following roles:

- A DCO Creator, is a user who initially created and submitted the DCO in the system. This may or may not be the same person as other roles.
- A DCO **Change Coordinator** (Owner), is a person responsible for managing the DCO from start to finish.
- The Configuration Management (CM) group.
- The Change Control Board (CCB), is responsible for review and final approval of an MCO.

A DCO traverses between various states during its life cycle depicted in the following figure.

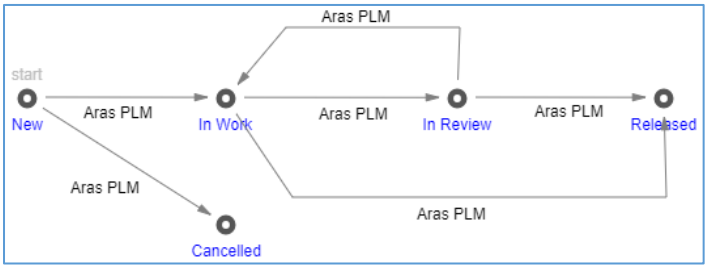

Figure 716.

The DCO workflow together with the DCO life cycle produces the following scenario:

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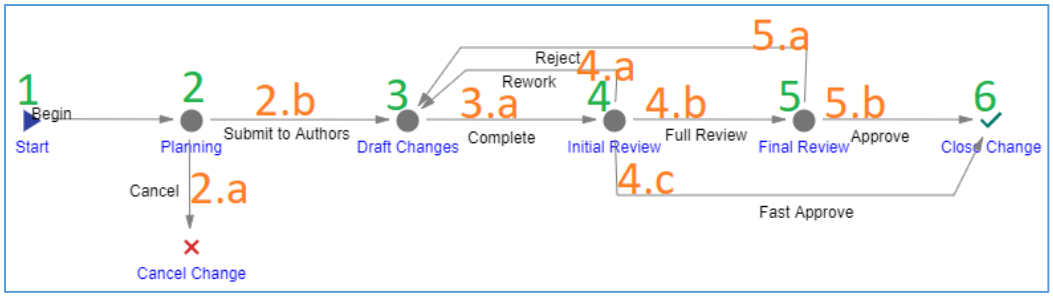

Figure 717.

1. **Start**. An Aras Innovator user initiates a DCO process by creating a new DCO. Once the DCO is saved, a workflow is automatically started to assign tasks and track the changes to it.
2. The Express ECO enters the **Planning** activity **assigned to the Team Manager**. The Team Manager reviews the DCO to vote either:
    a. **Cancel**. The DCO is cancelled and cannot be restored in the future.
    b. **Submit to Authors**. The DCO is ready for work and goes to the **Draft Changes** activity.
3. The DCO enters the **Draft Changes** activity **assigned to Team Members**. These Team Members make changes to the new revisions of Documents according to the DCO, and, when completed, vote:
    - **Complete** to propagate the DCO to the **Initial Review** activity.
4. The DCO enters the **Initial Review** activity **assigned to the Team Manager**. The Team Manager reviews the ECO and Affected Documents in details to vote either:
    a. **Rework** if the DCO or Affected Documents need any further reworking by the Team Manager. The DCO goes back to the **Draft Changes** activity.
    b. **Full Review** if the DCO requires the final review by the CCB. The DCO goes to the **Final Review** activity.
    c. **Fast Approve** if the DCO is ready for release. The DCO goes to the **Close Change** activity.
5. The Express ECO enters the **Final Review** activity **assigned to the CCB**. All the CCB members must conduct the final review of the DCO and vote the same decision of either:
    a. **Reject** if the DCO needs any further reworking. The DCO goes back to the **Draft Changes** activity.
    b. **Approve** if the DCO process is completed and does not require any further reworking. The DCO goes to the **Close Change** activity.
6. Once the DCO enters the **Close Change** activity, it becomes **Released**. Each Document is automatically released and versioned accordingly.

The following table shows the DCO lifecycle and workflow in terms of Roles and Permissions.

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Table 18: The Express DCO lifecycle and workflow in Roles and Permissions

Life Cycle State	Workflow Activity	Can Add	Get	Update	Delete	Change access	Can be promoted	Update responsible
New	Start, Planning	World	Team Manager, Team Member, Administrators, Owner, All Employees, Creator	Team Manager, Team Member, Administrators, Owner, Creator	Administrators, Owner, Creator	Administrators	Yes	Creator
Cancelled	Cancel Change		Team Manager, Team Member, Administrators, Owner, All Employees, Creator	Administrators		Administrators	No, a final state	
In Work	Draft Changes		Team Manager, Team Member, Administrators, Owner, All Employees, Creator	Team Manager, Team Member, Administrators, Owner, All Employees	Administrators	Administrators	Yes	Team Member
In Review	Initial Review, Final Review		Team Manager, Team Member, Administrators, Owner, All Employees, Creator	Team Manager, Team Member, Administrators, Owner, All Employees	Administrators	Administrators	Yes	CCB
Released	Closed Change		Team Manager, Team Member, Administrators, Owner, All Employees, Creator	Administrators		Administrators	No, a final state	

13.3.2.2 Creating a DCO

Because a DCO can be used to release, change, revise, or obsolete Affected Documents, the DCO creating process can be conventionally divided into general and specific procedures. This section defines the general steps you should use for creating a DCO. The specific procedures are outlined in sections *13.3.2.3 Releasing a Document within a DCO*, *13.3.2.4 Changing a Document within a DCO*, *13.3.2.5 Revising Documents within a DCO*, and *13.3.2.6 Obsoleting a Document within a DCO*.

