Aras Product Engineering 14

User Guide

Document #: ***D-008158***

Last Modified: *10/16/2026*

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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

The Aras Innovator user interface (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. This section describes essential UI interactions and components to navigate in the Product Engineering application.

2.1 Navigation Panel

Clicking the **Navigation** button  displays the **Navigation Panel.** This panel displays the Aras Innovator Table of Contents. A User's permissions determine the categories that appear in the Navigation Panel. The Navigation Panel is auto hidden when you click outside the TOC. Click the **Pin** button  in the Navigation Panel if you want to pin it to the UI.

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

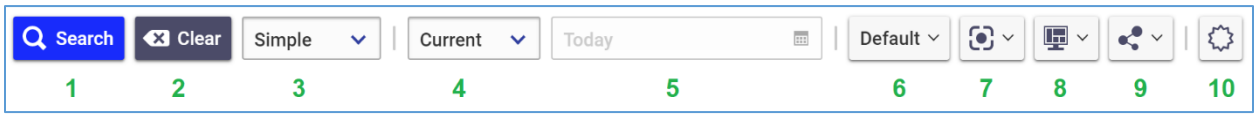
- **Change Management**: Contains Engineering Change Items, such as Problem Reports (PRs), Engineering Change Requests (ECRs) and Engineering Notices (ECNs). This list may vary depending on how an administrator configures the system.
- **Design**: Contains Part and Product items.
- **Documents**: Contains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

2.2 Search Page

Hover or click an item in the Navigation Panel to access the search page.

2.2.1 Search Toolbar

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



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.
    - Use **AML** search to create a complex search query.

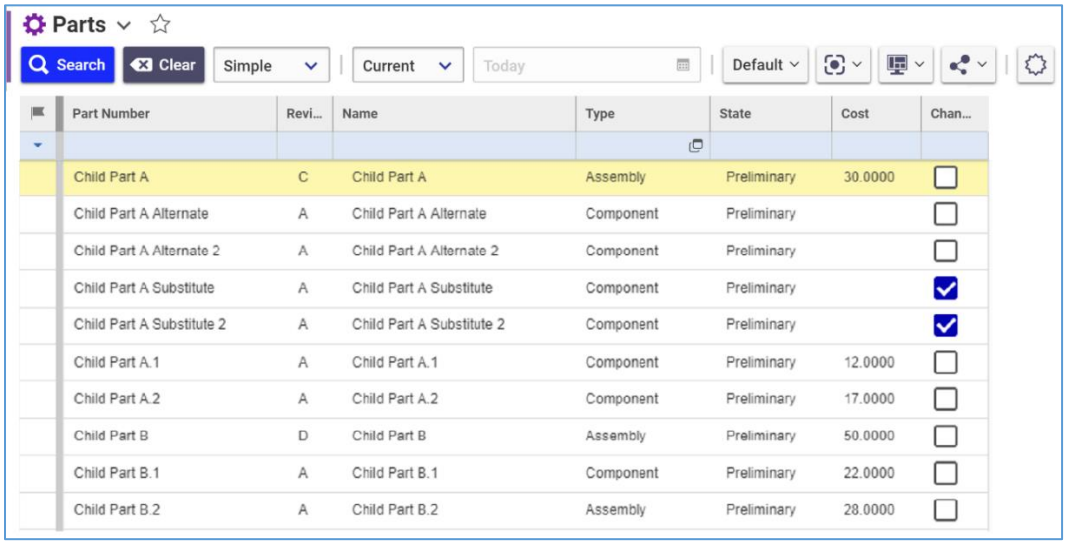
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- Use **Hidden** to hide the search criteria from the search grid.

4. Query Type dropdown 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.
5. 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.
6. The **Layouts** menu presents a list of layouts to select from. This menu also provides the ability to save a new layout, update a default layout, and delete a layout.
7. The **Refine** menu presents a list of item Properties and Extended Properties to select that appear in the Search Grid.
8. The **Display** menu allows you to select the level of details to display when an item is selected from the search results.
    - Select **Form** to display the selected item's form at the bottom pane of the search results page.
    - Select **Properties** to display details in a pane to the left of the search results page.
    - Select **Hide** to show no details.
9. The **Share** menu presents options to export search results.
10. Click the **New** button to create a new Item.

2.2.2 Search Grid

The Search Grid shows search results for items of one ItemType. Double-click an item in the search grid to open it for viewing, or right-click it to access the context menu. If you select multiple items, the context menu displays multi-item actions applicable for that ItemType.

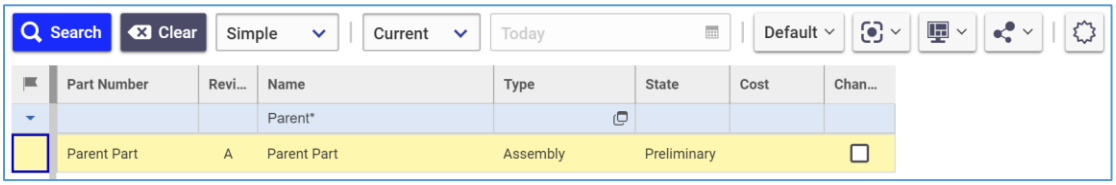


In Simple Search mode, you can enter simple search criteria in the blue filter row of the Search Grid to filter the results against these criteria.

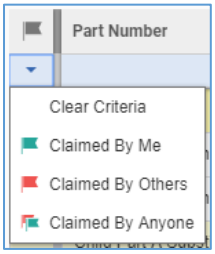
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All searches are case insensitive. Use * or % as a wildcard search. Use * to search for all non-blank values. Use 0 or 1 to filter on properties with check boxes: 0 corresponds to not checked, 1 corresponds to checked values.

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 start with the word Parent.



The first column shows the claim status of Items. Use this column to search for items claimed by you or someone else. For details, refer to section *2.4 Item Claiming*.



2.2.3 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.

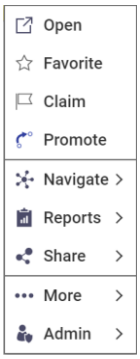


1. Click the **Prev** button to go to the previous page.
2. Click the **Next** button to go to the next page.
3. Displays the **Current page**.
4. Click the **Show Total Pages and Results** button to view the total number of pages and search results.
5. Use the **Results per Page** box to specify the number of results that appear on a page.
6. Enter a number in the **Maximum Results** box to specify the maximum number of results returned from a search.

2.2.4 Context Menu

The context menu displays the available actions for items appearing in the Search grid. Right-click an item in the grid to access the context menu. The context menu is an alternative access point to the functionality provided in the item window toolbar when you open an item. Each context menu contains commands specific to the ItemType and state of the item and is subject to permissions. As such, context menus are dynamic and variable. The commands common to most context menus are explained here.

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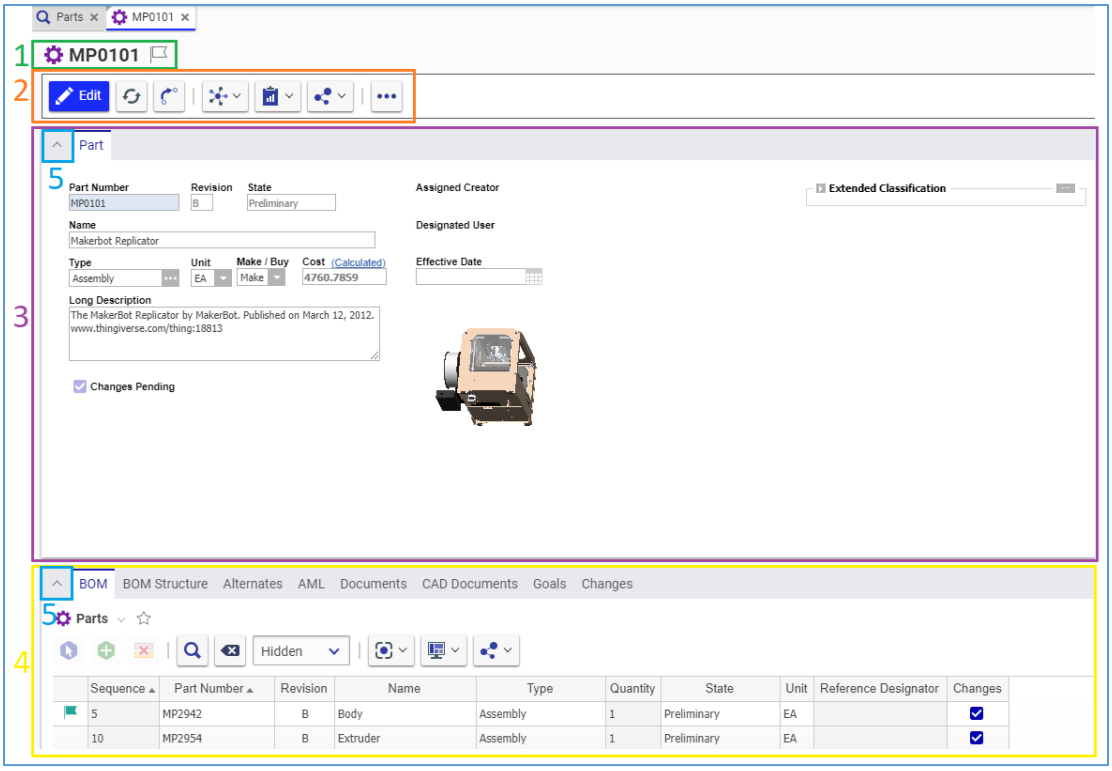
- **Open** displays an Item in a new tab in view mode.
- **Favorite** allows you to favorite an item.
- **Claim** explicitly locks an item to prevent editing by other users and keeps the item locked/claimed between sessions. For details, refer to section *2.4 Item Claiming*.
- **Unclaim** releases the claim from the item.
- **Promote** takes the item to its next life cycle state if any is available. For details, refer to section *4.3.1 Manual State Promotion*.
- **Navigate** contains exploration options for the selected item.
  - **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 determining where an Item is used by other Items. For details, refer to section *11.1 Finding Where an Item is Used*.
- **Reports** displays the Reports available for the selected item.
- **Share** displays options for sharing the selected item.
- **More** displays additional actions available for the selected item.
  - **Properties** displays the item's properties in the **Properties** dialog.
  - **Save As** starts the copy process by opening a form page tab to create a new item.
  - **Delete** displays options for deleting the current version or all versions of an item.

2.3 Item View

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

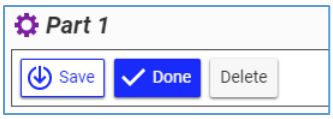
1. The Page Title bar.
2. The Item toolbar.
3. The Form accordion.
4. The Relationships accordion.
5. The Accordion Arrow button, which folds and unfolds an accordion.

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2.3.1 Item Toolbar

The contents of the **Item** toolbar depend on the ItemType, state of the item, and permissions. When you create a new item, the **Item** toolbar displays the following buttons:



- **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:



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** reverts 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 *4.3.1 Manual State Promotion*.

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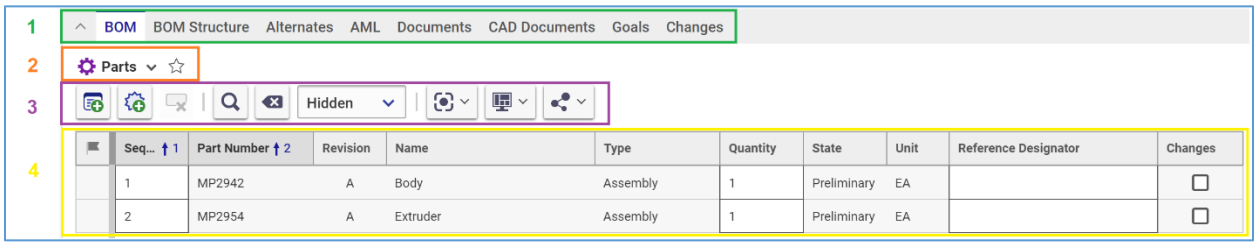
6. **Navigate** displays a menu with options to explore the item's history, usage, and relationships.
7. **Reports** displays a menu with reports available for this ItemType.
8. **Share** displays a menu with export options available for this ItemType.
9. **More** displays a menu with additional capabilities available for this ItemType.

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



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

2.3.2 Relationships Accordion

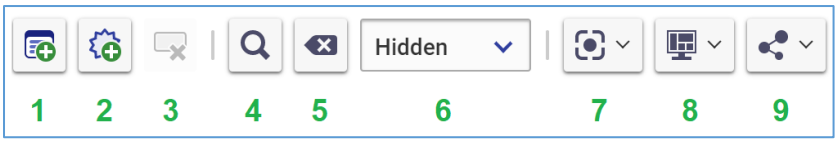


The **Relationships** accordion hosts:

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

2.3.3 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 contents of the **Relationships** toolbar depend on the relationship type, state of the item, and permissions. The buttons common to most **Relationships** toolbars are explained here.



1. The **Add Items** button launches a **Search dialog** to search for and add existing items to the **Relationships** grid.
2. The **New Item** button creates a new row in the **Relationships** grid. When the item is saved, the related item is created.
3. The **Delete Row** button removes the selected row (relationship) from the table without deleting the related item.
4. The **Run Search** button runs the search criteria on the related items.

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5. The **Clear Search Criteria** button clears the search criteria on the related items.
6. The **Search Modes** menu allows selecting the mode for the search criteria. For details on the search modes, refer to section *2.2.1 Search Toolbar*.
7. The **Refine** menu presents a list of item Properties and Extended Properties to select which are displayed in the **Relationships** grid.
8. The **Display** menu provides:
   a. **Redline View** to compare each item to its previous Released revision
   b. **Save Layout** to allow you to save the layout of the relationship grid
9. The **Share** menu displays options to export search results available for an item.

2.3.4 Relationships Content Area

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

Note: For further information regarding Tree Grid View usage, refer to the **Aras Innovator -Tree Grid View Administrator Guide** (available to Subscribers).

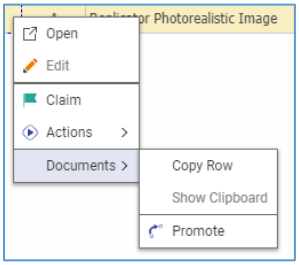
In a **Relationships** content area, single clicking an item highlights the **item** for further actions. Right-clicking highlights the **item** and opens its context menu.

In a **Relationships grid,** double-clicking opens the Item in a new tab. Standard Aras Innovator search procedure are applicable to the **Relationships** grids.

2.3.5 Relationship Context Menu

A **Relationship** context menu contains commands for a relationship and related items. This menu can be accessed by right clicking an item.

The **Relationship** context 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 relationship context menus are explained here.



- **Open** displays an Item in a new tab in view 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.
- **Replace** replaces the Item in its table row with another Item while retaining any existing relationship information.

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- **Remove** deletes the Item from the table.
- **Claim** explicitly locks an item to prevent editing by other users and keeps the item locked/claimed between sessions. For details, refer to section *2.4 Item Claiming*.
- **Unclaim** releases the claim from 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 or add to an existing change. For details, refer to section *13 Change Management*.
- **Copy Row** copies the Item to the clipboard.
- **Show Clipboard** opens the Clipboard Manager dialog.
- **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*.

2.4 Item Claiming

Claiming an item explicitly locks the item to prevent editing by other users. Users can edit only items claimed by themselves. An unclaimed item automatically becomes claimed when a user puts it in Edit mode, and it becomes unclaimed when the user exits Edit mode.

An item can be claimed by selecting the **Claim** flag  on the item page or by right-clicking the item from a search grid or relationship grid and selecting **Claim**.

When you claim an item, the item displays a green claim flag . When an item is claimed by another user, the item displays a red claim flag .

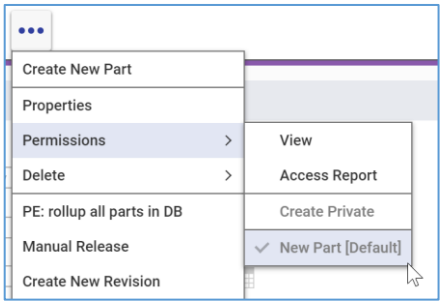
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3 Permissions

3.1 Viewing Permissions

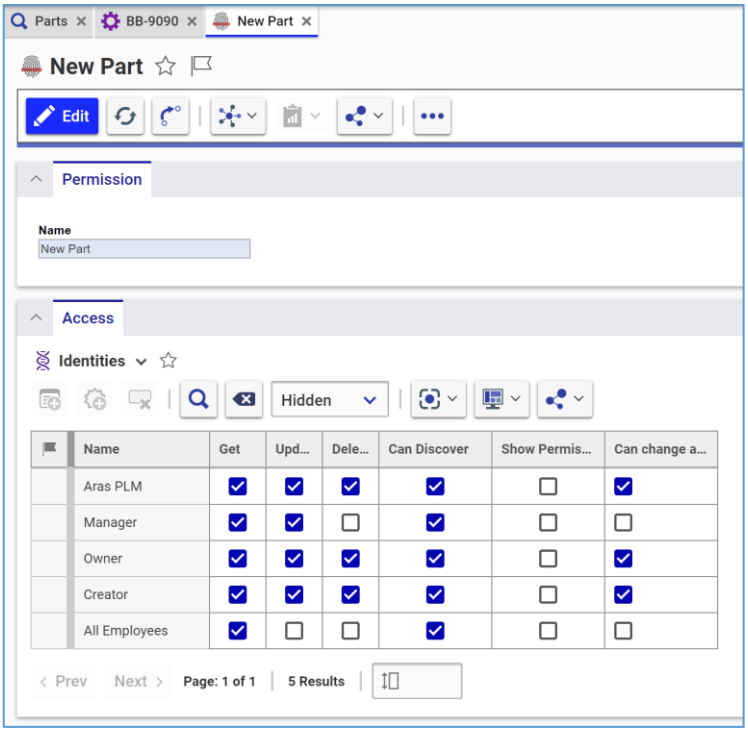
To view the current Permissions for an Item:

1. Open the Item.
2. On the Item toolbar and click **More > Permissions**. The **Permissions** submenu appears. The current Item Permission is checked.



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

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3.2 Understanding Permissions

A Permission defines what access rights a user or group has to an Item. Permissions are assigned to an ItemType to define security for all Items of that type. Permissions can also be assigned to Life Cycle states to change the security of an Item over its lifetime. Permissions define which Identities may:

- **Get** to retrieve Items in viewing mode.
- **Update** to claim and edit Items.
- **Delete** to delete Items.
- **Can Discover** to search for Items.
- **Show Permission Warning** to show a warning message if access is restricted to the identity.
- **Can Change Access** to change Item's Permissions.

Some standard Aras Innovator Identities that can be tied to Permissions are explained here:

- **Manager** is responsible for the management, usage, and review of the Item and is defined as the **Designated User** property on the Item. This property is optional.
- **Owner** is the Item owner and is defined as the **Assigned Creator** property on the Item. This property is optional.
- **Creator** is the creator of the Item and is defined as the **Created By** property on the Item. The Creator is assigned automatically and cannot be changed.

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

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3.3 Defining Private Permissions

A Private Permission is a Permission set specifically for a given Item, overriding its current Item Permission. The configured Permission is unique to the given Item and is not shared with any other Items. Private Permissions can be set for confidential Items to prevent viewing by other Identities. Once set, the Private Permission controls access to the Item by imposing a new set of access rights.

You can roll back to the default Item Permission. Once the default permission is reapplied, the Private Permission is deleted.

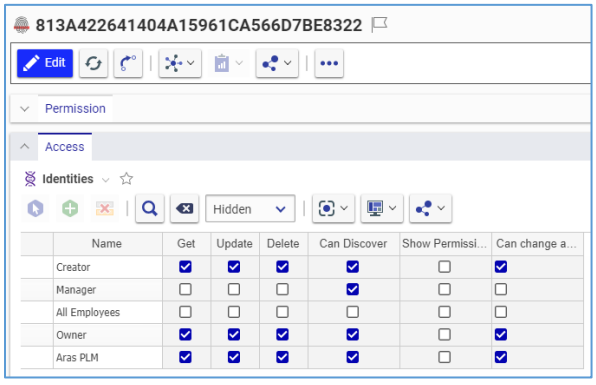
The **Can Change Access** grant in an Item Permission defines who can create Private Permissions. By default, the Item Creator and Assigned Creator have this grant. Aras Administrators can define who can change access rights for Items.

The following subsections assume that you have change access rights.

3.3.1 Creating Private Permissions

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

1. Open the Item that requires a private permission.
2. On the Item toolbar, click **Edit**.
3. Click **More > Permissions > Create Private**. A new Private Permission appears, pre-populated with the grants defined by the default Permission.
4. Update Identities as needed. The following sections of this document can be referenced for additional information on updating Identities in Private Permissions:
   - ***Adding Identities to Private Permission***
   - ***Creating Identities for Private Permission***
   - ***Replacing Identities in Private Permissions***
   - ***Removing Identities from Private Permissions***
5. Select the appropriate access for each Identity in the **Access** grid.
6. Click **Done** to create the Private Permission.



7. 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 a Private Permission

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

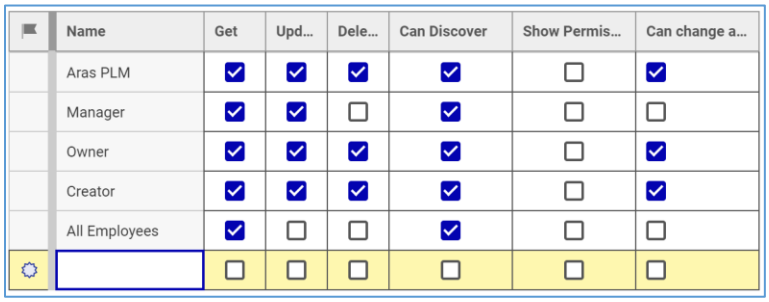
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1. Click **Add Identities** on the **Access** accordion toolbar on the Private Permission view. The search dialog appears.
2. Search for and select the necessary Identity.
3. Select OK to add the Identity to the Private Permission.

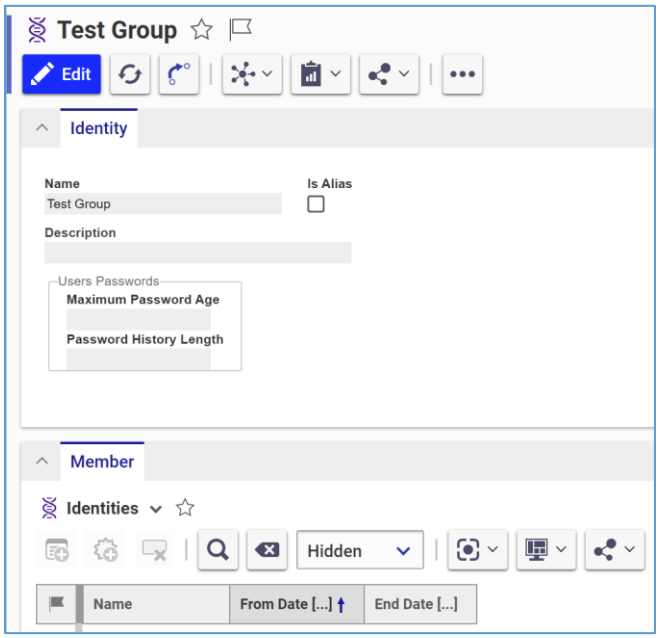
3.3.1.2 Creating Identities for Private Permission

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

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



2. In the **Name** cell of the **new row**, enter a name for the new Identity.
3. Click **Save** to save the new Identity.
4. (Optional) To add Members to an Identity, right-click the new identity and click **Open**. This opens the new Identity.



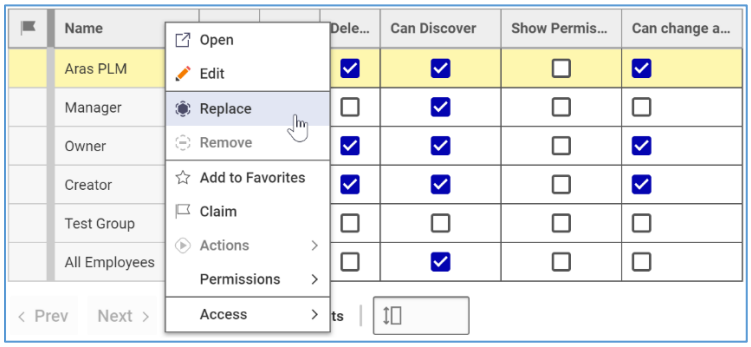
5. Click **Edit** to configure the new Identity and add Members.
6. Click **Done** to save your changes.

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3.3.1.3 *Replacing Identities in Private Permissions*

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

1. Right-click the Identity to be replaced and then click **Replace**. The search dialog appears.



2. Search for and select the necessary Identity, which replaces the previous Identity. The grants are retained for the selected Identity.

3.3.1.4 *Removing Identities from Private Permissions*

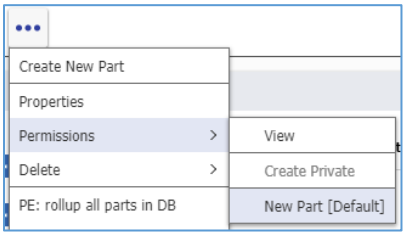
Use the following procedure to remove identities from a Private Permission:

1. Click the Identity to be removed to select it.
2. Click **Delete Access**  on the **Access** accordion toolbar.
3. Click **Save** to save the Permission and remove the Identity.

3.3.2 Rolling Back to Default Permissions

Use the following procedure to restore the default Permission on an Item:

1. Open the Item.
2. Click **Edit** on the Item toolbar.
3. On the **Item** toolbar, click **More > Permissions > *Current Item Permission* [Default]**. A blue checkmark appears next to the default Permission, which takes control of the access rights to the Item. The Private Permission is deleted.



4. Click **Done**.

Note:	Once a Private Permission is assigned to an Item, the Item cannot be directly deleted through the Item toolbar using standard delete procedures. Use the preceding procedure to roll back to the default permissions and avoid errors.

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4 Versioning and Promoting

ItemTypes in the Product Engineering application are versionable. Versionable Items keep a history of changes by storing a new generation of the item each time a change is made.

Every Item in Aras Innovator can be promoted through a defined Life Cycle, which is a series of states that an Item traverses during its existence. Most ItemTypes in the Product Engineering application have their own unique default Life Cycle.

In this section, the term *Item* refers to a versionable Item with a Life Cycle.

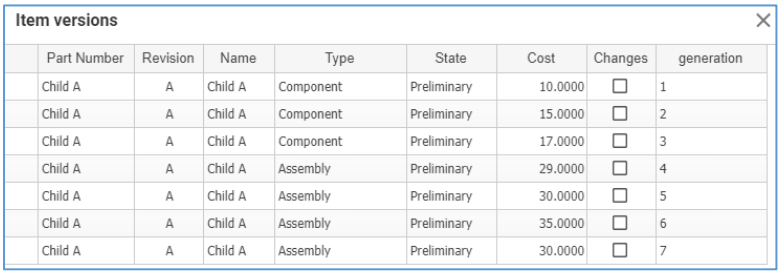
4.1 Item Revisions and Versions

The sequence of Claim, Save, and Unclaim actions results in the creation of a new generation of the Item. When an Item reaches the Released state in its Life Cycle, no further 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 Version Exploration

The **Item versions** dialog displays all versions of an Item. To access this dialog, either:

- In the Item Search Grid, right-click the Item and click **Navigate > Versions**.
- Open the Item, on the **Item** toolbar, click **Navigate**  **> Versions**.



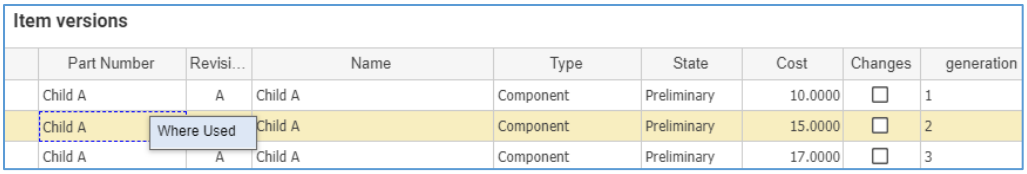
Part Number	Revision	Name	Type	State	Cost	Changes	generation
Child A	A	Child A	Component	Preliminary	10.0000	☐	1
Child A	A	Child A	Component	Preliminary	15.0000	☐	2
Child A	A	Child A	Component	Preliminary	17.0000	☐	3
Child A	A	Child A	Assembly	Preliminary	29.0000	☐	4
Child A	A	Child A	Assembly	Preliminary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

To examine details specific to an old version of an Item, double-click the corresponding row in the **Item versions** dialog.

Note: Previous versions of Items are read-only and cannot be edited.

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

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4.1.2 Version Deletion

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

Note: Claimed Items cannot be deleted.

To delete an old version of an Item:

1. Go to the **Item versions** dialog for the Item.
2. Double-click the version of the Item to be deleted to open it.
3. On the Item toolbar, click **More**  **> Delete > Purge This Version**. A confirmation dialog appears.
4. In the confirmation dialog, click **Purge** to delete the specific version of the Item.



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

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

4.2 Item History

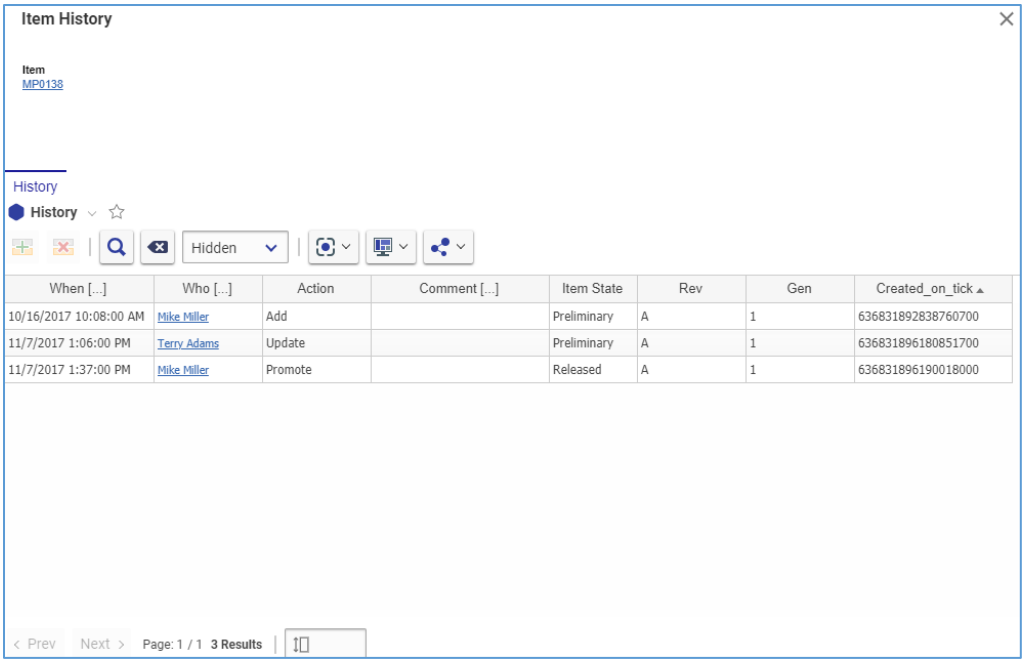
The Product Engineering application can track changes made to an Item at both the item and property levels, including who made the change and when. By default, the following actions result in the creation of a history record: Add, Update, Promote, Reset or Set Default Lifecycle State, and Delete.

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

1. Open the Item.
2. On the Item toolbar, click **Navigate**  **> History**.

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

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4.3 Manual Promotion and Revise

Items can be released 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, you can 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*.

Manual release and revise features are available only when all the following criteria are true:

- No generations of the Item have 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 Manual State Promotion

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

An Item can be promoted from either the Item view or its context menu in the Items Search Grid.

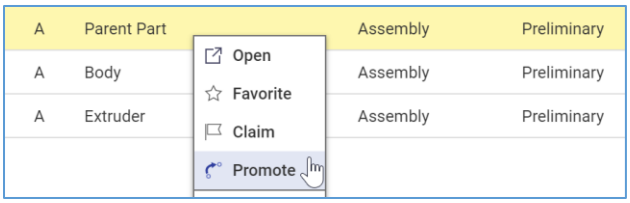
To promote an Item using its view:

1. Open the Item.
2. On the Item toolbar, click **Promote** .
3. In the promotion dialog, select the desired state to promote the Item to by either:
   a. Double-clicking the state to which the item should be promoted.
   b. Clicking the state to promote to and then clicking **Promote to Selected State**.

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To promote an Item using its context menu:

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



3. In the promotion dialog, select the desired state to promote the Item to by either:
   a. Double-clicking the state to which the item should be promoted.
   b. Clicking the state to promote to and then clicking **Promote to Selected State**.

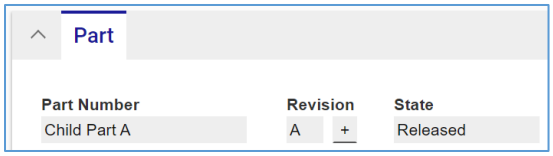
4.3.2 Manual Release

In addition to the manual promotion feature, you can release an Item in one action. In 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 by using either the Item view or its context menu in the Items Search Grid.

To release an Item using its view:

1. Open the Item.
2. On the Item toolbar, click **More**  > **Manual Release**.

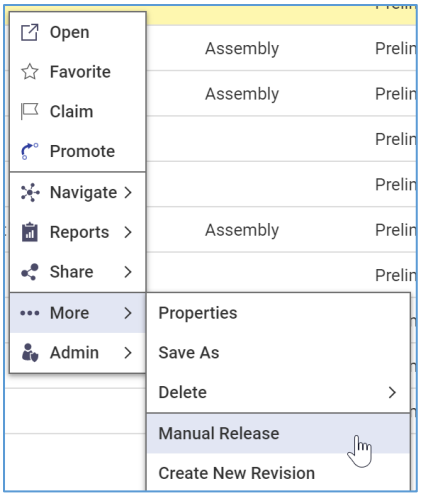
The promoted Item gets the **Released** value in the **State** field. The **plus** button also appears in the **Revision** field for manual revision.



To release an Item using its context menu:

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

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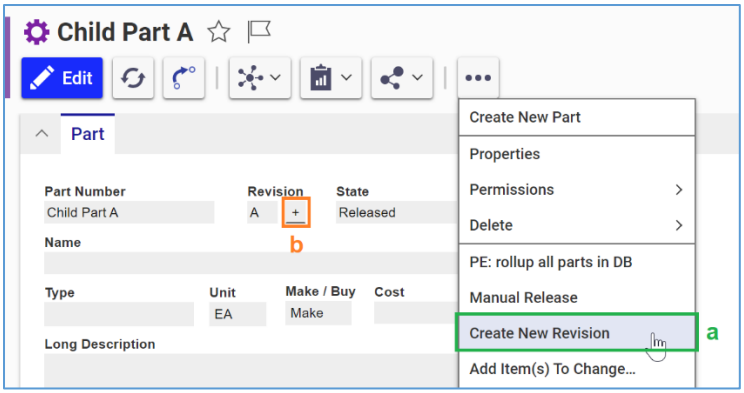


4.3.3 Manual Revise

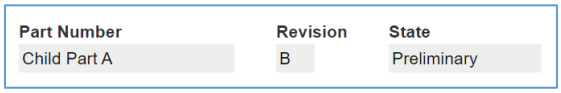
The Assigned Creator can manually create a new major revision of an Item if the preceding requirements for manual revision are met and if the Item is in the Released state either from the Item view or from the Item's context menu in the Items Search Grid.

To revise an Item manually using its view:

1. Open the Item.
2. Use one of the following options:
   a. On the Item toolbar, click **More**  > **Create New Revision**.
   b. Click the **+** button next to the **Revision** field and select **OK** in the confirmation prompt.



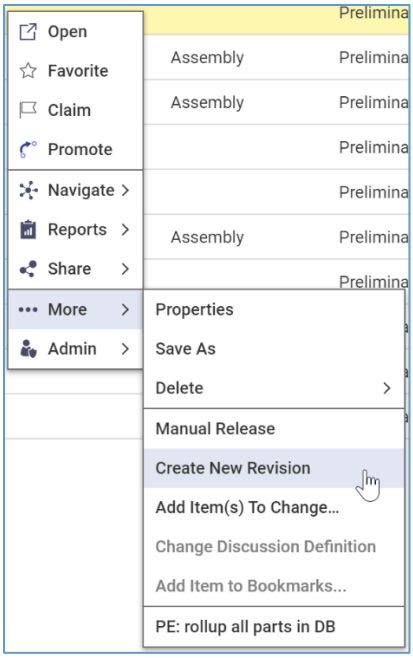
The revised Item gets the new major value in the **Revision** field and the Preliminary state. Under **Revision**, the **plus** button disappears.



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

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

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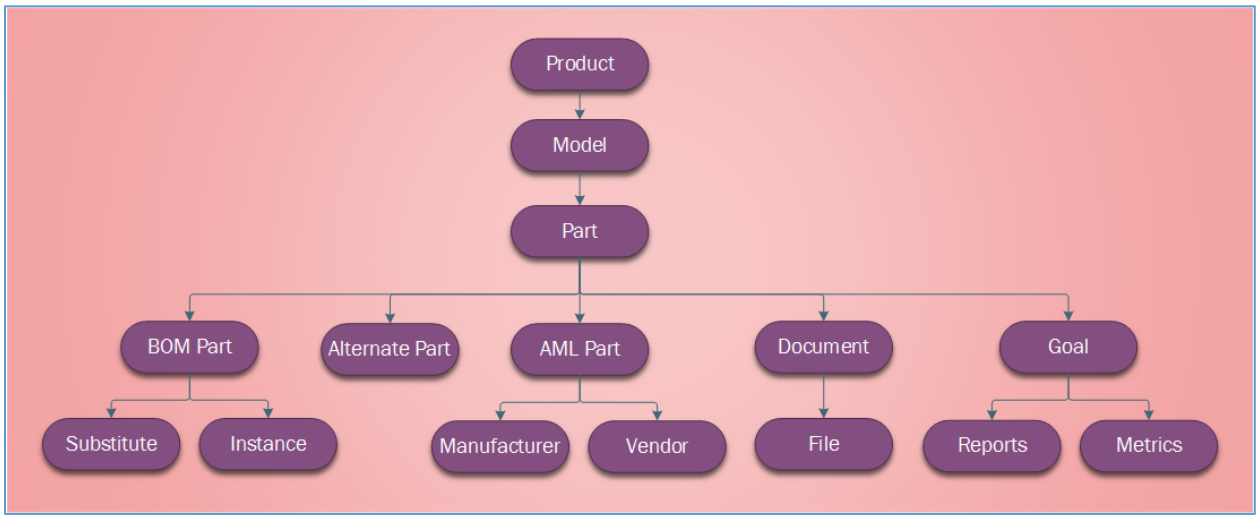
Note: If you cannot see the latest Item generation in a Search Grid, click **Search** to reload the Grid. Another option is to use the Version exploration procedure.

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5 Parts

Parts are the basic component of any Bill of Materials (BOM) management application. Parts can have a 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 part's BOM. 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.



Each part has a life cycle associated with it. Refer to 5.3 Part Life Cycle, 4.3. Manual Promotion and Revise and 13. Change Management for details.

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

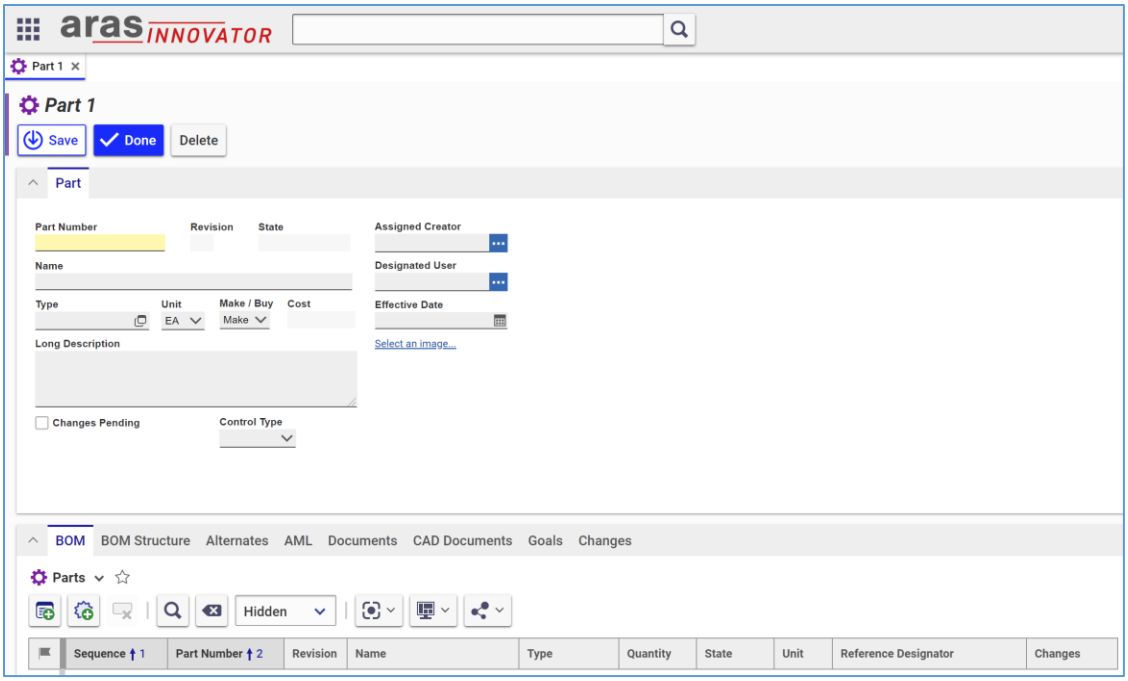
5.1 Creating a Part

This section outlines creating a Part in a standard instance of Aras Innovator. Your administrator may configure Parts as part of a different category in the Navigation panel, along with different or additional fields on the Part Form.

To create a Part:

1. Go to **Contents** > **Design** > **Parts**.
2. Click **Create New Part**. A New Part Form appears. Enter the necessary information.

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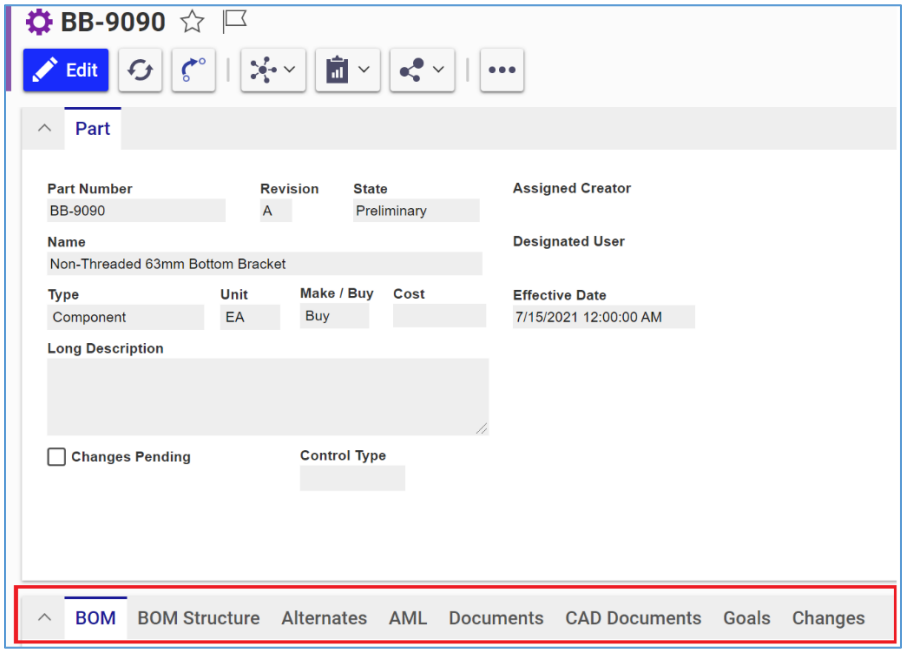
- **Part Number**: (Required) This is the part number. The Part Number must be unique.
- **Name**: This is the name for the Part.
- **Type**: This is the classification type for the Part. The classification dialog displays the Part classification tree. The Part classification tree can be adjusted and extended as needed by an administrator.
- **Unit**: This is the unit of measure for the Part:
- **Make/Buy:** This specifies whether the Part is made in-house or whether it is bought from a manufacturer.
- **Long Description**: This is where you can provide additional information about the Part.
- **Assigned Creator**: This is the user 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.
- **Designated User**: This is the user responsible for the management, usage, and review of the Part.
- **Effective Date**: This 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.
- **Select an image**: This allows you to select an image using the Image Browser to generate a thumbnail for the Part.
- **Extended Classification**: This allows you to assign values to Items based on the Item's extended classification.

3. Once you have entered in the necessary information, click **Save** or **Done** to save your changes and create the Part.

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5.2 Part Relationships

A Part can have relationships to other Items. The Relationships accordion keeps these relationships grouped in separate Relationships tabs. Each Relationships tab represents a single relationship type.

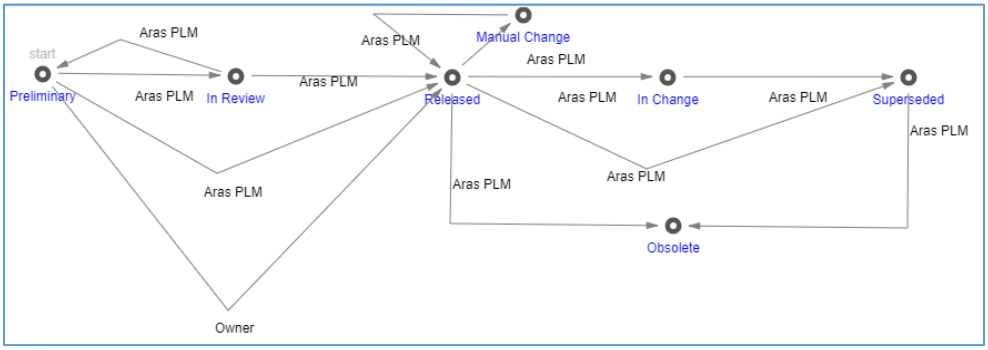


- **BOM**: A single-level BOM editor that enables you to view and manage the direct children of a Part. For more details, refer to section *6.1 Part BOM Relationships*.
- **BOM Structure**: A multi-level, read-only view of the Part's BOM. For more details, refer to section *6.2 BOM Structures*.
- **Alternates**: A list of alternate Parts for a Part. For more details, refer to section *6.7 Alternates*.
- **AML**: An Approved Manufacturing List for a Part. For more details, refer to section *7.7 Approved Manufacturer List (AML)*.
- **Documents**: A list of documents for a Part. For more details, refer to section *8.4 Managing Part Documents*.
- **CAD Documents**: A list of CAD documents, such as 2D/3D models and drawings for a Part. For more details, refer to section *9.6 Managing CAD Documents in Parts*.
- **Goals:** The Goals set for this Part. For more details, refer to section *6.11 Design Goals*.
- **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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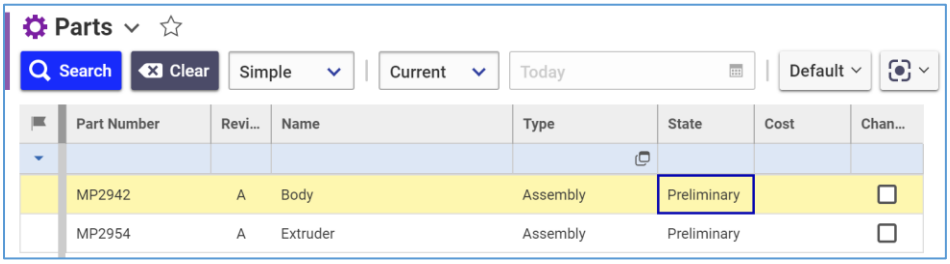
5.3 Part Life Cycle

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 manual release. The Product Engineering application provides change management processes, which are used to release Parts after appropriate reviews and approvals. During the change processes, a Part goes through different life cycle states depending on the step in the workflow. For more details, refer to section *13. Change Management*.

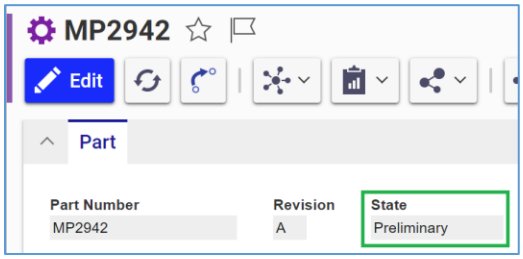


The current State of a Part can be viewed in the following places:

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

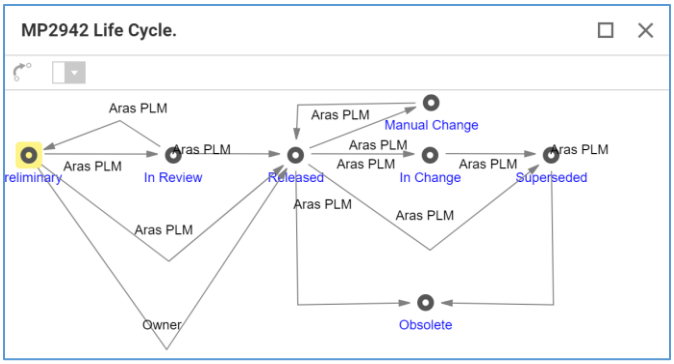


- The **State** read-only property box of the Part form.



- The **Life Cycle** dialog, where the current State is highlighted.

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

1. Open the Part
2. On the Part toolbar, click **Navigate** > **Life Cycle**.

5.5 Part Deletion

You can 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, you 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, you must have the **Delete** rights granted in Permissions for both states. An error message appears if you do not have Delete rights. For details on access rights, refer to section *3. Permissions*. This subsection assumes you have these rights.

You can delete a Part either directly from the Part form, or by using the context menu in the Parts Search Grid.

To delete a Part completely through the Part Form:

1. Open the Part.
2. On the Part toolbar, click **More** > **Delete** > **Delete All Versions**. A notification dialog appears.
3. Click **OK** to delete the Part completely. Click **Cancel** to cancel.

To delete a Part using the context menu:

1. Go to the Part Search Grid.
2. Right-click the **Part** > **Delete All Versions**. A notification dialog appears.
3. Click **OK** to delete the Part completely. Click **Cancel** to cancel.

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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* to other Parts. A Child can be a single Part or another assembly (Parent) creating a multi-level BOM structure.

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 *6.7 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 *6.8 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.

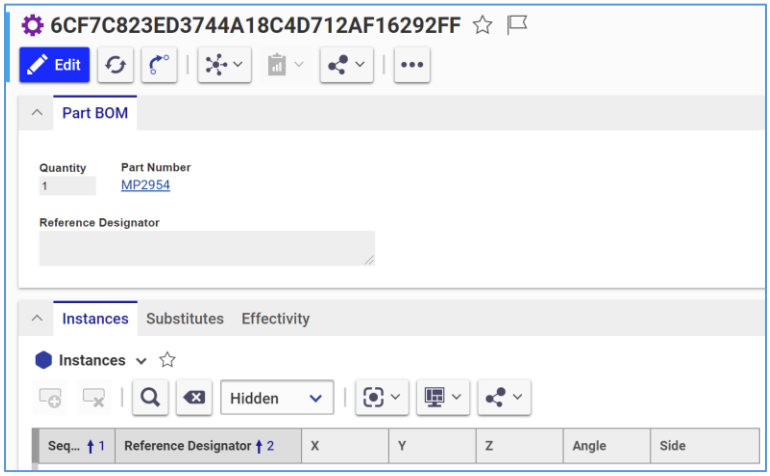
The Goals of a Parent Part are automatically rolled up from all its Children. For more details on Goals, refer to section *6.11 Design Goals*.

6.1 Part BOM Relationships

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 Part.

To view a Part BOM relationship:

1. Open the Parent Part item.
2. Go to the **BOM** tab.
3. In the **BOM** grid, right-click a Child > **BOM** > **Open**. The view of the Part BOM relationship between the Parent and the Child appears.



- **Quantity:** The number of Parts used in the assembly.
- **Part Number**: The part number.

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- **Reference Designator**: Used primarily in electronic assemblies to list labels of each Instance.

The relationships accordion of the Part BOM contains three tabs:

- **Instances**: Refer to section *6.6 Instances* for details.
- **Substitutes**: Refer to section *6.8 Substitutes* for details.
- **Effectivity**: Refer to section *6.10 Effectivity Management* for details.

6.2 BOM Structures

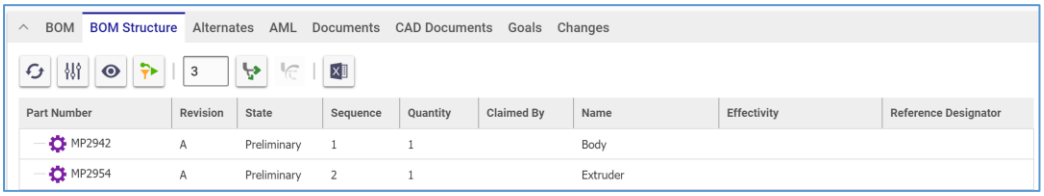
A multi-level BOM is a structure of Parts and is often designed to be configurable. This approach enables you to have a single product structure for numerous product configurations.

Aras Innovator provides functionality to resolve a BOM structure using:

- Structure Resolution, which identifies Part versions depending on a Resolution Mode. Refer to section *6.9 Applying Structure Resolution Modes* for details.
- Effectivity, which identifies valid Parts to be used under different conditions. Refer to section *6.10 Effectivity Management* for details.

To view the BOM Structure for a Parent Part:

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



Note: The **BOM Structure** tab uses a Tree Grid View to display the multi-level BOM structure for the Part. You can refer to the **Aras Innovator - Tree Grid View Administrator Guide** (available to Subscribers) for information on the available toolbar options, along with instructions on configuring the items displayed in the BOM Structure.

6.3 Setting up a BOM

There are two ways to set up a BOM Relationship:

1. Create all the necessary Children and then create a Parent and populate the **BOM** tab with its Children. This approach builds a new assembly using existing Parts and is outlined in 6.3.1 Creating a BOM from Existing Parts.
2. Create a Parent and then create its Children using 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. This approach is outlined in 6.3.2 Creating a BOM from the BOM tab.

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

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6.3.1 Creating a BOM from Existing Parts

This approach is used for building a new assembly using existing Parts. With this approach, all necessary Children are created prior to creating the Parent Part and populating the BOM tab of the Parent Part with Children. This section assumes that a Parent Part and all necessary Children exist.

To set up a BOM:

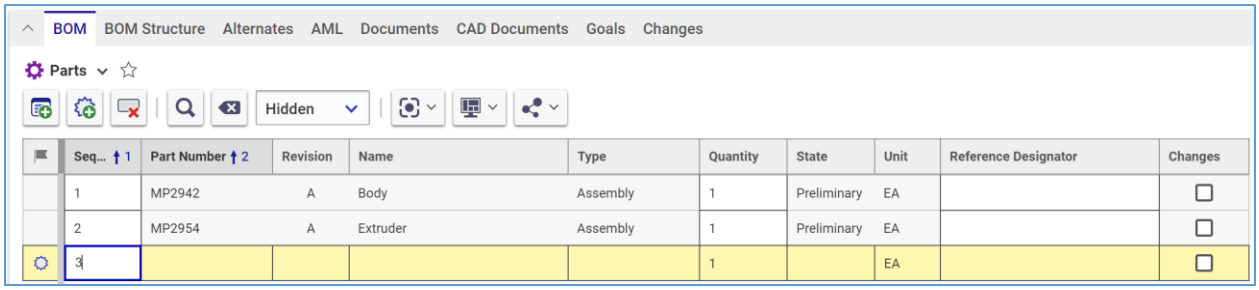
1. Open the Parent Part.
2. On the Parent toolbar, click **Edit**.
3. Go to the **BOM** accordion tab.
4. Click **Add Parts**. The Search dialog appears.
5. Search for and select the necessary Children to be added to the **BOM** table.
6. Enter relationship information, such as Quantity and Reference Designator, as needed. Double-click the **Quantity** cells of each Child and enter the required quantity.
7. Click **Save** or **Done**. The BOM is created.

6.3.2 Creating a BOM 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. With this approach, all Children are created directly from within the BOM tab. Note that you still need to complete the details for each Child later. This section assumes that a Parent Part is created.

To set up a BOM:

1. Open the Parent Part.
2. On the Parent toolbar, click **Edit**.
3. Go to the **BOM** accordion tab.
4. Click **New Part**. A new **row** appears in the **BOM** table.



5. Click the **Part Number** cell and enter a unique part number for the Child.

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

6. Enter any additional data by clicking the corresponding cell in the BOM table. Refer to section 5.1 Creating a Part for a description of the Part fields.
7. Click **Save** or **Done**. The BOM and the Children are created.

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6.4 Editing a BOM

You can update an existing BOM to add, replace, or remove Children from the BOM.

6.4.1 Adding New Children

To add new Children to an existing BOM, refer to section 6.3 Setting up a BOM.

6.4.2 Replacing Children

To replace Children in a BOM:

1. Open the Parent Part.
2. On the Parent toolbar, click **Edit**.
3. Go to the **BOM** accordion tab.
4. Right-click the Child to be replaced and then click **Replace**. The Search dialog appears.
5. Search for and select a replacement Part. The Child in the BOM is replaced with the Part selected. The BOM relationship data, such as Quantity and Reference Designator, is retained.
6. Click **Save** or **Done**. The Children are replaced.

6.4.3 Removing Children

To remove Children from a BOM:

1. Open the Parent Part.
2. Click **Edit** on the Parent toolbar.
3. Go to the **BOM** accordion tab.
4. Click the Child or Children to be deleted and then click **Delete Part BOM**.
5. Click **Save** or **Done**. The selected Children are removed from the BOM.

6.5 Editing Parts within a BOM

To edit Children (related Parts) from the Parent BOM:

1. Open the Parent Part.
2. Click **Edit** on the Parent toolbar.
3. Go to the **BOM** accordion tab.
4. Right-click a Child and click **Edit**. The Child becomes claimed, and its row becomes editable. Enter any edits by clicking the corresponding cell in the BOM table.
5. Right-clicking the Child and clicking **Discard Changes** will discard any 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. You can continue editing the Child in its row, but you cannot discard this data.

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6. Right-click the Child Part and then click **Done Editing**. The Child becomes unclaimed, **its row** becomes read-only, and its new property values are saved.
7. Click **Done** on the toolbar of Child's Parent to save your changes.

Note: To edit properties that are not present in the BOM table, right-click the Child Part and then click **Open**. The Child Part form appears allowing you to edit those properties.

8. Click **Save** or **Done** to save your changes.

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

- **Reference Designator**: This is a unique Instance label. 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.
- **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.

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

6.6.1 Specifying Instances

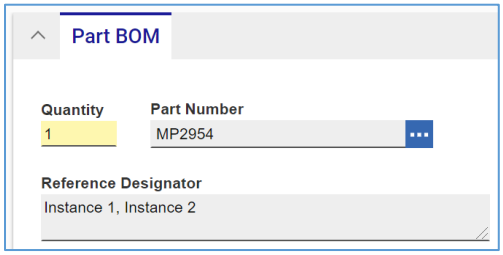
To specify Instances of a Child Part in a BOM:

1. Claim the Parent Part.
2. Open the Part BOM relationship as described in *6.1 Part BOM Relationships*.
3. Click **Edit** on the Part BOM toolbar.
4. Click **New BOM Instance** on the **Instances** relationship accordion toolbar. A new row appears in the Instances table.
5. Click the corresponding cell in the row to enter the appropriate information.
6. If it is necessary to remove an Instance:
   a. Click the Instance to select it.
   b. Click **Delete BOM Instance** on the **Instances** relationship accordion toolbar.
   c. On the **Part BOM** toolbar, click **Save**. The **Instance** disappears.

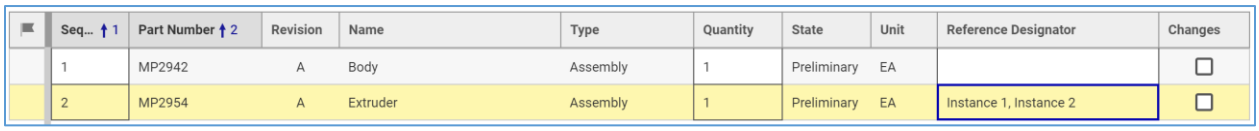
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Note: The **Instance** disappears if you do not save the Part BOM after it was added.

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



8. On the Part BOM toolbar, click **Done**.
9. Go to the **Parent** Part form. The list of Instances is displayed in the corresponding Child's **row.**



Seq... 1	Part Number 2	Revision	Name	Type	Quantity	State	Unit	Reference Designator	Changes
1	MP2942	A	Body	Assembly	1	Preliminary	EA		
2	MP2954	A	Extruder	Assembly	1	Preliminary	EA	Instance 1, Instance 2	

10. Unclaim the Parent Part.

6.7 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 Part replacement procedure outlined in section *6.4.2. Replacing Children*.

6.7.1 Assigning Alternates

To add an existing Part to another Part as an Alternate:

1. Open the Part where the Alternate will be added.
2. Click **Edit** on the **Part** toolbar.
3. Go to the Alternates relationship tab.
4. Click **Add Parts** on the Alternates accordion toolbar. The Search dialog appears.
5. Search for and select a Part to add as an Alternate for the current Part.
6. Click **Save** or **Done** on the Part toolbar.

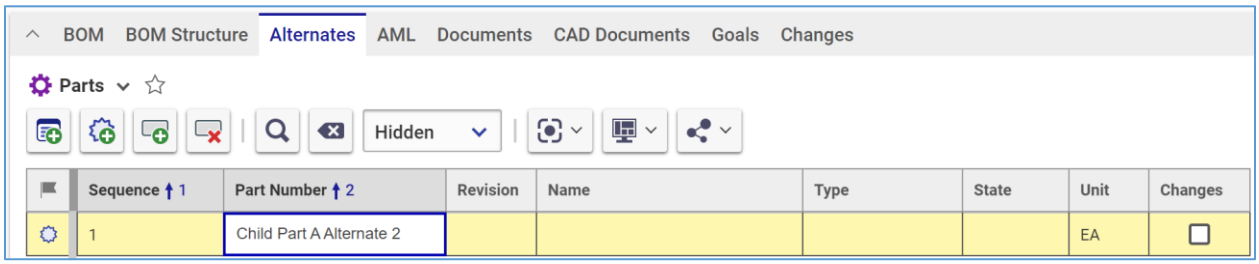
6.7.2 Creating Alternates

To create a new Part and add it to another Part as an Alternate:

1. Open the Part where the Alternate will be added.
2. Click **Edit** on the **Part** toolbar.
3. Go to the Alternates relationship tab.

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4. Click **New Part** on the Alternates accordion toolbar. A blank row appears in the Alternates grid.



5. Click the **Part Number** cell to specify a unique part number for the new Part.
6. If it is necessary to provide additional data, click the corresponding cell and enter the data.
7. Click **Save** or **Done** on the Part toolbar.

6.7.3 Replacing Alternates

To replace an Alternate in a Part:

1. Open the Part where the Alternate will be added.
2. Click **Edit** on the **Part** toolbar.
3. Go to the Alternates relationship tab.
4. Right-click the Alternate and then click **Replace**. The Search dialog appears.
5. Search for and select a replacement Alternate Part.
6. Click **Save** or **Done** on the **Part** toolbar.

6.7.4 Removing Alternates

To remove an Alternate from a Part:

1. Open the Part where the Alternate will be added.
2. Click **Edit** on the **Part** toolbar.
3. Go to the Alternates relationship tab.
4. Click the Alternate and then click **Delete Part Alternate** on the Alternates relationship tab toolbar.
5. Click **Save** or **Done** on the **Part** toolbar.

6.8 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 Part replacement procedure outlined in section *6.4.2 Replacing Children*.

6.8.1 Assigning Substitutes

To add a Substitute Part for a Child Part in a BOM:

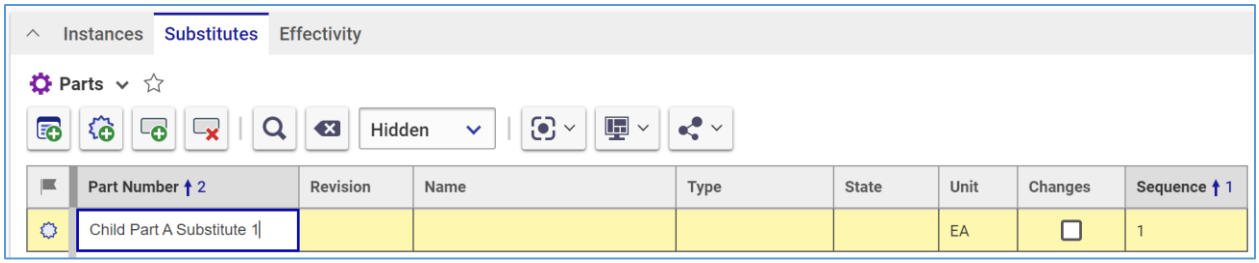
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1. Claim the Parent Part.
2. Open the Part BOM relationship as described in *6.1 Part BOM Relationships*.
3. Click **Edit**.
4. In the Substitutes tab, click **Add Parts** on the accordion toolbar. The Search dialog appears.
5. Search for and select a Part to be added as a Substitute for the current Part.
6. Click **Done** on the **Part BOM** toolbar.
7. Unclaim the Parent.

6.8.2 Creating Substitutes

To create a new Part and add it as a Substitute Part for a Child Part in a BOM:

1. Claim the Parent Part.
2. Open the Part BOM relationship as described in *6.1 Part BOM Relationships*.
3. Click **Edit**.
4. In the Substitutes tab, click **New Part** on the Substitutes accordion toolbar. A blank row appears in the Substitutes grid.



5. Click the **Part Number** cell to specify a unique part number for the new Part.
6. If it is necessary to provide additional data, click the corresponding cell and enter the data.
7. Click **Save** or **Done** on the Part toolbar.

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6.8.3 Replacing Substitutes

To replace a Substitute in a Part:

1. Claim the Parent Part.
2. Open the Part BOM relationship as described in *6.1 Part BOM Relationships*.
3. Click **Edit**.
4. In the Substitutes tab, right-click the Substitute and then click **Replace**. The Search dialog appears.
5. Search for and select a replacement Substitute Part.
6. Click **Done** on the **Part BOM** toolbar.
7. Unclaim the Parent.

6.8.4 Removing Substitutes

To remove a Substitute from a Part:

1. Claim the Parent Part.
2. Open the Part BOM relationship as described in *6.1 Part BOM Relationships*.
3. Click **Edit**.
4. In the Substitutes tab, click the Substitute and then click **Delete BOM Substitute** on the Substitutes accordion toolbar.
5. Click **Save** or **Done** on the Part toolbar.
6. Unclaim the Parent.

6.9 Applying Structure Resolution Modes

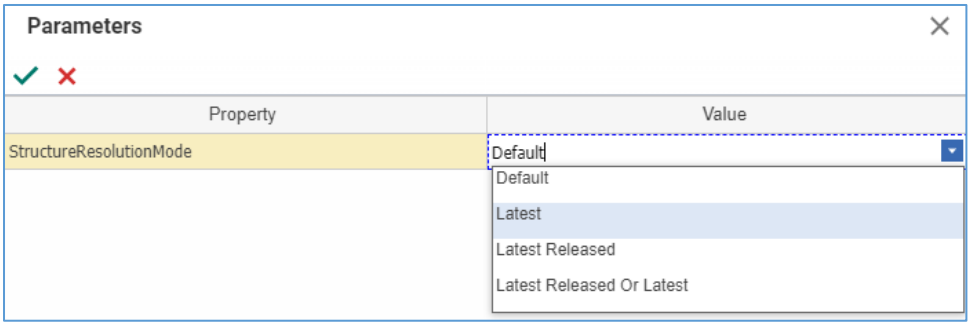
The following Structure Resolution Modes are available to dynamically resolve a multi-level Part BOM structure using item versions as specified in the Resolution Mode:

- **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.

To apply a Structure Resolution Mode to a BOM structure:

1. Open the Part.
2. In the **BOM Structure** accordion tab, click **Parameters** .
3. Select the desired Structure Resolution Mode in the Value drop-down list of the StructureResolutionMode row of the Parameters dialog.

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4. Click **Apply**. 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**: 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.

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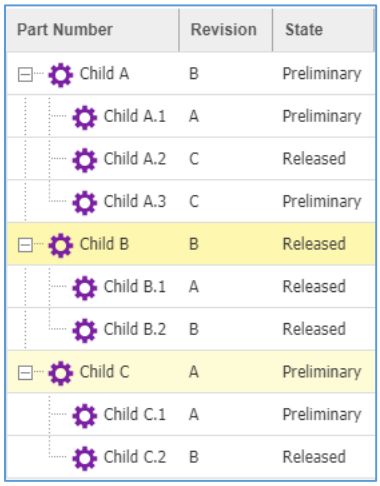
Table 1: A simple BOM example

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

6.9.1 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.

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



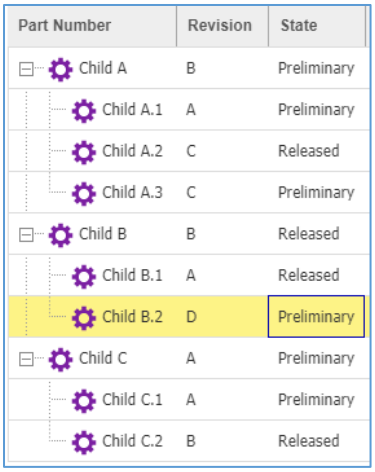
6.9.2 Latest Resolution Mode

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:

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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	D	Preliminary
Child C	A	Preliminary
Child C.1	A	Preliminary
Child C.2	B	Released

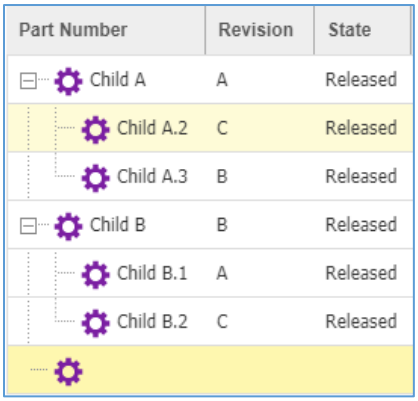
The latest revision D of Child B.2 is shown where this Part version is in the Preliminary state.

6.9.3 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:



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

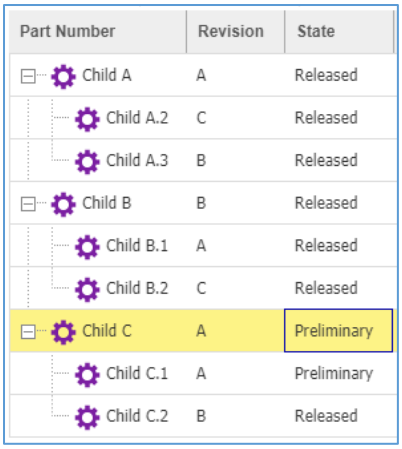
The latest Released versions of child Parts are resolved. A blank row is displayed for Child C because it has no version that is in the Released state.

6.9.4 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:

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

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.

6.10 Effectivity Management

Effectivity Management is incorporated into Part BOM Structures. Using effectivity, conditions for which to include or exclude items in specific configurations can be expressed.

The PE application provides commonly used effectivity variables out-of-the-box along with the ability to add effectivity variables.

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 an Aras Part BOM Scope with Model, Unit and Date variables. Additional effectivity scopes and variables can be created by an Administrator.

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

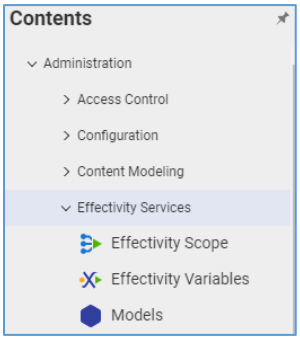
Table 2: Effectivity Terminology

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 ItemType 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.

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Term	Definition
	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).

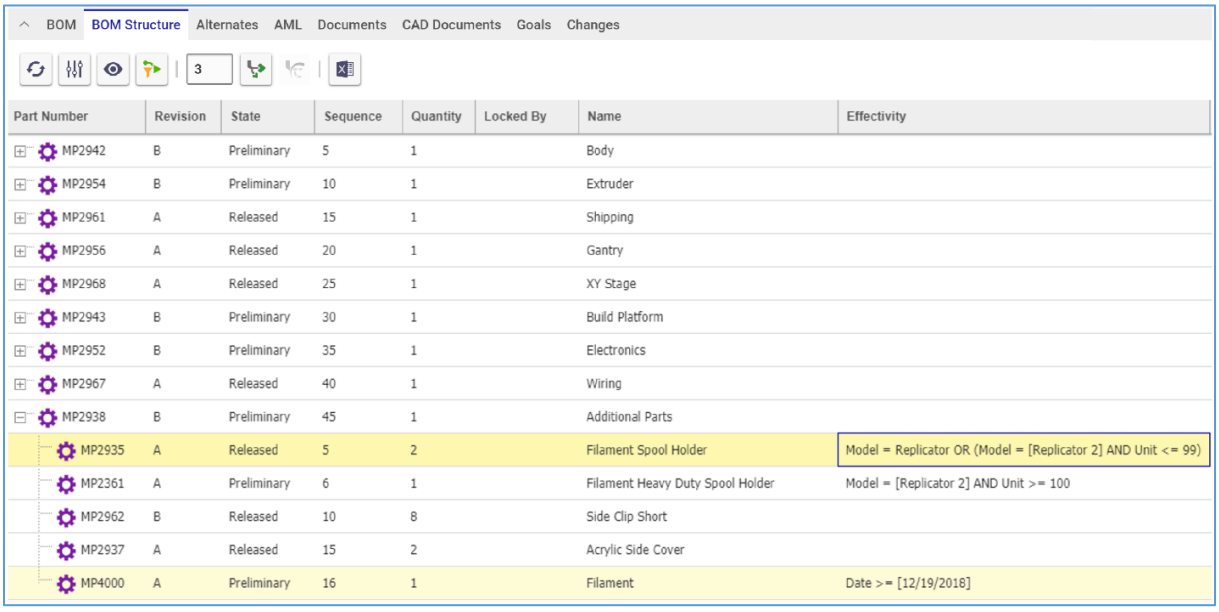
To access the Effectivity Services, go to **Contents > Administration > Effectivity Services**.



6.10.1 Viewing Effectivity on BOM Structure tab

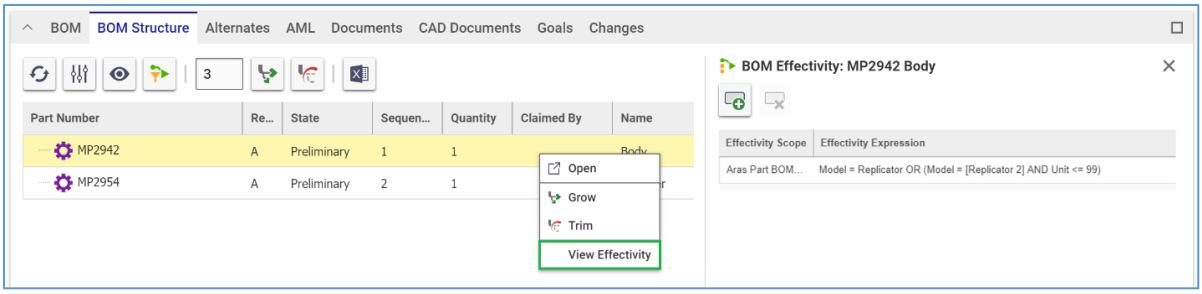
Effectivity, which is set on Part BOM relationships, can be viewed from the **BOM Structure** tab.
To view an Effectivity on a multi-level BOM:

1. Open the **BOM Structure** tab of the Part.
2. BOM Effectivities are displayed in the Effectivity column.



3. To view full details, right-click a BOM row > **View Effectivity**. The Manage Effectivity Expressions split pane appears on the right side of the **BOM Structure** tab with a list of effectivities set on the selected BOM.

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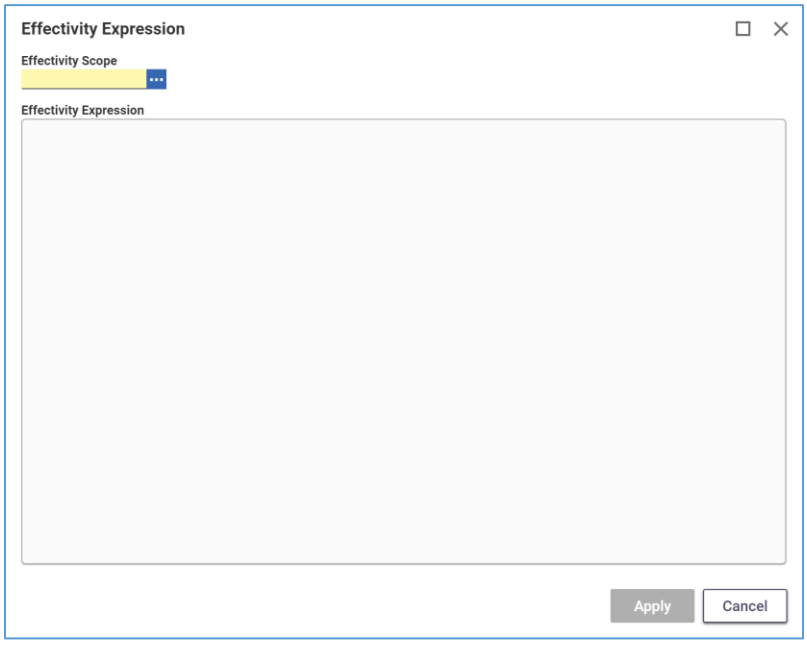
6.10.2 Managing Effectivity on a BOM

6.10.2.1 Setting Effectivity on a BOM

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 set Effectivity on a BOM using the Part Item view:

1. In the Manage Effectivity Expressions split pane, click **Create effectivity**  **.** The Effectivity Expression dialog appears.



2. Set the Effectivity Scope field by either typing or using the ellipsis to search for an Effectivity Scope.
3. Enter your Effectivity Expression in the Effectivity Expression text field.

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.

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4. Click **Apply**.

6.10.2.2 Updating Effectivity on a BOM

To update Effectivity on a BOM:

1. In the Manage Effectivity Expressions split pane, right-click an Effectivity > **Edit Effectivity**.
2. Update the Effectivity Expression as required.
3. Click **Apply**. The updated Effectivity Expression appears in the Manage Effectivity Expressions split pane. The updated Effectivity Expression is set on the BOM.

6.10.2.3 Removing Effectivity from a BOM

To remove an Effectivity from a BOM with the help of a Part Item view:

1. In the Manage Effectivity Expressions split pane, click the Effectivity to be deleted.
2. Click **Delete effectivity** .
3. In the confirmation dialog, click **OK** to delete the effectivity.

6.10.3 Resolving a BOM Structure by Effectivity

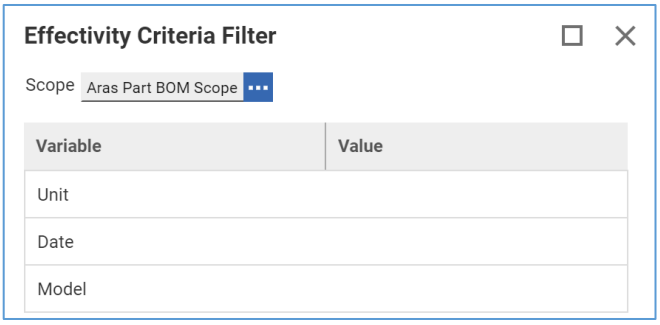
When no Effectivity Criteria is yet specified, the unfiltered BOM structure is displayed. The unfiltered BOM structure can contain extra Parts. In the following example, Parts for two different models are both included.

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	
MP2506	B	Released	30	2	MK8 Nozzle 0.4mm	Model = [Replicator 2]
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
MP2590	A	Released	60	1	MK8 Bar Mount	Model = [Replicator 2]
MP1872	C	Released	65	2	Stepper Motor NEMA17	

To resolve a BOM by Effectivity:

1. On the **BOM Structure** toolbar, click **Set Effectivity Criteria**. The Effectivity Criteria Filter dialog appears.
2. Click the ellipsis in the Scope field.
3. Search for and select a proper Effectivity Scope. The selected Effectivity Scope populates the Scope field and Effectivity Variables of this Scope appear as editable rows.

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4. Provide the Effectivity Criteria you need to resolve the BOM structure in the Value cells of the Effectivity Variables.

Note: You can resolve a structure either fully or partially. To resolve a structure fully, enter a value 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.

5. Click **Apply**.

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 during structure resolution. This means that if at least one of the effectivities 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, an administrator can change the configuration.

To return to the unfiltered structure, remove the Effectivity Criteria:

1. On the **BOM Structure** toolbar, click **Set Effectivity Criteria**.
2. Click **Clear**.
3. Click **Apply**.

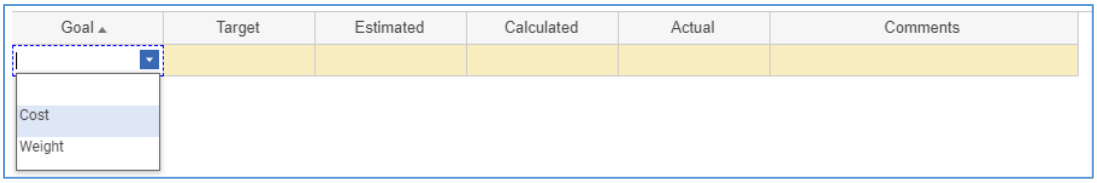
6.11 Design Goals

6.11.1 Adding a Design Goal

You can add design goals to a Part item using the Goals tab in the relationship accordion. A design goal is either defined by cost or weight. The supplied values for each Child Part can then be used in a part structure to calculate the cost of a Parent Part. To add a design goal for a Part:

1. Open the Part.
2. Click **Edit**.
3. Go to the **Goals** tab.
4. Click **New Part Goal** on the Goals relationships toolbar. A new row appears in the Goals table.

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5. Enter the appropriate values for each cell of the new row:
   - **Goal**: (Required) Cost or Weight.
   - **Target**: The design target value for the cost or weight.
   - **Estimate**: The estimated value for the cost or weight.
   - **Calculated**: The roll-up calculated value for the cost or weight based on the child component values in the BOM. This value is not editable.
   - **Actual**: The actual value for the cost or weight. For cost, this may be the value that was negotiated with the vendor. For weight, this may be the value resulting from a measurement.
   - **Comments**: Remarks about the design goal.

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

6. Click **Save** to save your changes.

Note: A Part can have at most one Cost and one Weight Goal row. If there are several rows for Goals of the same type, you receive an error when you save the Part. Delete the extra row to resolve the error.

6.11.2 Rolling Up Costs

Costs are entered as either Target, Estimate, Calculated, or Actual. Based on the values supplied in the design goal, the system automatically calculates a cost or weight rollup for a BOM. To initiate a roll up, you must specify at least a Target on the parent. The calculated value is determined using the values supplied in the design goal based on the following hierarchy from lowest to highest accuracy: Target, Estimated, Calculated, Actual.

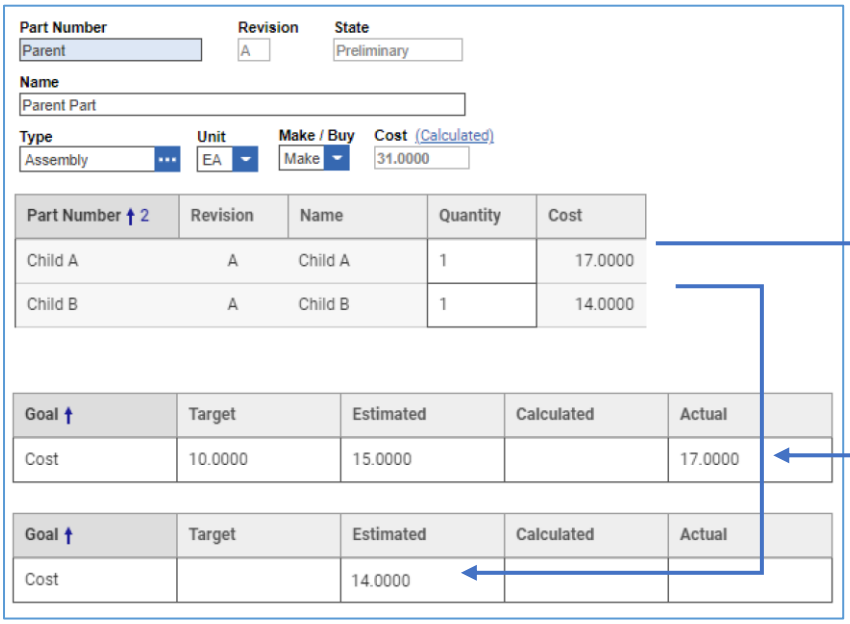
In other words:

- If the Target and Estimated values are supplied, then the Estimated value is used.
- If the Target, Estimated and Calculated values are supplied, the Calculated value of the part is used.
- If Actual value is specified, it overrides any of the other values defined.

Specifying only Target values on the child parts prevents a roll-up calculation. As long as the children cost goal values are Target, they do not alter the parent's goal value. The Target goal for the Parent remains as long as there is at least one child part that has only a Target value for its cost goal. However, as soon as all children have an Estimated or Actual goal value, the parent's value changes to Calculated. The parent’s Goal value is automatically re-calculated whenever any Child has a Goal changed.

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In the following example, Parent Part contains two immediate children: Child A and Child B.



Child A has a Target cost goal of 10.00, and an Estimated goal of 15.00, but the Actual cost is 17.00. Actual cost is used for the rollup calculation.

Child B has an Estimated cost goal of 14.00 so that is used for the rollup calculation. If you supply an Actual cost goal to Child B, the rollup calculation uses this value.

To initiate a roll up, you must specify at least a Target on the parent. A user then assigns a cost goal on Parent Part with an Estimated goal of 30.00.

Now the calculated cost of Parent Part appears automatically and is 31.00.

Note: 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.

6.12 BOM Reports

To present complex multi-level BOMs in a well-organized layout, Aras Innovator provides 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.

To access these standard Reports, either:

- Go to **Contents > Parts > Search Parts**, right-click a Part > **Reports**.
- Open a Part, and on the Part toolbar, click **Reports** , and then select the **Report** you need.

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To print a Report, use the Print button  available in the top left corner of each Report tab. 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.

6.12.1 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.

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

6.12.2 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.

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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

6.12.3 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.

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

6.12.4 Circular Reference Report

A circular reference occurs in a series of parts or assemblies where a Child Part adds its Parent Part to its own BOM, causing an “infinite” series of references.

For example, a circular reference would occur if there is a Parent Part that has two Children A and B and a user were to edit Child A to add the Parent Part to its BOM. The BOM Relationship from Child A to the Parent Part creates a Circular Reference in this case.

When the Circular Reference Report is run, it detects these cases in a BOM structure, indicating where the circular references occur.

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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)

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.

6.13 Comparing BOMs

To compare complex multi-level BOMs side-by-side, Aras Innovator provides 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.

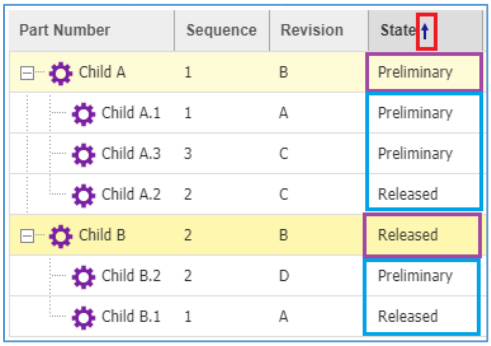
6.14 Finding Where a Part is Used

Aras Innovator offers the Where Used feature to determine where an Item is used by other Items. 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.

6.15 Sorting BOM Structures

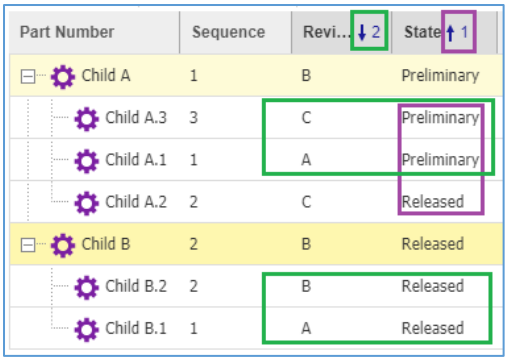
Columns in the **BOM Structure** accordion tab can be sorted in ascending or descending order by clicking the column headers.

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.



To sort across multiple columns, press and hold the **Ctrl** key while clicking the column headers.

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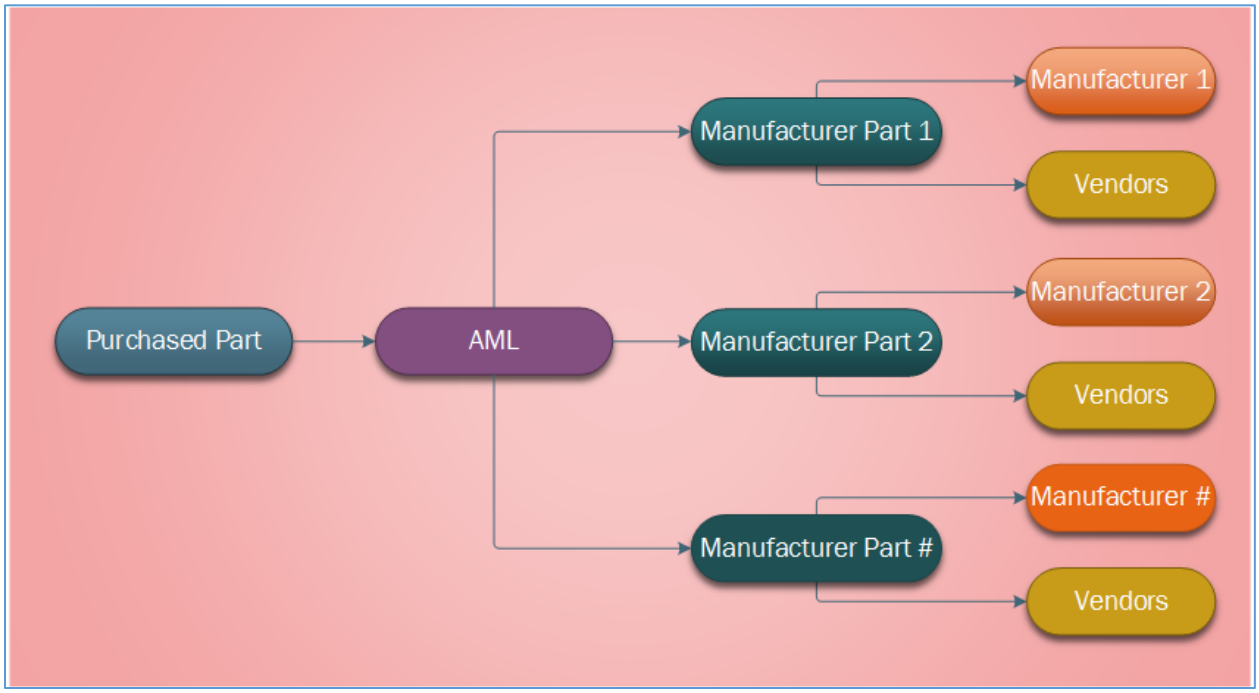


Part Number	Sequence	Revi... 2	State 1
Child A	1	B	Preliminary
Child A.3	3	C	Preliminary
Child A.1	1	A	Preliminary
Child A.2	2	C	Released
Child B	2	B	Released
Child B.2	2	B	Released
Child B.1	1	A	Released

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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 an 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.



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 as needed.