Use the following procedure to create a DCO:

1. Go to **Contents --> Change Management --> DCOs**.
2. Click **Create New DCO**. The view of a new DCO appears.

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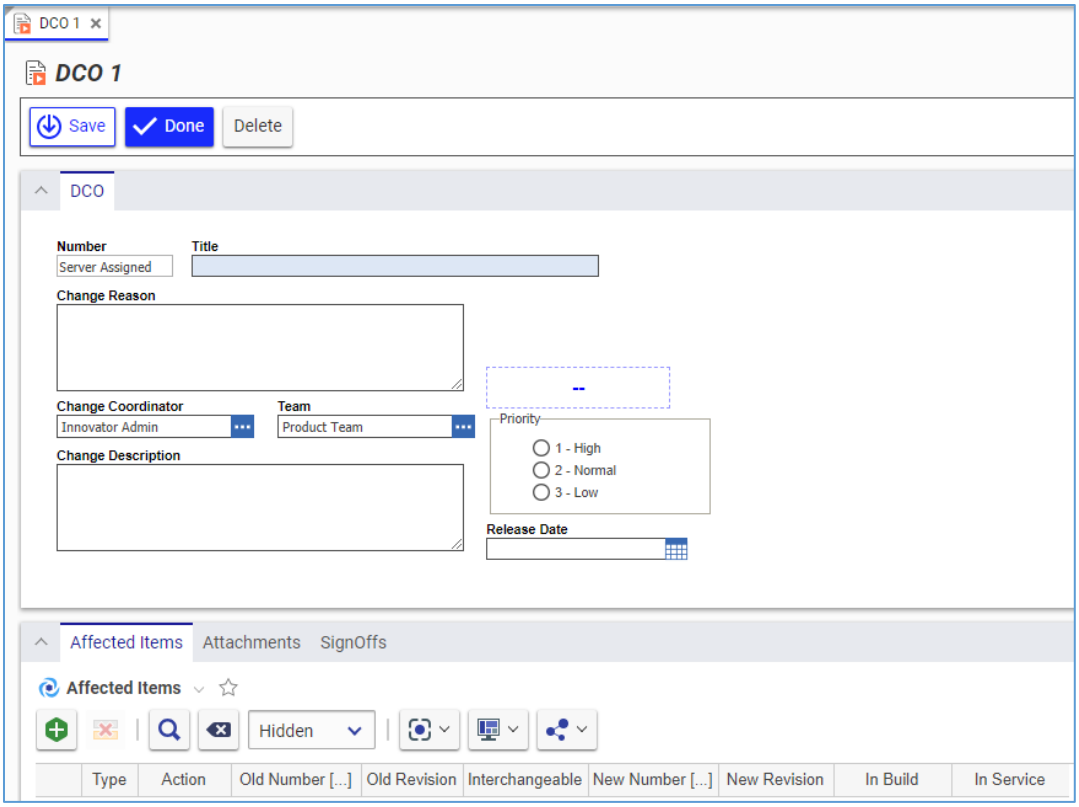

Figure 718.

3. Enter the ***DCO title*** as precisely as possible in the **Title** text box.
4. Describe the reason for the change as precisely as possible in the **Change Reason** text box.
5. If it is necessary to set the Express ECO Owner other than you:
    a. Click the **ellipses** button In the **Change Coordinator** box. The **Search dialog – Identity** appears.
    b. Using the standard search procedure, search for and select a Team. The selected Team replaces the default identity.
6. If it is necessary to set a Team other than the default:
    a. Click the **ellipses** button In the **Team** box. The **Search dialog – Team** appears.
    b. Using the standard search procedure, search for and select a Team. The selected TEam replaces the default identity.
7. Describe the change as precisely as possible in the **Change Description** text box.
8. Specify change priority using the **Priority** radio button: **1 – High**, **2 – Normal**, or **3 – Low**.
9. Keep the **Release Date** box blank. This box is automatically filled with the date on which the Express ECO is approved and closed.
10. If the DCO should release Documents, use the procedure described in the section *13.3.2.3 Releasing a Document within a DCO*.
11. If the DCO should change Documents, use the procedure described in the section *13.3.2.4 Changing a Document within a DCO*.

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12. If the DCO should revise Documents, use the procedure described in the section *13.3.2.5 Revising Documents within a DCO*.
13. If the DCO should obsolete Documents, use the procedure described in the section *13.3.2.6 Obsoleting a Document within a DCO*.
14. Go to the **Attachments** accordion tab to attach all the files concerning this DCO.

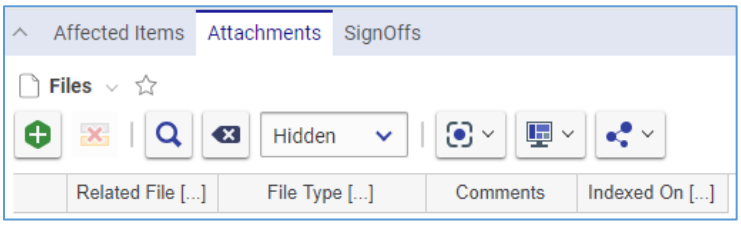

Figure 719.

15. Click **Create Item** on the **Attachments** accordion toolbar. The standard operating system dialog for file browsing and selection appears.
16. Search for and select a file. A new row appears in the **Files** grid with the file attached.

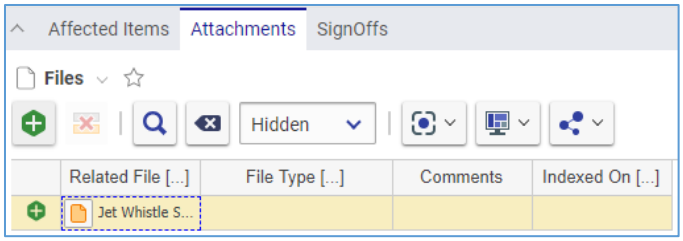

Figure 720.

Note: Aras Innovator will automatically provide a file type to the **File Type** cell depending on the File's extension when you save the DCO.

17. If it is necessary to provide additional information on the File, enter it in the **Comments** cell.
18. Click **Done** on the **DCO** toolbar. The DCO is created and awaits to be either submitted or cancelled as defined in the section *12.3.2.8 Voting on a DCO*.

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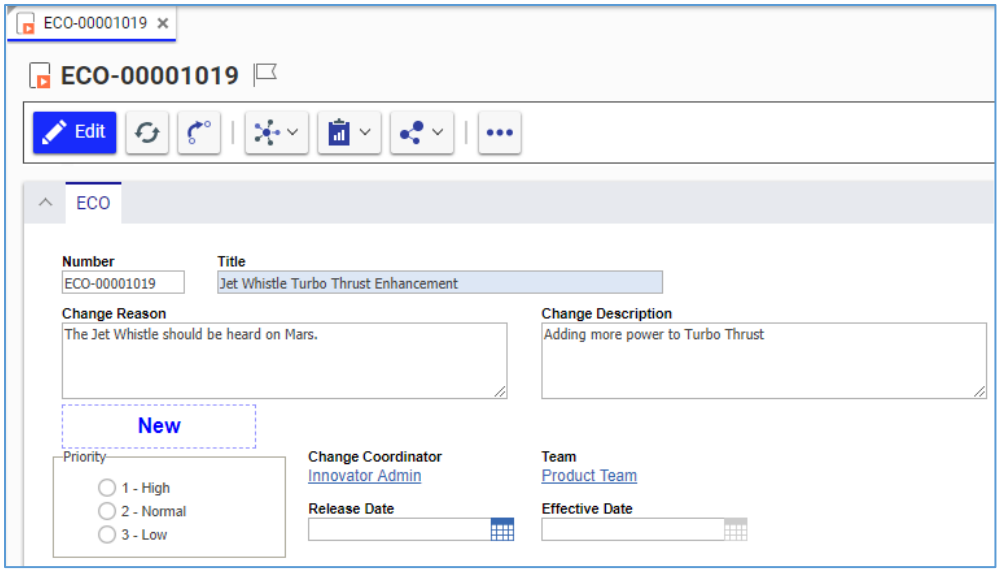

Figure 721.

13.3.2.3 Releasing a Document within a DCO

Because a DCO can be used to release, change, or obsolete Affected Documents, the DCO creating process can be conventionally divided into general and specific procedures. This section defines the steps you should use for releasing affected Documents when creating a DCO. Section *12.3.2.2 Creating a DCO* outlines the general procedure. The other specific procedures are outlined in sections *13.3.2.4 Changing a Document within a DCO*, *13.3.2.5 Revising Documents within a DCO*, and *13.3.2.6 Obsoleting a Document within a DCO*.

Use the following procedure to assign an affected Document in the **Preliminary** state for release when creating a DCO:

1. Open the **DCO** view.
2. Click **Edit** on the **DCO** toolbar.
3. Go to the **Affected Items** accordion tab.
4. Click **Create Item** on the **Affected Items** accordion toolbar. A new row appears at the bottom of the **Affected Items** grid.

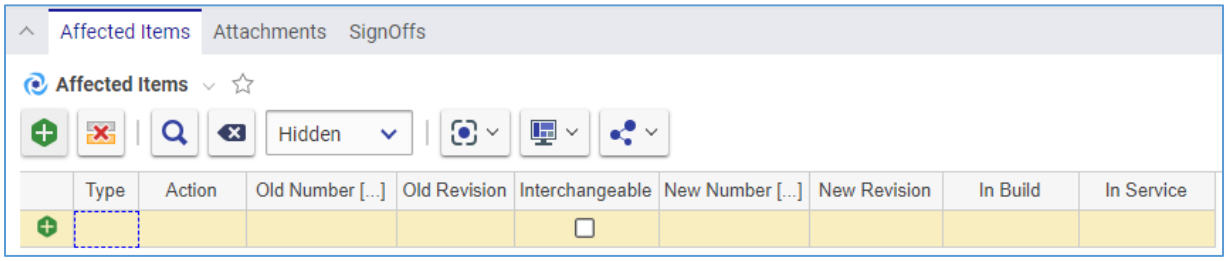

Figure 722.

5. Select **Add** in the **Action** cell.

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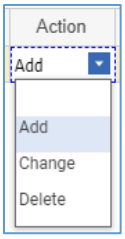

Figure 723.

6. Click the **ellipsis** button in the **New Number** cell. The **Search dialog – Change Controlled Item** appears.
7. Using the standard search procedure, search for and select the new affected Document. The affected Document populates the **New Number** cell.

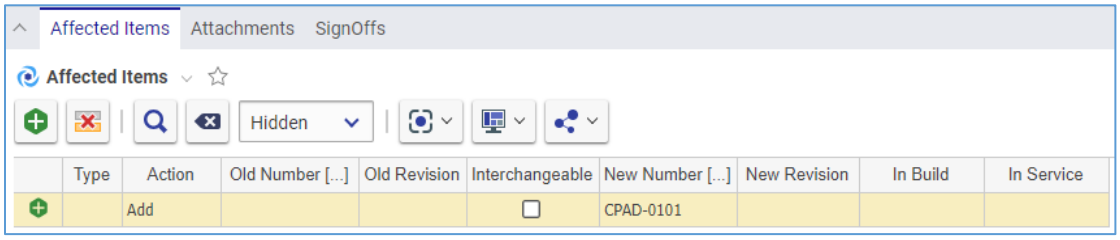

Figure 724.

8. Click either **Save** or **Done** on the **DCO** toolbar. The DCO has an Affected Document in the **Preliminary** state assigned for release.

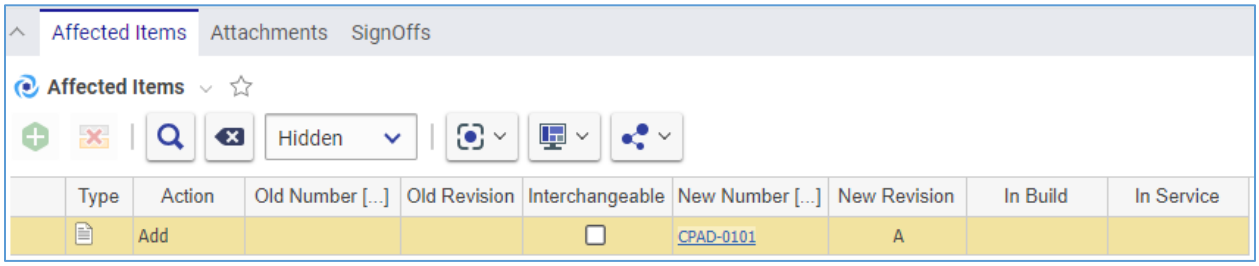

Figure 725.