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

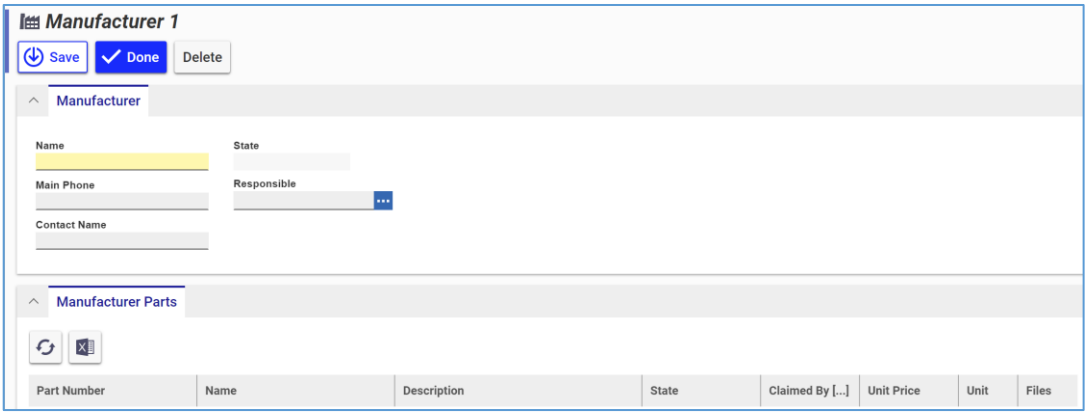
1. Create Manufacturers.
2. Create Manufacturer Parts.
3. Create Vendors.
4. Approve Manufacturers, Manufacturer Parts, and Vendors.
5. Add Manufacturer Parts to the AML of the corresponding Part.

7.1 Creating a Manufacturer

A Manufacturer produces Manufacturer Parts. To create a Manufacturer:

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



   - **Name**: (Required) The name of the Manufacturer. The name of the Manufacturer must be unique.
   - **Main Phone**: The number used to call the Manufacturer.
   - **Contact Name**: The name of the contact person for the Manufacturer.
   - **Responsible**: The Identity responsible for the Manufacturer. This role is often identified as the Owner of the Manufacturer item and may be different from the user creating the Manufacturer in the system.
3. Once you have entered the necessary information, click **Done** to save your changes.

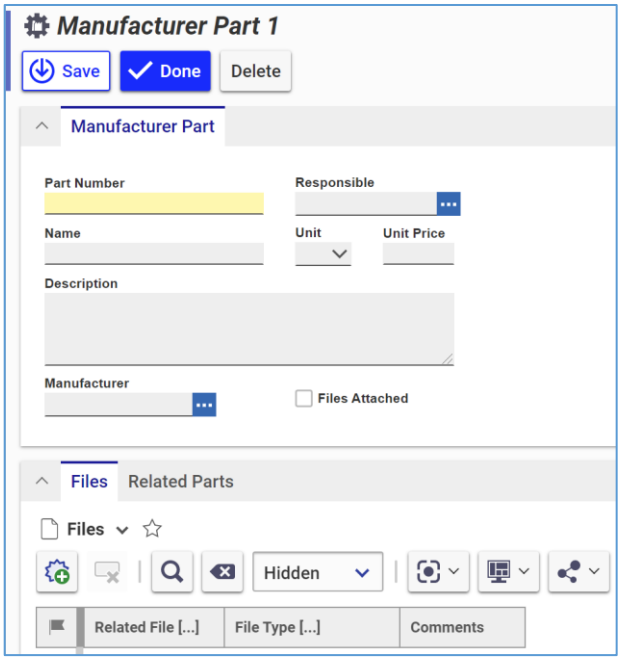
7.2 Creating a Manufacturer Part

Manufacturer Parts contain a Manufacturer property to specify the Manufacturer that 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.

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. Enter the necessary information.

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- **Part Number**: (Required) The Manufacturer Part's part number.
- **Responsible**: The Identity responsible for the Manufacturer Part. This role is often identified as the Owner of the Manufacturer Part item and may be different from the user creating the Manufacturer in the system.
- **Name**: The name of the Manufacturer Part.
- **Unit**: The unit of measure for the Manufacturer Part.
- **Unit Price**: The price per Manufacturer Part unit.
- **Description**: Remarks about the Manufacturer Part.
- **Manufacturer**: The Manufacturer of the Manufacturer Part.

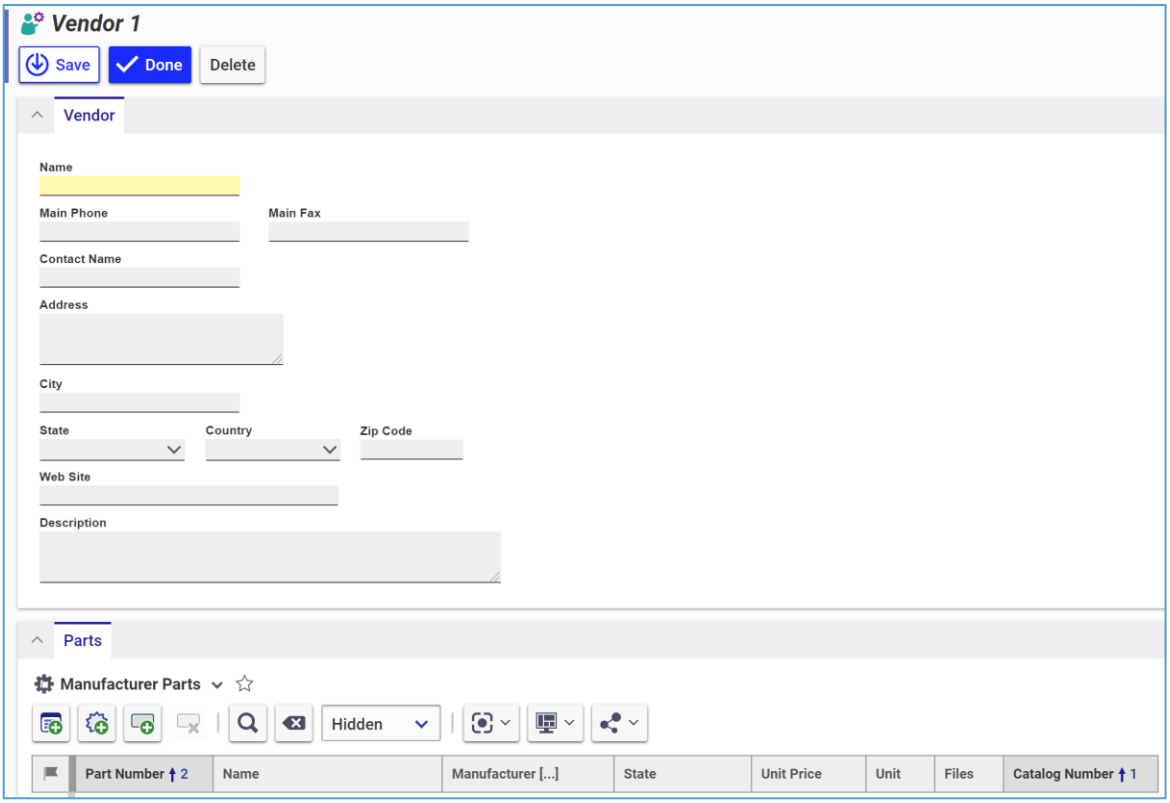
3. If it is necessary to add a file, in the Files tab, select New File  to select a file for upload, or drag and drop the desired file into the Files area.
4. Once you have entered the necessary information, click **Done** to save your changes.

7.3 Creating a Vendor

A Vendor sells Manufacturer Parts. You can assign multiple Vendors to a Manufacturer Part.
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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- **Name**: (Required) The name of the Vendor. The vendor name must be unique.
- **Main Phone**: The phone number for the Vendor.
- **Main Fax**: The fax number for the Vendor.
- **Contact Name***:* The name of the contact person for the Vendor.
- **Address***:* The vendor's street address.
- **City**: The Vendor's city.
- **State:** The Vendor's US State / Canadian Province.
- **Country**: The Vendor's country.
- **Zip Code**: The Vendor's postal code.
- **Web Site**: The Vendor's website address.
- **Description**: Remarks about the Vendor.

3. Assign Manufacturer Parts to the Vendor as described in section *7.3.1. Assigning Manufacturer Parts to a Vendor*.
4. If it is necessary, create new Manufacturer Parts and assign them to the Vendor as described in section *7.3.2. Creating Manufacturer Parts from a Vendor*.
5. Once you have entered the necessary information, click **Done** to save your changes.

7.3.1 Assigning Manufacturer Parts to a Vendor

To add an existing Manufacturer Part to a Vendor:

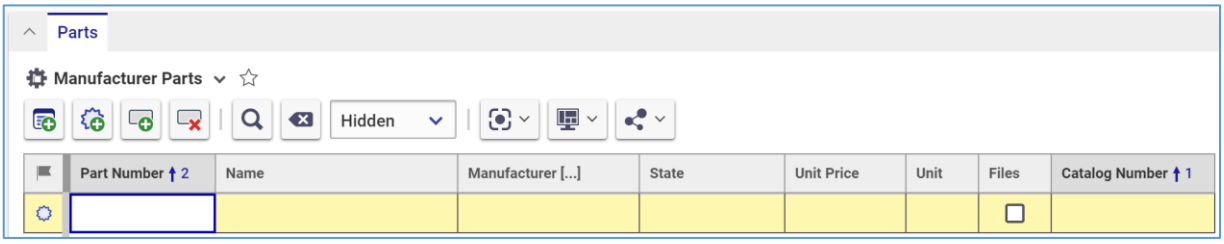
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1. Open the Vendor Item.
2. Click **Edit**.
3. Go to the **Parts** tab.
4. Click **Add Manufacturer Parts**  . The Search dialog appears.
5. Search for and select a Manufacturer Part that the Vendor supplies.
6. Click **Save** or **Done** to save your changes.

7.3.2 Creating Manufacturer Parts from a Vendor

To create a new Manufacturer Part and add it to a Vendor:

1. Open the Vendor Item.
2. Click **Edit**.
3. Go to the **Parts** tab.
4. Click **New Manufacturer Part**  . A **blank row** appears in the **Manufacturer Parts** grid.



5. Enter the appropriate values for each cell of the new row.
6. Click **Save** or **Done** to save your changes.

7.3.3 Replacing Manufacturer Parts in a Vendor

To replace a Manufacturer Part in a Vendor:

1. Open the Vendor Item.
2. Click **Edit**.
3. Go to the **Parts** tab.
4. Right-click the **Manufacturer Part** to be replaced and then click **Replace**. The Search dialog appears.
5. Search for and select a replacement Manufacturer Part. The selected Manufacturer Part replaces the old one.
6. Click **Save** or **Done** to save your changes.

7.3.4 Removing Manufacturer Parts from a Vendor

To remove a Manufacturer Part from a Vendor:

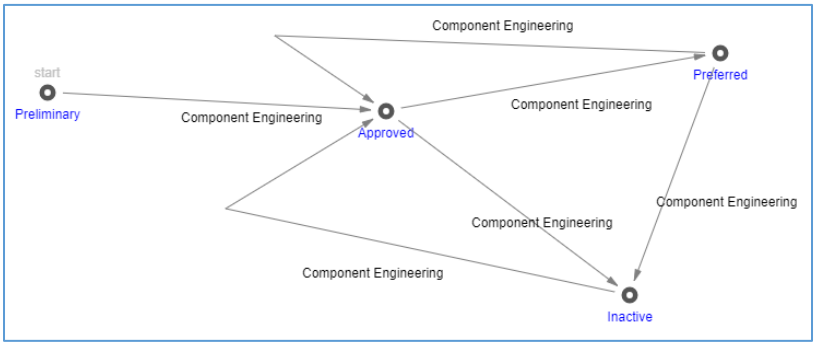
1. Open the Vendor Item.

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2. Click Edit.
3. Go to the **Parts** tab.
4. Click the **Manufacturer Part** to be deleted and then click **Delete Vendor Part** .
5. Click **Save** or **Done** to save your changes.

7.4 Life Cycle of Sourcing Items

The PE application has Sourcing Life Cycles for Manufacturer, Part AML, and Vendor. Each Sourcing Life Cycle is based on the same Life Cycle Map and can be configured by an Administrator as needed.



When created, each Sourcing Item starts 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.

7.5 Promoting Sourcing Items

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

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.

7.6 Approved Vendors Report

The Approved Vendors Report provided in Aras Innovator displays a list of all approved Vendors.

You can access the Approved Vendors Report by either:

1. Going to **Contents > Sourcing > Vendors**: Right-click a Vendor > **Reports** >**Approved Vendors Report**.
2. Opening the Vendor: On the **Vendor** toolbar, click **Reports**  > **Approved Vendors Report**.

To print the Approved Vendors Report, use the Print button  available in the top left corner of the Report. 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.

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7.7 Approved Manufacturer List (AML)

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

7.7.1 Assigning Existing Manufacturer Parts to a Part

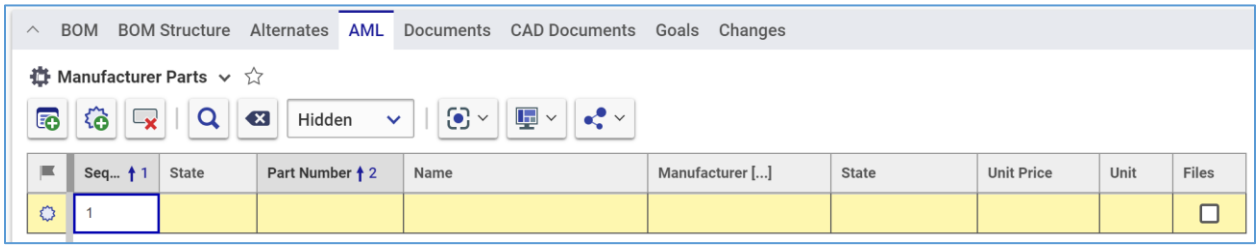
To assign a Manufacturer Part to a Part:

1. Open the Part.
2. Click **Edit**.
3. Go to the **AML** tab.
4. Click **Add Manufacturer Parts** on the **AML** accordion toolbar. The Search dialog appears.
5. Search for and select the necessary Manufacturer Parts to add to the AML.
6. Click **Save** or **Done** to save your changes.

7.7.2 Creating Manufacturer Parts from an AML

To create a new Manufacturer Part and add it to a Part:

1. Open the Part.
2. Click **Edit**.
3. Go to the **AML** tab.
4. Click **New Manufacturer Part** . A blank row appears in the AML grid.



5. Enter the appropriate values for each cell of the new row.
6. Click **Save** or **Done** to save your changes.

7.7.3 Replacing Manufacturer Parts in an AML

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

1. Open the Part.
2. Click **Edit**.
3. Go to the AML tab.
4. Right-click the **Manufacturer Part** to be replaced and then click **Replace**. The Search dialog appears.

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5. Search for and select a replacement Manufacturer Part. The selected Manufacturer Part replaces the Manufacturer Part.
6. Click **Save** or **Done** to save your changes.

7.7.4 Removing Manufacturer Parts from an AML

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

1. Open the Part.
2. Click **Edit**.
3. Go to the **AML** tab.
4. Click the **Manufacturer Part** to be removed and then click **Delete Approved Manufacturer** .
5. Click **Save** or **Done** to save your changes.

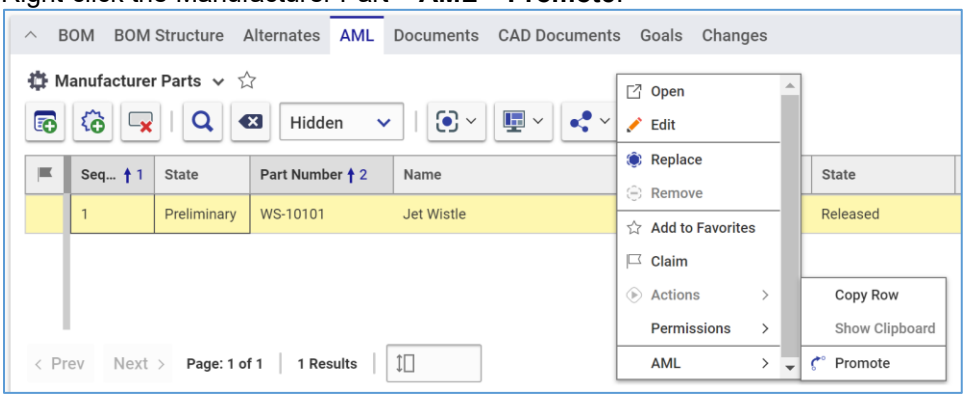
7.7.5 Promoting Manufacturer Parts for a Part

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 *7.4 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.

To promote a Manufacturer Part from an AML:

1. Open the Part associated with the Manufacturer Part.
2. Go to the **AML** tab.
3. Right-click the Manufacturer Part > **AML** > **Promote**.



4. In the promotion dialog, select the desired state to promote the Item to by either:
   a. Double-clicking the state to which the item should be promoted.
   b. Clicking the state to promote to and then clicking **Promote to Selected State**.

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7.8 Finding Where Used and Comparing Sourcing Items

Aras Innovator offers the Where Used feature to determine where an Item is used by other Items. Refer to section *11.1 Finding Where an Item is Used* for further information. All examples in that section are applicable to Manufacturers, Manufacturer Parts, and Vendors.

To compare Items side-by-side, Aras Innovator offers the Structure Browser. Refer to section *11.2 Comparing Items* for further information. All examples in that section are applicable to Manufacturers, Manufacturer Parts, and Vendors.

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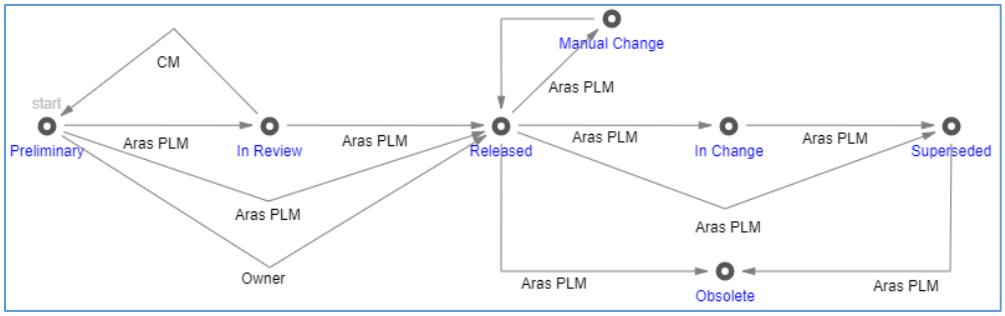
8 Documents

A Part can have one or more Documents associated with it. A Document can be a drawing, a specification, quality control, etc. Documents can have associated files. 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.

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 as needed to meet specific business needs.

The following figure shows the default Document Life Cycle. A new Document starts in the **Preliminary** state 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.

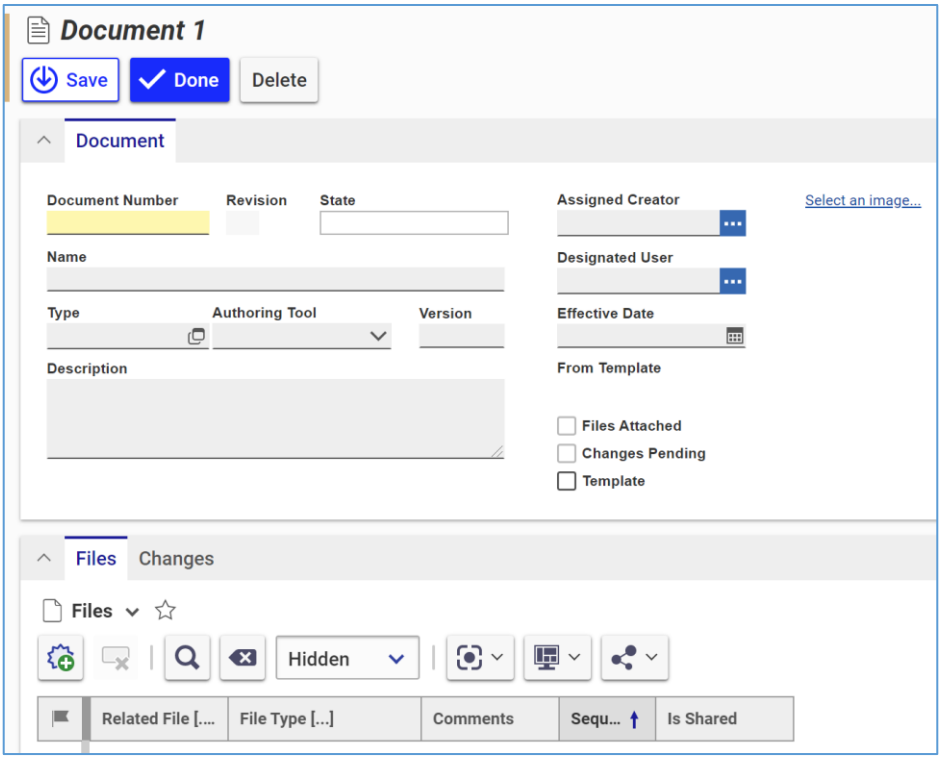


8.2 Creating a Document

To create a new Document:

1. Go to **Contents > Documents > Documents**.
2. Click **Create New Document**. The new Document appears. Enter the necessary information.

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- **Document Number**: (Required) The number for the Document. The Document Number must be unique.
- **Name**: The name of the Document.
- **Type**: This is the classification type for the Document. The classification dialog displays the Document classification tree. The Document classification tree can be adjusted and extended as needed by an administrator.
- **Authoring Tool**: The application used to create the Document.
- **Version**: The version of the authoring tool.
- **Description**: Remarks about the Document.
- **Assigned Creator**: This is the user responsible for the design or the content of the Document. The Assigned Creator is often identified as the Owner of the item, who may be different from the user creating the Document in the system.
- **Designated User**: This is the user responsible for the management, usage, and review of the Document.
- **Effective Date**: This 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.
- **Select an image**: This allows you to select an image using the Image Browser to generate a thumbnail for the Document. For more details, refer to section *2.4.6 Item Thumbnail*.
- **Extended Classification**: This allows you to assign values to Items based on the Item's extended classification.
- **Template**: Identifies whether a Document is a template.

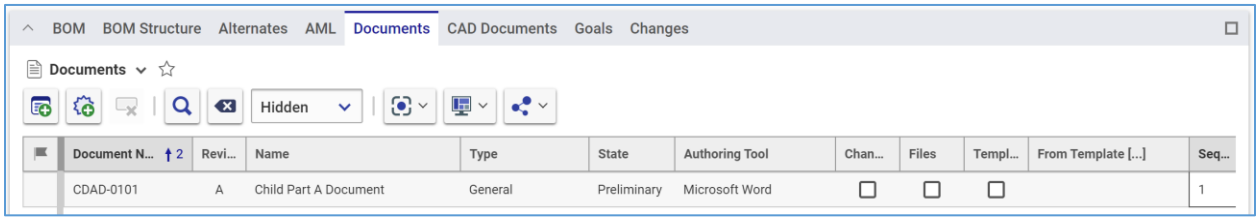
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3. If it is necessary to add a file, in the Files tab, select New File to select a file for upload, or drag and drop the desired file into the Files area.
4. Once you have entered the necessary information, click **Save** or **Done** to save your changes.

8.3 Creating a Document from a Part

To create a new Document and add it to a Part:

1. Open the **Part** where the Document will be added.
2. Click **Edit**.
3. Go to the **Documents** tab.
4. Click **New Document**. A new Document view appears. A row also appears in the Documents grid on the Part.
5. If it is necessary to add a file to the Document, in the Files tab, select New File to select a file for upload, or drag and drop the desired file into the Files area.
6. Once you have entered the necessary information, click **Done** to save your changes.
7. Close the new Document. The new Document appears in the Documents tab on the Part.



8. Click **Save** or **Done** on the Part to save your changes.

8.4 Managing Part Documents

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

8.4.1 Adding Documents to a Part

To add an existing document to a Part:

1. Open the **Part** where the Document will be added.
2. Click **Edit**.
3. Go to the **Documents** tab.
4. Click **Add Documents**. The Search dialog appears.
5. Search for and select a Document to add.

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6. Click **Save** or **Done** to save your changes.

8.4.2 Replacing Documents in a Part

To replace a document in a Part:

1. Open the **Part** where the Document will be added.
2. Click **Edit**.
3. Go to the **Documents** tab.
4. Right-click the Document to be replaced > **Replace**. The Search dialog appears.
5. Search for and select a Document. The selected Document replaces the selected Document.
6. Click **Save** or **Done** to save your changes.

8.4.3 Removing Documents from a Part

To remove a Document from a Part:

1. Open the **Part** where the Document will be added.
2. Click **Edit**.
3. Go to the **Documents** tab.
4. Click the **Document** to be deleted and then click **Delete Part Document** .
5. Click **Save** or **Done** to save your changes.

8.5 Managing Document Files

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

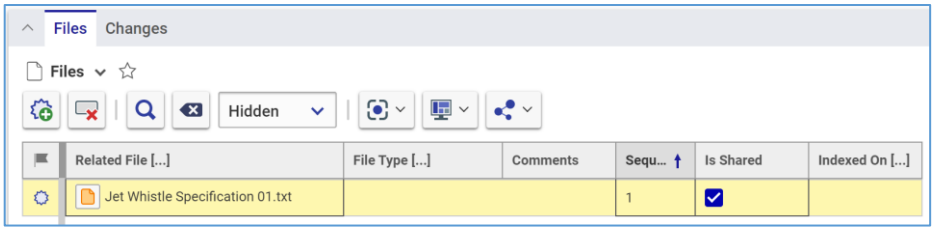
Files are not versionable, but Documents are. When you make an edit to Document Files, a new version of the Document is created. Old versions of the Document reference old Files. For example, if you replaced File A with File B, the previous version of the Document has File A, and the current one has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

8.5.1 Adding Files to a Document

To add a File to a Document:

1. Open the **Document**.
2. Click **Edit**.
3. Go to the **Files** tab.
4. Click **New File** . 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.

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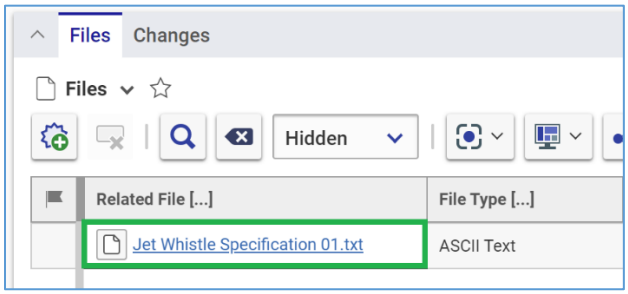
6. Enter any necessary information:
   - **File Type**: The file type. This property is an optional property, and if left blank, Aras Innovator will automatically assign a file type depending on the File's extension once the Document is saved.
   - **Comments**: Remarks about the File.
   - **Is Shared**: Determines whether the File is shared with other users. If it is necessary to hide the File from other users, uncheck the Is Shared check box.
7. Click **Save** or **Done** to save your changes.

8.5.2 Working with Files

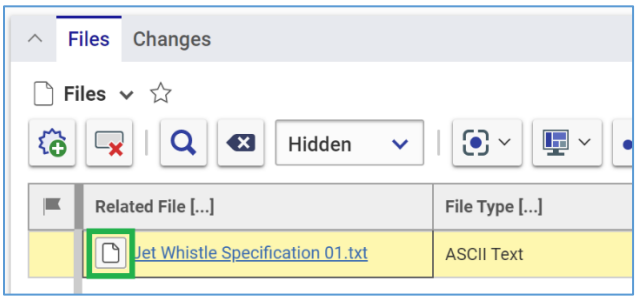
In this section, it is assumed that you are working with the current Document version.

To work with Files attached to a Document, you can download them from the Aras Innovator Vault, where they are kept.

Files can be downloaded by clicking the hyperlink in the Files tab on the Document:

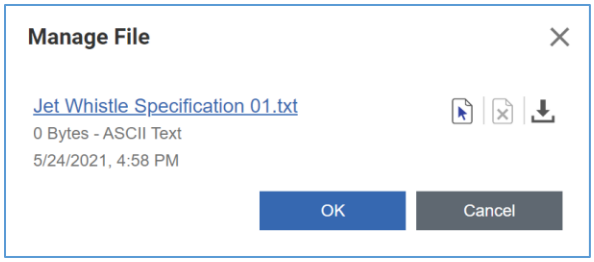


Files can also be downloaded through the **Manage File** dialog:



You can either click the hyperlink in the **Manage File** dialog or use the **Download file** button to download the File.

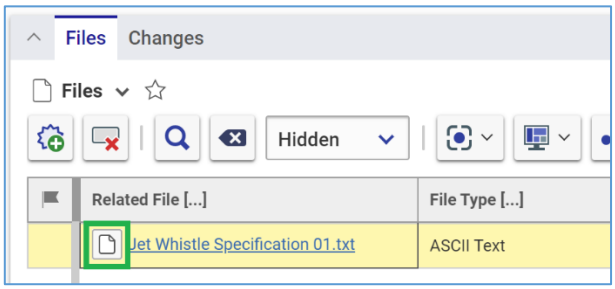
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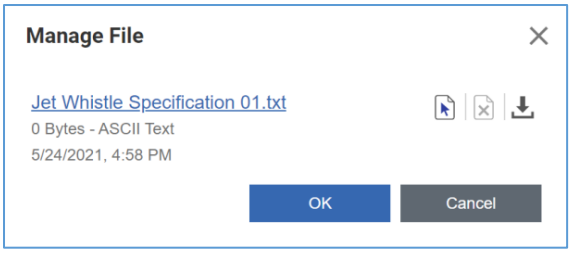
8.5.3 Replacing Files in a Document

To replace a File, you can remove the old File from a Document and then attach the replacing File while keeping the Document in the **Edit** mode. Refer to sections *8.5.1 Adding Files to a Document* and *8.5.4 Removing Files from a Document* to use this approach.

Files can also be replaced using the **Manage file** dialog:



You can click the **Select new file** button  to replace the existing file.



8.5.4 Removing Files from a Document

To remove a File from a Document:

1. Open the **Document**.
2. Click **Edit**.
3. Go to the **Files** tab.
4. Click the file to be removed and click **Delete Document File** .
5. Click **Save** or **Done** to save your changes.

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

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8.6 Deleting Documents

You can delete all or some versions of a Document. This subsection outlines the former case, in which the Document is deleted from Aras Innovator completely. For details on the latter case, refer to section *4.1.2 Version Deletion*.

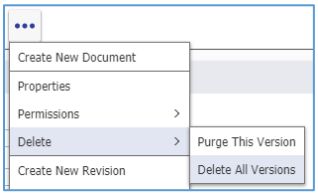
To delete a Document completely, you must have **Delete** rights granted in Permissions for all Life Cycle states of the Document, including the current one. For example, if the latest Document revision is currently in the Preliminary state, but has Released revisions, you must have the **Delete** rights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

Note: Documents that are claimed by any user or are used on other items cannot be deleted.

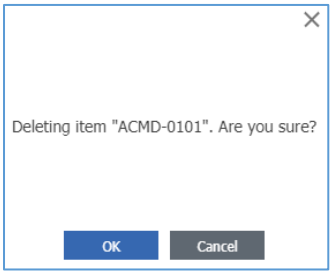
You can delete a Document using either its view or the context menu in the Documents Search Page.

To delete a Document using its view:

1. Open the Document.
2. On the Document toolbar, click **More** > **Delete** > **Delete All Versions**.



3. Click **OK** in the confirmation dialog to delete the Document.



To delete a Document using its context menu:

1. Go to the Documents Search Page.
2. Right-click the Document to be deleted and click **More** > **Delete** > **Delete All Versions**.
3. Click **OK** in the confirmation dialog to delete the Document.

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

Aras Innovator offers the Where Used feature to determine where an Item is used by other Items. Refer to section *11.1 Finding Where an Item is Used* for further information. All examples in that section are applicable to Documents.

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To compare Items side-by-side, Aras Innovator offers the Structure Browser. Refer to section *11.2 Comparing Items* for further information. All examples in that section are applicable to Documents.

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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.

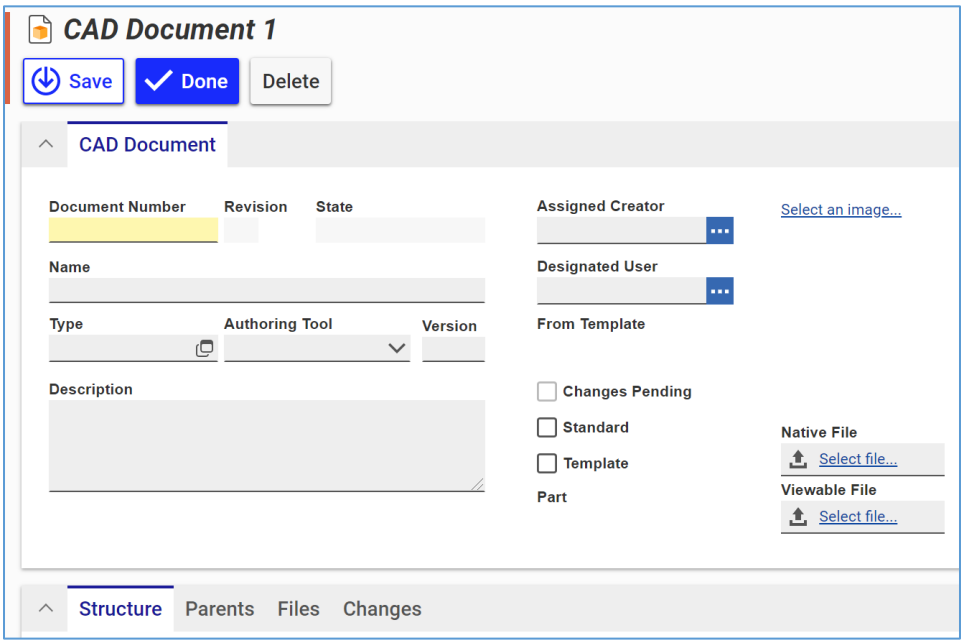
A CAD Document can have Files associated with it that are kept in the Aras Innovator Vault. If you have purchased a third-party integration to a CAD tool, you can attach a native File to a Part using your CAD Authoring tool and a viewable File. This subscription enables you to view and work with native Files using Aras Innovator.

Note: Some features of CAD Documents, such as transformation of native files into other viewable formats, require an Aras subscription.

9.1 Creating a CAD Document

To create a CAD Document:

1. Go to **Contents > Documents > CAD Documents**.
2. Select **Create New CAD Document**. The new CAD Document appears. Enter the necessary information.



- **Document Number**: (Required) The CAD Document number.
- **Name**: The name of the CAD Document.
- **Type**: This is the classification type for the CAD Document. The classification dialog displays the CAD Document classification tree. The CAD Document classification tree can be adjusted and extended as needed by an administrator.
- **Authoring Tool**: The application used to create the CAD Document.
- **Version**: The version of the authoring tool.

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- **Description**: Remarks about the CAD Document.
- **Assigned Creator**: This is the user responsible for the design or the content of the CAD Document. The Assigned Creator is often identified as the Owner of the item, who may be different from the user creating the CAD Document in the system.
- **Designated User**: This is the user responsible for the management, usage, and review of the CAD Document.
- **Select an image**: This allows you to select an image using the Image Browser to generate a thumbnail for the CAD Document.
- **Changes Pending**: The Changes Pending flag is automatically set when the CAD Document is associated with a change item.
- **Standard**: If the CAD Document follows a standard, select the Standard check box.
- **Template**: If the CAD Document is going to be used as a template, select the Template check box.
- **Extended Classification**: This allows you to assign values to Items based on the Item's extended classification.

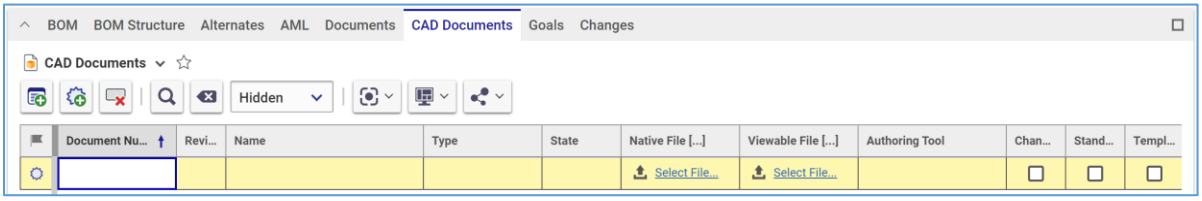
Note: There are no extended classifications provided for CAD Documents out of the box.

3. If it is necessary to attach a native or viewable File to the CAD Document, use the procedure described in section *9.7.1 Attaching Native and Viewable CAD Files to a CAD Document*.
4. If it is necessary to attach additional Files to the CAD Document, use the procedure described in section *9.7.2 Attaching Other Files to a CAD Document*.
5. Once you have entered the necessary information, click **Save** or **Done** to save your changes.

9.2 Creating a CAD Document from a Part

To create a new CAD Document and attach it to a Part:

1. Open the **Part** where the CAD Document will be added.
2. Click **Edit**.
3. Go to the **CAD Documents** tab.
4. Click **New CAD Document** . A new CAD Document row appears in the CAD Documents grid on the Part.



5. Click the **Document Number** cell and enter a document number for the CAD Document.

Note: The Document Number is required and must be provided by the user.

6. Enter any additional data by clicking the corresponding cell in the BOM table.

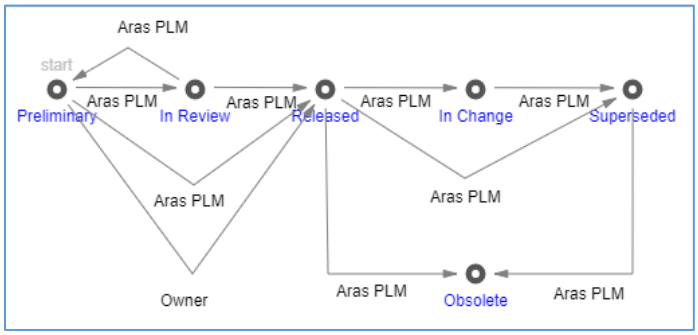
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7. Click **Save** or **Done** to save your changes.

9.3 CAD Documents Life Cycle

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

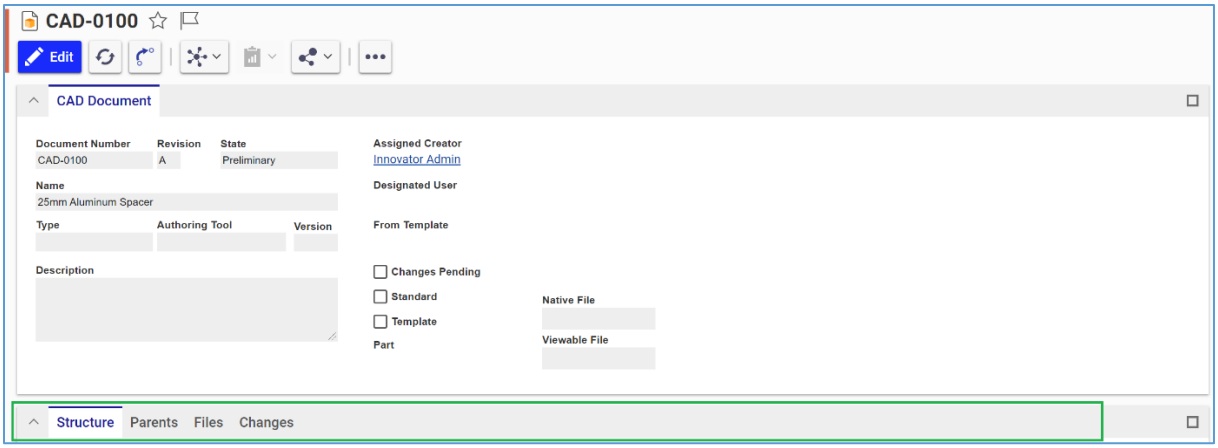
The following figure shows the default CAD Document Life Cycle. A new CAD Document starts in the **Preliminary** state and can be promoted either automatically or manually. Both the simplified and CMII change management processes can automatically promote the CAD Documents. The associated Life Cycles 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 if certain requirements are met. By default, a CAD Document Owner can release a CAD Document. For further details on this feature, refer to section *4.3. Manual Promotion and Revise*.



9.4 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.

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- **Structure**: 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 *9.5 Hierarchy of CAD Documents*.
- **Parents**: A read-only list of the CAD Document's direct Parents.
- **Parts**: 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 *9.10.2 Parts Associated with a CAD Document*.
- **Files**: 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 *9.7 Managing CAD Files*.
- **Changes:** Displays 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*.

9.5 Hierarchy of CAD Documents

If you have purchased a third-party integration to a CAD authoring application, you can import Part families that were created with this CAD application into Aras Innovator. The Product Engineering (PE) application's 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 consist 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 *9.5.1 Creating a CAD Document Relationship*.

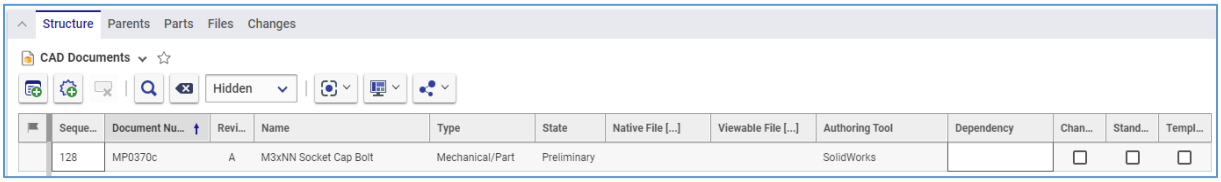
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- Create new Children while adding them to a Parent. This approach is convenient for populating nested CAD Documents or creating hierarchies quickly without getting into the details of each Child. However, it is still necessary to complete each Child later. For more details on this approach, refer to section *9.5.2 Creating a CAD Document from another CAD Document*.

9.5.1 Creating a CAD Document Relationship

This approach is used for building a new assembly using existing CAD Documents.
To add an existing CAD Document to another CAD Document:

1. Open the Parent CAD Document.
2. On the Parent toolbar, click **Edit**.
3. Go to the **Structure** accordion tab.
4. On the **Structure** accordion toolbar, click **Add CAD Documents**.
5. Search for and select the necessary Children to be added.

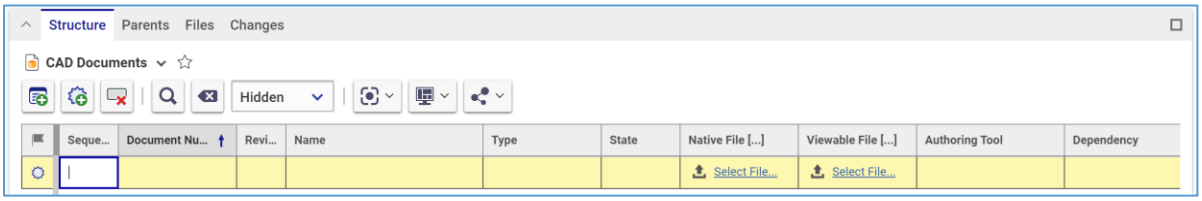


6. Specify the Dependency type, if necessary, by selecting the ellipsis in the Dependency cell, or by typing in the dependency.
7. Click **Save** or **Done** to save your changes and create the Parent-Child relationship between the CAD Documents.

9.5.2 Creating a CAD Document from Another CAD Document

To create a new CAD Document and add it to another CAD Document:

1. Open the Parent CAD Document.
2. On the Parent toolbar, click **Edit**.
3. Go to the **Structure** accordion tab.
4. Click **New CAD Document**. A new row appears at the bottom of the **CAD Documents** grid.



5. Click the **Document Number** cell and enter a document number for the Child.

Note: The Document Number is required and should be provided by the user.

6. Enter any additional data by clicking the corresponding cell or hyperlink in the CAD Documents grid. Refer to section 9.1 Creating a CAD Document for a description of the CAD Document fields.

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7. Click **Save** or **Done**. The new CAD Document is created and attached to the Parent CAD Document.

9.5.3 Replacing a CAD Documents Relationship

To replace a Child CAD Document in a CAD Document Relationship:

1. Open the Parent CAD Document.
2. On the Parent toolbar, click **Edit**.
3. Go to the **Structure** accordion tab.
4. Right-click the Child CAD Document to be replaced and then click **Replace**. The Search dialog appears.
5. Search for and select a replacement CAD Document. The selected CAD Document replaces the existing CAD Document.
6. Click **Save** or **Done**. The Children are replaced.

9.5.4 Removing a CAD Documents Relationship

To remove a Child CAD Document from a Parent CAD Document:

1. Open the Parent CAD Document.
2. On the Parent toolbar, click **Edit**.
3. Go to the **Structure** accordion tab.
4. Click the CAD Document(s) to be deleted and then click **Delete CAD Document.**
5. Click **Save** or **Done**. The selected Children are removed.

9.6 Managing CAD Documents in Parts

For a single Part, you can attach, replace, and remove CAD Documents. If you have purchased a third-party CAD integration tool, you can use it to attach native CAD and viewable files to a Part using the CAD authoring tool. This subscription enables you to view and work with CAD File representations in Aras Innovator using viewers for Parts and CAD Documents.

Note: You cannot attach Parts to a CAD Document.

9.6.1 Adding CAD Documents to a Part

To add an existing CAD Document to a Part:

1. Open the **Part** where the CAD Document will be added.
2. Click **Edit**.
3. Go to the **CAD Documents** tab.
4. Click **Add CAD Documents** . The Search dialog appears.
5. Search for and select a CAD Document to add.
6. Click **Save** or **Done** to save your changes.

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9.6.2 Replacing CAD Documents in a Part

To replace a CAD Document in a Part:

1. Open the **Part** where the CAD Document will be added.
2. Click **Edit**.
3. Go to the **CAD Documents** tab.
4. Right-click the CAD Document to be replaced > **Replace**. The Search dialog appears.
5. Search for and select a CAD Document. The selected CAD Document replaces the selected CAD Document.
6. Click **Save** or **Done** to save your changes.