13.3.2.4 Changing a Document within a DCO

Because a DCO can be used to release, change, or obsolete Affected Documents, the DCO creating process can be conventionally divided into general and specific procedures. This section defines the steps you should use for changing affected Documents when creating a DCO. Section *12.3.2.2 Creating a DCO* outlines the general procedure. The other specific procedures are outlined in sections *12.3.2.3 Releasing a Document within a DCO*, *13.3.2.5 Revising Documents within a DCO*, and *13.3.2.6 Obsoleting a Document within a DCO*.

The DCO **Change** Action for a Document does not modify the contents of the Document or attached files; it informs users that the old, **Superseded**, Document should no longer be used. It also changes the old Document with the new one in the hierarchies where it is used.

Use the following procedure to assign an existing affected Document to be changed when creating a DCO:

1. Follow steps 1-4 of the Adding a Document within a DCO procedure.
2. Select **Change** in the **Action** cell.

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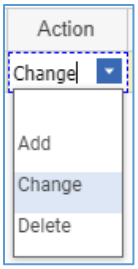

Figure 726.

3. Click the **ellipsis** button in the **Old Number** cell. The **Search dialog – Change Controlled Item** appears.
4. Using the standard search procedure, search for and select the affected Document to be changed. The selected Document populates the **Old Number** cell.

Figure 727.

5. Leave the **Interchangeable** cell check box blank.
6. Click the **ellipsis** button in the **New Number** cell. The **Search dialog – Change Controlled Item** appears.
7. Using the standard search procedure, search for and select the new Affected Document. The new affected Document populates the **New Number** cell.

Figure 728.

8. Click **Save** two times on the **DCO** toolbar.
9. Select the action to take on the Items that are being built in the **In Build** cell: **Use Existing**, **Rework**, or **Scrap**.
10. Select the action to take on the Items that are currently in service in the **In Service** cell: **Use Existing**, **Rework**, or **Scrap**.

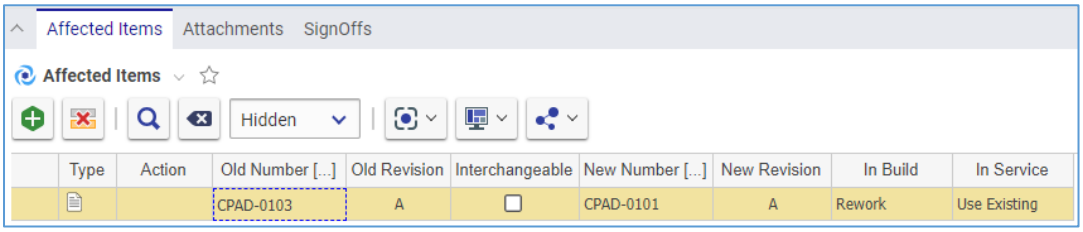

Figure 729.

11. Click either **Save** or **Done** on the **DCO** toolbar. The DCO has an Affected Document assigned for changing.

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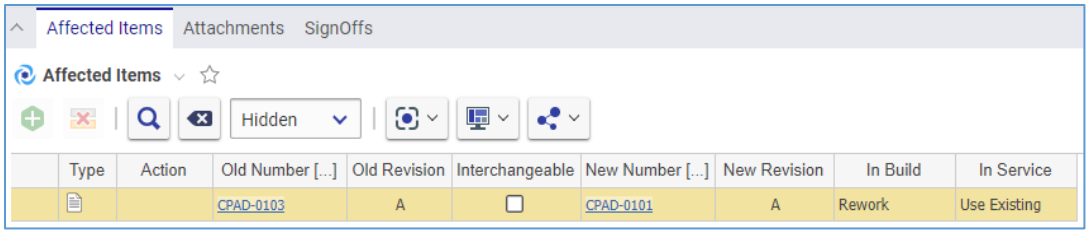

Figure 730.

13.3.2.5 Revising Documents within a DCO

Because a DCO can be used to release, change, or obsolete Affected Documents, the DCO creating process can be conventionally divided into general and specific procedures. This section defines the steps you should use for revising affected released Documents when creating a DCO. Section *12.3.2.2 Creating a DCO* outlines the general procedure. The other specific procedures are outlined in sections *13.3.2.3 Releasing a Document within a DCO*, *13.3.2.4 Changing a Document within a DCO*, and *13.3.2.6 Obsoleting a Document within a DCO*.

A released Document cannot be changed. A DCO can be issued to increment the revision to the next level and reset the lifecycle back to the preliminary state, allowing modifications. This controls who and when can make edits to a new revision of a Document.

The DCO **Change** Action for a Document does not modify the contents of the Document or attached files; it informs users that the old, **Superseded**, Document should no longer be used.

Use the following procedure to assign an existing affected Document to be revised when creating a DCO:

1. Follow steps 1-4 of the Adding a Document within a DCO procedure.
2. Select **Change** in the **Action** cell.

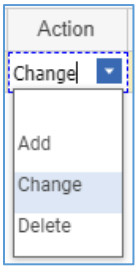

Figure 731.

3. Click the **ellipsis** button in the **Old Number** cell. The **Search dialog – Change Controlled Item** appears.
4. Using the standard search procedure, search for and select the affected Document to be changed. The selected Document populates the **Old Number** cell.

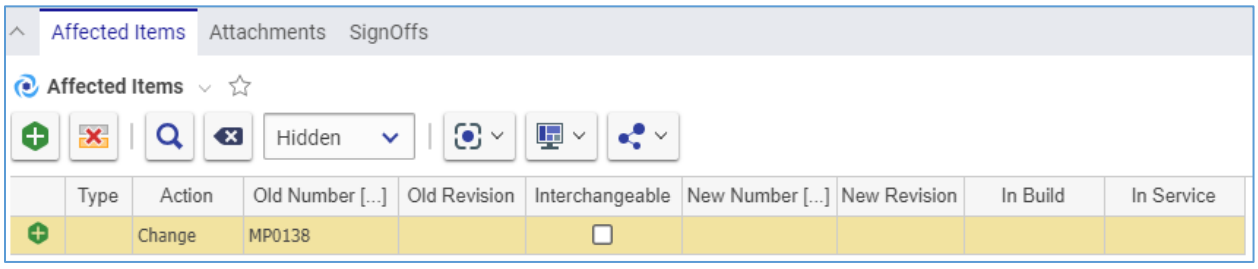

Figure 732.