9.6.3 Removing CAD Documents from a Part

To remove a CAD Document from a Part:

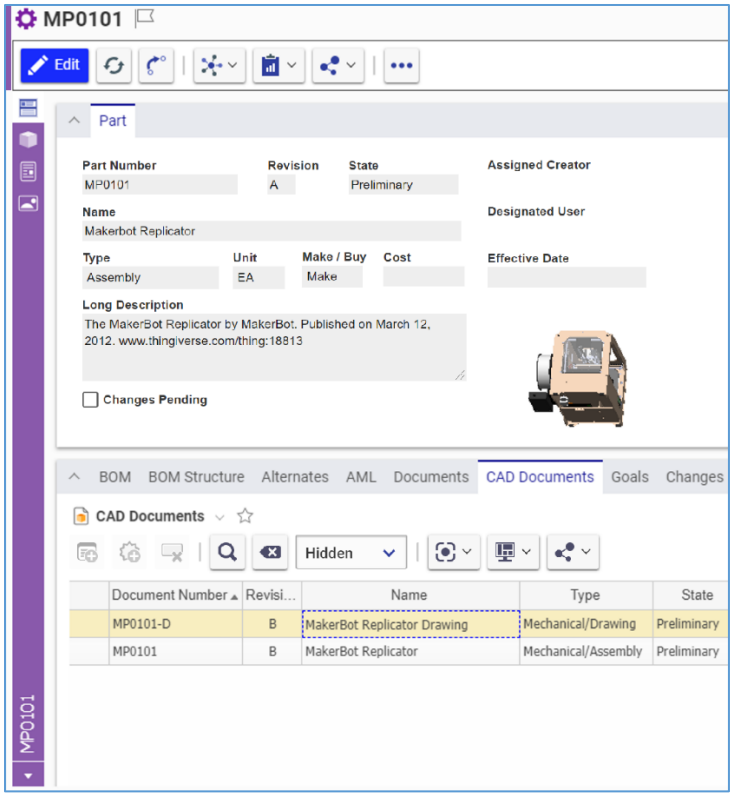
1. Open the **Part** where the CAD Document will be added.
2. Click **Edit**.
3. Go to the **CAD Documents** tab.
4. Click the **CAD Document** to be deleted and then click **Delete Part CAD** .
5. Click **Save** or **Done** to save your changes.

9.6.4 Working with CAD Documents from a Part

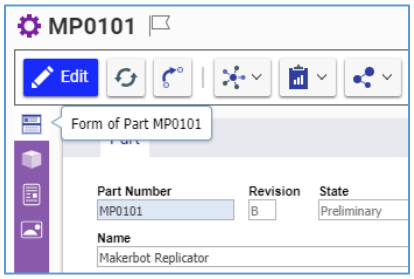
If you have purchased a third-party CAD integration tool, you can use it to attach a native CAD File to a Part, using the CAD authoring tool, for viewing and working in Aras Innovator.

Once the integration license is used, and files are imported into Aras Innovator, the viewers appear in a sidebar on the left-hand side of the Part view, allowing you to view and work with the CAD Files and images attached to the Part.

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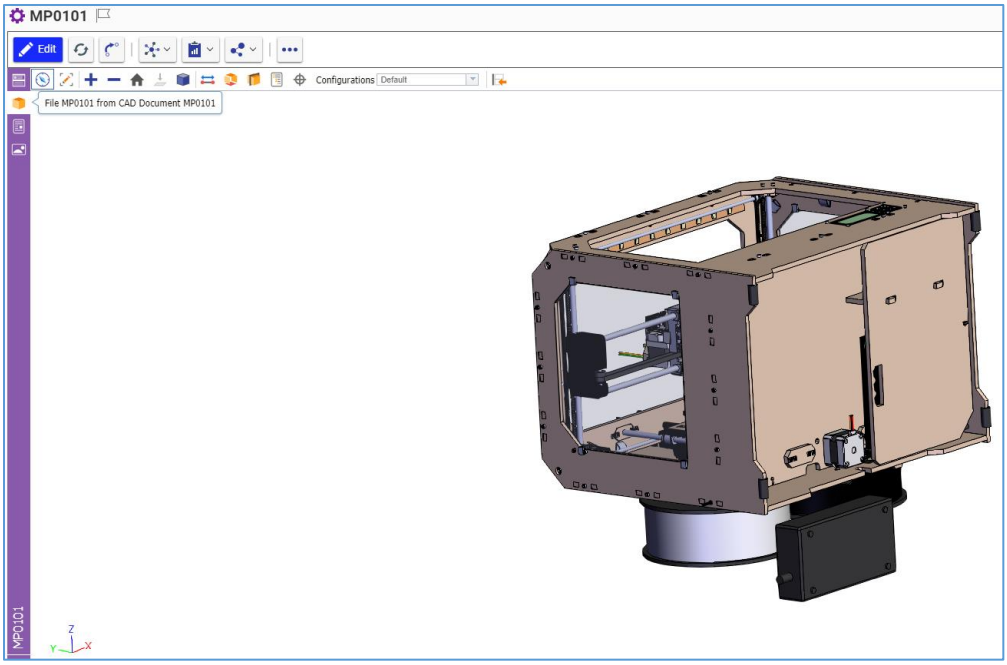


- **Form** shows the Part view.

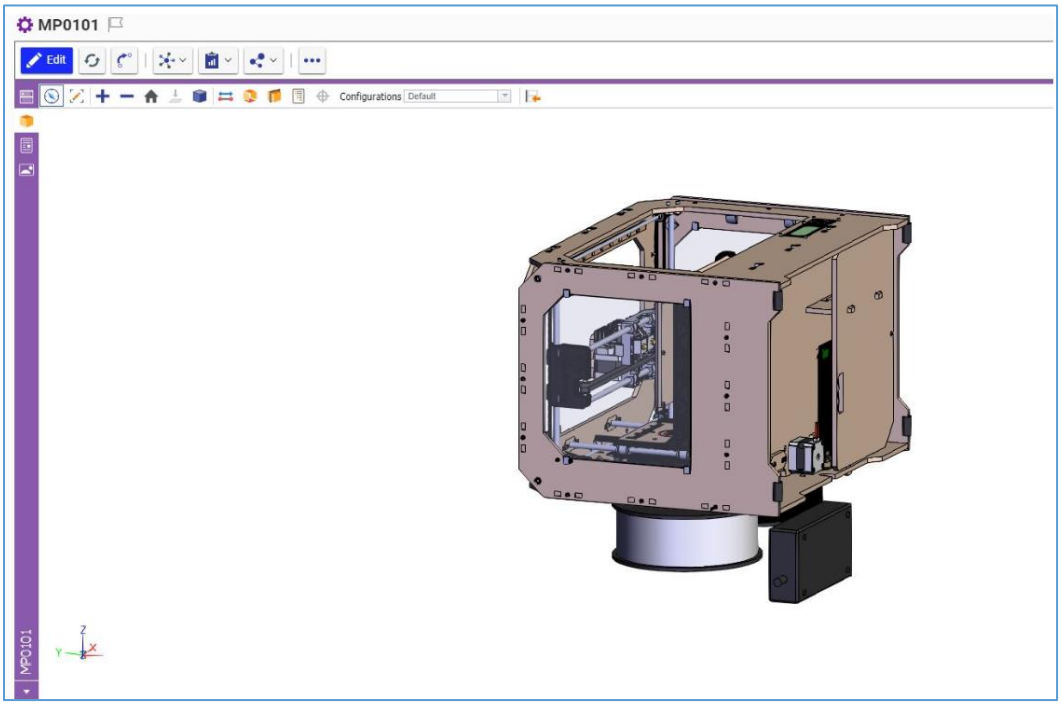


- **Monolithic Viewer** is a simple tool for viewing and working with 3D CAD Model representations. For more details, refer to section *9.8 Working with CAD Files*.

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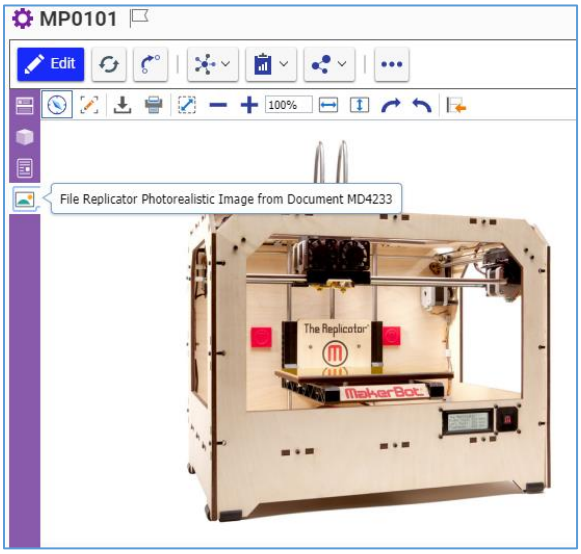


- **PDF Viewer** displays the PDF file.

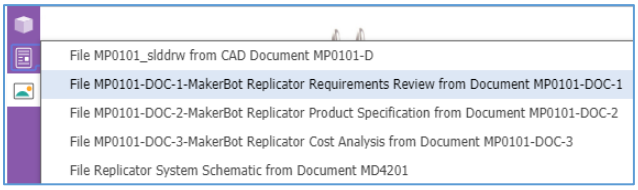


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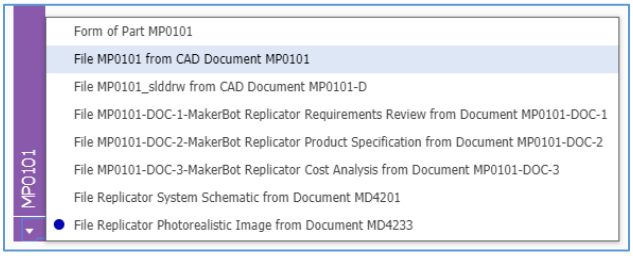
- **Image Viewer** displays the image file.



If there are several Files of the same type, you are prompted to select one.



Alternatively, you can view the list of all possible navigation options within the sidebar by clicking the arrow at the bottom of the sidebar and making your selection for the viewer you want to view. This list includes the Part Form view. You can view Files attached to the Part. The blue circle marks the currently selected viewer.



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9.7 Managing CAD Files

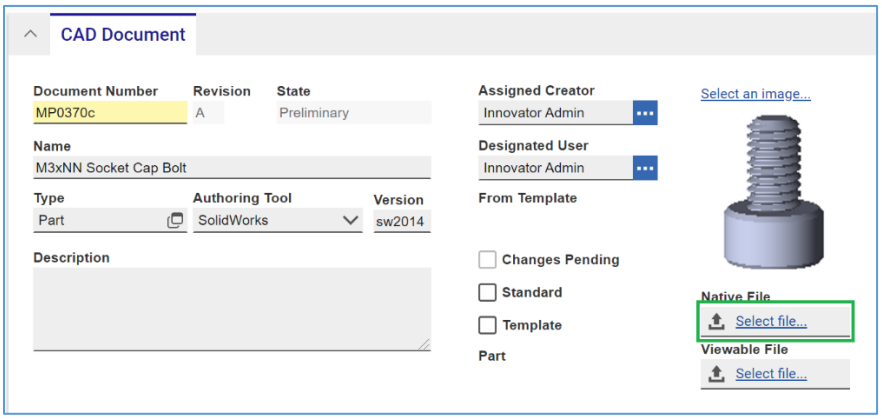
A CAD Document can have Files associated with it that are kept in the Aras Innovator Vault. If you have purchased a third-party CAD integration tool, you can use it to attach, download, replace, and remove native CAD and viewable files to a Part using the CAD authoring tool. This subscription also enables you to view and work with CAD File representations in Aras Innovator directly from the corresponding CAD Document.

In Aras Innovator, CAD Files and Files are not versionable, but CAD Documents are. When a CAD Document is versioned, the references to its Files remain the same. In other words, old versions of the CAD Document keep old Files. For example, if Version 1 of a CAD Document contains File A, then gets versioned, after which, File A is replaced with File B, the previous version of the CAD Document (Version 1) has File A, and the current version has File B. To access the old Files, you can view the appropriate version of the CAD Document. For details about how to access CAD Document versions, refer to section *4.1.1 Versions Exploration*.

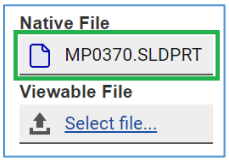
9.7.1 Attaching Native and Viewable CAD Files to a CAD Document

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.
2. Click **Edit**.
3. Click the **Select file** link in the Native file field. The Open file dialog appears.

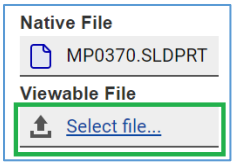


4. Select a Native CAD File. The **Select file** link is replaced with the name of the selected Native CAD File.



5. Click the **Select file** link in the Viewable file field. The Open file dialog appears.

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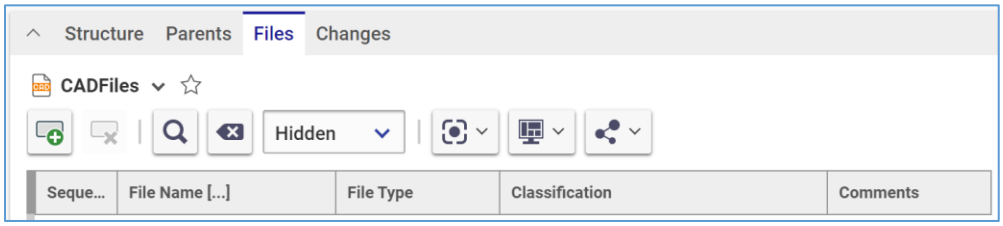


6. Select a viewable representation of the Native CAD File. The **Select file** link is replaced with the name of the selected Viewable File.
7. Click **Save** or **Done** to save your changes. The names of the selected Files become links and the Files are attached to the CAD Document.

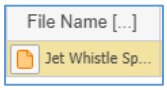
9.7.2 Attaching Other Files to a CAD Document

To attach additional Files to a CAD Document:

1. Open the CAD Document.
2. Click **Edit**.
3. Go to the **Files** accordion tab.
4. Click **New CADFiles** on the Files accordion toolbar. A new row appears at the bottom of the Files grid.



5. Click the **Select File** link in the File Name cell. The Open file dialog appears.
6. Select the File to be uploaded. The **Select file** link is replaced with the name of the selected File.



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. Specify the Classification of the File by clicking the **Classification** cell, clicking the ellipsis button, and selecting the appropriate classification.
8. Provide any additional information about the File in the **Comments** cell as needed.
9. Click **Save** or **Done** to save your changes and attach the additional File to the CAD Document.

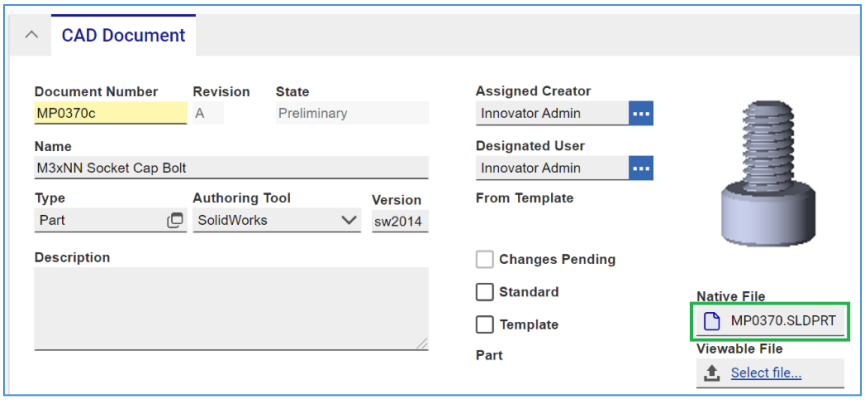
9.7.3 Downloading Native and Viewable CAD Files from a CAD Document

You can download native and viewable CAD Files using either of the following methods:

- The file links on the CAD Document
- The Manage file property dialog

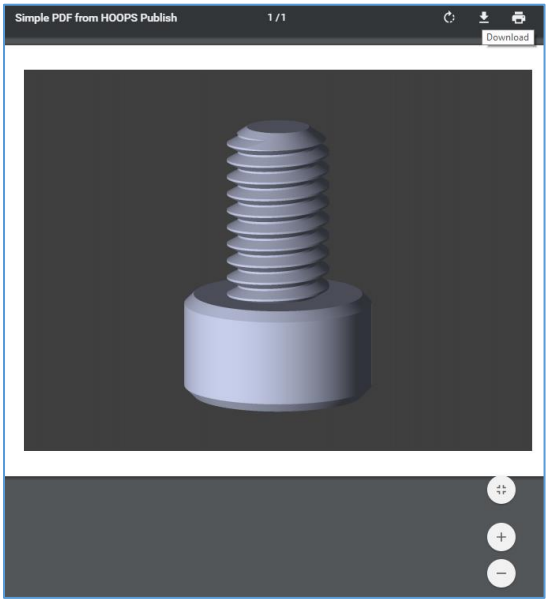
To download native and viewable CAD Files using the file links on the CAD Document, click the corresponding link on the CAD Document:

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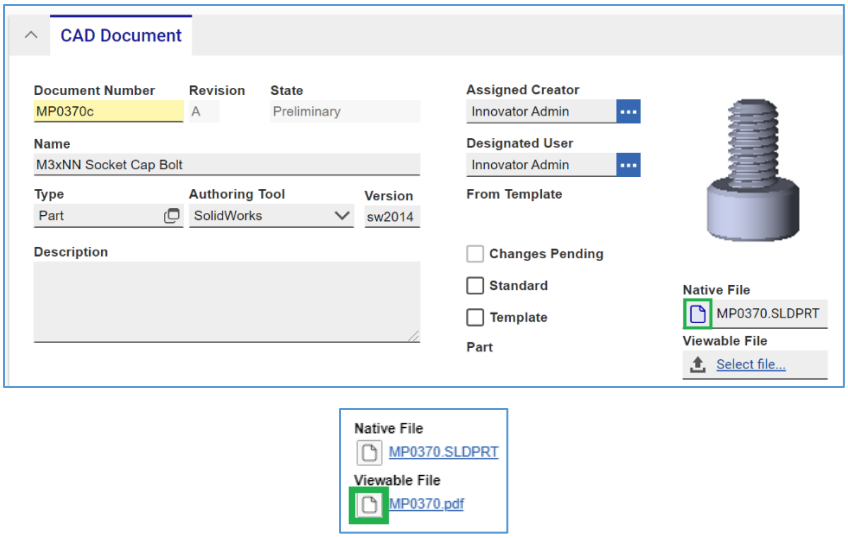
When you click the link of the Viewable File, a new browser window appears showing the viewable file and providing functionality for viewing and downloading.

Note: The view of a viewable file and functionality available depend on your browser.

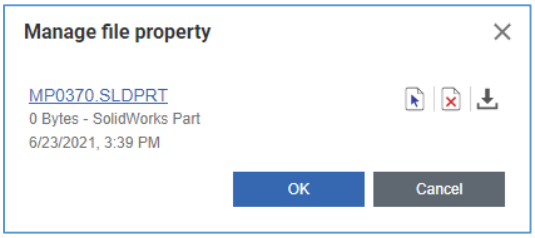


To download files using the Manage file property dialog, click the **Manage file property** icon for the corresponding file:

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You can either select the hyperlink in the Manage file property dialog or use the **Download file** button to download the File.

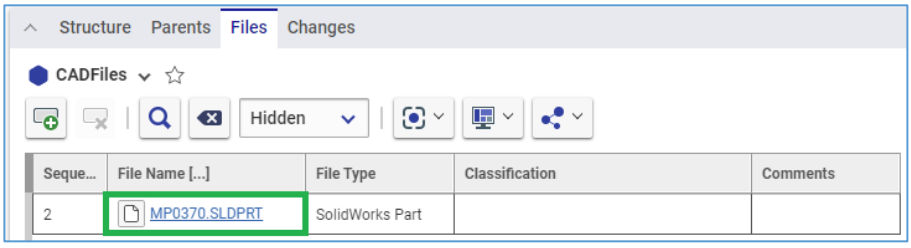


9.7.4 Downloading Other Files from a CAD Document

You can download additional Files from a CAD Document using either of the following methods:

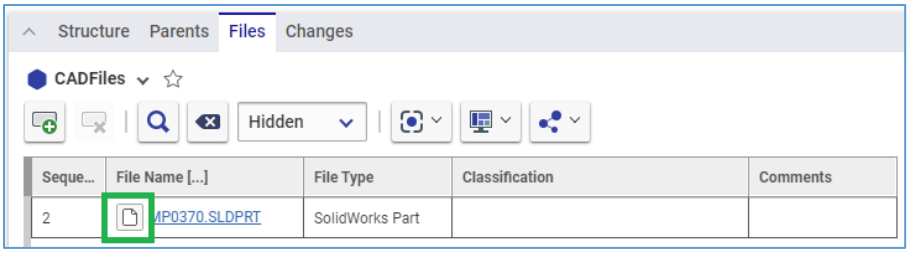
1. The File Name link in the Files grid.
2. The Manage file property dialog.

To download files from the CAD Document, click the corresponding link in the Files tab on the CAD Document:

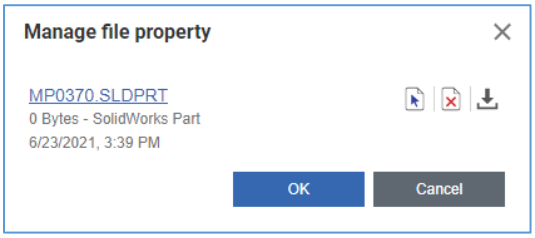


To download files from the CAD Document using the Manage file property dialog, click the Manage file property button for the corresponding file:

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You can either select the hyperlink in the Manage file property dialog or use the **Download file** button to download the File.

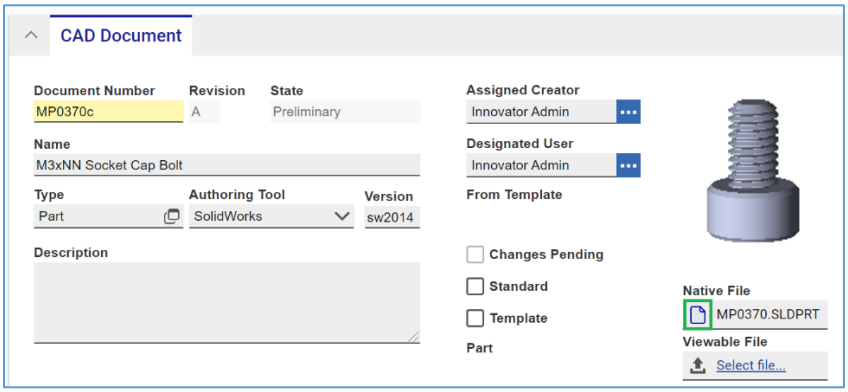


If you are downloading a viewable file, such as a PDF, instead of starting the downloading process of your operating system, a new browser window appears showing the viewable file and providing functionality for viewing and downloading. Use the file download procedure of your browser to download the file and close the browser window with the viewable file when completed.

9.7.5 Replacing Native and Viewable CAD Files in a CAD Document

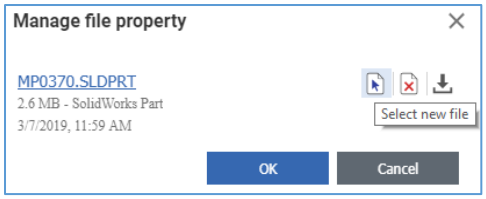
To replace the native and viewable files on a CAD Document:

1. Open the **CAD Document**.
2. Click **Edit**.
3. Click the **Manage file property** button under Native File.



The **Manage file property** dialog appears.

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4. Click the **Select new file** button.
5. Search for and select the replacement Native File. In the **Manage file property** dialog, the 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.



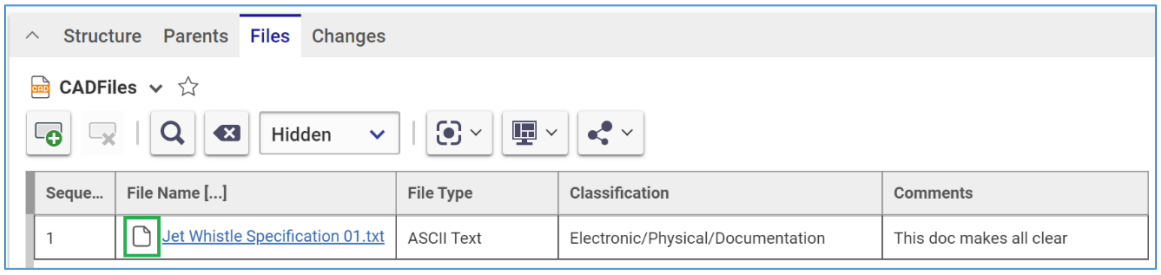
6. Click **OK**. In the CAD Document view, a link with the name of the old native File is replaced with the name of the new native File.
7. Repeat steps 3-6 using the **Manage file property** button under Viewable File.
8. Click **Save** or **Done** to save your changes. The names of the replacement Files become links. These Files are attached to the CAD Document.



9.7.6 Replacing Other Files in a CAD Document

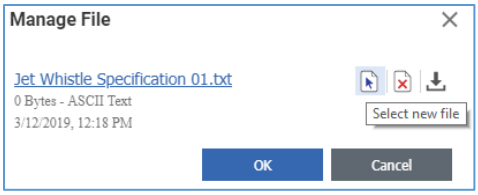
To replace additional Files in a CAD Document:

1. Open the CAD Document.
2. Go to the Files accordion tab.
3. Click the **Manage file property** button in the File Name cell.

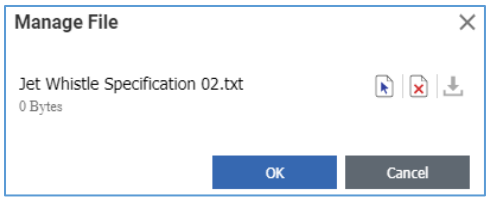


The **Manage File** dialog appears.

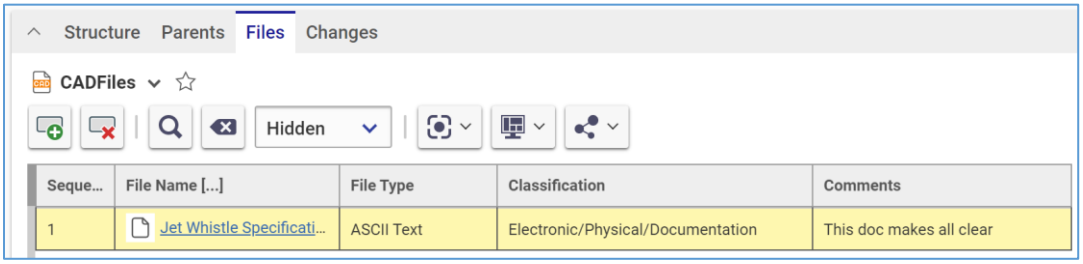
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4. Click the **Select new file** button.
5. Search for and select the replacing File. In the Manage file dialog, the link with the name of the old File is replaced with the name of the new File.



6. 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.
7. Click **Save** or **Done** to save your changes. 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

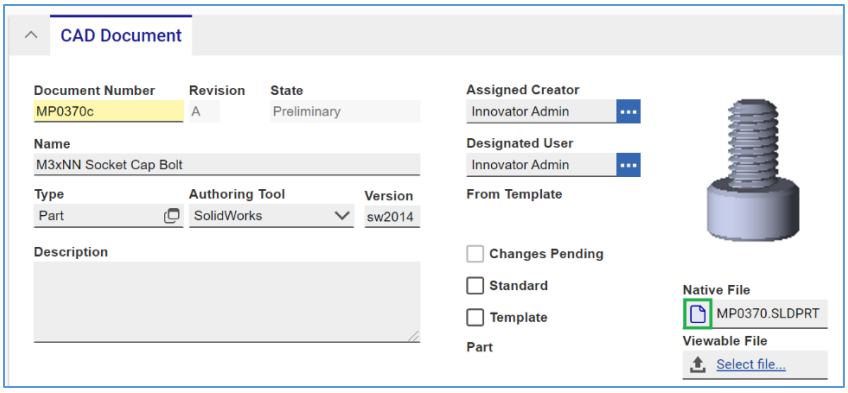


9.7.7 Removing Native and Viewable CAD Files from a CAD Document

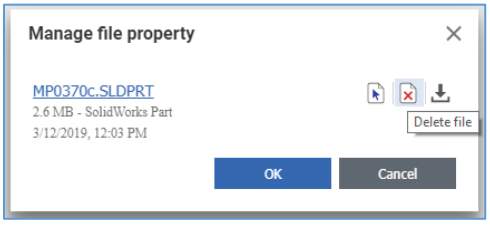
To remove native and viewable CAD Files from a CAD Document:

1. Open the CAD Document.
2. Click **Edit**.
3. Click the **Manage file property** button under Native file.

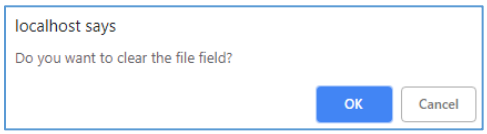
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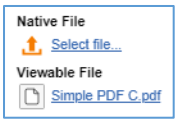
The **Manage file property** dialog appears.



4. Click the **Delete file** button. A notification dialog appears.



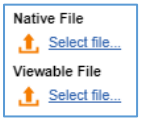
5. Click **OK** in the notification dialog. The Select File link replaces the link to the native File.



6. Click the **Manage file property** button under Viewable file. The Manage file property dialog appears.

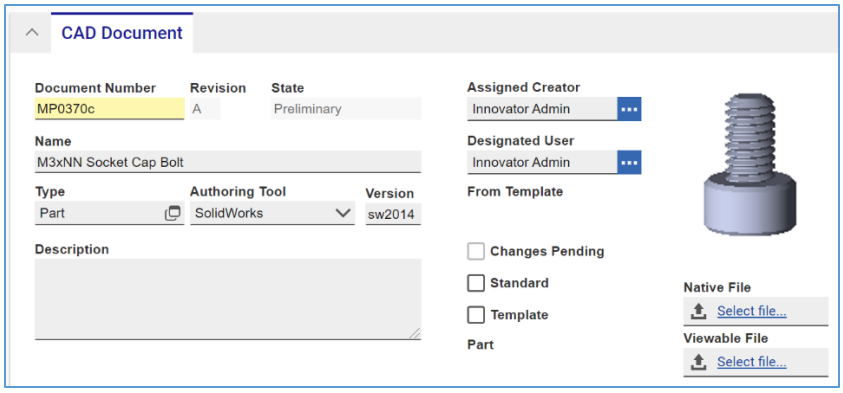


7. Click the **Delete file** button. A notification dialog appears.
8. Click **OK** in the notification dialog. The Select File link replaces the link to the viewable File.



9. Click **Save** or **Done**. The native and viewable Files are removed from the CAD Document.

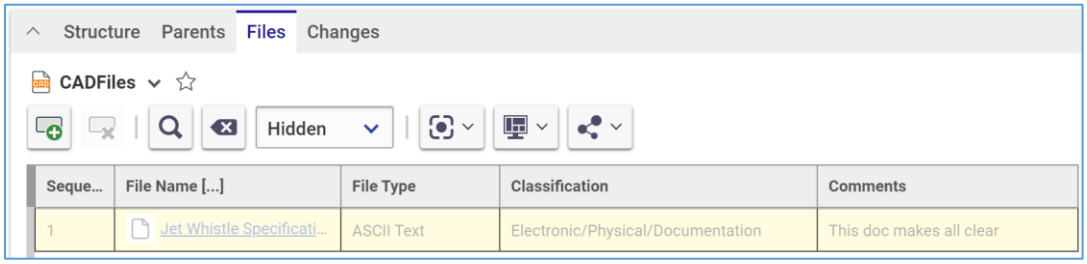
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9.7.8 Removing Other Files from a CAD Document

To remove a File from a Document:

1. Open the CAD Document.
2. Click **Edit**.
3. Go to the **Files** accordion tab.
4. Click the **File** row and then click **Delete Row** on the **Files** accordion toolbar. The **File** becomes unavailable.



5. Click **Save** or **Done** on the **CAD Document** toolbar. The File disappears from the grid.

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

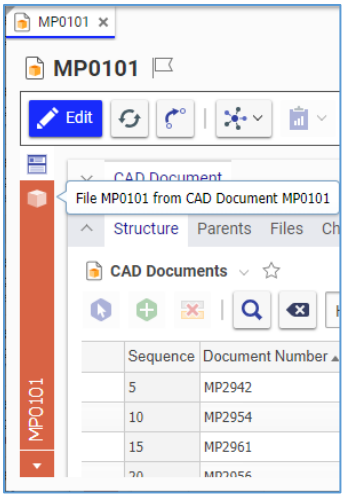
9.8 Working with CAD Files

If you have purchased a third-party CAD integration tool, you can use it to attach native CAD and viewable files to a Part using the CAD authoring tool. This subscription also enables you to view and work with CAD File representations in Aras Innovator directly from the corresponding CAD Document.

9.8.1 Accessing CAD Models from CAD Documents

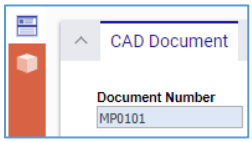
Once the integration license is obtained, and files are imported into Aras Innovator, the CAD Document displays the Sidebar viewer icon on its left side.

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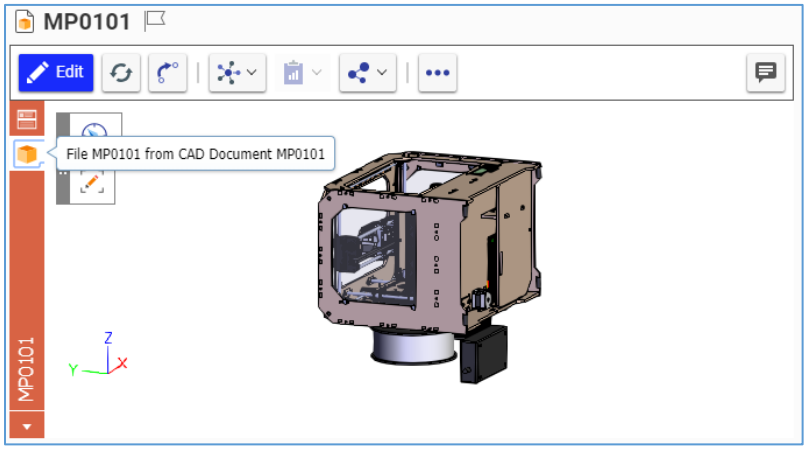


The Sidebar hosts tabs that provide access to tools for viewing and working with CAD Models, PDF files and images attached to the CAD Document. The Sidebar contents depend on your license, CAD authoring tool, CAD and other Files attached to a CAD Document. The most used tabs are as follows:

- **Form** shows the CAD Document view.

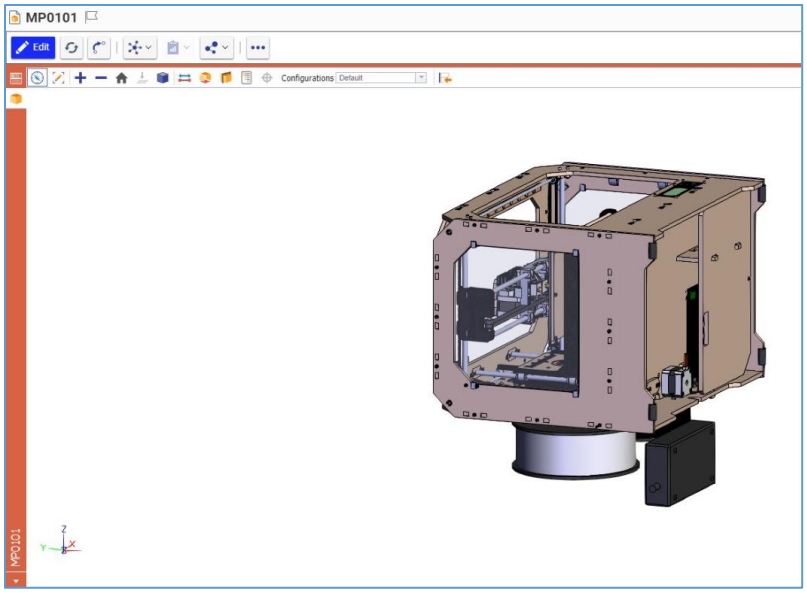


- **Monolithic Viewer** is a simple tool for viewing and working with 3D CAD models.

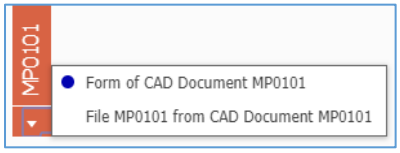


- **PDF Viewer** displays the PDF file.

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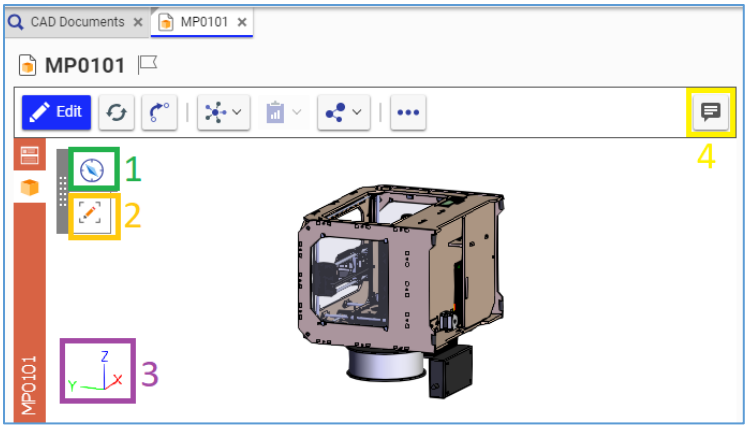


Alternatively, you can view the list of all possible navigation options within the sidebar by clicking the arrow at the bottom of the sidebar and making your selection for the viewer you want to view. This list includes the CAD Document Form view. You can view Files attached to the CAD Document. The blue circle marks the currently selected viewer.



9.8.2 Viewing CAD Models

When the viewer is selected, the CAD Model appears as follows:



The view includes the following functionality:

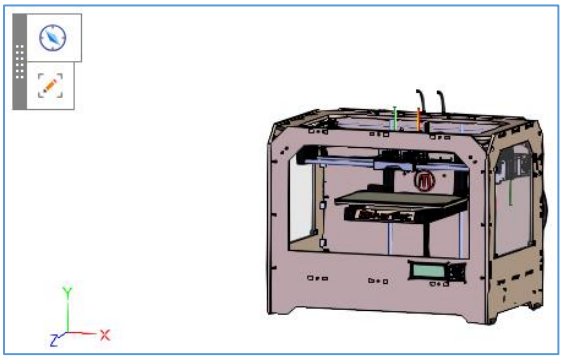
1. The **View** toolbar button
2. The **Markup** toolbar button
3. The **Model Orientation** indicator

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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.

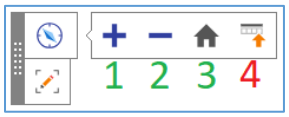
You can view a CAD Model from different sides by clicking and dragging at any place on the Model canvas. The **Model Orientation** indicator tells you which side is toward you and where the other sides are.



Use the Viewing toolbar and Model context menu for advanced viewing.

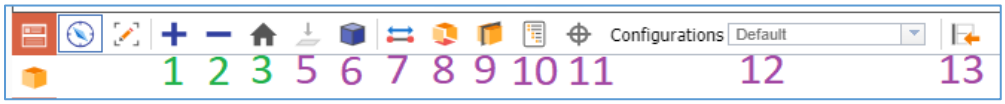
9.8.2.1 Using the Viewing Toolbars

Click the **View** toolbar button to launch the viewing mode and to access the Basic Viewing toolbar:



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:



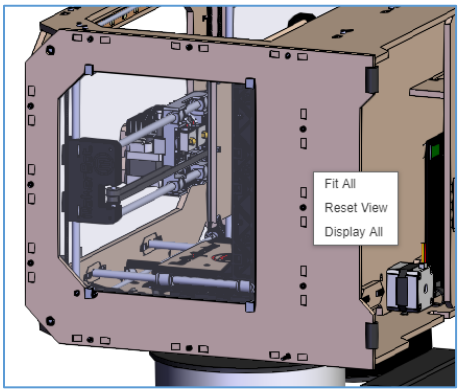
5. **Orient to Face** shows the CAD Model oriented to you with the surface (part) selected.
6. **Set Display Style** shows/hides a toolbar with options on how to display the CAD Model.
7. **Measure** shows/hides a toolbar with options for measuring the CAD Model.
8. **Exploded View** shows/hides the 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.

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12. **Configurations** is the list of configurations available within the CAD Model.
13. **Switch to Basic Toolbar** shows the **Basic Viewing** toolbar.

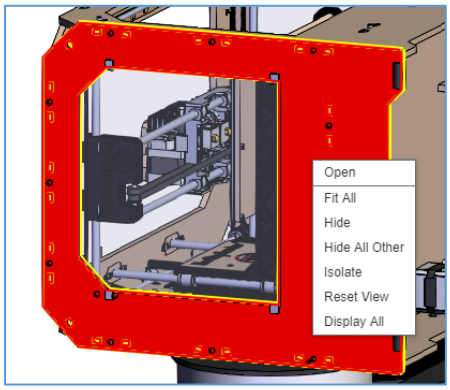
9.8.2.2 Using the CAD Model Context Menus

When viewing a CAD Model, **right-click** the CAD Model to access its context menu:



- **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 an individual part to select it and then right-click to access the part context menu:

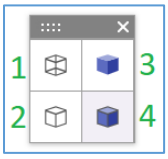


- **Open** opens the CAD Document view of the selected part.
- **Fit All** sets the CAD Model size so that all parts are shown on the screen.
- **Hide** hides the selected part from showing on the screen.
- **Hide All Other** hides everything appearing on the screen except the selected part.
- **Isolate** 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.

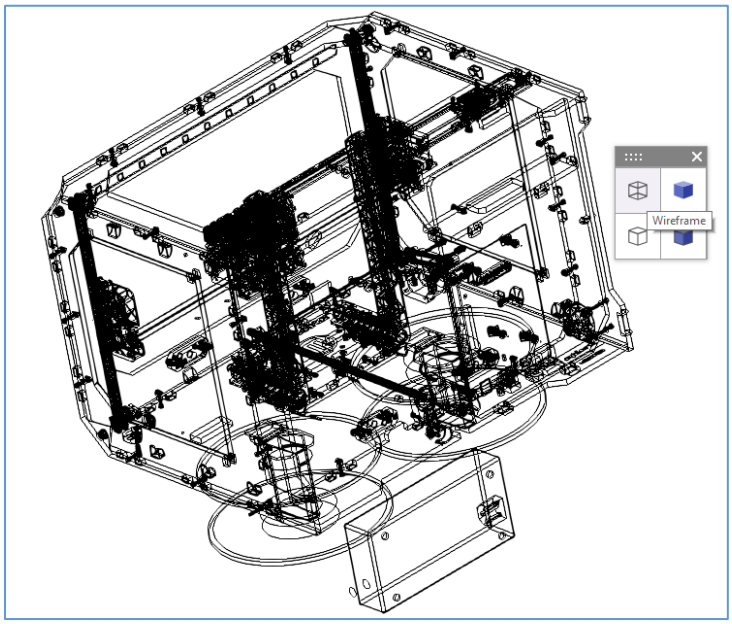
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9.8.2.3 Setting the CAD Model Display Style

The **Display Style** toolbar provides the following display options for the CAD Model. Refer to section *9.8.2.1 Using the Viewing Toolbars* to access the button.

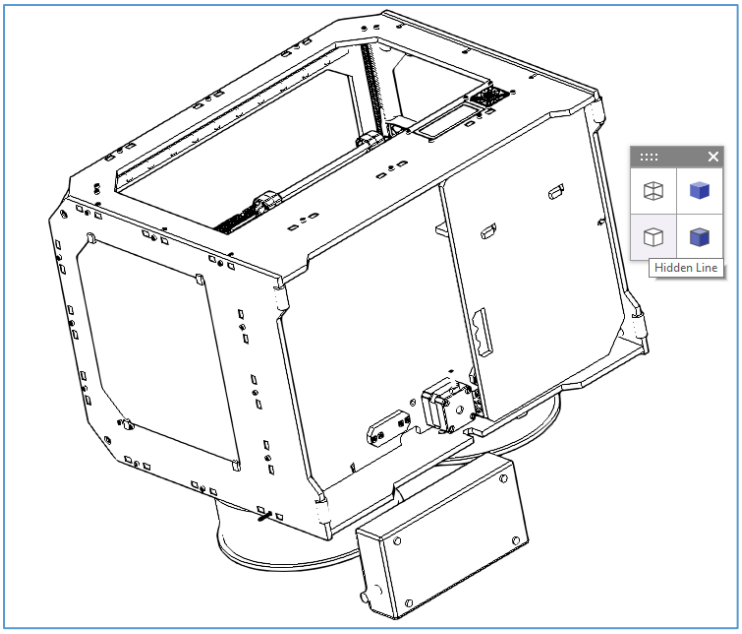


1. **Wireframe** displays wireframes of the CAD Model assembly and all its parts. Surfaces are transparent.

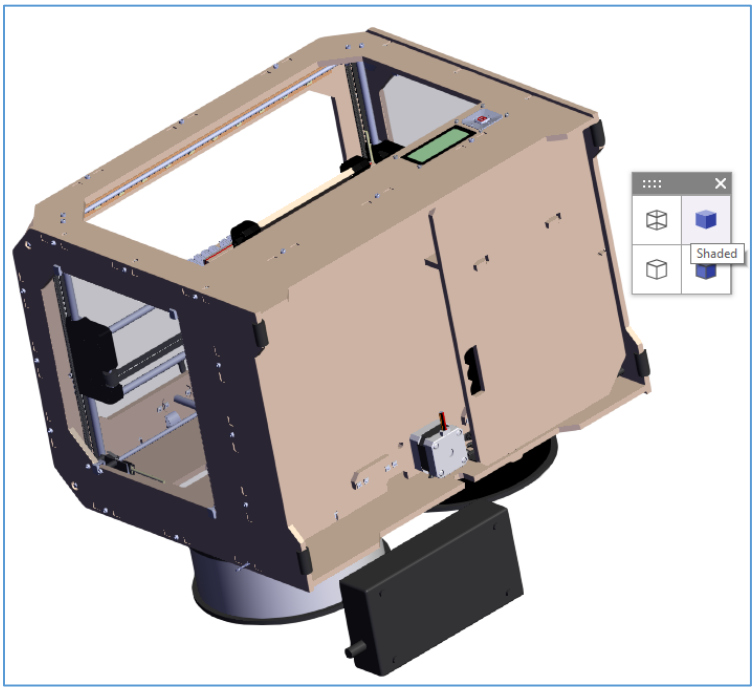


2. **Hidden Line** displays the white surfaces and black edges of the CAD Model assembly.

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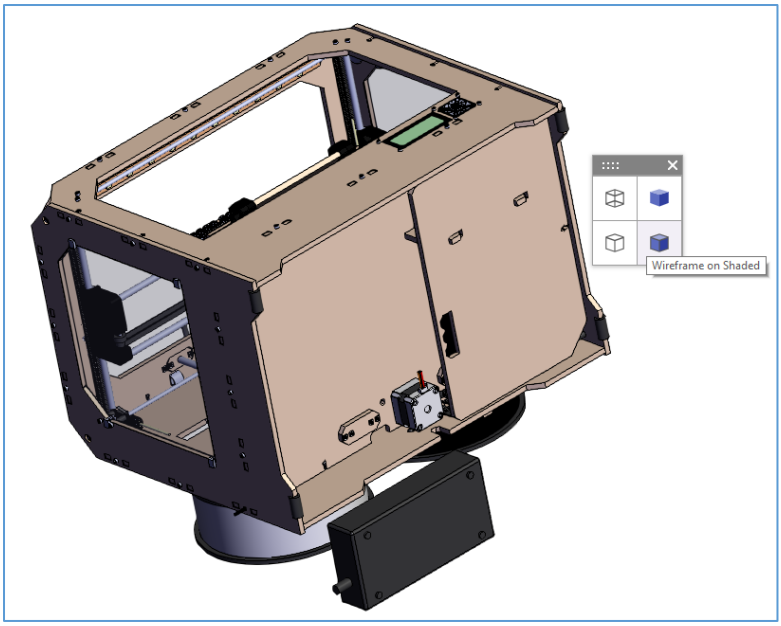


3. **Shaded** displays the CAD Model assembly surfaces in color.



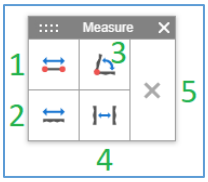
4. **Wireframe on Shaded** displays the CAD Model assembly with both wireframes and colored surfaces. This is the default display style.

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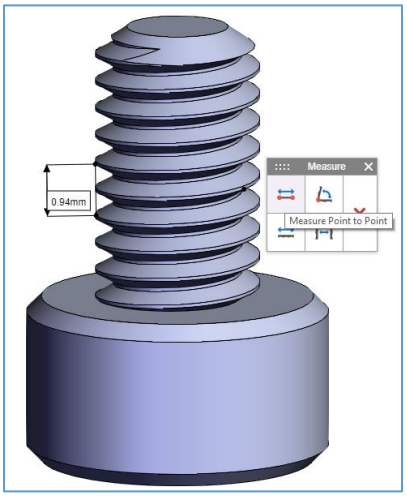


9.8.2.4 Measuring CAD Models

The **Measure** toolbar enables you to specify the type of measurement to use for the CAD Model. Measurements are displayed in the CAD Model authored units. Refer to section *9.8.2.1 Using the Viewing Toolbars* to access the button.

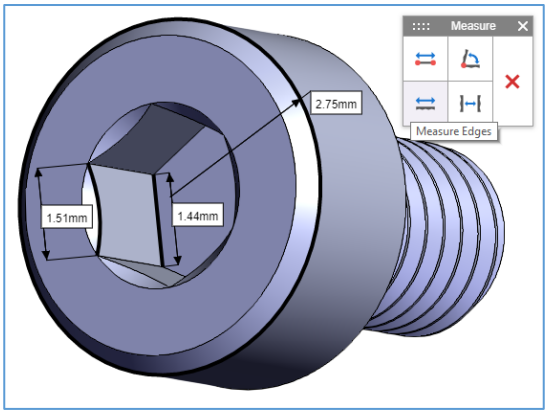


1. **Measure Point to Point** shows the distance between two arbitrary points. Click this button and then click the CAD Model to set these points and measure the distance between them.

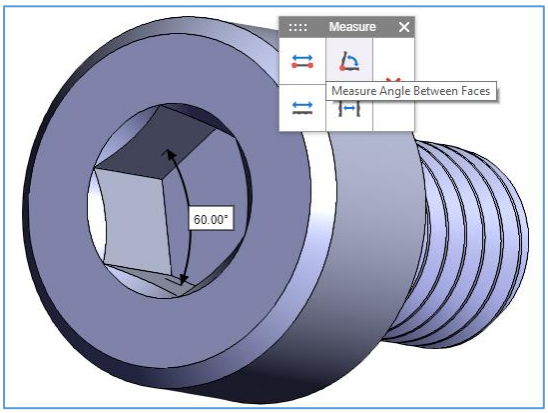


2. **Measure Edges** shows the length or radius of an arbitrary edge depending on the edge type. Click this button and then click an edge to measure it. The measured edges are bolded.

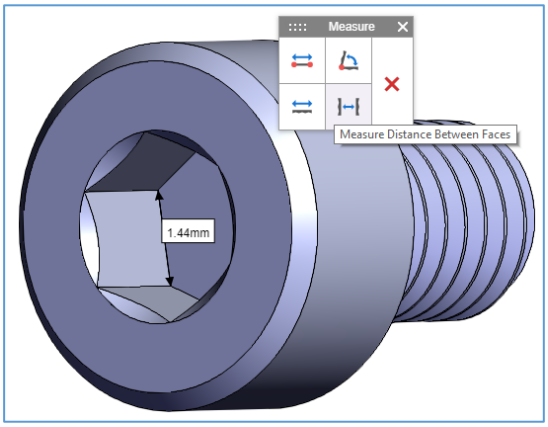
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3. **Measure Angle Between Faces** shows the angle in grades between two arbitrary surfaces of the CAD Model assembly. Click this button and then click the appropriate surfaces to measure them.



4. **Measure Distance Between Faces** shows 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.



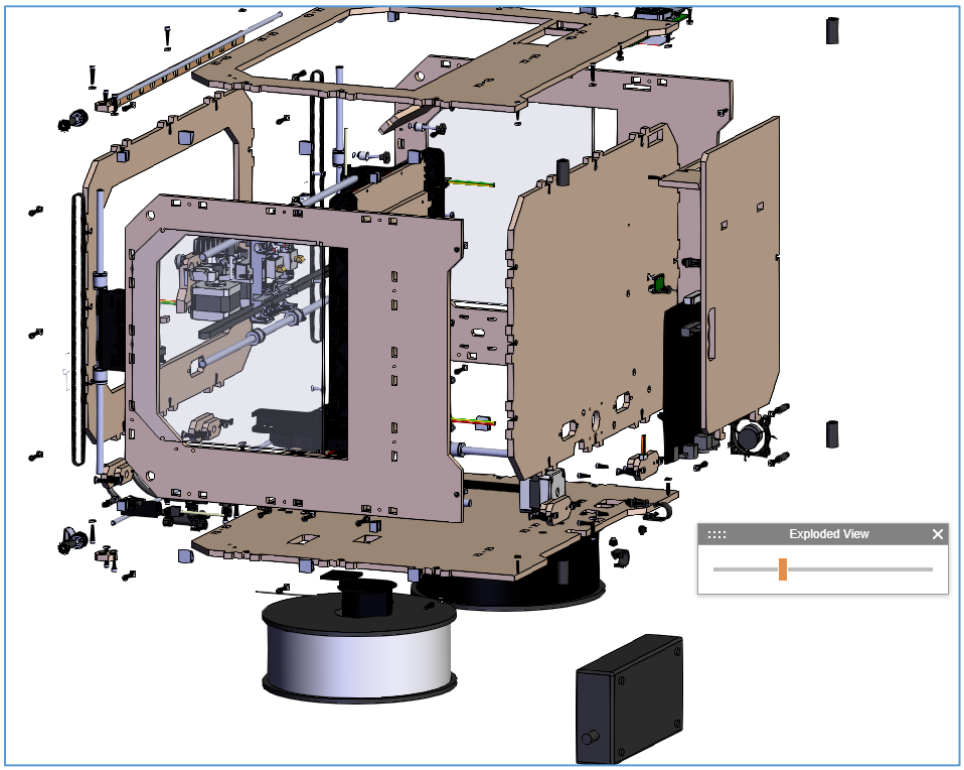
5. Click **Delete All** to clear all measurements from the CAD Model.

9.8.2.5 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 *9.8.2.1 Using the Viewing Toolbars* to access the button.

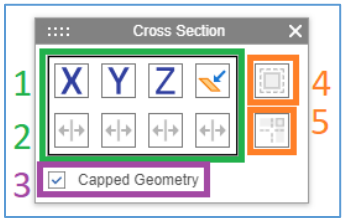
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You can use other viewing and markup features, like measure or labels, in the exploded view.
To quit the exploded view, you can click the **Reset View** button on the viewing toolbar or context menu.



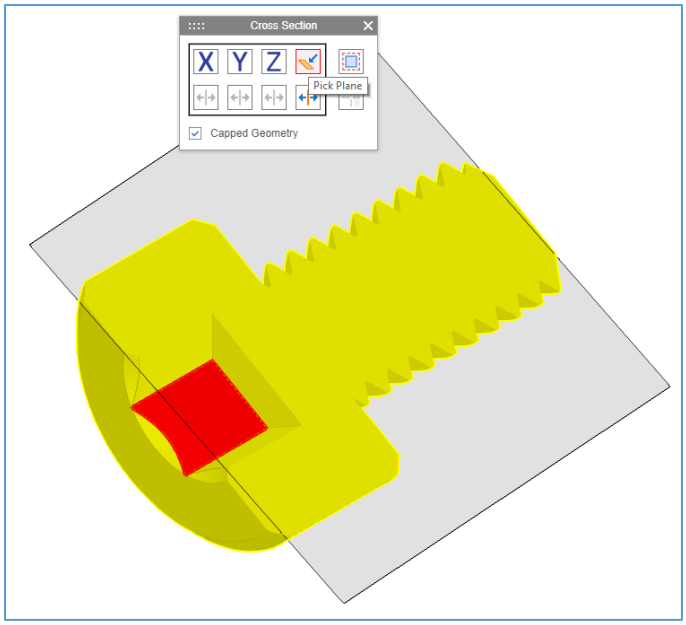
9.8.2.6 Cross Section Viewing of the CAD Model

The **Cross Section** toolbar enables you to view the CAD Model in sections providing the following features. Refer to section *9.8.2.1 Using the Viewing Toolbars* to access the button.

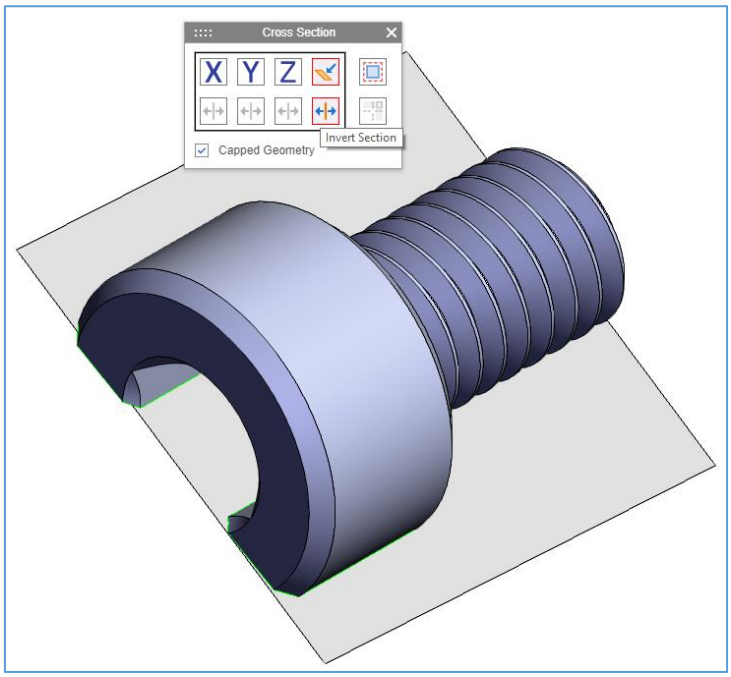


1. Use the **set of plane buttons** to specify cutting planes for the CAD Model. The **X**, **Y**, and **Z** buttons set the cutting planes according to the Model coordinate system. The **Pick Plane** button sets an arbitrary cutting plane: click a surface and then click this button. To cut the CAD Model in sections, drag the cutting planes.

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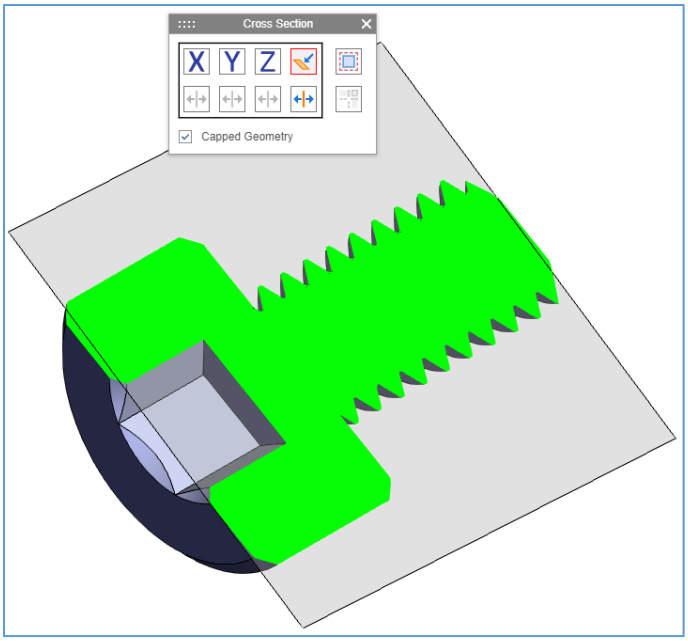


2. Each **plane** button includes an **Invert Section** button. Click this button to determine which of the cut sections is visible.

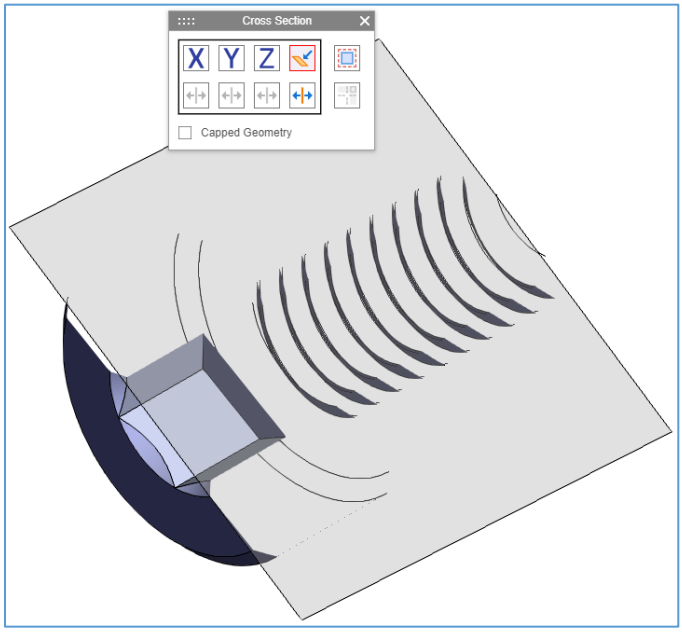


3. Select the **Capped Geometry** check box to display the cut section in green.

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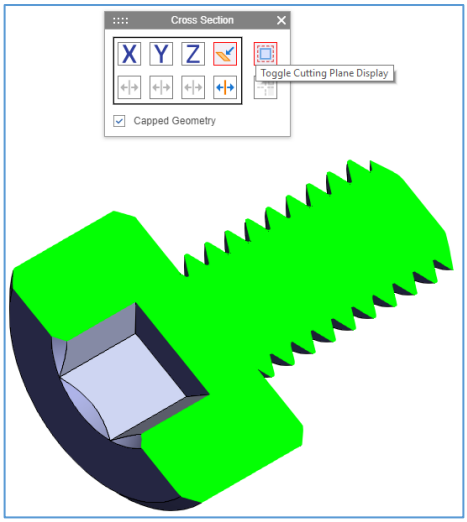


If you do not select the checkbox, the cut section is hollow.

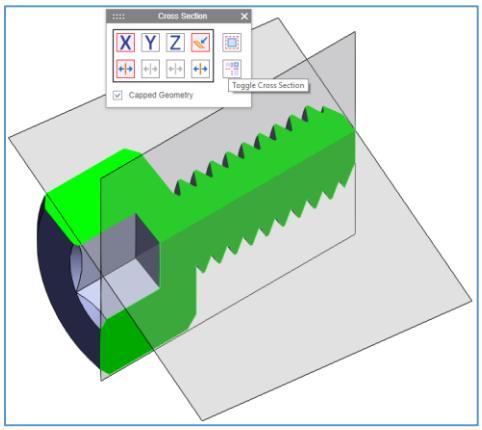


4. Click the **Toggle Cutting Plane Display** button to hide/show the cutting planes.

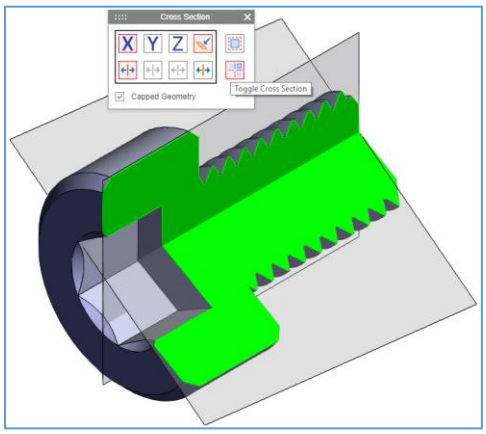
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5. When using several cutting planes, the **Toggle Cross Section** button becomes available, enabling you to select which sides of the planes can cut.

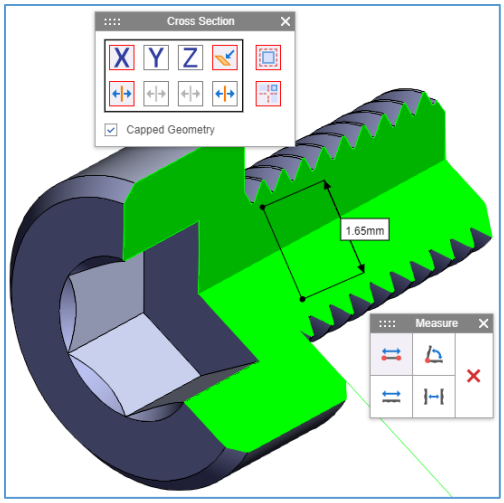


6. Click the **Toggle Cross Section** button to toggle the cutting sides of the planes. You can combine this button with the Invert Section buttons of these planes.

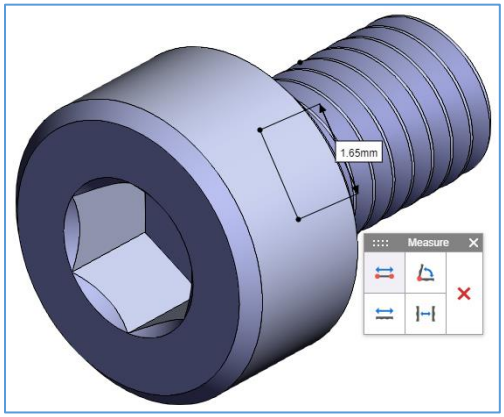


To enable other viewing and markup functionality in the exploded view, hide the cutting planes.

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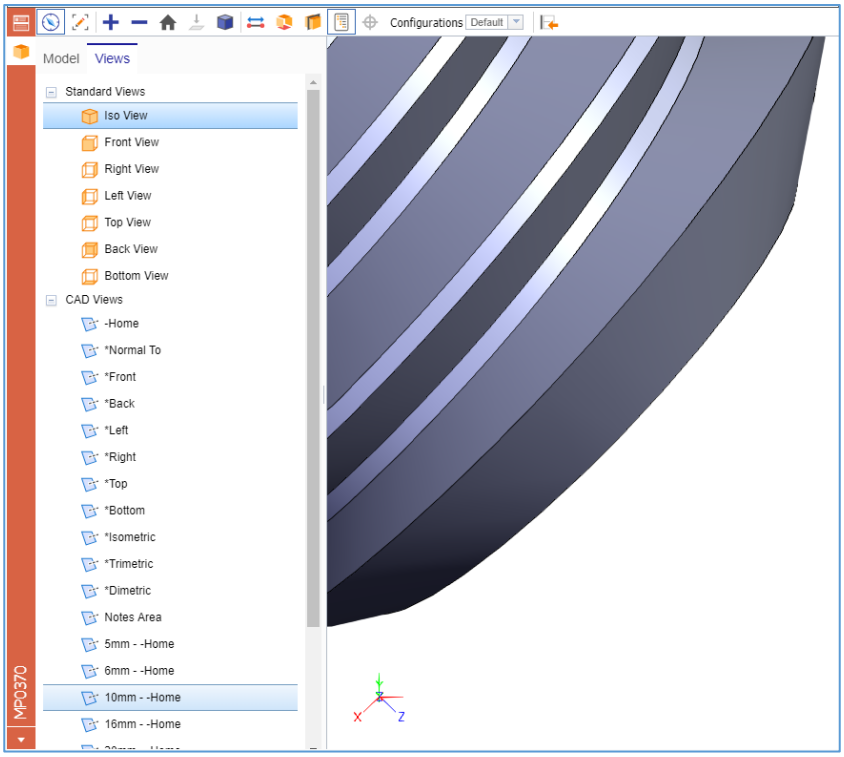
To quit the cross-section view of a Model, close the **Cross Section** toolbar.



9.8.2.7 Browsing the CAD Model

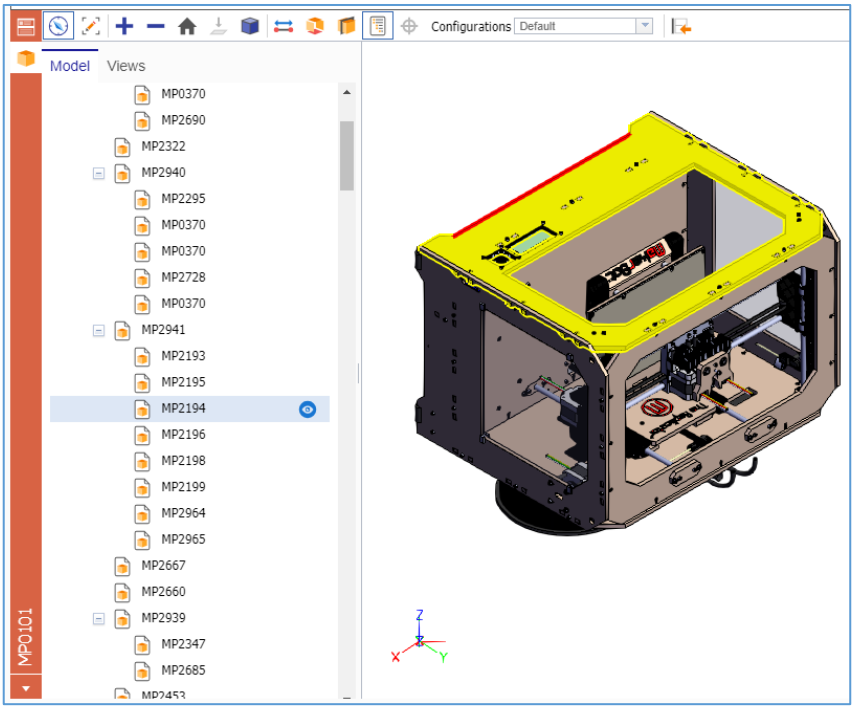
You can use the **Model Browser** to switch quickly between CAD Model viewing positions. The **Model Browser** appears at the left side with the **Views** tab. It displays viewing position options specific to the CAD Model. Click an option to apply its view. Refer to section *9.8.2.1 Using the Viewing Toolbars* to access the button.

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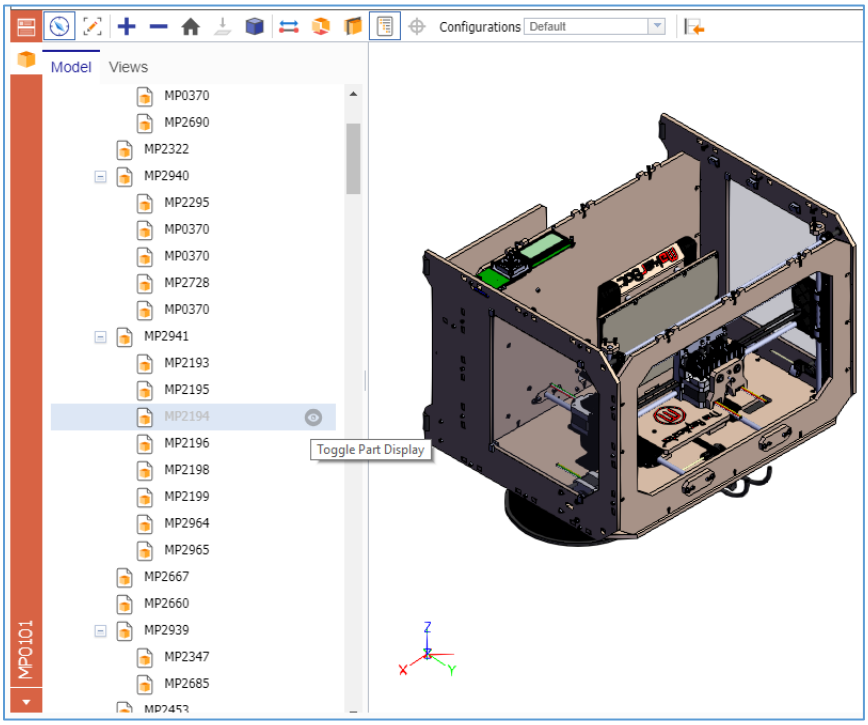


For assemblies, the **Model Browser** provides the **Model** tab for quick navigation through the assembly structure. It appears as a tree of CAD Documents. Click a part on the CAD Model, and its CAD Document is highlighted in the tree. You can also click a CAD Document in the tree, and its part is highlighted on the CAD Model.

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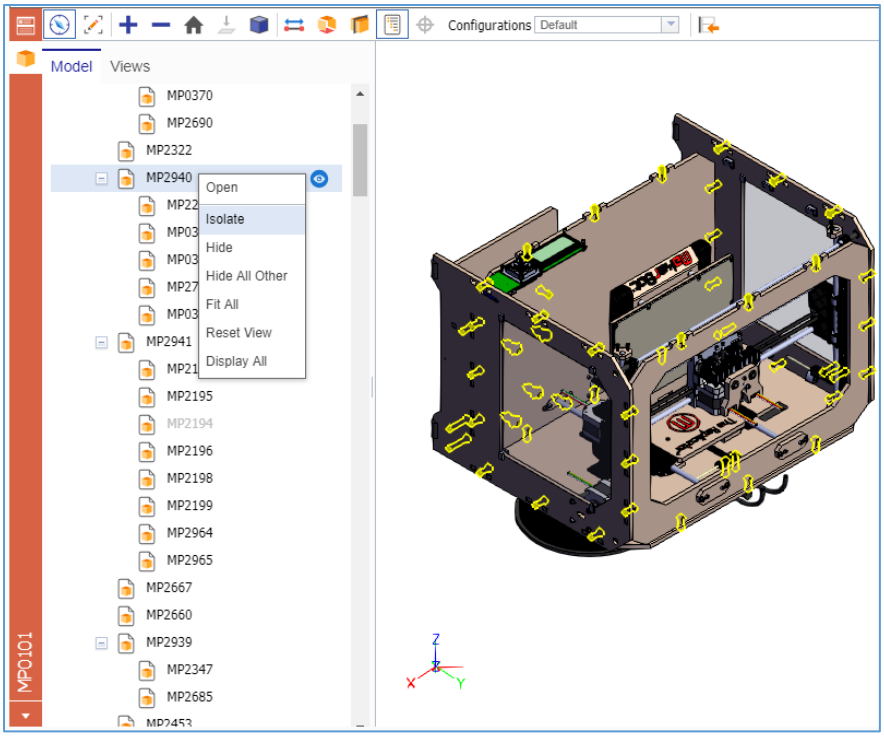


Each CAD Document has the **Toggle Part Display** button that enables you to hide/show this part on the CAD Model. Hidden parts in the CAD Documents appear light grey in the tree.



The context menu is available for CAD Document in the tree.

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Click the **Model Browser** button on the **Standard Viewing** toolbar to quit the Model Browser.

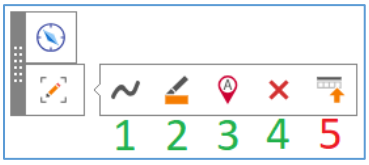
To show hidden parts, click **Display All** in the context menu.

9.8.3 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 context menu and viewing functionality are not available in markup mode. To use them, launch viewing mode.

9.8.3.1 Using the Markup Toolbars

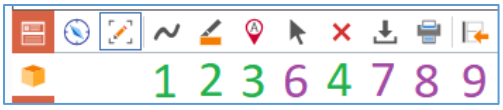
Click the **Markup** toolbar button to launch markup mode and access the **Basic Markup** toolbar. The following buttons appear:



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.

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:

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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.

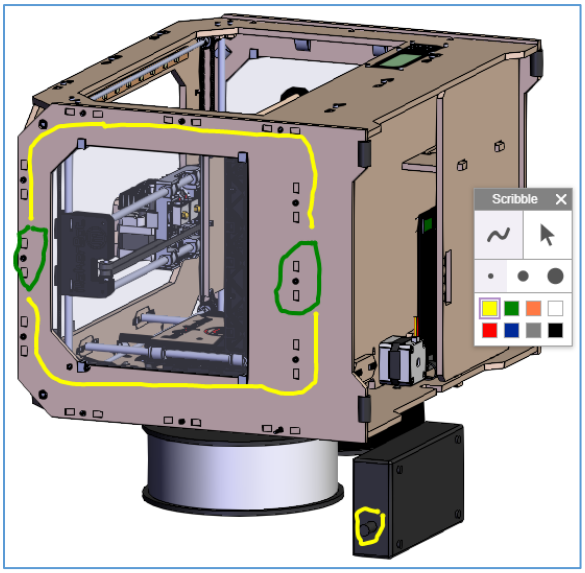
Unlike the **Basic Markup** toolbar, the **Standard Markup** toolbar is dynamic. The **Standard Markup** toolbar does not show/hide an additional toolbar containing functionality for a selected markup feature (buttons 1-3), it displays functionality for the selected markup feature. The selected feature and functionality options are enclosed by blue boxes. To hide the functionality options, click the selected feature.



Markup features discussed in the following subsections assume that you have accessed the corresponding feature.

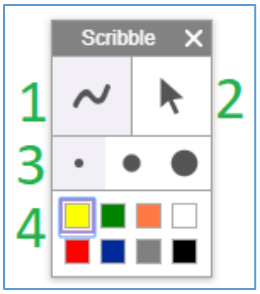
9.8.3.2 Drawing on CAD Models

You can draw arbitrary lines on a CAD Model using the scribble feature. Refer to section *9.8.3.1 Using the Markup Toolbars* to access the button.

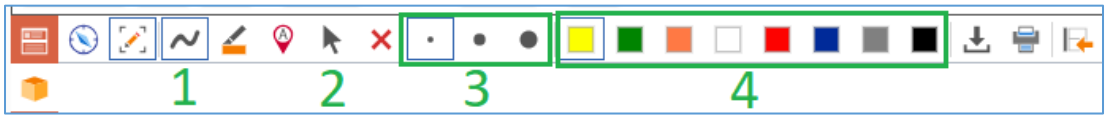


When accessed from the **Basic Markup** toolbar, the scribble feature appears as the **Scribble** toolbar.

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When accessed from the **Standard Markup** toolbar, the scribble feature is hosted on this toolbar.

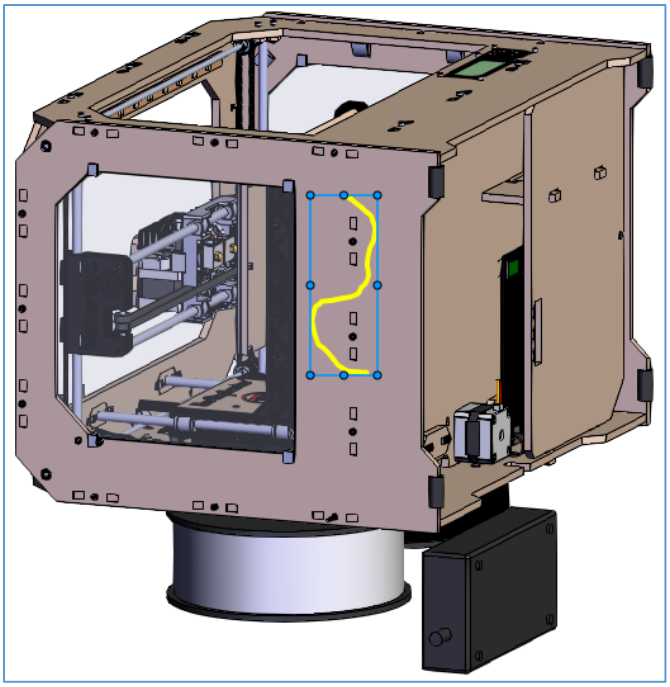


The scribble feature provides the following functionality:

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.

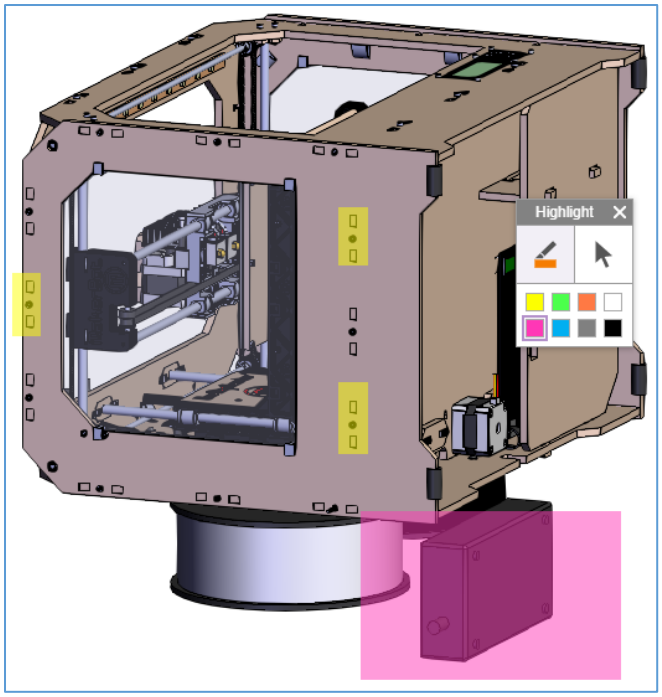
Click **Select** and then click a line to select it. When selected, the line has **blue edges with circles**. You cannot reposition selected lines.



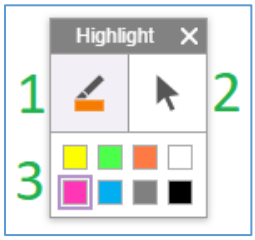
9.8.3.3 Highlighting Areas on CAD Models

You can specify arbitrary rectangular areas on a CAD Model using the highlighting feature. Refer to section *9.8.3.1 Using the Markup Toolbars* to access the button.

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When accessed from the **Basic Markup** toolbar, the highlighting feature appears as the **Highlight** toolbar.



When accessed from the **Standard Markup** toolbar, the highlighting feature is hosted on this toolbar.



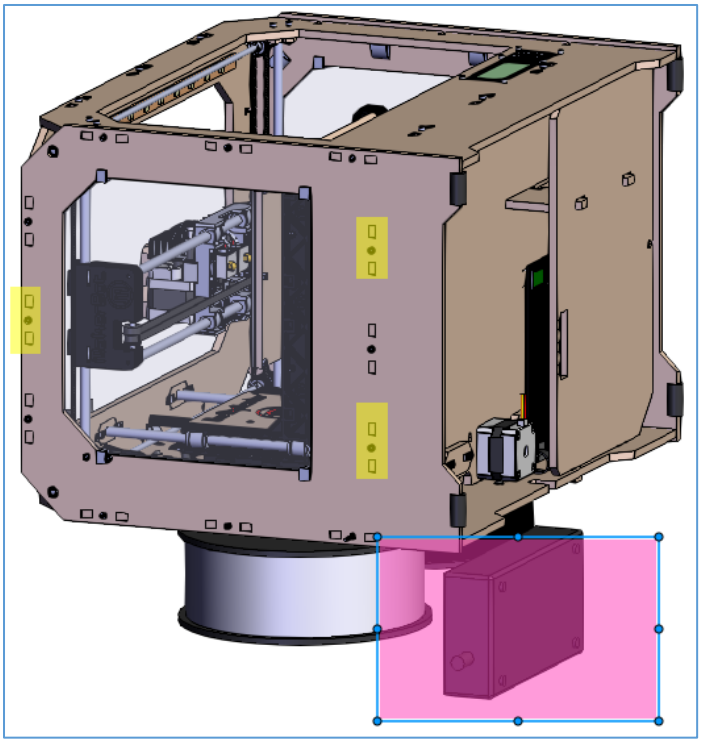
The highlighting feature provides the following functionality:

1. **Highlight** draws arbitrary rectangles on the CAD Model.
2. **Select** selects markups on the CAD Model.
3. A set of rectangle colors.

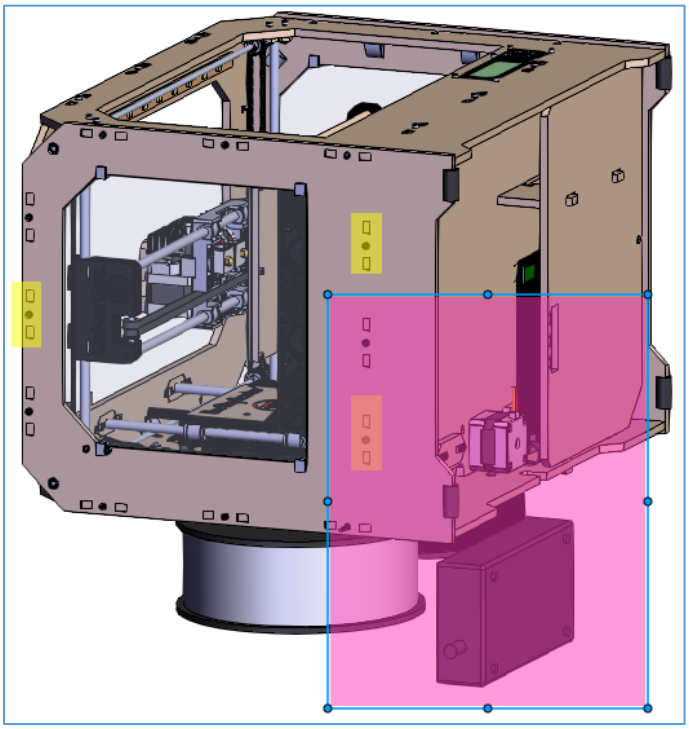
Click a feature or option to use it.

Click **Select** and then click a rectangle area to select this area. When selected, the rectangle area has **blue edges with circles**.

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Drag the **blue circles** on the selected rectangle **edges** to reposition the rectangle.

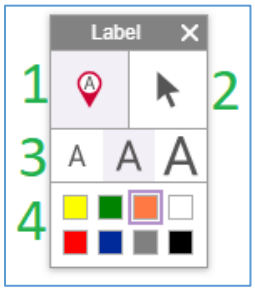


9.8.3.4 Putting Labels on CAD Models

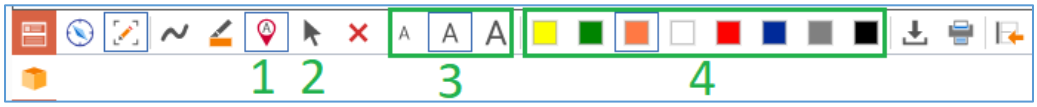
You can label parts of a CAD Model using the label feature. Refer to section *9.8.3.1 Using the Markup Toolbars* to access the button.

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When accessed from the **Basic Markup** toolbar, the label feature appears as the **Label** toolbar.



When accessed from the **Standard Markup** toolbar, the label feature appears on this toolbar.



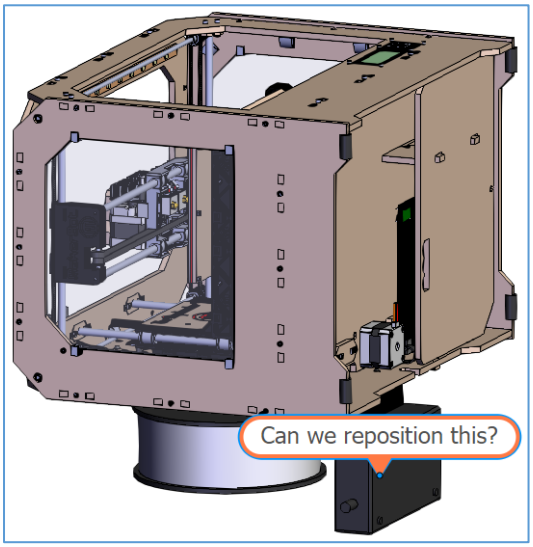
The label feature provides the following functionality:

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.

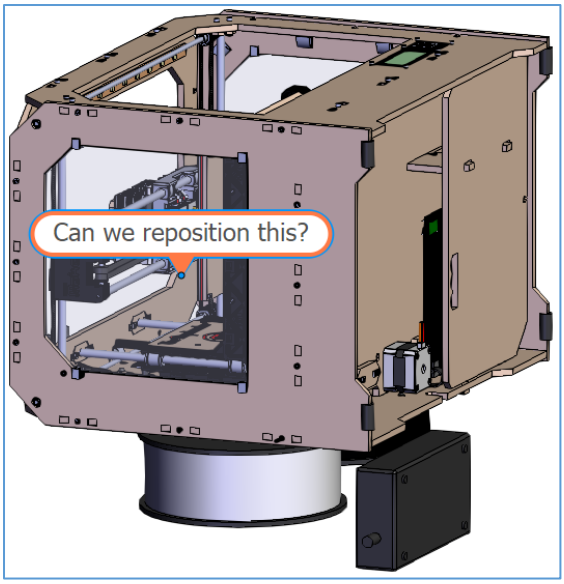
To create a label:

1. Click the **Label** button.
2. Click the area of the CAD Model that you want to label.
3. Enter the appropriate text inside the label.
4. Click **Select** and then click a label to select it. When selected, the label has **blue edges with a circle at the bottom**.

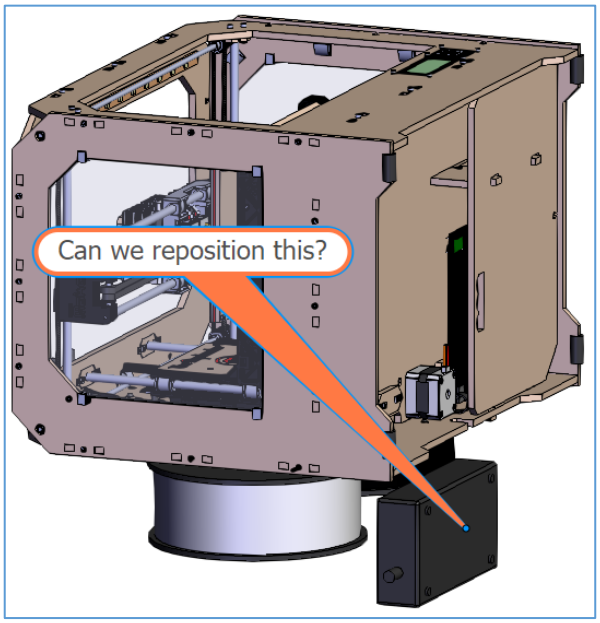


To reposition a label, select and drag **its colored frame from right above the blue bottom circle** to the appropriate position on the CAD model.

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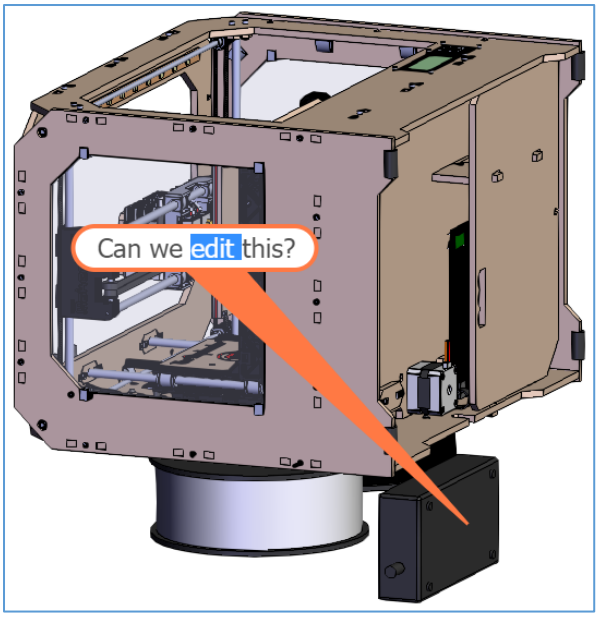


To change where a label points to, select the label, and drag **the blue bottom circle**.



To enter or change the label text, click inside the label, and edit the text.

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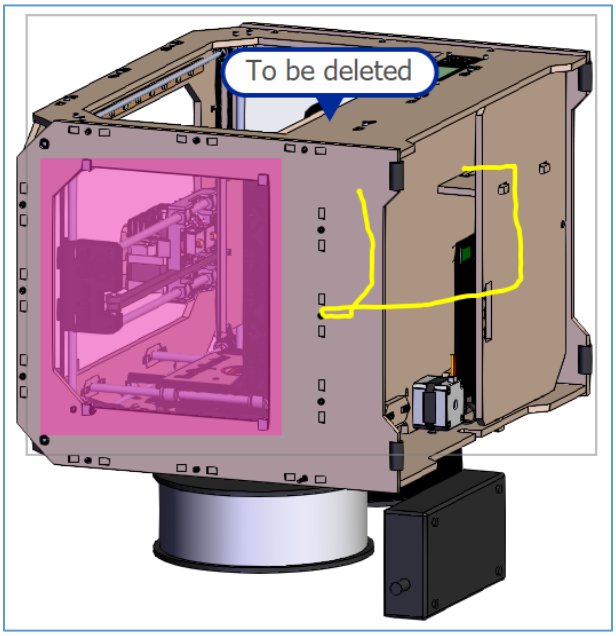


9.8.3.5 Selecting Markups on CAD Models

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.