5. Select the **Interchangeable** cell check box.

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6. Click **Save** two times on the **DCO** toolbar.
7. Select the action to take on the Items that are being built in the **In Build** cell: **Use Existing**, **Rework**, or **Scrap**.
8. Select the action to take on the Items that are currently in service in the **In Service** field: **Use Existing**, **Rework**, or **Scrap**.

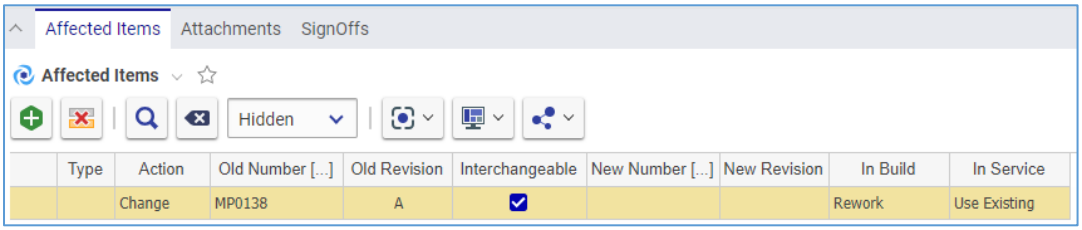

Figure 733.

9. Click either **Save** or **Done** on the **DCO** toolbar. The DCO has an Affected Document assigned for revising.

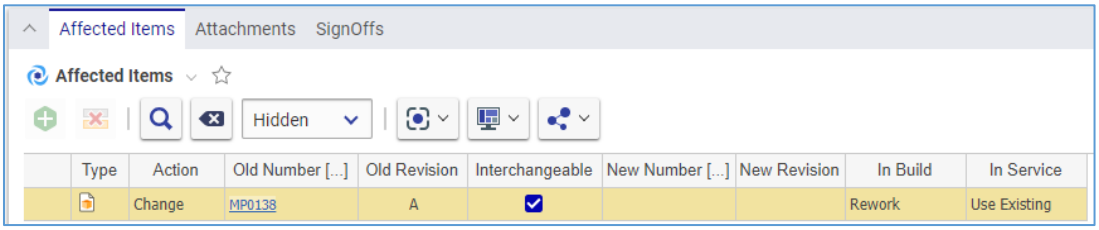

Figure 734.

13.3.2.6 Obsoleting a Document within a DCO

Because a DCO can be used to release, change, or obsolete Affected Documents, the DCO creating process can be conventionally divided into general and specific procedures. This section defines the steps you should use for obsoleting Affected Documents when creating a DCO. Section *12.3.2.2 Creating a DCO* outlines the general procedure. The other specific procedures are outlined in sections *13.3.2.3 Releasing a Document within a DCO*, *13.3.2.4 Changing a Document within a DCO*, and *13.3.2.5 Revising Documents within a DCO*.

Don't confuse obsoleting a Document with physical deleting a Document. The DCO **Delete** Action does obsoleting, not deleting. The DCO **Delete** Action for a Document does not delete the Document or attached files; it informs users that this Document is **Obsolete** and should no longer be used.

Use the following procedure to assign an existing Affected Document to be deleted when creating a DCO:

1. Follow steps 1-4 of the Adding a Document within a DCO procedure.
2. Select **Delete** in the **Action** cell.

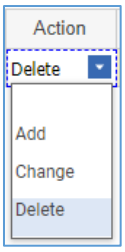

Figure 735.

3. Click the **ellipsis** button in the **Old Number** cell. The **Search dialog – Change Controlled Item** appears.

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4. Using the standard search procedure, search for and select the affected Document to be deleted. The selected affected Document populates the **Old Number** cell.

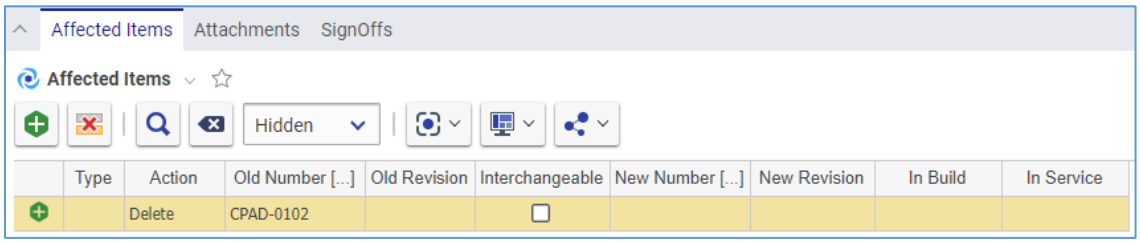

Figure 736.

5. Click **Save** two times on the **DCO** toolbar.
6. Select the action to take on the Items that are being built in the **In Build** cell: **Use Existing**, **Rework**, or **Scrap**.
7. Select the action to take on the Items that are currently in service in the **In Service** cell: **Use Existing**, **Rework**, or **Scrap**.

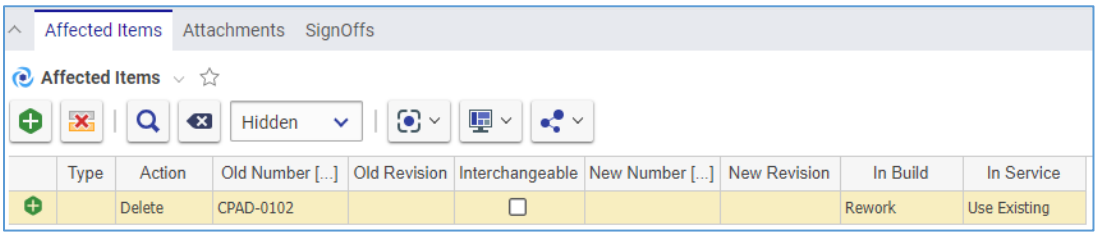

Figure 737.

8. Click either **Save** or **Done** on the **DCO** toolbar. The DCO has an affected Document assigned for deleting.

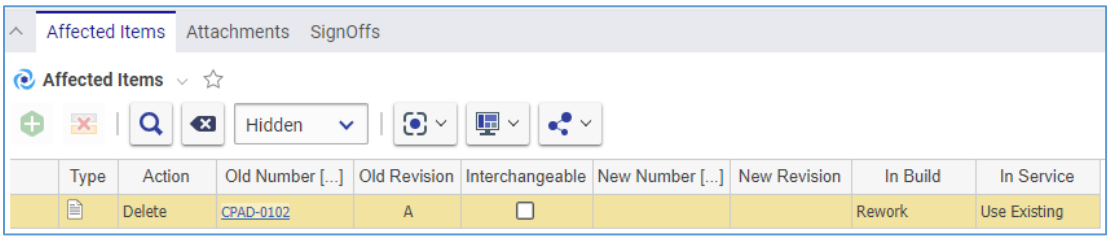

Figure 738.

13.3.2.7 Removing a Document from a DCO

Use the following procedure:

1. Follow steps 1-3 of the Adding a Document within a DCO procedure.
2. Click the **Document** and then click **Delete Row** on the **Affected Items** accordion toolbar. The **Document** becomes unavailable.

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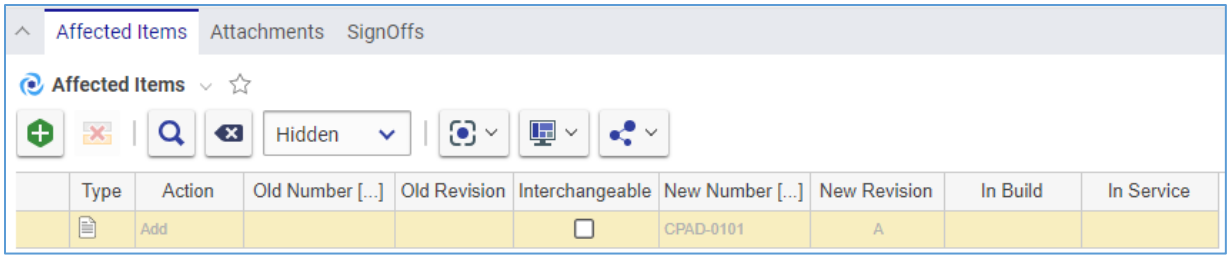

Figure 739.

3. Click either **Save** or **Done** on the **DCO** toolbar. The **Document** disappears from the grid.

Note: The **Document** disappears immediately if the DCO was not saved after it was added.

13.3.2.8 Voting on a DCO

Use the following procedure:

1. Go to **Contents --> My Innovator --> My InBasket --> Search My InBasket**.
2. Go to the **Workflow Activity Completion** dialog for the DCO.

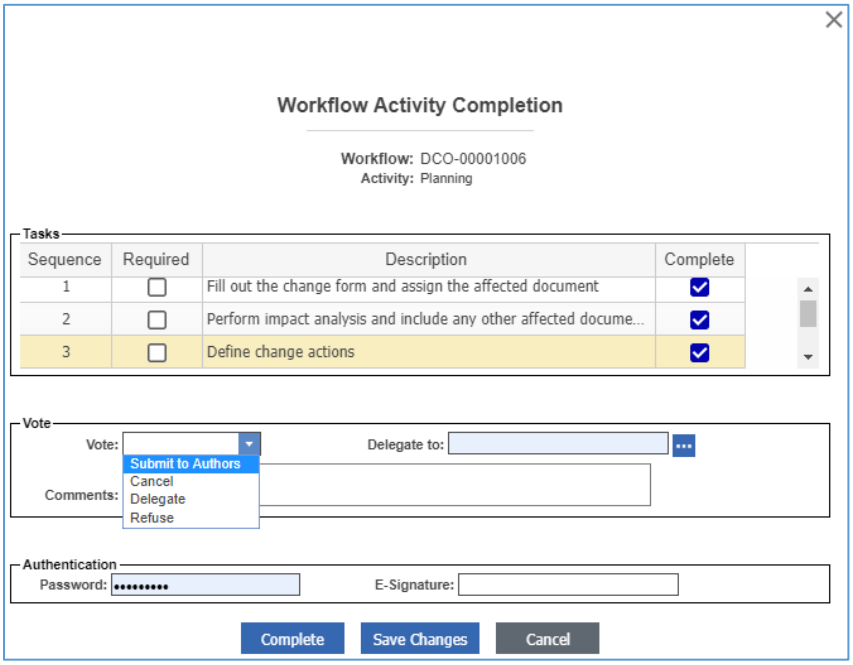

Figure 740.

3. Mark the tasks you completed in the **Tasks** field.
4. Select ***the option*** proper to your decision in the **Vote** list.
5. Click **Complete**.

The DCO enters the ***next*** activity as defined in the DCO workflow.

13.3.2.9 Viewing and Processing a DCO Signoff Activities

From the DCO view, you can review the current and previous Activities assigned for the DCO. You can also vote within an Activity if you have rights.

Use the following procedure:

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1. Open the **DCO** view.
2. Go to the **SignOffs** accordion tab.

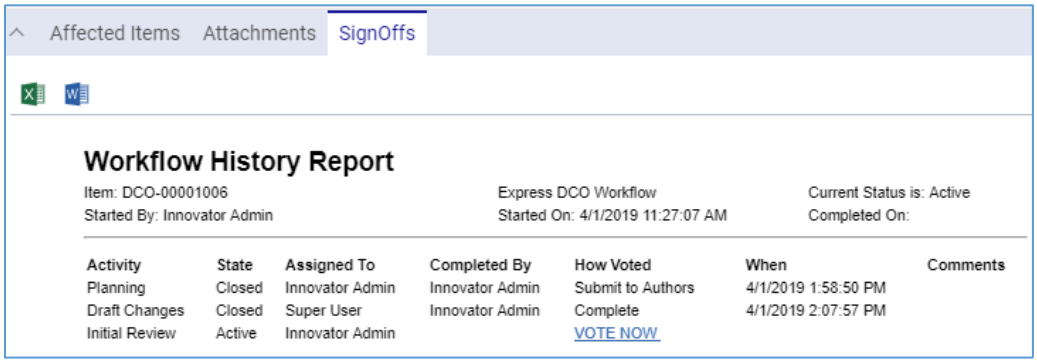

Figure 741.