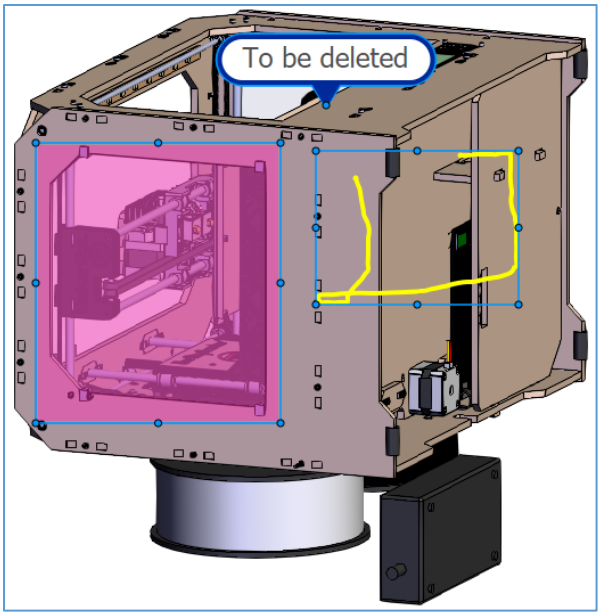
To select a single markup item, click **Select** on a **Markup** toolbar and then click the **item**.

To select several markup items, click **Select** on a **Markup** toolbar and drag the cursor to specify the rectangular selecting area.



All the markup items within the selected area become selected.

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9.8.3.6 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.

9.8.4 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 *9.8.3.1 Using the Markup Toolbars* to access the button.

9.8.5 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 *9.8.3.1 Using the Markup Toolbars* to access the button.

9.9 Deleting CAD Documents

You can 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. 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.

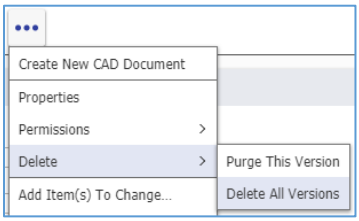
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Note: CAD Documents that are claimed by any user or are used on other items cannot be deleted.

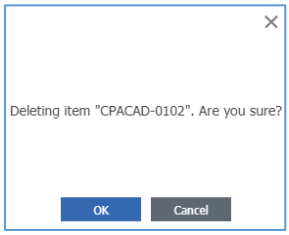
CAD Documents can be deleted using either its view or the context menu in the CAD Documents Search Page.

To delete a CAD Document from its view:

1. Open the CAD Document.
2. On the CAD Document toolbar, click **More > Delete > Delete All Versions**.



3. Click **OK** in the confirmation dialog to delete the CAD Document.



To delete a CAD Document using its context menu:

1. Go to the Documents Search Page.
2. Right-click the Document to be deleted and click **More** > **Delete** > **Delete All Versions**.
3. Click **OK** in the confirmation dialog to delete the Document.

9.10 Finding Where a CAD Document is Used

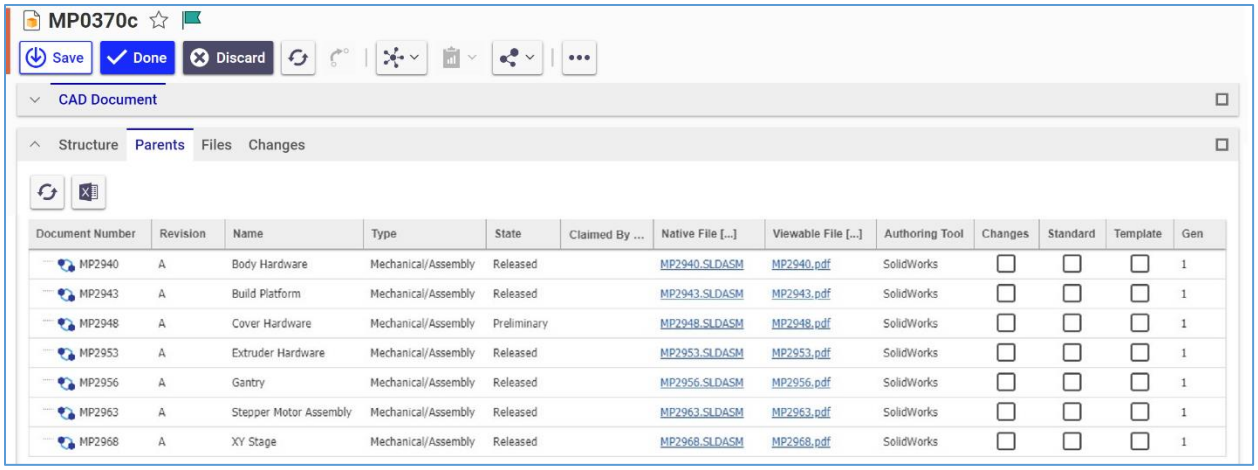
There are several methods to determine where a CAD Document is used:

- The Parents accordion tab on the CAD Document
- Parts associated with a CAD Document
- The Where Used browser

9.10.1 CAD Document Parents

The **Parents** accordion tab of the CAD Document view shows a read-only list of the CAD Document's direct Parents.

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1. Right-click a Parent CAD Document and click **View** open the selected Parent.
2. To download the native or viewable files, click the link in the corresponding cell.

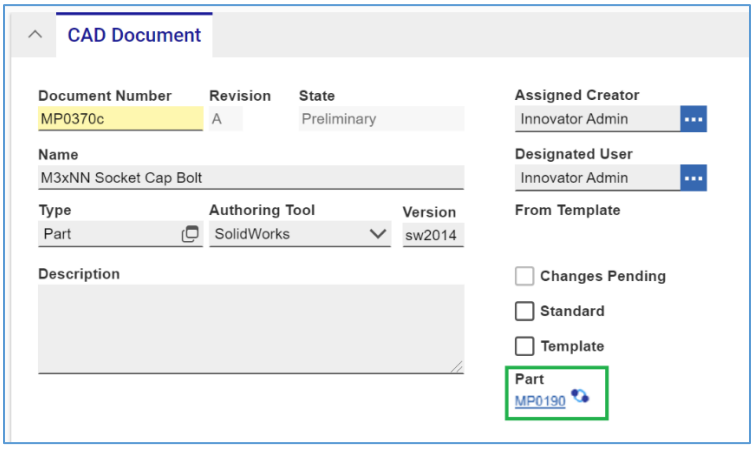
9.10.2 Parts Associated with a CAD Document

CAD Documents can be attached to a Part, but Parts cannot be attached to a CAD Document.

You can use the Parts accordion tab on the CAD Document to explore which Parts include this CAD Document as an attachment.

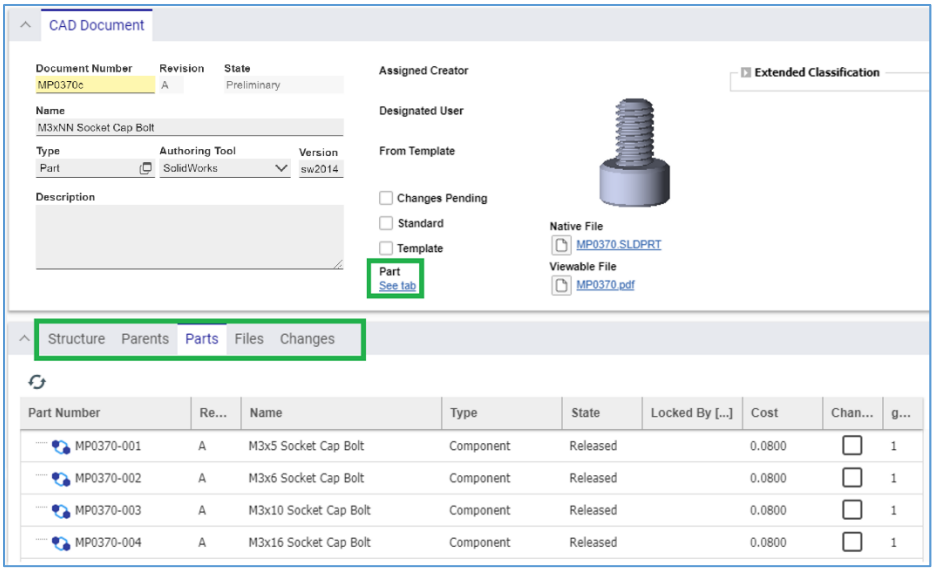
Note: If the CAD Document is not attached anywhere, there are no Part links or Part accordion tabs.

If the CAD Document is attached to a single Part, there is a link to this Part but there is no Parts accordion tab.



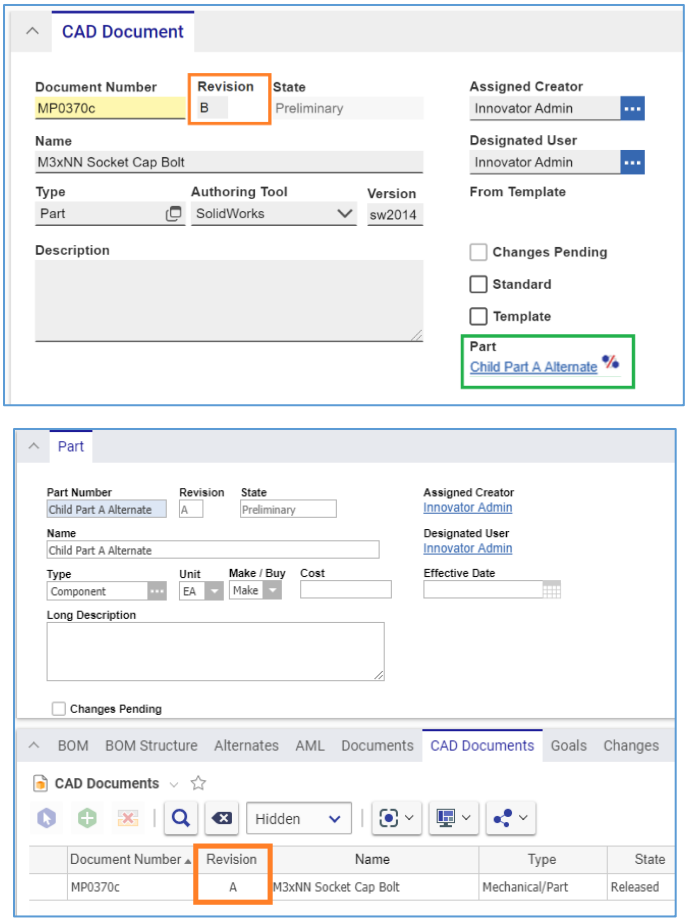
If the CAD Document is attached to several Parts, the Part link and the Parts accordion tab appear. Clicking the Part link opens the Parts accordion tab. Right-click a Part in the Parts grid and click View to open the selected Part.

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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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9.10.3 Where Used CAD Document Browser

Aras Innovator offers the Where Used feature to determine where an Item is used by other Items. Refer to section *11.1 Finding Where an Item is Used* for further information. All examples in that section are applicable to CAD Documents.

9.11 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* for further information. All examples in that section are applicable to CAD Documents.

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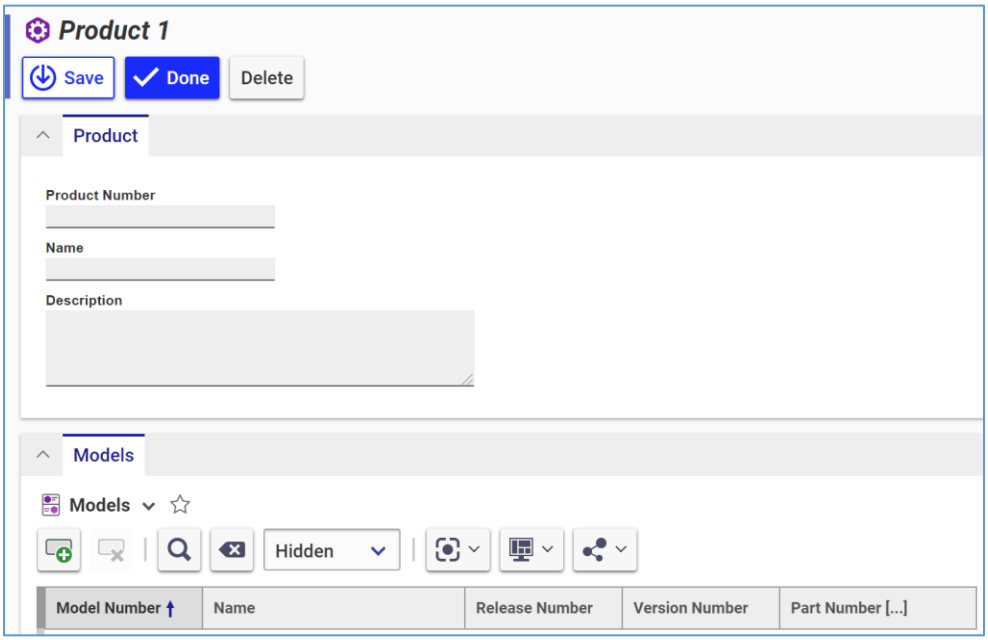
10 Products

A Product is an additional ItemType 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

To create a Product:

1. Go to **Contents > Design > Products**.
2. Click **Create New Product**. The new Product view appears. Enter the necessary information.



   - **Product Number:** The Product number.
   - **Name**: The name of the Product.
   - **Description**: Remarks about the Product.
3. Add Models as described in section *10.2 Adding Models to a Product*.
4. Click **Save** or **Done** to save your changes and create the Product.

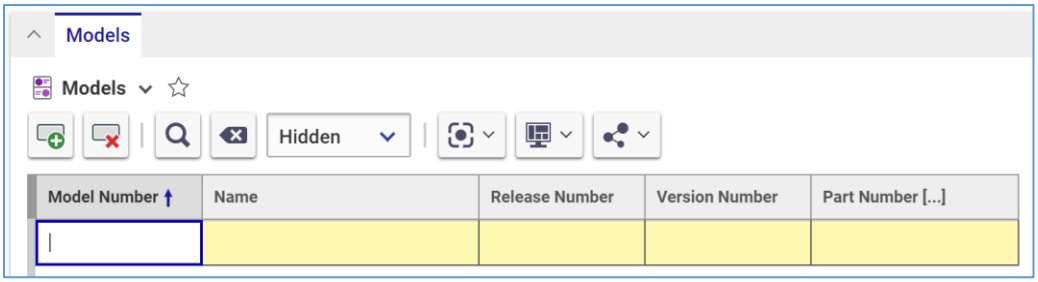
10.2 Adding Models to a Product

To add a Model to a Product:

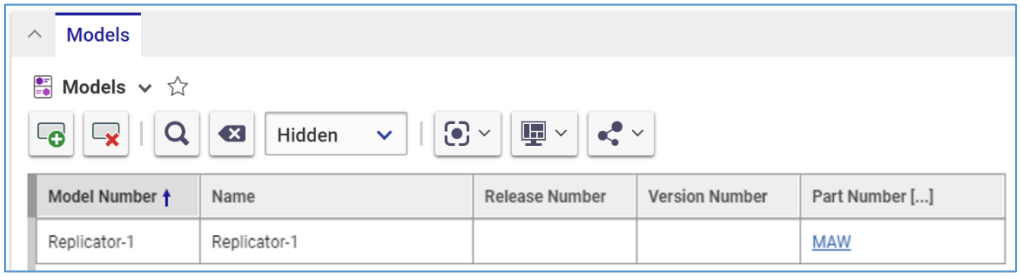
1. Open the Product.
2. Click **Edit**.

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3. Go to the **Models** accordion tab.
4. Click **New Model** on the Models accordion toolbar. A new row appears at the bottom of the Models grid.



5. Enter the necessary information by clicking the corresponding cell in the Models grid.
   - **Model Number**: The Model number.
   - **Model Name:** The Model name.
   - **Release Number**: For software products, this is the release number.
   - **Version Number**: For software products, this is the version number.
   - **Part Number**: The Part that represents the Model.
6. Click **Save** or **Done** to save your changes. The Model is attached to the Part.

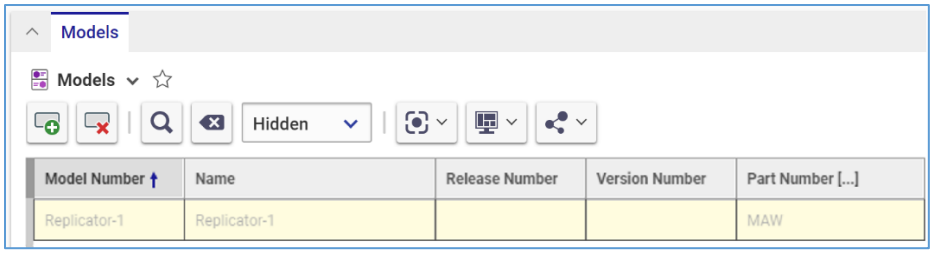


10.3 Removing Models from a Product

To remove Models from a Product:

1. Open the Product.
2. Click **Edit**.
3. Go to the **Models** accordion tab.
4. Click the Model to be removed and then click **Delete Model** on the Models accordion toolbar. The Model becomes greyed out.

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5. Click either **Save** or **Done** to save your changes. The **Model** disappears from the grid.

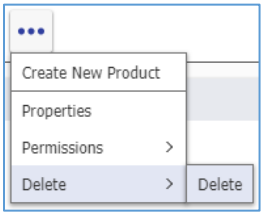
10.4 Deleting a Product

You can delete a Product either from its view or by using the context menu in the Product Search Page.

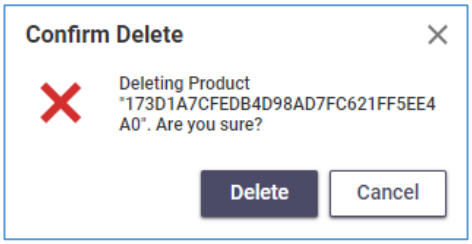
Note: A claimed Product cannot be deleted.

To delete a Product using its view:

1. Open the **Product**.
2. On the **Product** toolbar, click **More** > **Delete > Delete**.



3. Click **OK** in the confirmation dialog to delete the Product.



To delete a Product using its context menu:

1. Go to the Products Search Page.
2. Right-click the Product to be deleted and then click **More** > **Delete**.
3. Click **OK** in the confirmation dialog to delete the Product.

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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 ItemTypes: 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 ItemTypes provide additional information or features for explorations specific to these ItemTypes.

11.1 Finding Where an Item is Used

The **Where Used** page displays a reverse-dependency tree for the selected Item. Each expandable level shows Items that reference it through a relationship or an Item property.

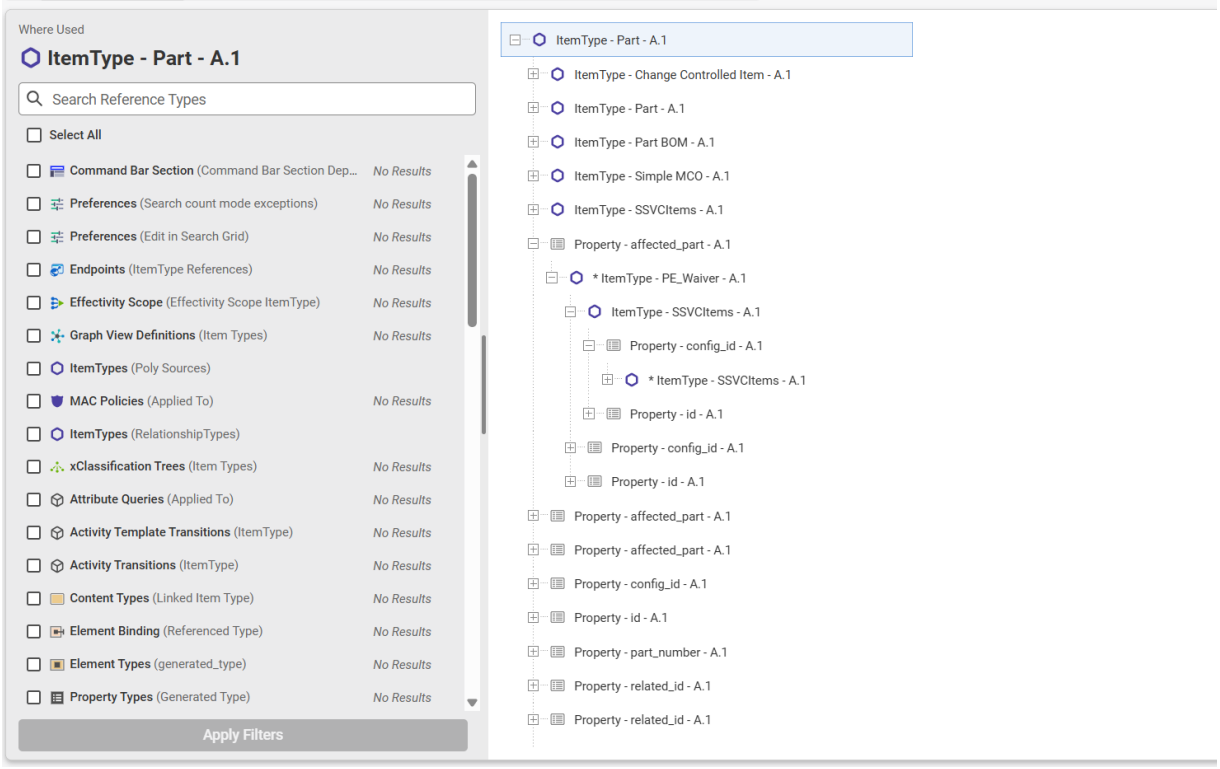
The page contains a filter panel on the left and the Where Used tree on the right. Drag the **splitter** between the panels to resize them.

The selected Item appears as the collapsed root of the tree. Its label shows:

- ItemType
- Keyed name
- Revision
- Generation

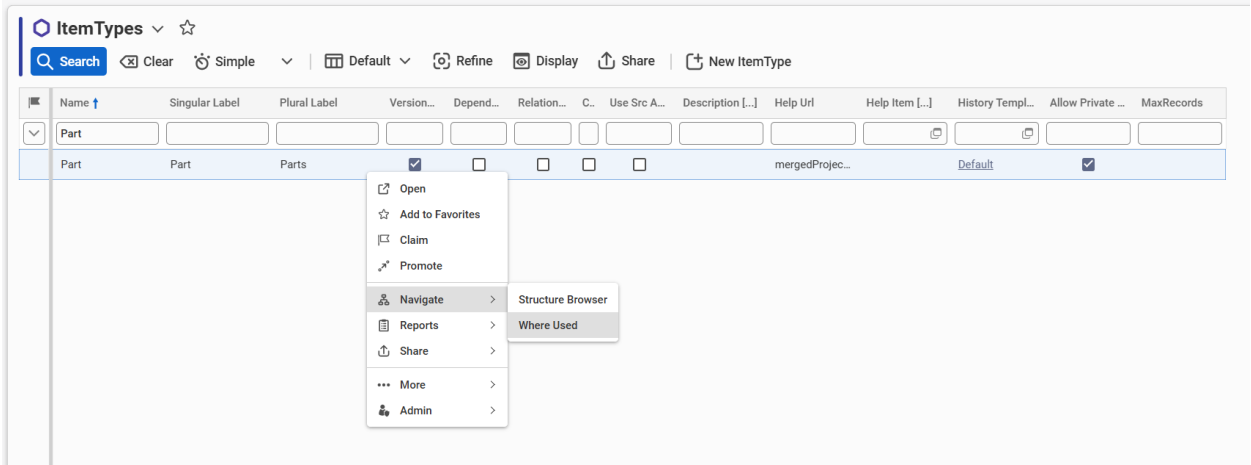
Expand a row to load the Items that directly reference it. Continue expanding rows to explore the reverse-dependency tree level by level.

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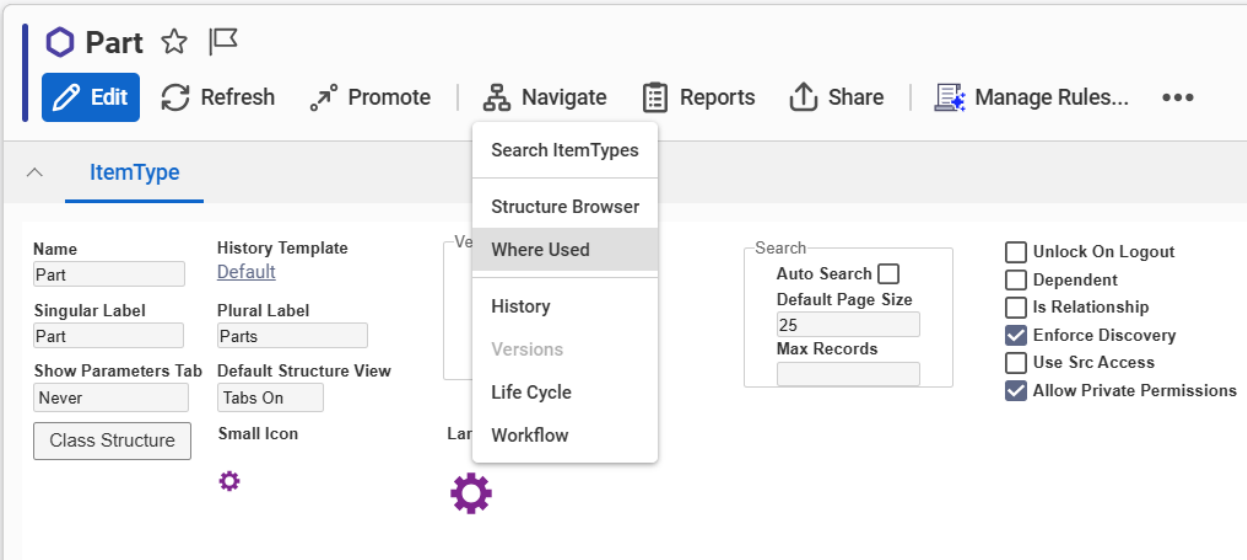
To access the **Where Used** browser for an Item, use one of the following methods:

1. Go to the Item Search Grid Page, right-click the Item, and then click **Navigate** > **Where Used**.

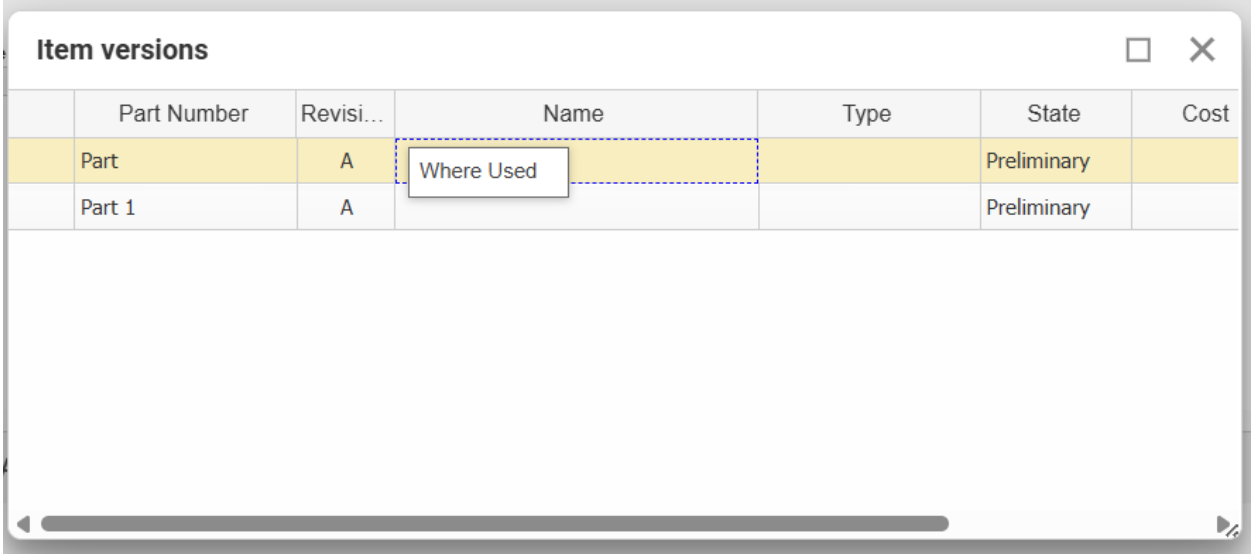


2. Open the Item, click **Navigate** on the **Item** toolbar, and then click **Where Used**.

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3. In the Item versions dialog, right-click a version and click **Where Used**.



From an Item Search Grid or Item view, Where Used opens as a separate tab in the main Aras Innovator window.
From the Item versions dialog, it opens as a dialog.

Working with Filtering Reference Paths

Select a row to display its available reference paths in the filter panel. A reference path identifies the relationship or Item property through which another Item references the selected row.

To filter reference paths:

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1. Use the search field to filter the reference path cards by ItemType or reference path name.
2. Select the cards for the reference paths you want to include.
3. Click **Apply Filters**.

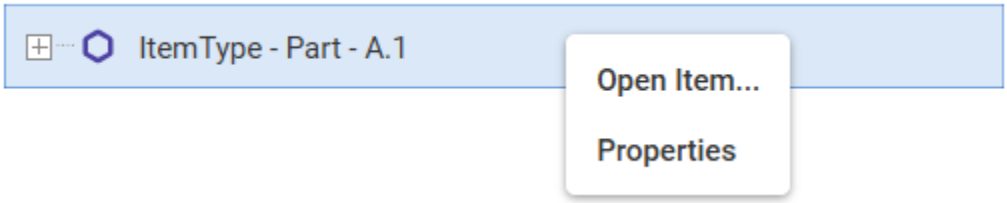
With no cards selected, all reference paths are included. When several cards are selected, results matching any selected path are included.

After you search, **Select All** selects or clears only the cards currently visible in the results. If selected cards are hidden by the search, a badge shows how many selected cards are hidden.

The first time you expand a row, Where Used applies your current filter selection to load its children. To change the results of an already-expanded row, select the required cards and click **Apply Filters** again.

Working with the Where Used Tree

1. Right-click a row in the tree to use one of the following actions:
    - **Open Item…** - Opens the selected Item in a new tab.
    - **Properties** - Opens the Properties dialog for the selected Item.



2. Double-click a row to open the selected Item.

To quit the Where Used Browser, close its view in Aras Innovator.

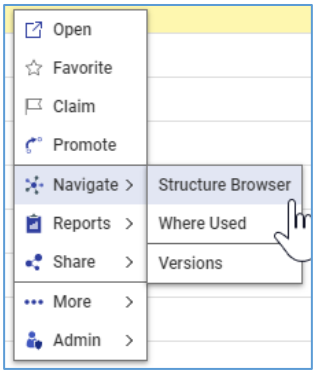
11.2 Comparing Items

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.

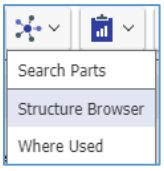
There are several ways to access the Structure Browser:

- Go the Item Search Grid Page, right-click an Item to be compared, and then click **Navigate** > **Structure Browser**.

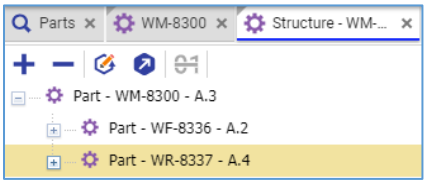
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- Open the view of an Item to be compared. Click **Navigate** on the **Item** toolbar, and then click **Structure Browser**.

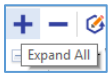


When you access the Structure Browser, it appears as a new Aras Innovator view showing the Item hierarchy tree where you can see the Number and Revision for each Item.

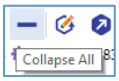


In addition to the standard tree navigation features, the following buttons are available in the Structure Browser toolbar:

- **Expand All**, which opens the whole hierarchy tree.



- **Collapse All**, which closes the whole hierarchy tree.



To quit the Structure Browser, close its view.

11.2.1 Comparing Different Item Versions

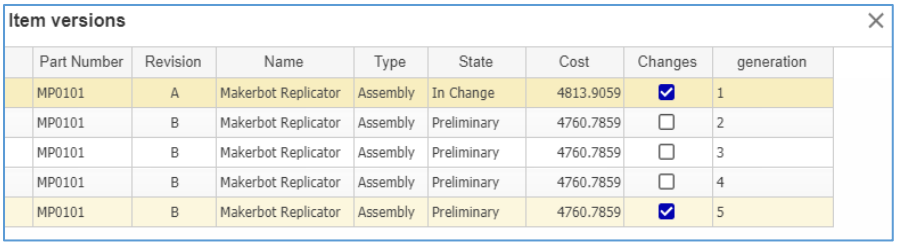
Use the following procedure to compare the current version of an Item with an older one:

1. Click **Side-by-side with other Version** on the Structure Browser toolbar.



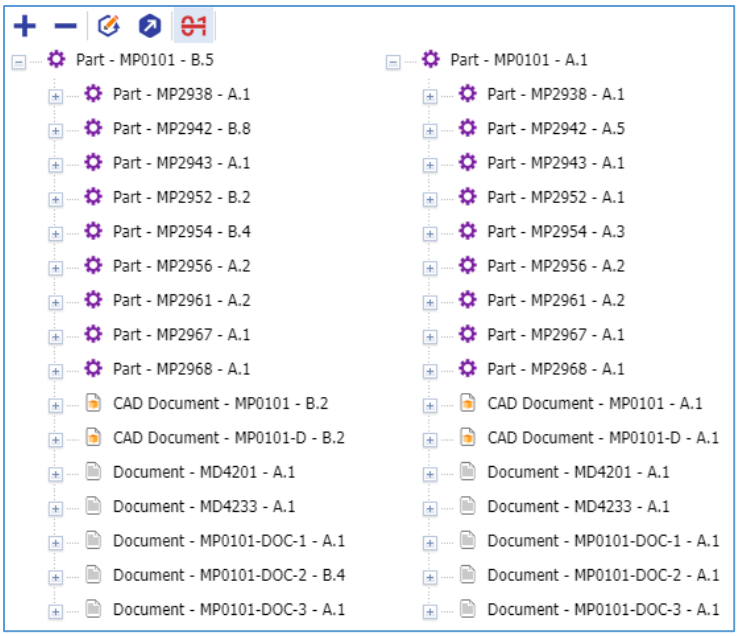
   The Item versions dialog appears.

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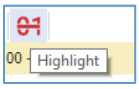


Part Number	Revision	Name	Type	State	Cost	Changes	generation
MP0101	A	Makerbot Replicator	Assembly	In Change	4813.9059	☑	1
MP0101	B	Makerbot Replicator	Assembly	Preliminary	4760.7859	☐	2
MP0101	B	Makerbot Replicator	Assembly	Preliminary	4760.7859	☐	3
MP0101	B	Makerbot Replicator	Assembly	Preliminary	4760.7859	☐	4
MP0101	B	Makerbot Replicator	Assembly	Preliminary	4760.7859	☑	5

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.

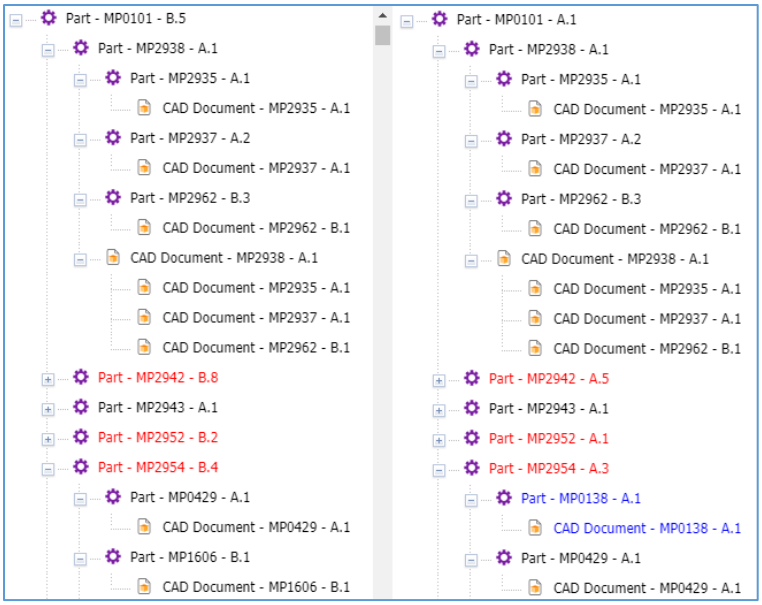


3. Click **Highlight** on the Structure Browser toolbar.



The trees open. Differences are highlighted.

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- Black means that both Item versions use the same version of this Item.
- 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.

4. If it is necessary to view detailed information on an Item version, double-click the Item to open its view.

Note: You cannot compare more than two versions of an Item in one Structure Browser tab.

11.2.2 Comparing Different Items

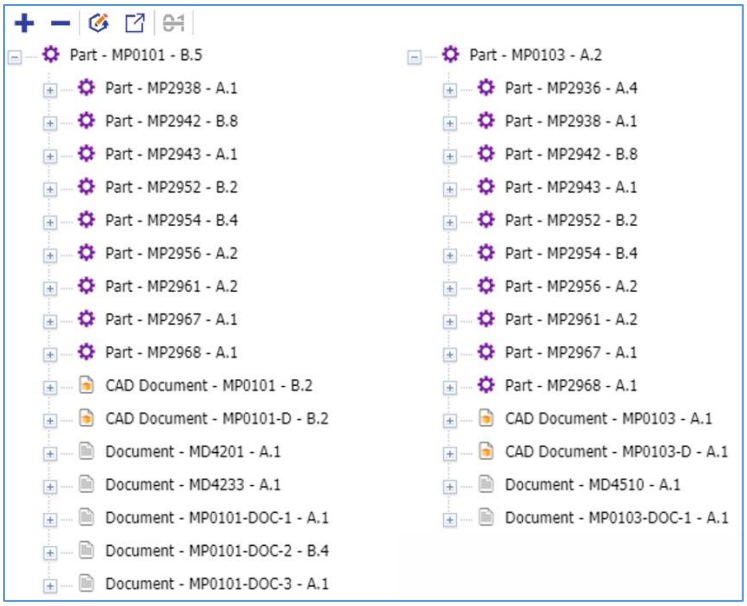
To compare the hierarchies of two different CAD Documents:

1. Click **Side-by-Side with other *ItemType*** in the Structure Browser toolbar. The **Search dialog** appears.

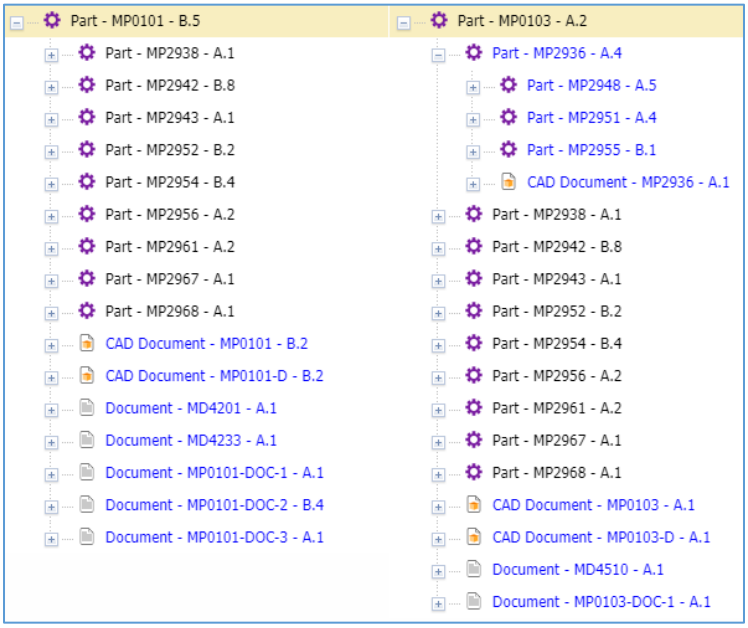


2. Using the standard search procedure, search for and select the Item to be compared. The tree of the selected Item hierarchy appears on the right side of the Structure Browser, and the Highlight button becomes available on the Structure Browser toolbar.

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3. Click **Highlight** in the Structure Browser toolbar. The trees appear with differences 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.

4. If it is necessary to view detailed information on an Item, double-click the Item to open its view.

Note: You cannot compare more than two Item hierarchies in one Structure Browser tab.

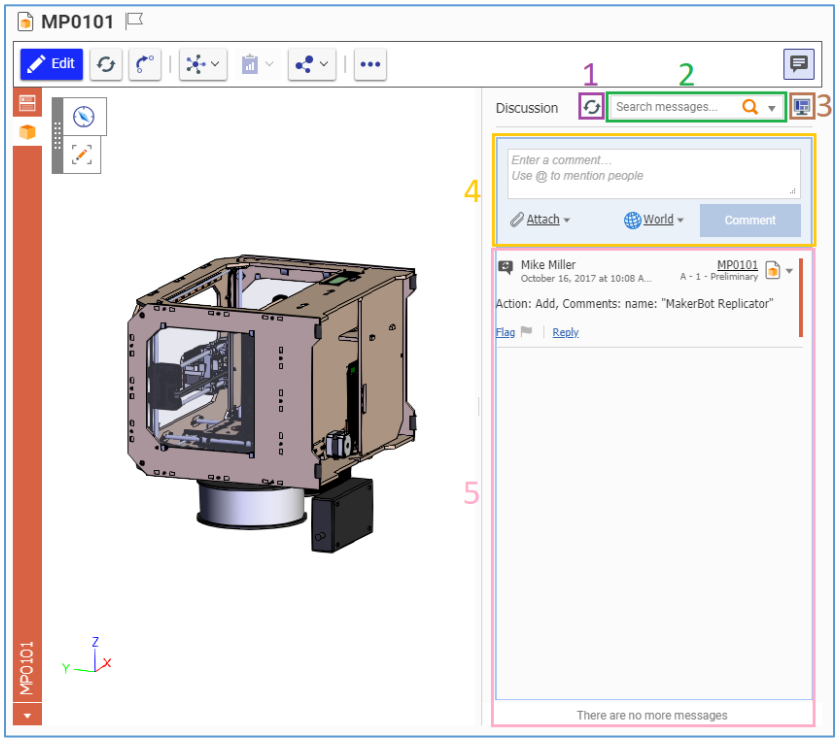
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12 Visual Collaboration for Discussing Items

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 ItemTypes: 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:



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.

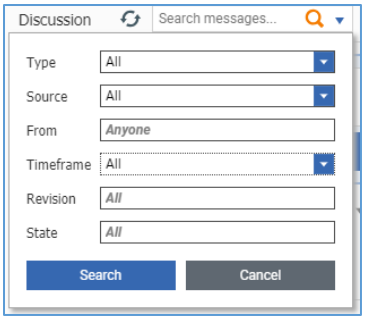
12.1 Searching Comments

You can use the **Search** box for simple and advanced searching of specific comment messages in a discussion. You can combine these two methods.

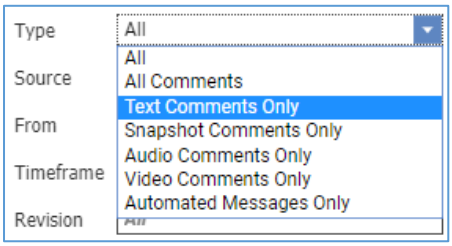
For a simple search, type your keywords in the **Search** box and press Enter on your keyboard.

For advanced search, click the **drop-down arrow** in the **Search** box and specify your search criteria in the following fields:

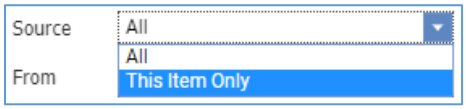
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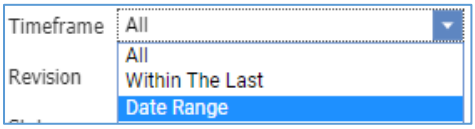
- **Type**: Displays a drop-down list of comment message types: All, All Comments, Text Comments Only, Snapshot Comments Only, Audio Comments Only, Video Comments Only, Automated Messages Only.



- **Source**: Displays a drop-down list of comment messages: **All**, **This Item Only**.



- **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**.

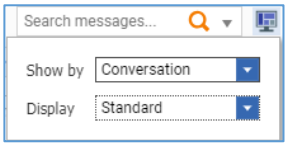


- **Revision:** Enables you to specify a Revision value of the item for search.
- **State**: Enables you to specify a life cycle state for search.

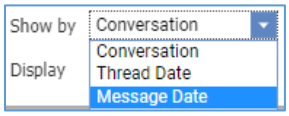
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12.2 Setting up the Discussion Display

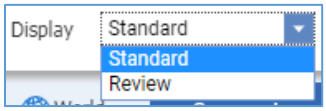
The **Display Settings** button enables you to configure the view of information that appears in a discussion.



- **Show by**: A drop-down list to specify the order of comment messages: **Conversation**, **Thread Date**, **Message Date**.

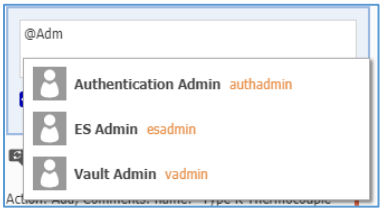


- **Display**: A drop-down list to specify the display type: **Standard**, **Review**.

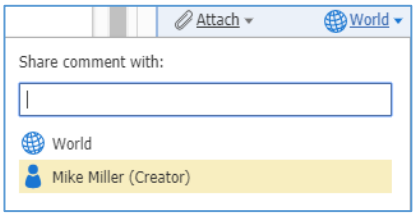


12.3 Managing Your Comments

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.



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.



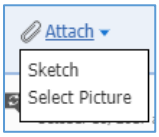
The person's **name** replaces the **Word** link. Only you and this person can see this comment thread.