3. Click the **VOTE NOW** link. The **Workflow Activity Completion** dialog for the DCO Activity appears.
4. Use steps 3-5 of the **Voting on a DCO** procedure.

13.3.2.10 Processing Documents within a DCO

This section describes revising a released Document as an example of processing Documents within an Express ECO.

To process Documents, follow the Express DCO workflow for a created DCO as explained in section *13.3.2.1 Understanding the Express DCO Process* and watch how the state of Documents is changing:

1. **Submit the DCO** to the **Draft Changes** activity. The old Document version is in the **In Change** state and has **Changes Pending** check mark set automatically to indicate that this Document is under a change process.

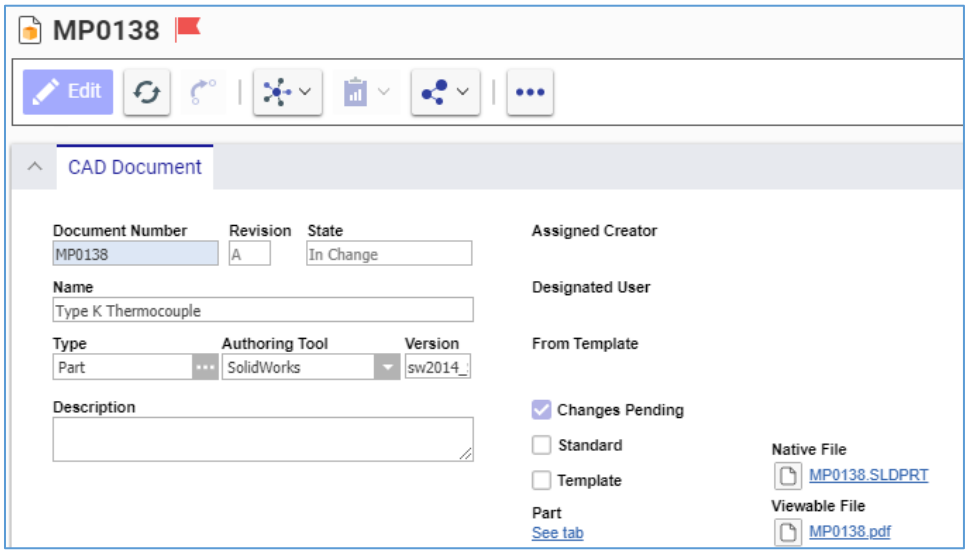

Figure 742.

The DCO has a link to the new major revision of the Document.

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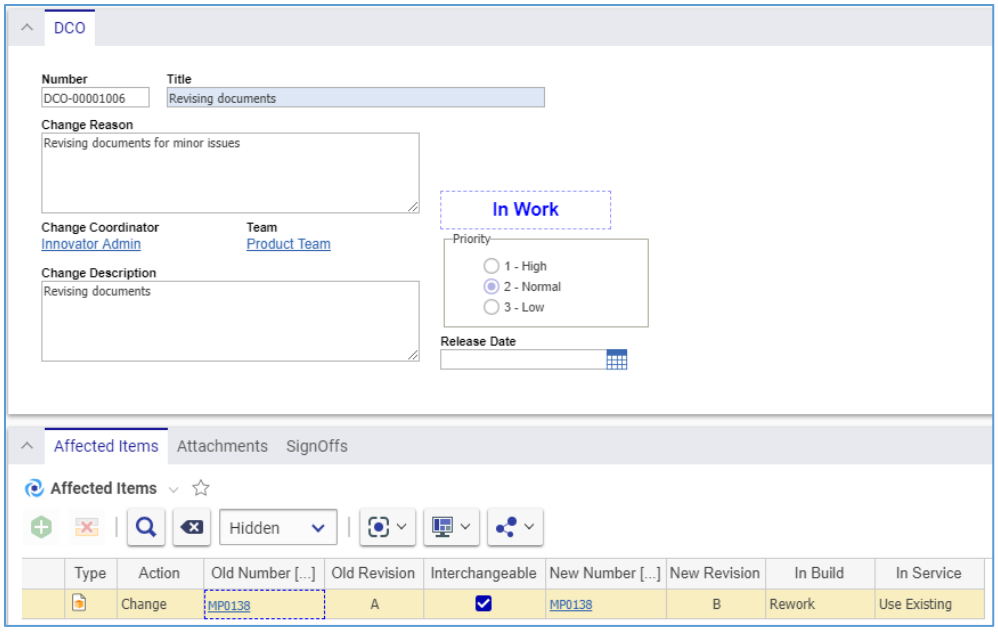

Figure 743.

The new major revision of the Document is in the **Preliminary** state and has **Changes Pending** check mark set automatically to indicate that this Document is under a change process.

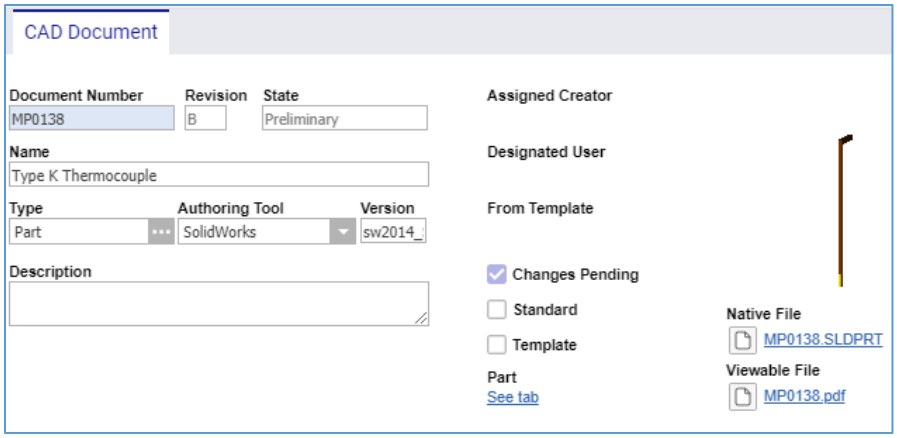

Figure 744.