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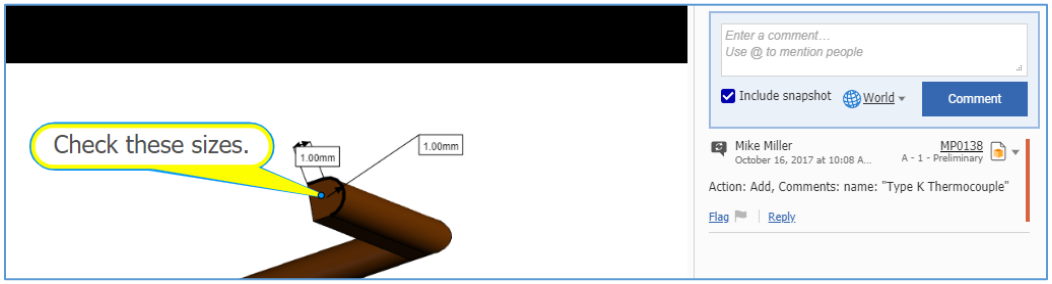


If you want to add an image to your message, use the **Attach** link to attach the image file and click **Comment**. The **Attach** link displays the following options:

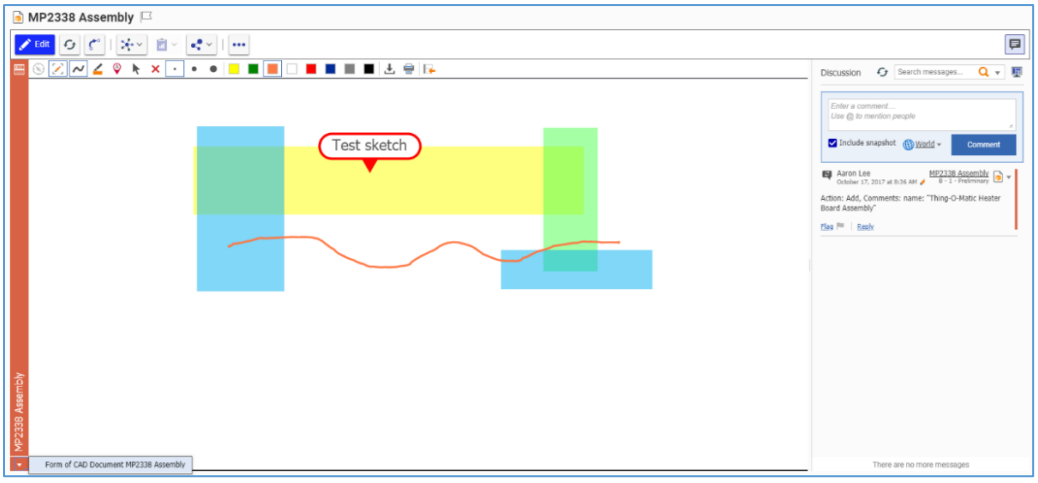
Note: You need to purchase a subscription for viewing and working with native CAD Models in Aras Innovator right from the corresponding Item and the discussion feature. Without this subscription, drawing and images are not available.



- **Sketch** makes a snapshot of an Item view if you check the **Include snapshot** check box.

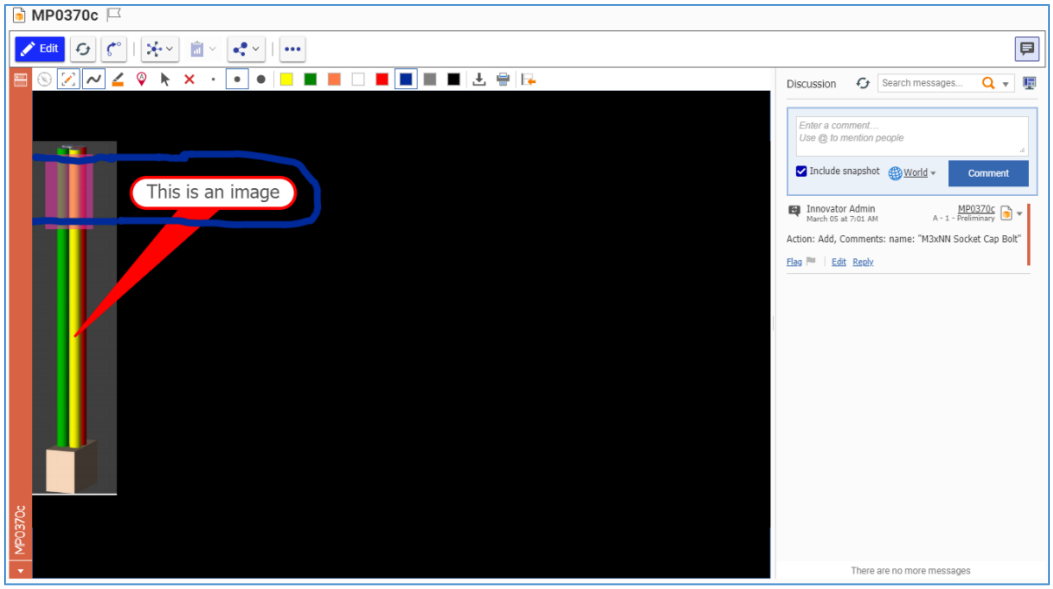


Even if an Item has no 3D Model attached, you can use this feature to draw an arbitrary sketch using the markup tools.

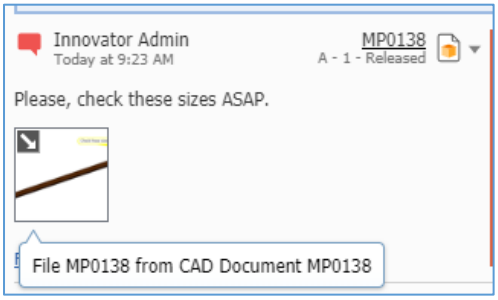


- **Select Picture** opens the standard dialog of your operating system for file browsing. Search for and select an image. The uploaded image appears in the image view. You can draw on the uploaded image using the markup tools.

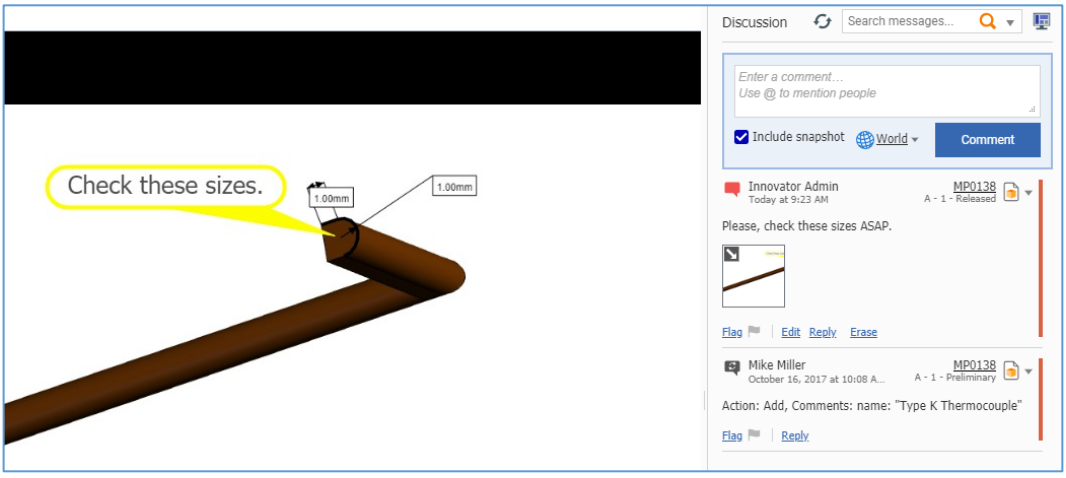
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When attached, the image appears as a thumbnail in a comment message.

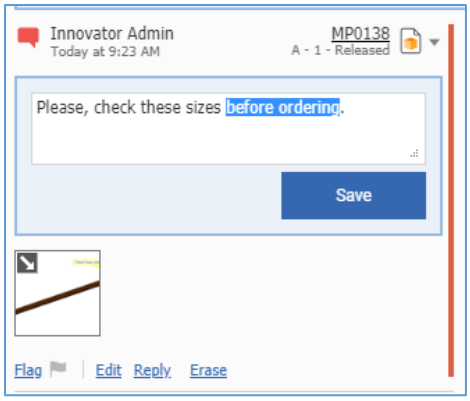


Click the thumbnail, and the image appears in the Item view.

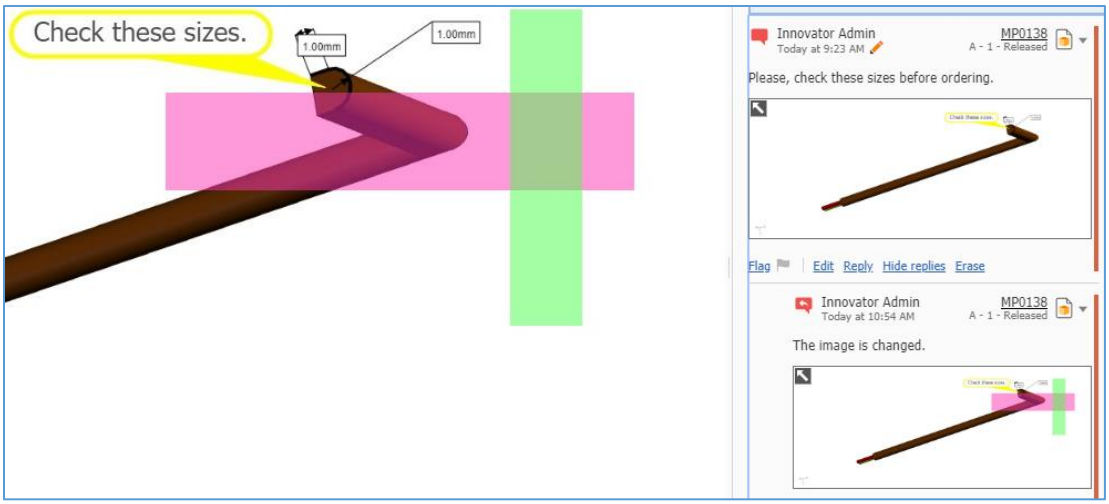


If you need to edit your message, click the **Edit** link at the bottom of your comment, edit the message text, and click **Save**.

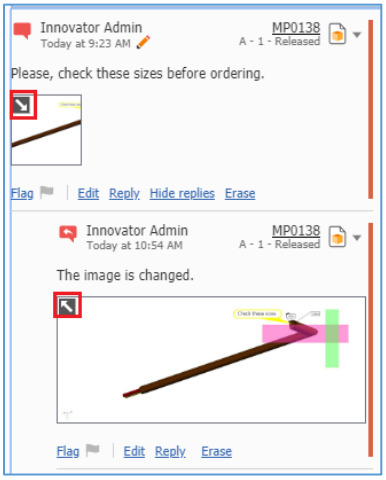
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You cannot edit or remove attached images. You can draw with the markup tools on the attached images. To save the changes, you need to attach the changed image as a snapshot to a new comment. To keep a history of changes, you can attach the changed snapshot as a reply to your own comment.

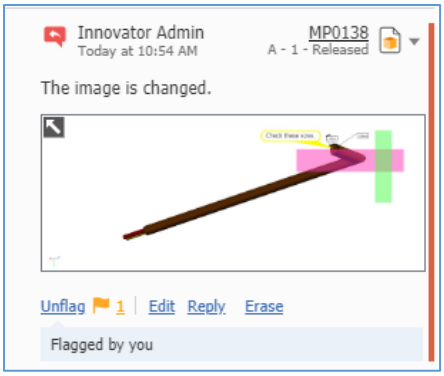


To enlarge or reduce a thumbnail, click the **arrow** button at the top left corner of the thumbnail.

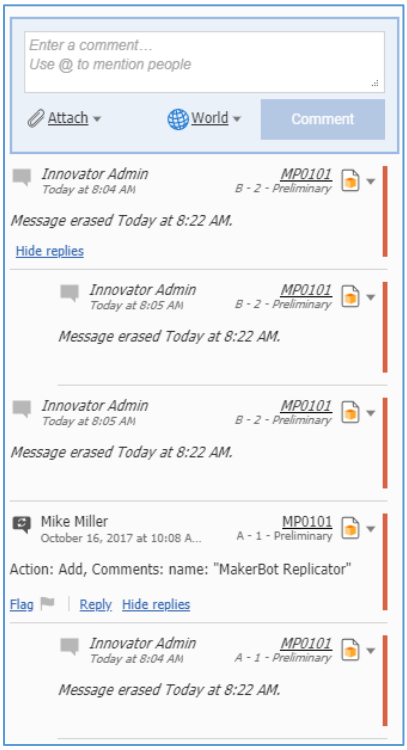


You can mark important messages with the **Flag** link. For a comment with flags, click the **number** link after the flag icon to see who flagged the comment.

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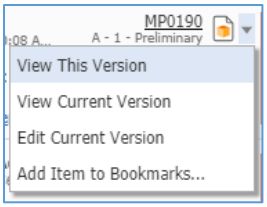


Click the **Erase** link that appears at the bottom of the Comment box to delete your comment message in a discussion. You can only delete your own messages and attached files. You cannot delete other people's messages. The discussions keep a history of changes; metadata for erased messages remains available. This metadata provides the following information about a deleted message: author, when it was erased, related CAD Document, CAD Document version and state.



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.

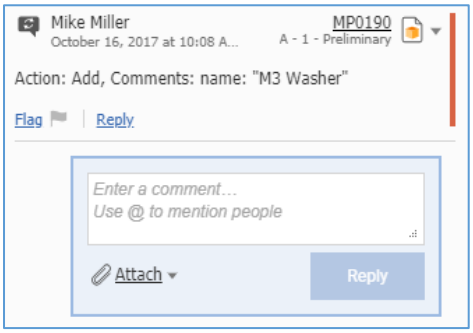
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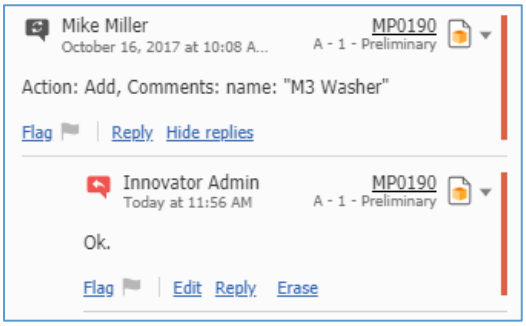
12.4 Replying to Others' Comments

To reply to a comment:

1. Click the **Reply** link at the bottom of the **Comment** box. The **Reply** box appears.



2. Enter your comment.
3. If necessary, attach an image as described in section *12.3 Managing Your Comments*.
4. Click **Reply**.



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 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 process has a built-in Impact Matrix utility that shows how the change affects 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 ItemTypes 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. ECRs do not actually affect change on the Item(s).
- The **Engineering Change Notice** (**ECN**) is an authorization to make changes to an Item based on an approved ECR. It is used to describe modifications (real or proposed) to affected Items and is also used for notifying the appropriate users that the Item is changed. ECNs do affect change on the Item(s). 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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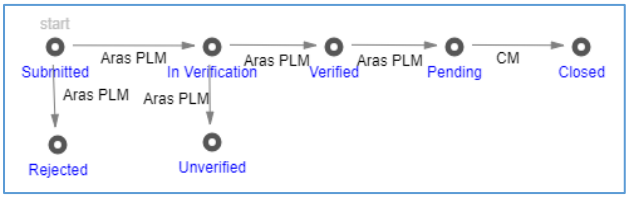
Anyone who has access to the Item in question can create a PR. An initiator can be a company employee or customer. For example, at a software company, a PR could be a new issue that has been reported by the helpdesk. At a services company, it could be a complaint call from a customer.

13.1.1.1 Understanding the PR Process

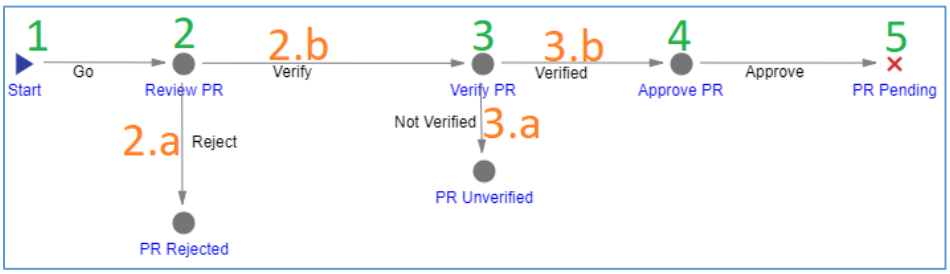
The PR workflow has the following roles:

- PR Creator: The user who initially created the PR in the system. This may or may not be the same person as other roles.
- PR Owner (**Assigned Creator**): 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.
- 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.



The PR workflow together with the PR life cycle produces the following scenario:



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**.
5. A member of the CM group starts a further CMII process according to the PR results and closes the PR.

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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 states and workflow activities in terms of Roles and Permissions.

Table 3: The PR lifecycle and workflow activities with corresponding 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: A list of all the PRs. For details, refer to section *13.1.1.6 PR Log Report*.
- PR Report: A printable PR form. For details, refer to section *13.1.1.7 PR Report*.

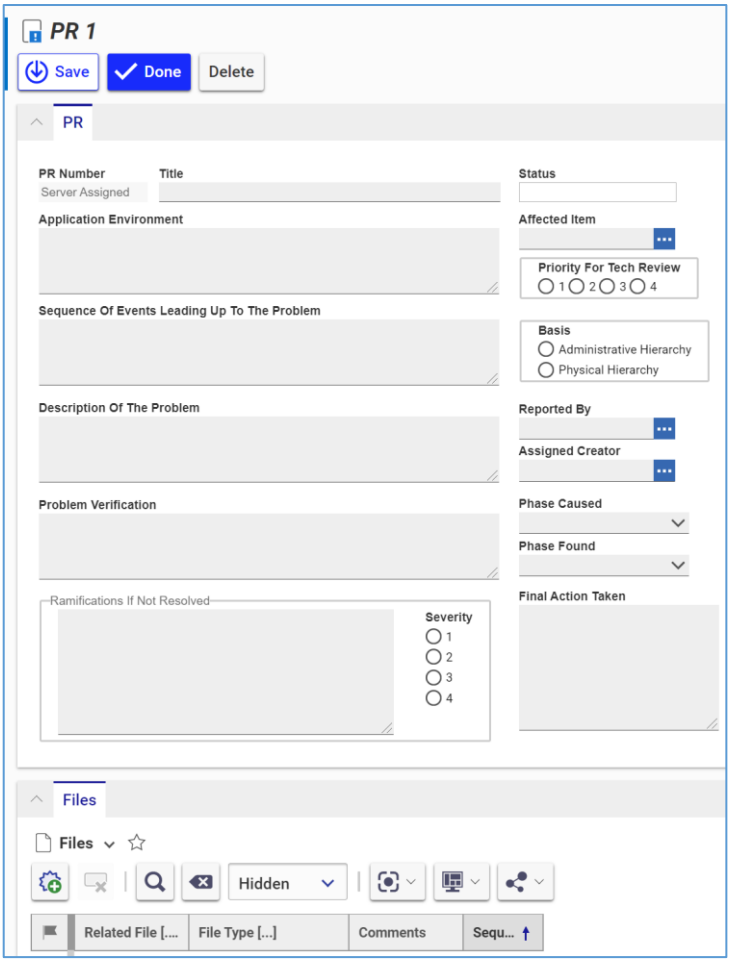
13.1.1.2 Submitting a PR

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.

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. Enter the necessary information.

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- **Title**: The title for the PR. The title should be as descriptive as possible.
- **Application Environment**: The background information about the product and/or any related problems. 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.
- **Sequence Of Events Leading Up To The Problem**: The exact steps taken that led to the problem.
- **Description Of The Problem**: A description of the problem. The description should describe the problem as precisely as possible.
- **Affected Item**: The affected item.
- **Basis**:
  - **Physical Hierarchy**: The Item (Part) itself and any Document associated with it. A bug in software would be classified as a physical hierarchy.
  - **Administrative Hierarchy**: Anything related to the process of running the business. An error in an expense report procedure would be classified as an administrative hierarchy.

3. Click **Done** on the **PR** toolbar. The PR is created and submitted for a CSI's decision.

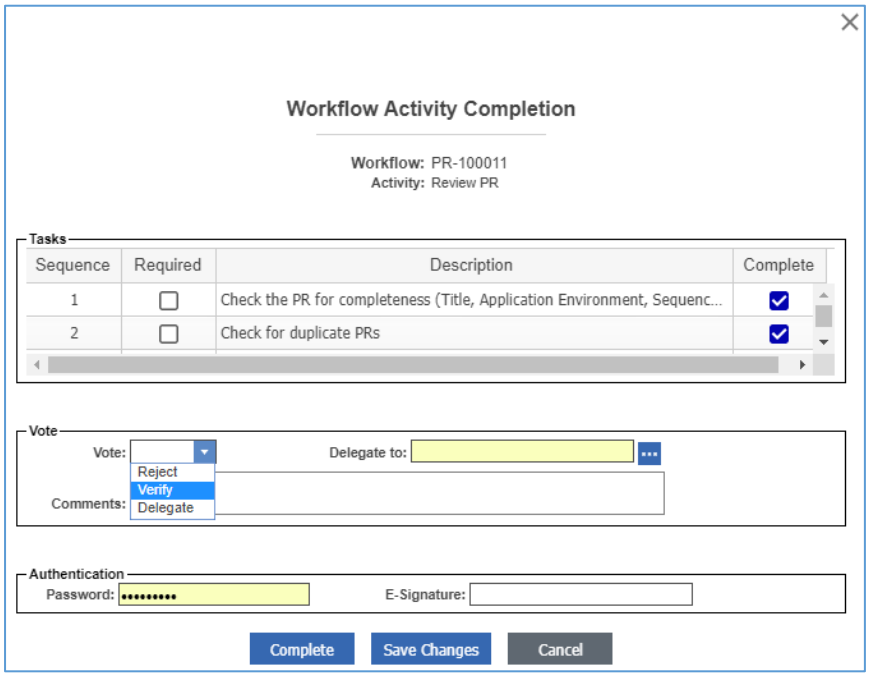
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13.1.1.3 Reviewing a PR

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.



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.

13.1.1.4 Verifying a PR

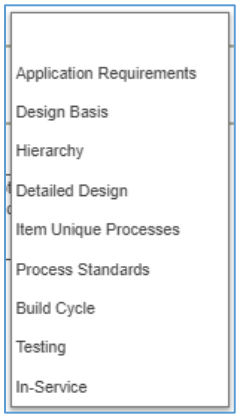
A PR Owner receives a PR **In Verification** to decide whether to reject or verify it. This section defines which pieces of information the PR Owner must provide when verifying the PR.

Use the following procedure to verify a Problem Report:

1. Open the **PR** view.

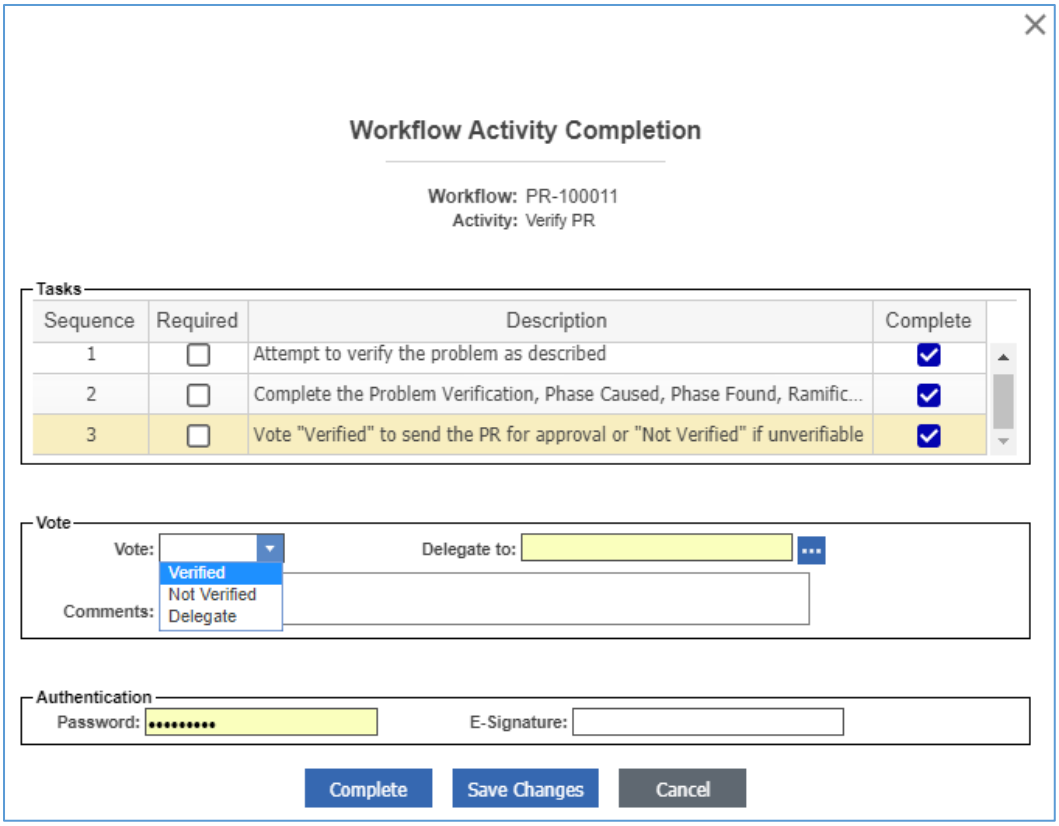
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2. Click **Edit** on the **PR** toolbar.
3. Enter the steps that were taken to verify the problem as well as any special conditions or descriptions of the problem in the **Problem Verification** text box.
4. Enter an assessment of what would happen 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.



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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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.

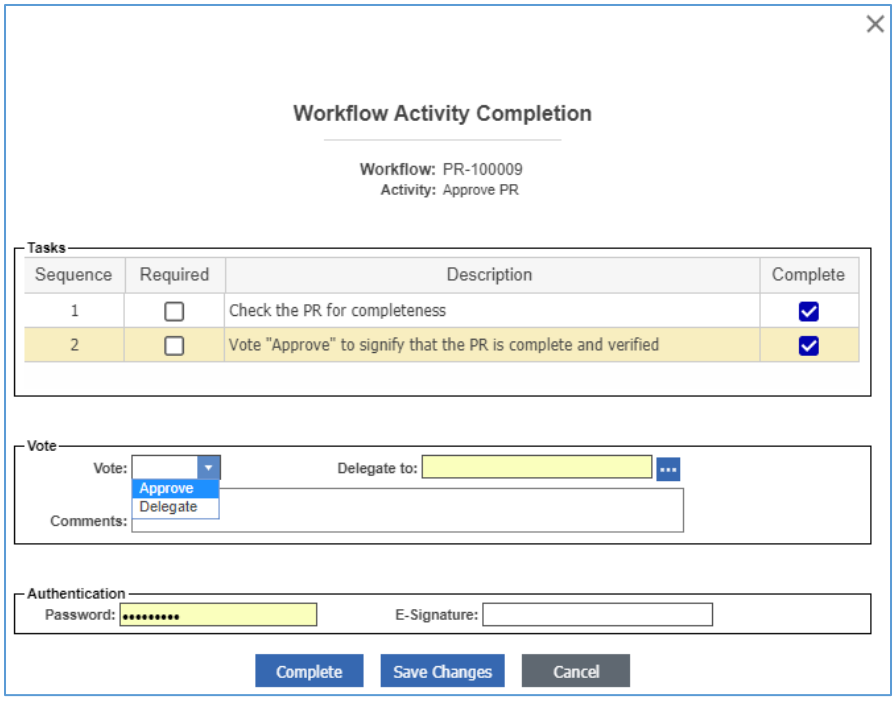
13.1.1.5 Approving a PR

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.

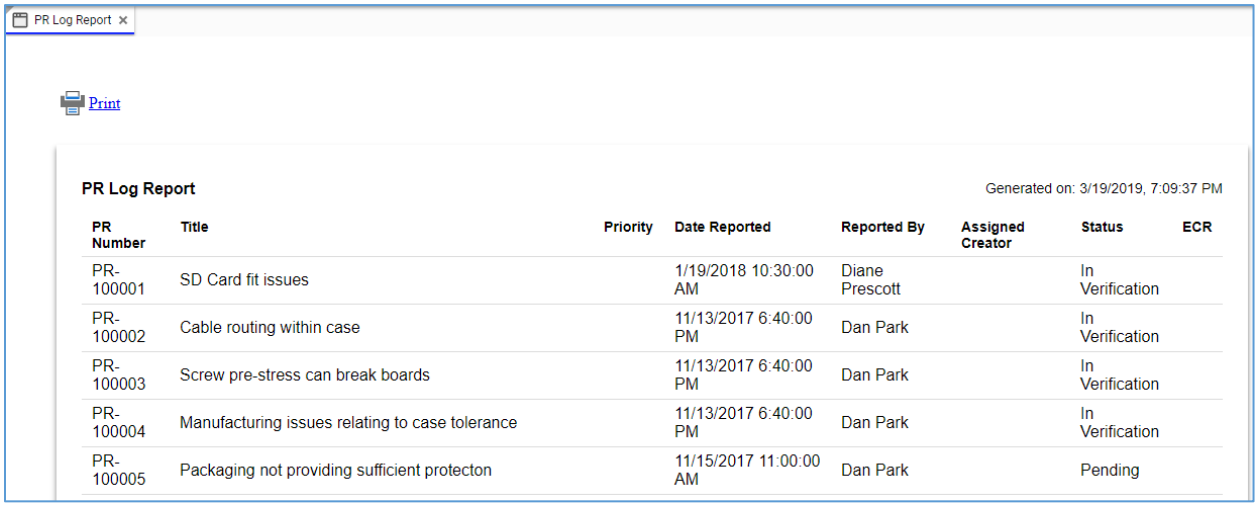
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5. Select the tasks you completed in the **Tasks** field.
6. Select **Approve** in the **Vote** list.

13.1.1.6 PR Log Report

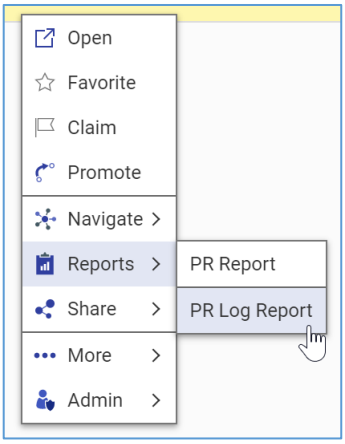
You can get quick information about all the PRs submitted to Aras Innovator with the PR Log Report.



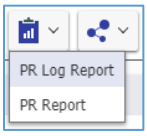
There are several ways to access the PR Log Report:

4. Go to **Contents > Change Management > PRs**, right-click any **PR**, and then click **Reports > PR Log Report**.

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5. Open the view of any PR, on the **PR** toolbar, click **Reports**, and then click **PR Log Report**.

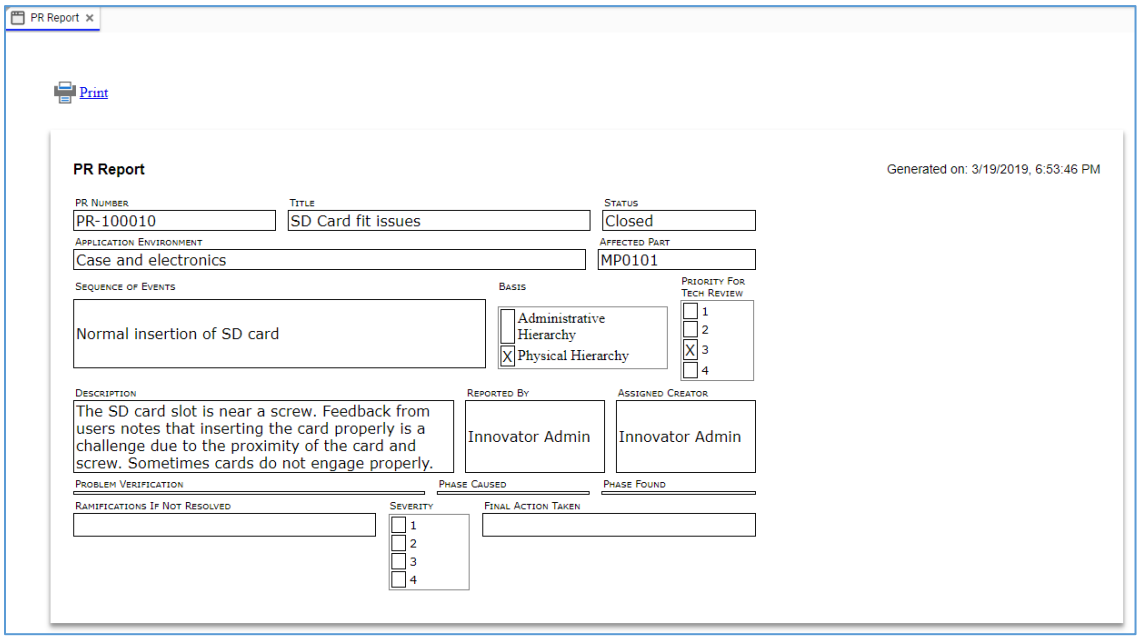


To quit a Report, close its view in Aras Innovator.

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

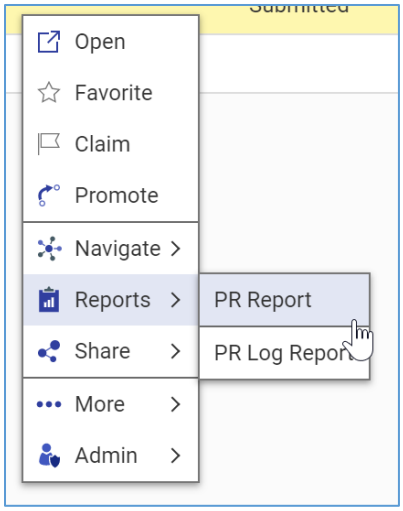
You can print or share a PR using the PR Report.



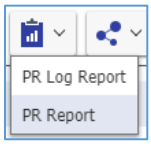
There are several ways to access the PR Report:

6. Go to **Contents > Change Management > PRs**, right-click a **PR** to be reported, and then click **Reports > PR Report**.

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7. Open the view of a PR. On the **PR** toolbar, click **Reports**, and then click **PR Report**.



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.

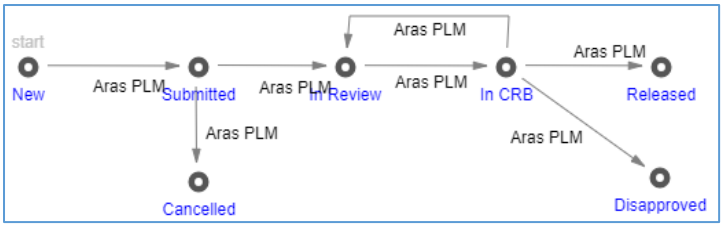
13.1.2.1 Understanding the ECR Process

The ECR workflow has the following roles:

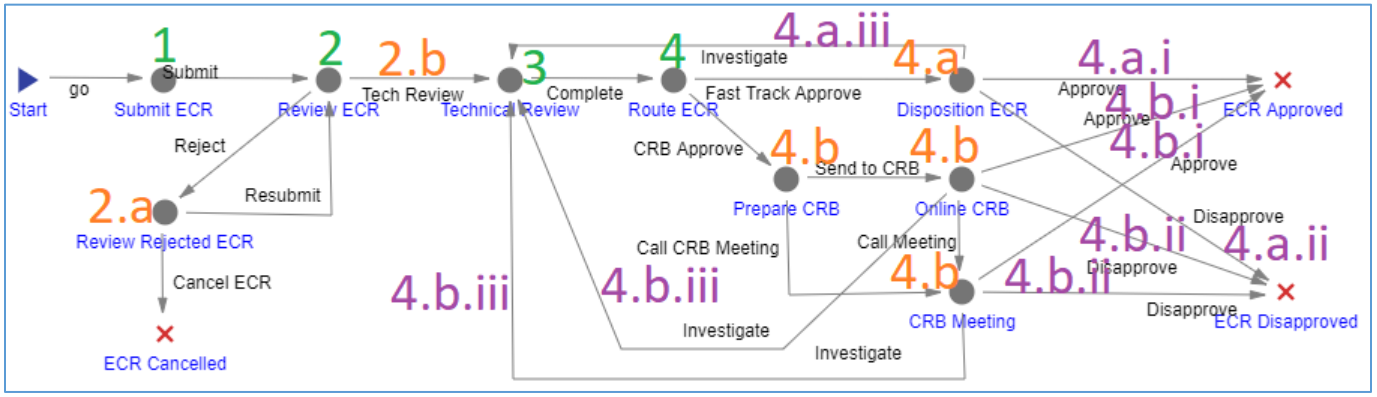
- An ECR Creator is a user who initially created the ECR in the system. This may or may not be the same person as other roles.
- An ECR Owner (**Assigned Creator**) is a person responsible for the technical review of the ECR. This person must be able to identify and verify the problem itself and to see 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).
- The Configuration Management (CM) group.

An ECR moves between various states during its life cycle as shown in the following figure.

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The ECR workflow together with the ECR life cycle produces the following scenario:



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.
    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.

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iii. **Investigate** to send the ECR back for more investigation.

The following table shows the ECR lifecycle states and workflow activities in terms of Roles and Permissions.

Table 4: The ECR lifecycle and workflow activities with corresponding 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	
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	

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The final ECR states (Cancelled, Disapproved, Released) are used to classify ECRs in the system and in reports.

The ECR reports are:

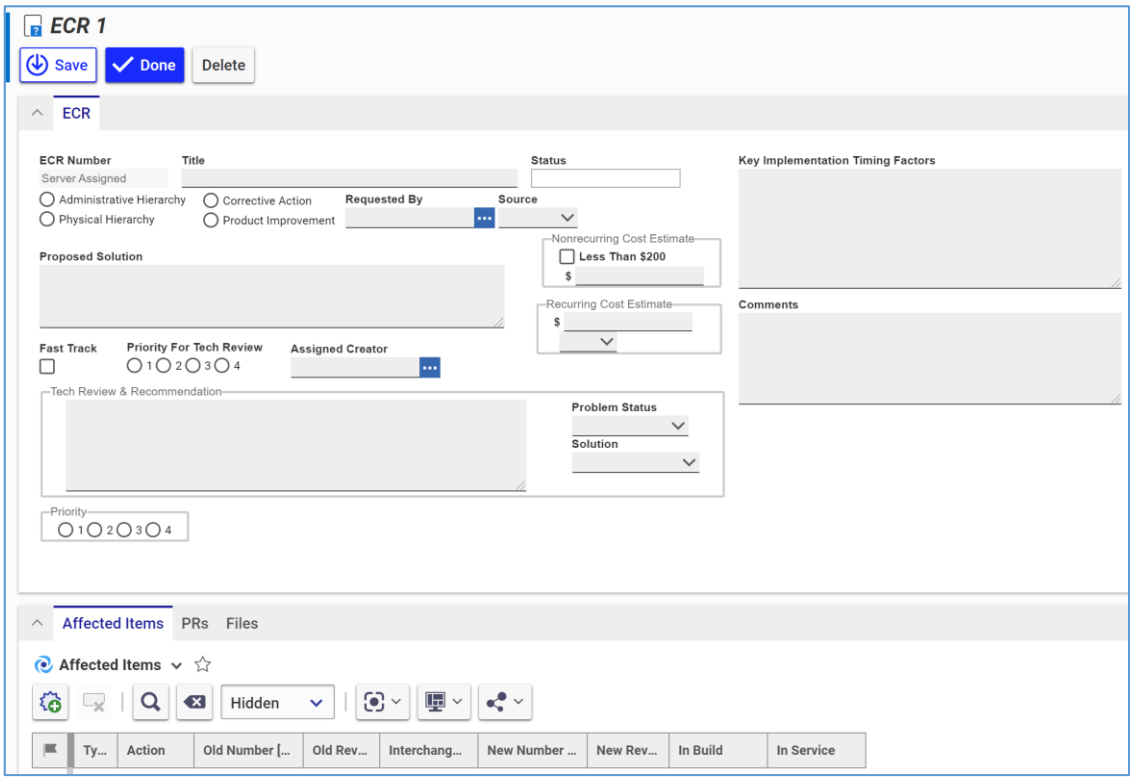
- ECR Log Report is a list of all the ECRs. For details, refer to section *13.1.2.10 ECR Log Report*.
- ECR Report is a printable form of an ECR. For details, refer to section *13.1.2.11 ECR Report*.

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 expected 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:

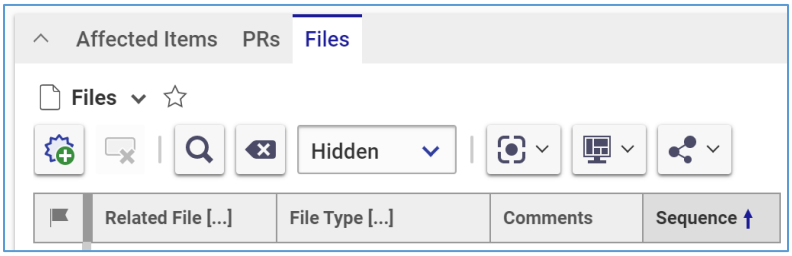
1. Go to **Contents > Change Management > ECRs**.
2. Click **Create New ECR**. The view of a new ECR appears.



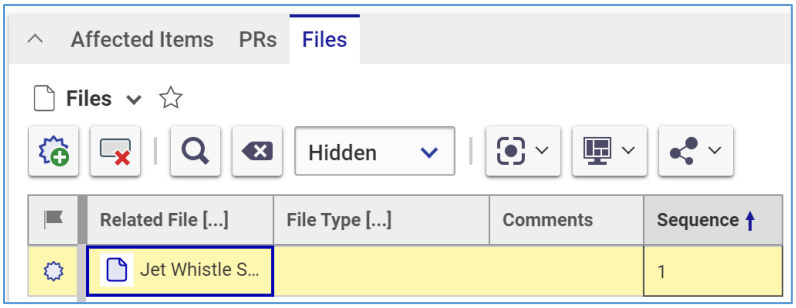
3. Enter the ***ECR title*** In the **Title** text box, making it as descriptive as possible.
4. Select the appropriate hierarchy:
   - **Physical hierarchy** refers to the Item (Part) itself and any Document associated with it. A bug in software would be classified as a physical hierarchy.
   - **Administrative 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.

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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**.
8. Describe the solution proposed by the ECR Creator 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 an Item 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.



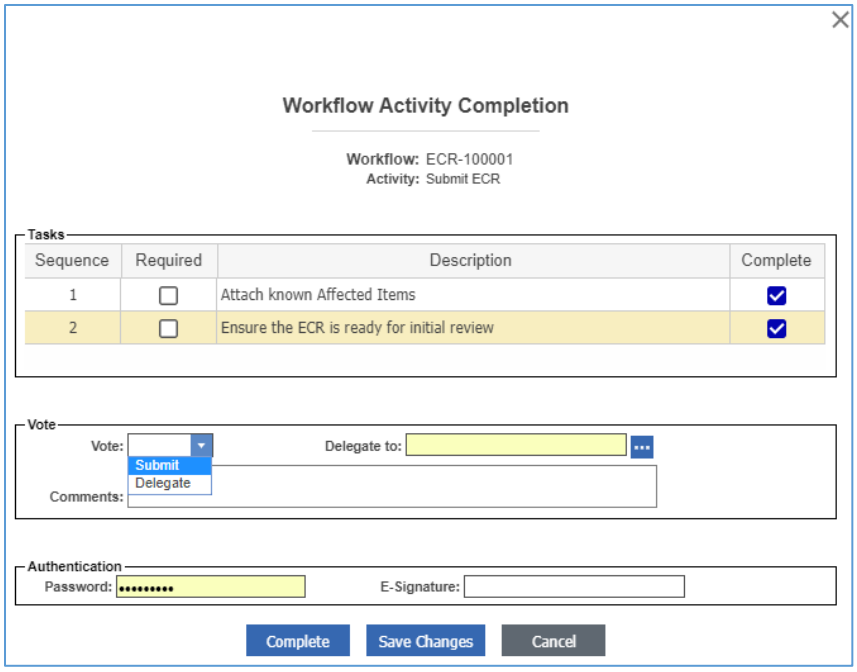
14. Click **New File** on the Files accordion toolbar. The standard operating system dialog for file browsing and selection appears.
15. Search for and select a file. A new row appears in the **Files** grid with the file attached.



Note: Aras Innovator will automatically assign a file type depending on File's extension when you save the ECR.

16. If it is necessary to provide additional information about the File, enter it in the **Comments** cell.
17. Repeat steps 14-16 for other files related to this ECR.
18. Click **Done** on the **ECR** toolbar. The ECR is created. The automatic ECR properties get their values.
19. Go to **Contents > My Innovator > My InBasket > Search My InBasket**.
20. Go to the **Workflow Activity Completion** dialog for the ECR.

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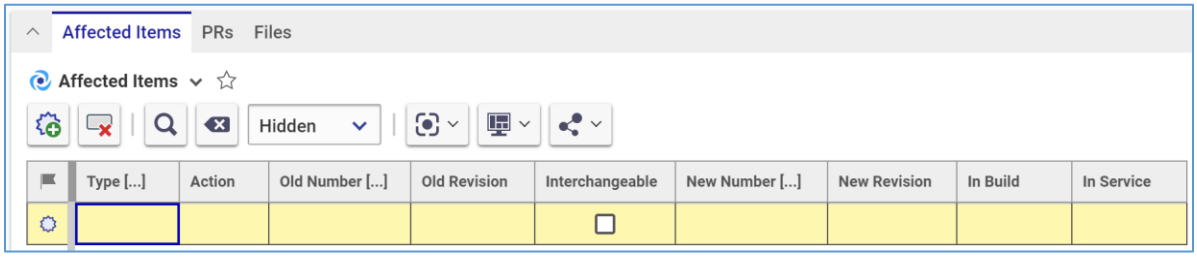
21. Mark the tasks you completed in the **Tasks** field.
22. Select **Submit** in the **Vote** list.
23. Click **Complete**.

    The ECR enters the **Review ECR** activity and awaits the decision of the CSI.