2. The **Initial Review** activity. The Affected Document is set to the **In Review** state and is not allowed to be edited.

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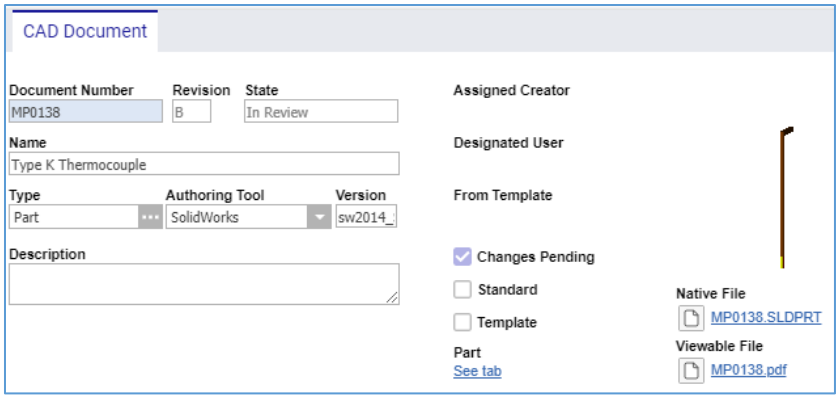

Figure 745.

3. The **Final Review** activity. The Affected Document is still in the **In Review** state and is not allowed to be edited.
4. **Close Change**. The DCO is **Released**.

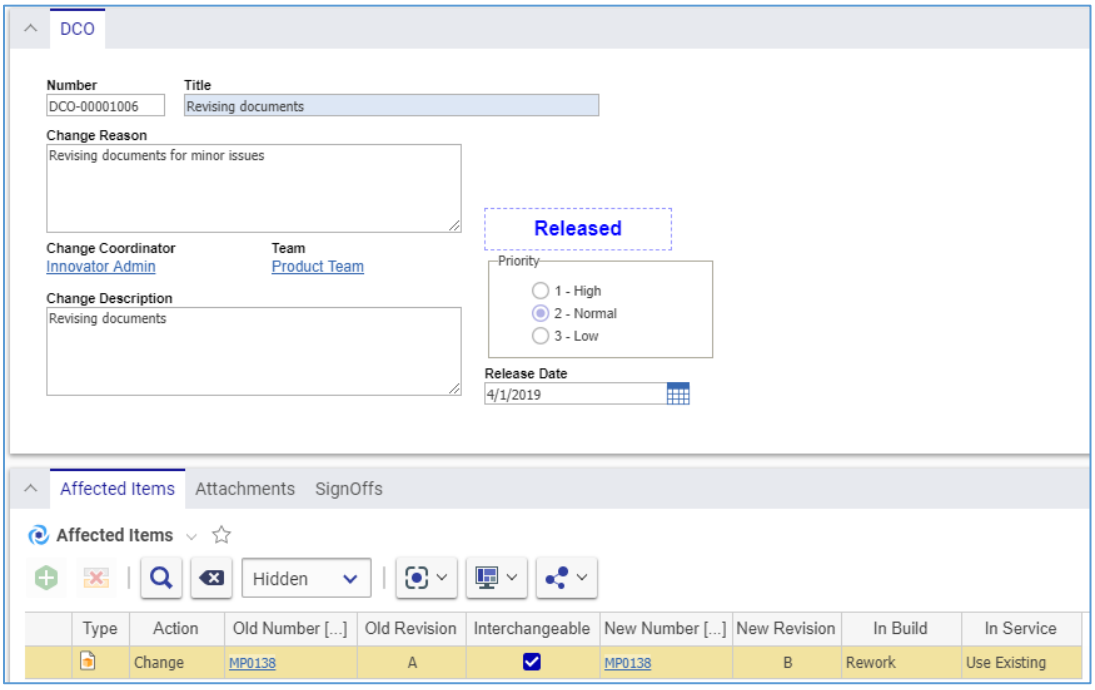

Figure 746.

5. The newly revised Document is **Released** at the new major Revision.

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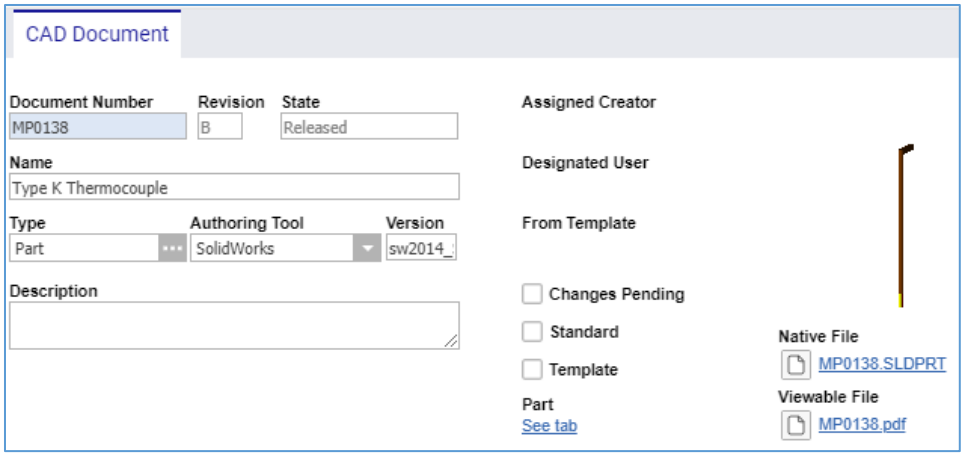

Figure 747.

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