13.1.2.3 Adding an Item with an ECR

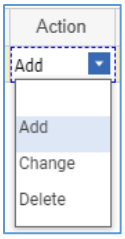
To request add and release of an affected Item with an Engineering Change Request:

1. Open the ECR.
2. Click **Edit** on the ECR toolbar.
3. Go to the Affected Items accordion tab.
4. Click **New Affected Item** on the Affected Items accordion toolbar. A new row appears at the bottom of the Affected Items grid.

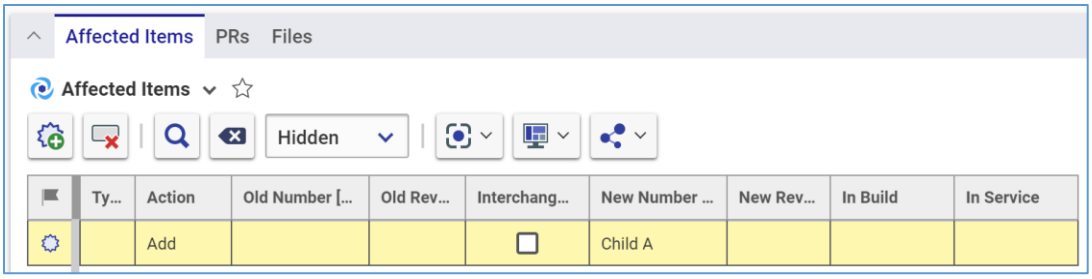


5. Select **Add** in the **Action** cell.

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6. Click the **ellipsis** button in the **New Number** cell. The **Search dialog – Change Controlled Item** appears.
7. Search for and select the new affected Item. The affected Item populates the **New Number** cell.

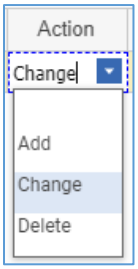


8. Click **Save** or **Done** on the **ECR** toolbar. The ECR now has an affected Item that needs to be added and released.

13.1.2.4 Changing an Item with an ECR

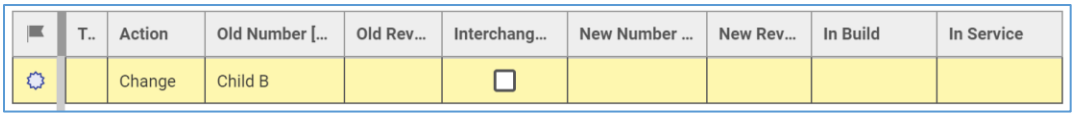
To request changing an existing affected item with an Engineering Change Request:

1. Open the ECR.
2. Click **Edit** on the ECR toolbar.
3. Go to the Affected Items accordion tab.
4. Click **New Affected Item** on the Affected Items accordion toolbar. A new row appears at the bottom of the Affected Items grid.
5. Select **Change** in the **Action** cell.

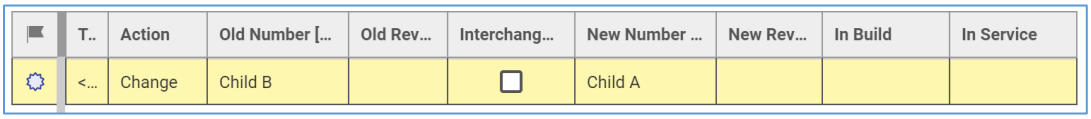


6. Click the **ellipsis** button in the **Old Number** cell. The **Search dialog – Change Controlled Item** dialog box appears.
7. Using the standard search procedure, search for and select the affected Item to be changed. The selected Item populates the **Old Number** cell.

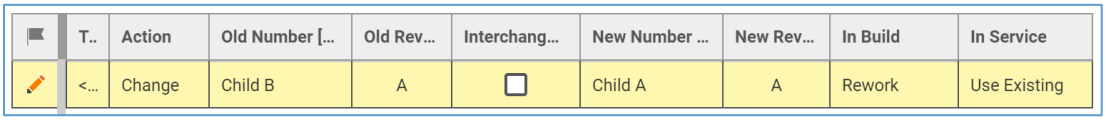
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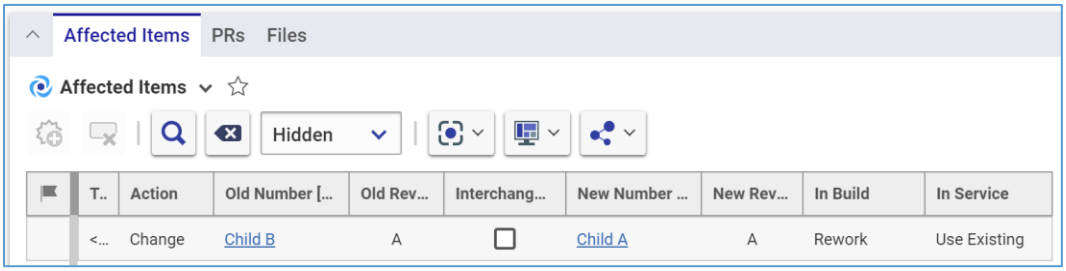
8. Select the **Interchangeable** cell check box if the old and new Items are interchangeable e.g., if there is no Fit-Form-Function change. When selected, the same Item number is retained. Otherwise, a new Item number will need to be assigned.
9. If the **Interchangeable** cell is not selected, e.g., 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. Search for and select the new affected Item. The new affected Item populates the **New Number** cell.



10. Click **Save** two times on the **ECR** toolbar.
11. Select the action to take for the Items that are being built in the **In Build** cell: **Use Existing**, **Rework**, or **Scrap**.
12. Select the action to take for the Items that are currently in service in the **In Service** cell: **Use Existing**, **Rework**, or **Scrap**.



13. Click **Save** or **Done** on the ECR toolbar. The ECR has an affected Item requested for changing.

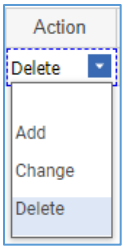


13.1.2.5 Deleting an Item with an ECR

To request superseding of an existing affected Item with an Engineering Change Request:

1. Open the ECR.
2. Click **Edit** on the ECR toolbar.
3. Go to the Affected Items accordion tab.
4. Click **New Affected Item** on the Affected Items accordion toolbar. A new row appears at the bottom of the Affected Items grid.
5. Select **Delete** in the **Action** cell.

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6. Click the ellipsis button in the Old Number cell. The **Search dialog – Change Controlled Item** appears.
7. Search for and select the affected Item. The old Affected Item populates the **Old Number** cell.



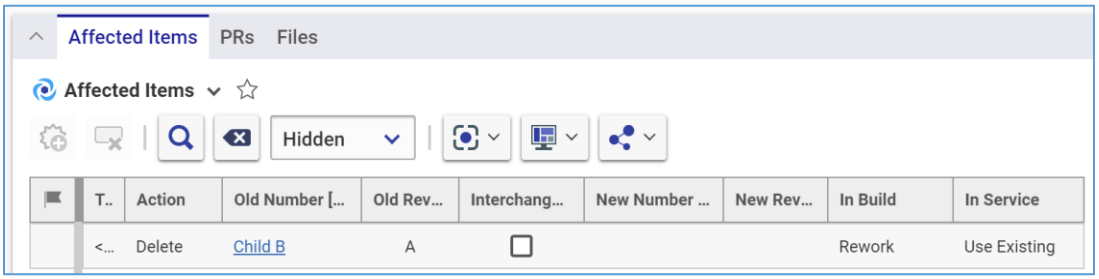
	T..	Action	Old Number [...	Old Rev...	Interchang...	New Number ...	New Rev...	In Build	In Service
		Delete	Child B		☐				

8. Click **Save** two times on the **ECR** toolbar.
9. Select the action to take for the Items that are being built in the **In Build** cell: **Use Existing**, **Rework**, or **Scrap**.
10. Select the action to take for the Items that are currently in service in the **In Service** cell: **Use Existing**, **Rework**, or **Scrap**.



	T..	Action	Old Number [...	Old Rev...	Interchang...	New Number ...	New Rev...	In Build	In Service
	<...	Delete	Child B	A	☐			Rework	Use Existing

11. Click **Save** or **Done** on the ECR toolbar. The ECR has an affected Item assigned for deletion.

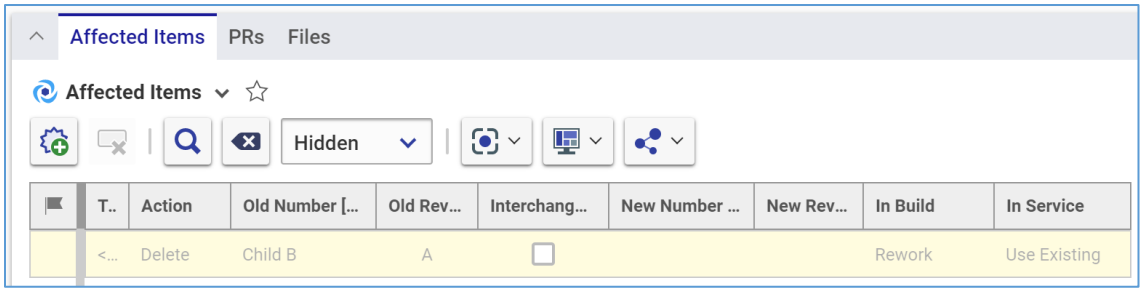


13.1.2.6 Removing an Affected Item from an ECR

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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3. Click **Save** or **Done** on the **ECR** toolbar. The **Affected Item** disappears from the grid.

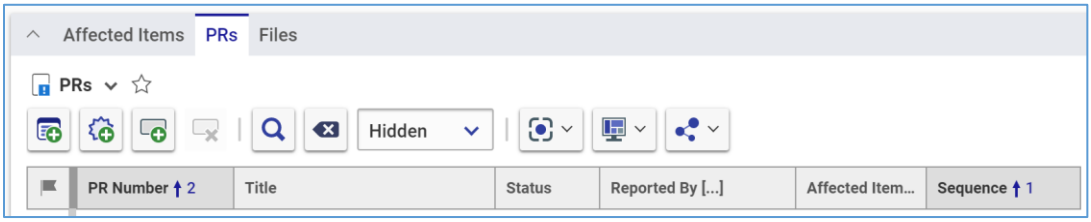
Note: The **Affected Item** disappears if the ECR was not saved after it was added.

13.1.2.7 Reviewing an ECR

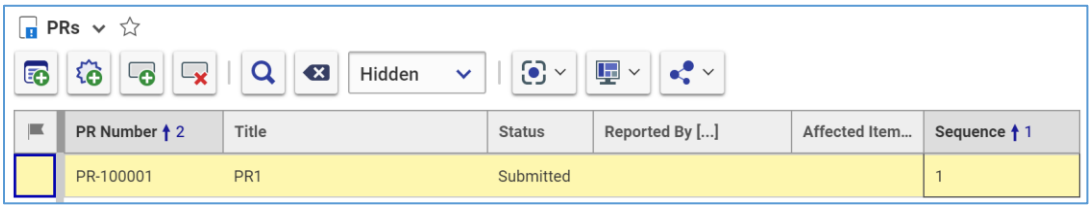
A CSI receives a **Submitted** ECR to decide whether to reject it or to submit it for technical review. This section defines the information the CSI must provide when the decision is made to submit the PR.

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.



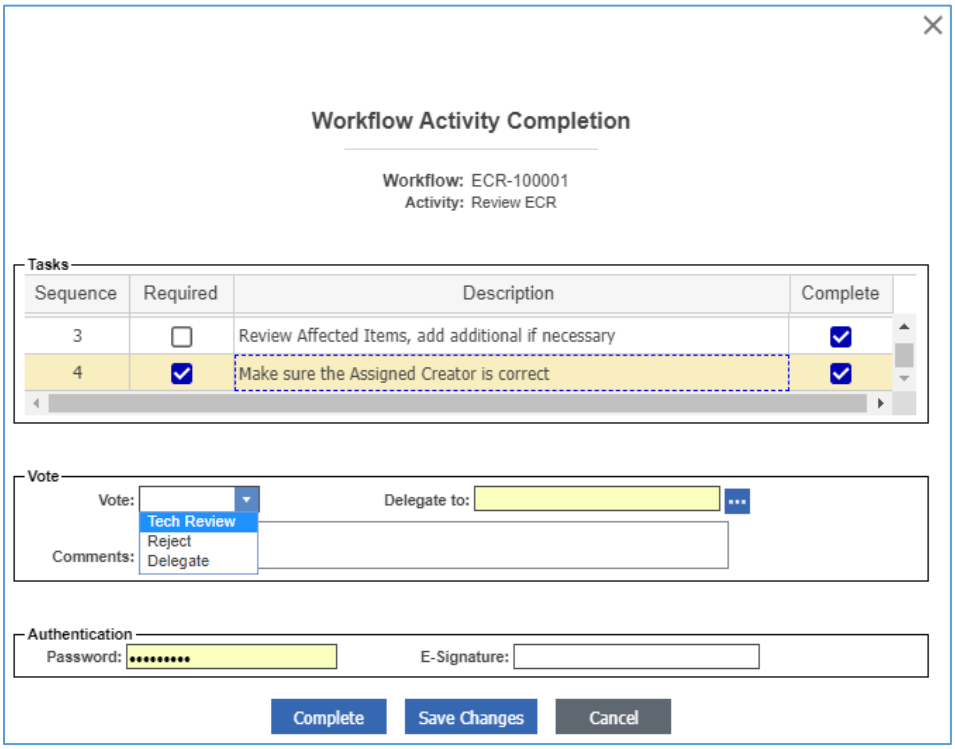
    b. Click **Select Items**. The **Search dialog – PR** appears.
    c. Search for and select the initiating PR. The selected PR appears as a bottom row in the PRs grid.



9. Click **Done** on the ECR toolbar.
10. Go to **Contents > My Innovator > My InBasket > Search My InBasket**.

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11. Go to the **Workflow Activity Completion** dialog for the ECR.



12. Mark the tasks you completed in the Tasks field.
13. Select **Tech Review** in the Vote list.
14. Click **Complete**.

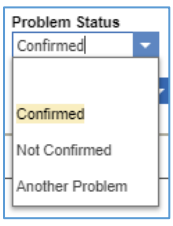
    The ECR enters the **Technical Review** activity and awaits technical review by the ECR Owner.

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.

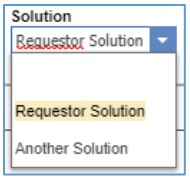
Use the following procedure to conduct a technical review of an Engineering Change Request:

1. Open the ECR.
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**.

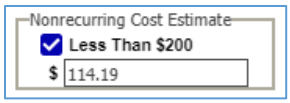


5. Select the proper value in the **Solution** list: **Requestor Solution** or **Another Solution**.

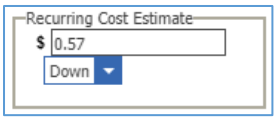
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6. Enter the **Nonrecurring Cost Estimate** value in the accompanying text box. If the estimate is less than $200, select the check box. This is a one-time cost estimation of the ECR solution implementation.

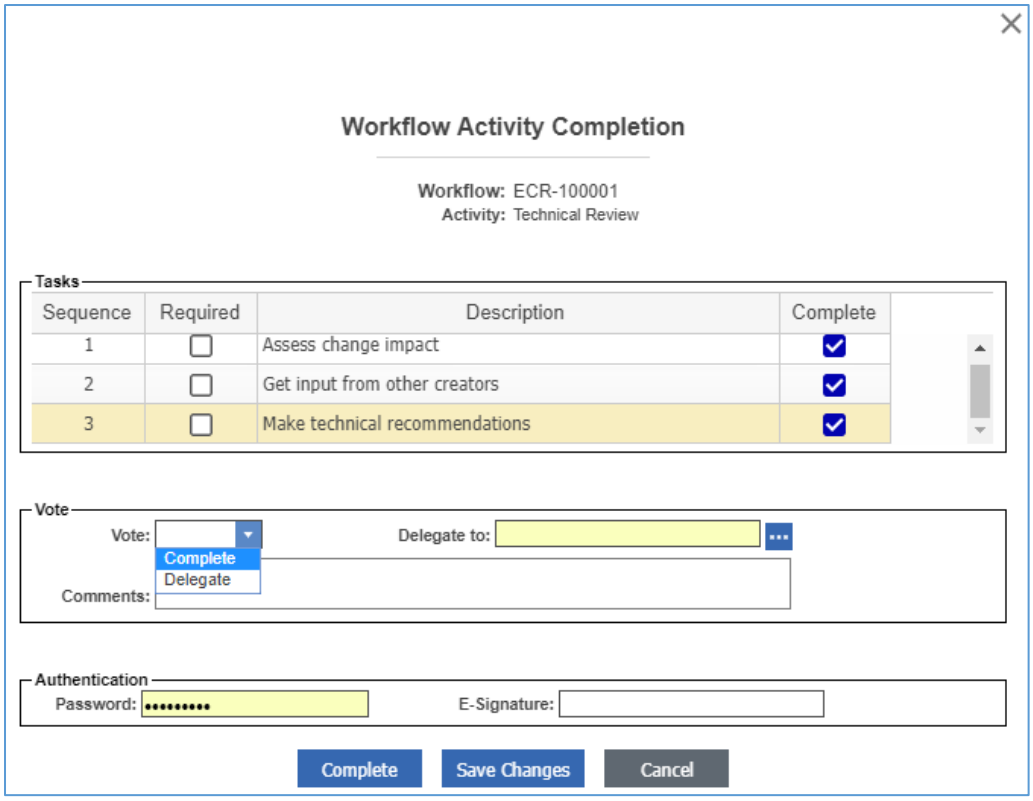


7. Enter the recurring cost estimation in the **Recurring Cost Estimate** text box. This is the difference in the unit cost of the Item as a result of the change. Select **Up** or **Down** in the accompanying list to indicate whether the unit cost went up or down as a result of the ECR.



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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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.

To route an Engineering Change Request:

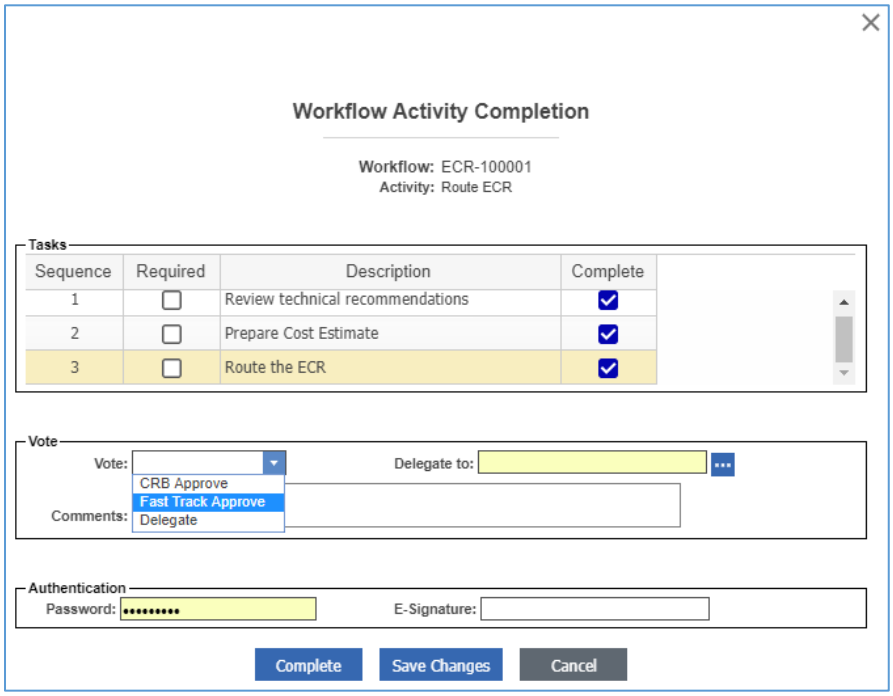
1. Open the ECR.
2. Click **Edit** on the ECR toolbar.
3. Verify that the information already entered in the ECR is correct.
4. Double-check the **Key Implementation Timing Factors** text box to make sure it contains the correct data.
5. Specify the implementation priority number in the **Priority For Tech Review** field. The higher the priority, the lower the number selected.



6. Click **Done** on the **ECR** toolbar.

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7. Go to **Contents > My Innovator > My InBasket > Search My InBasket**.
8. Go to the **Workflow Activity Completion** dialog for the ECR.

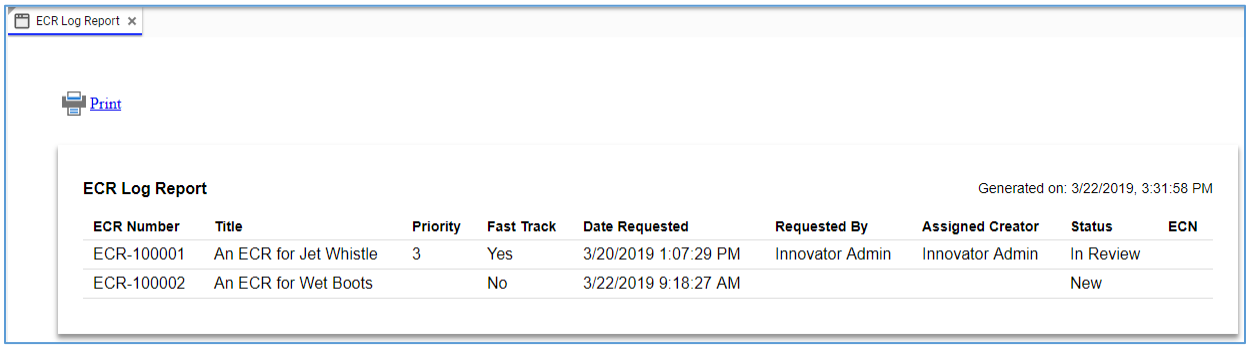


9. Mark the tasks you completed in the **Tasks** field.
10. Select either **CRB Approve** or **Fast Track Approve** in the **Vote** list depending on your decision.
11. Click **Complete**.

    The ECR now awaits the final decision to be either **ECR Approved** or **ECR Disapproved**.

13.1.2.10 ECR Log Report

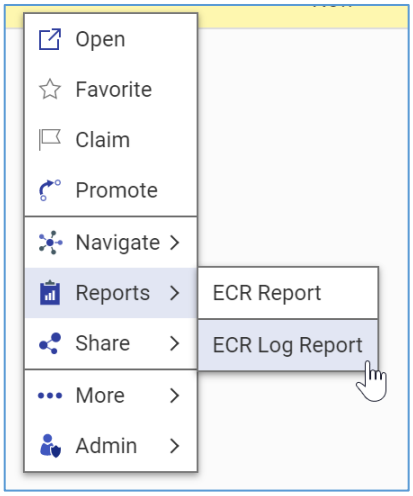
You can get quick information about all the ECRs submitted to Aras Innovator with the ECR Log Report.



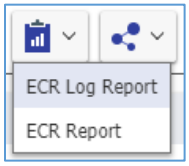
There are several ways to access the ECR Log Report:

8. Go to **Contents > Change Management > ECRs**, right-click any **ECR**, and then click **Reports > ECR Log Report**.

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9. Open the view of any ECR. On the **ECR** toolbar, click **Reports**, and then click **ECR Log Report**.



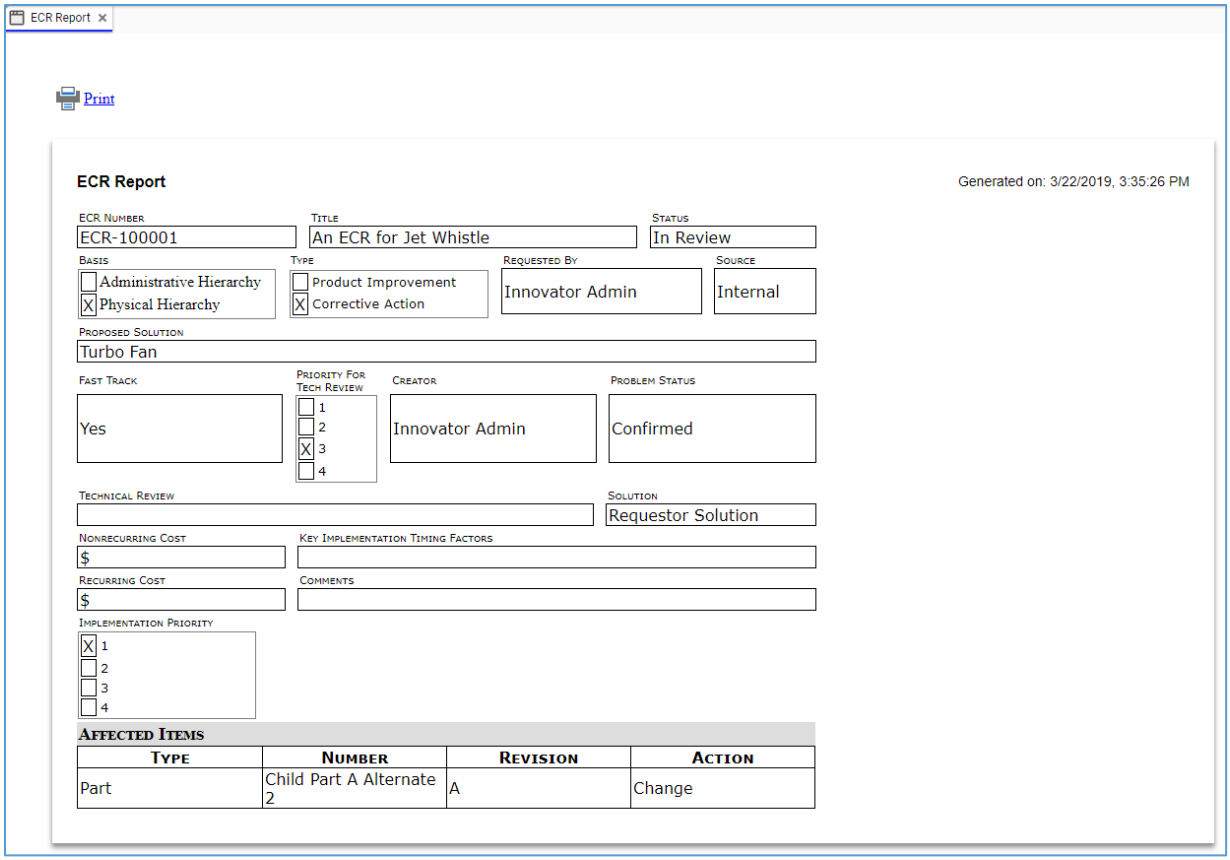
To quit a Report, close its view in Aras Innovator.

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

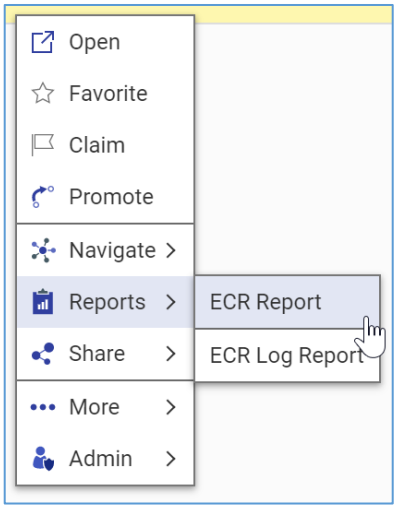
You can print or share an ECR using the ECR Report.

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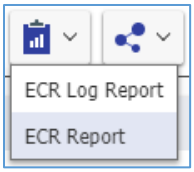
There are several ways to access the ECR Report:

10. Go to **Contents > Change Management > ECRs**, right-click an **ECR** to be reported, and then click **Reports > ECR Report**.



11. Open the view of an ECR. On the **ECR** toolbar, click **Reports**, and then click **ECR Report**.

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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:

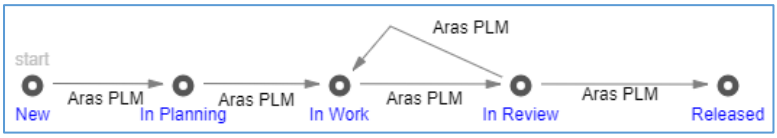
- **Add: A new** affected Item becomes **Released**.
- **Change**: An affected existing Item is modified. The Item becomes **Superseded**, **Obsolete**, or incremented to a **new revision** level to allow modification.
- **Delete**: An existing affected Item is obsolete. The Item becomes **Superseded** 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.



The ECN workflow together with the ECN life cycle produces the following scenario:



1. A member of the CM group creates and submits the ECN.
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

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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 states and workflow activities in terms of Roles and Permissions.

Table 5: The ECN lifecycle and workflow activities with corresponding 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*.

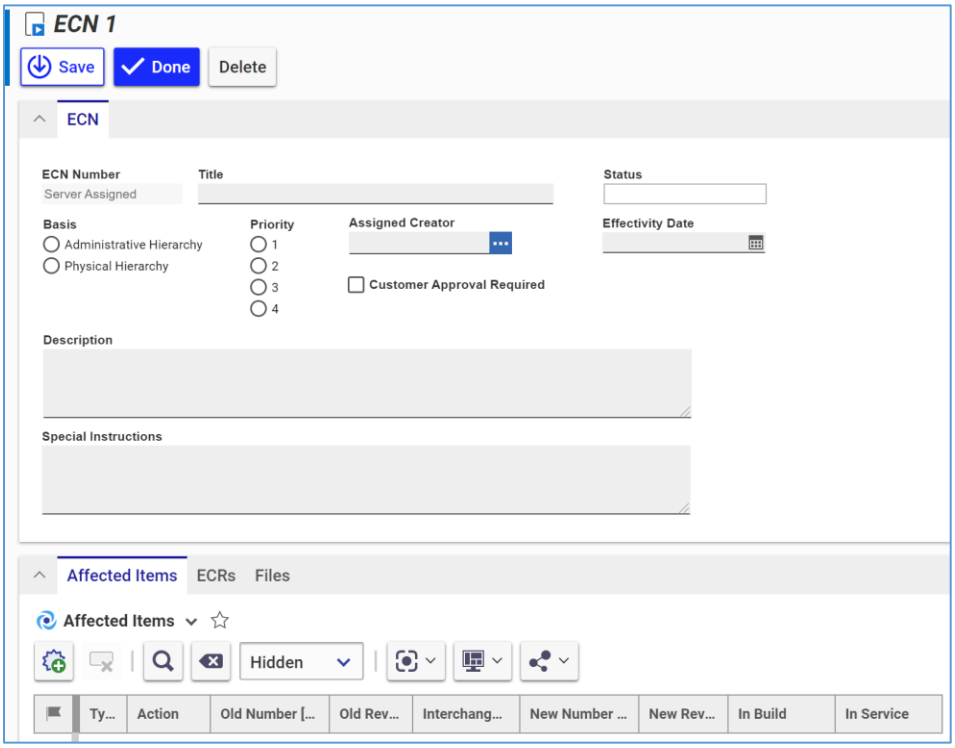
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13.1.3.2 Creating an ECN

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 with an ECN*, *13.1.3.4 Changing Items with an ECN*, and *13.1.3.5 Deleting an Item with an ECN*.

To create an Engineering Change Notice:

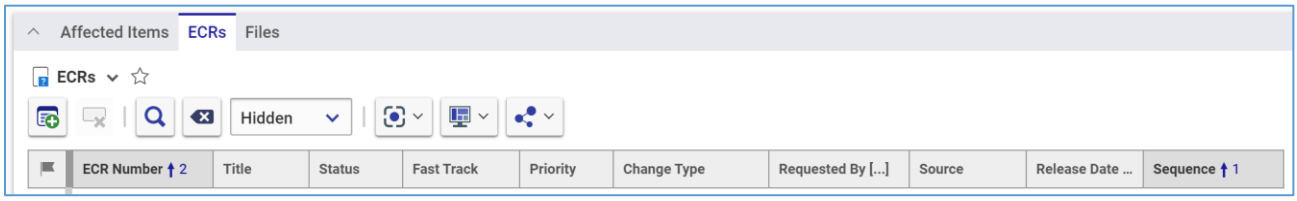
1. Go to **Contents > Change Management > ECNs**.
2. Click **Create New ECN**. The view of a new ECN appears.



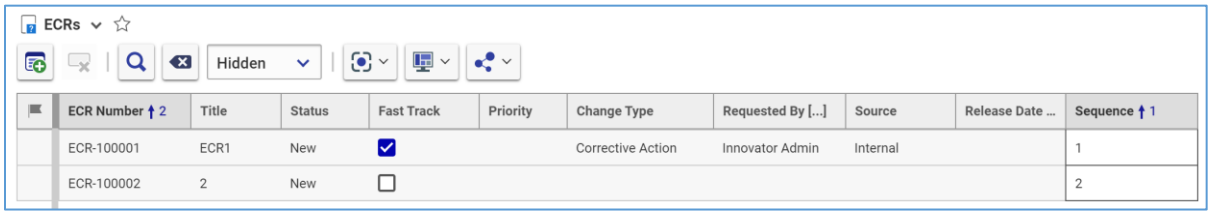
3. Enter the ***ECN title*** In the **Title** text box, making it as descriptive as possible.
4. Select the appropriate hierarchy for **Basis**:
   - **Administrative hierarchy** refers to anything related to the process of running the business. An error in an expense report procedure would be classified 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.
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 in the **Description** text box.

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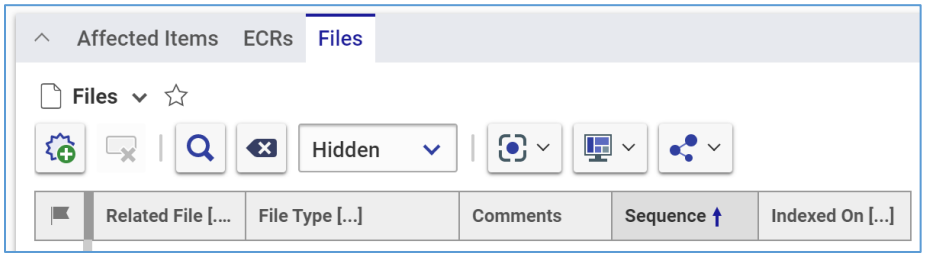
10. If there are any special instructions for the change, enter them in the **Special Instructions** text box.
11. Go to the **ECRs** accordion tab to attach all the ECRs included in this ECN for tracking and reporting.



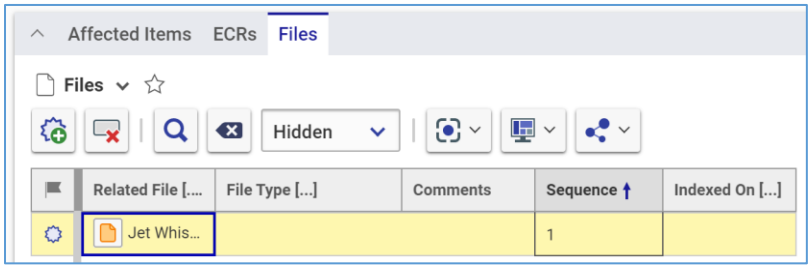
12. Click **Add ECRs** on the ECRs accordion toolbar. The **Search dialog – ECR** appears.
13. Search for and select the ECRs combined or included in this ECN. The selected ECRs appear as new rows at the bottom of the ECRs grid.



14. Go to the **Files** accordion tab to attach all the files concerning this ECN.



15. Click **New File** 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.

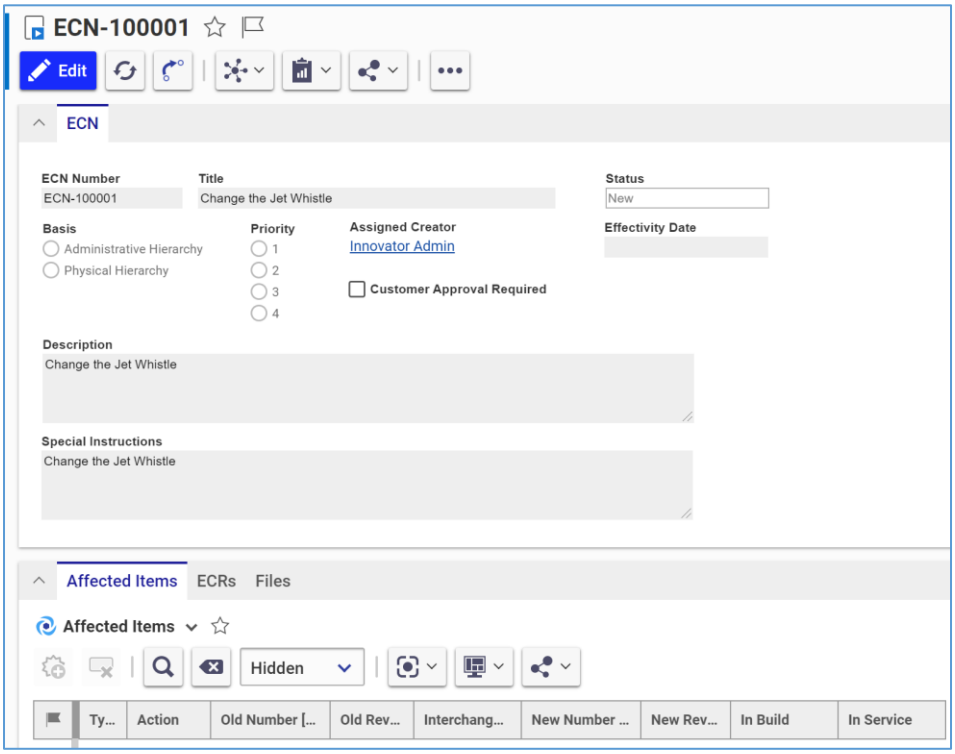


Note: Aras Innovator will automatically assign a file type depending on File's extension when you save the ECN.

17. If it is necessary to provide additional information about the File, enter it in the **Comments** cell.
18. Repeat steps 15-17 for other files concerning this ECN.

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19. If you need to add Items with the ECN, use the procedure described in section *13.1.3.3 Adding an Item with an ECN*.
20. If you need to change Items with the ECN, use the procedure described in section *13.1.3.4 Changing Items with an ECN*.
21. If you need to delete Items with the ECN, use the procedure described in section *13.1.3.5 Deleting an Item with an ECN*.
22. Click **Done** on the **ECN** toolbar. The ECN is created and waits to be submitted as defined in the section *13.1.3.7 Submitting an ECN*.



13.1.3.3 Adding an Item with an ECN

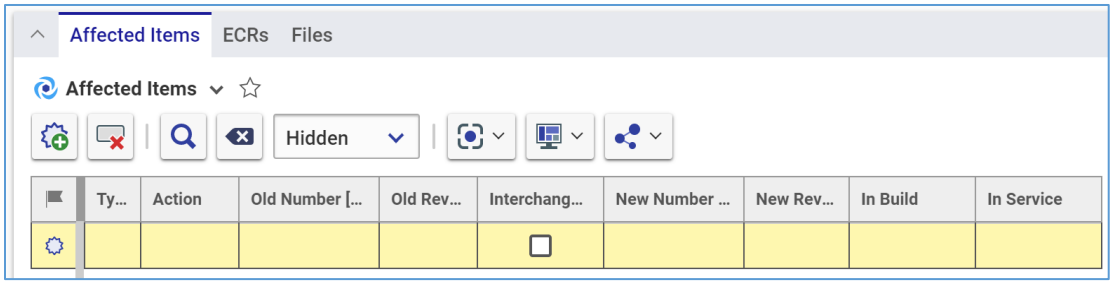
Because an ECN can be used to add, change, or delete affected Items, the ECN creation process can be conventionally divided into general and specific procedures. This section defines the steps a member of the CM group should use for adding affected Items when creating the ECN. Section *13.1.3.2 Creating 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.

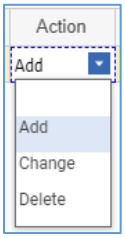
To assign a new affected Item to release with an Engineering Change Notice:

1. Open the ECN.
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.

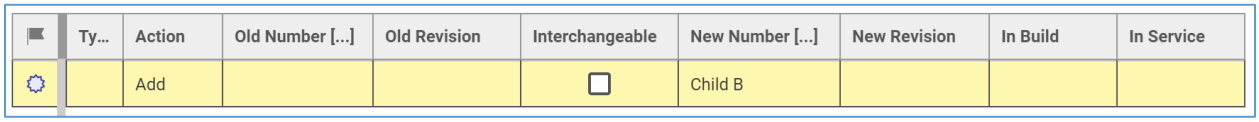
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5. Select **Add** in the **Action** cell.



6. Click the **ellipsis** button in the **New Number** cell. The **Search dialog – Change Controlled Item** appears.
7. Search for and select the new affected Item. The affected Item populates the **New Number** cell.



8. Click **Save** or **Done** on the **ECN** toolbar. The ECN has an affected Item assigned for adding.

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 with an ECN* and *13.1.3.5 Deleting an Item with an ECN*.

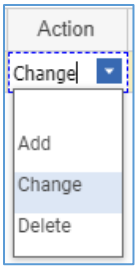
A change for an already Released Item can be either:

12. **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.
13. **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.

To assign an existing affected Item to be changed when creating an Engineering Change Notice:

1. Follow steps 1-4 of the Adding an Item within an ECN procedure.
2. Select **Change** in the **Action** cell.

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3. Click the **ellipsis** button in the **Old Number** cell. The **Search dialog – Change Controlled Item** appears.
4. Search for and select the affected Item to be changed. The selected affected Item populates the **Old Number** cell.

	Ty...	Action	Old Number [...]	Old Revision	Interchangeable	New Number [...]	New Revision	In Build	In Service
		Change	Child A		☐				

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.

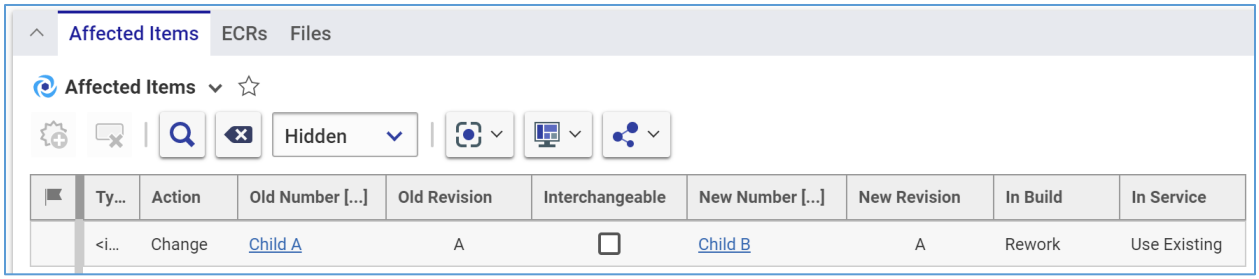
	Ty...	Action	Old Number [...]	Old Revision	Interchangeable	New Number [...]	New Revision	In Build	In Service
	<i...	Change	Child A		☐	Child B			

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**.

	Ty...	Action	Old Number [...]	Old Revision	Interchangeable	New Number [...]	New Revision	In Build	In Service
	<i...	Change	Child A	A	☐	Child B	A	Rework	Use Existing

10. Click **Save** or **Done** on the **ECN** toolbar. The ECN has an affected Item assigned for changing.

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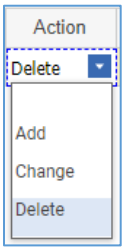
13.1.3.5 Deleting an Item with an ECN

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 with an ECN* and *13.1.3.4 Changing Items with an ECN*.

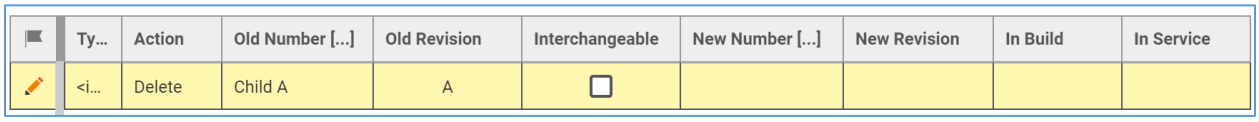
An already Released item gets Superseded at the end of the ECN process when it is released.

Use the following procedure to assign an existing affected Item to be superseded with an Engineering Change Notice:

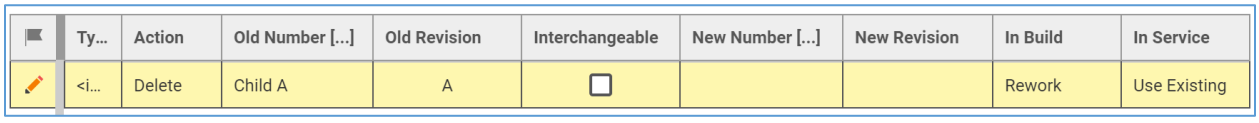
1. Follow steps 1-4 of the Adding an Item within an ECN procedure.
2. Select **Delete** in the **Action** cell.



3. Click the **ellipsis** button in the **Old Number** cell. The **Search dialog – Change Controlled Item** appears.
4. Search for and select the affected Item to be deleted. The selected affected Item populates the **Old Number** cell.

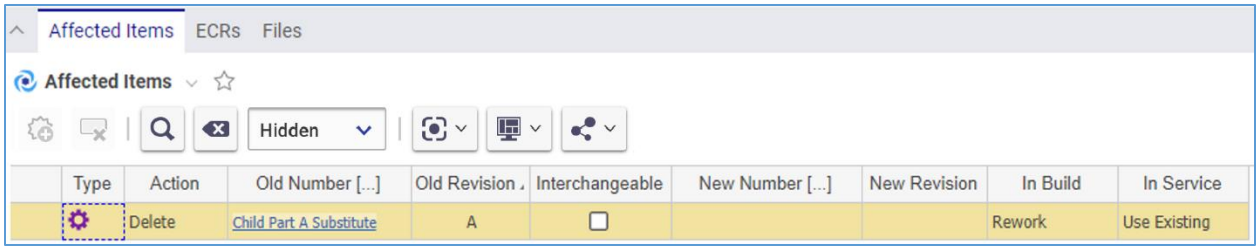


5. Click **Save** two times on the ECN toolbar.
6. Select the action to take on the Items that are being built in the **In Build** cell: **Use Existing**, **Rework**, or **Scrap**.
7. Select the action to take on the Items that are currently in service in the **In Service** cell: **Use Existing**, **Rework**, or **Scrap**.



8. Click **Save** or **Done** on the ECN toolbar. The ECN has an affected Item assigned for superseding.

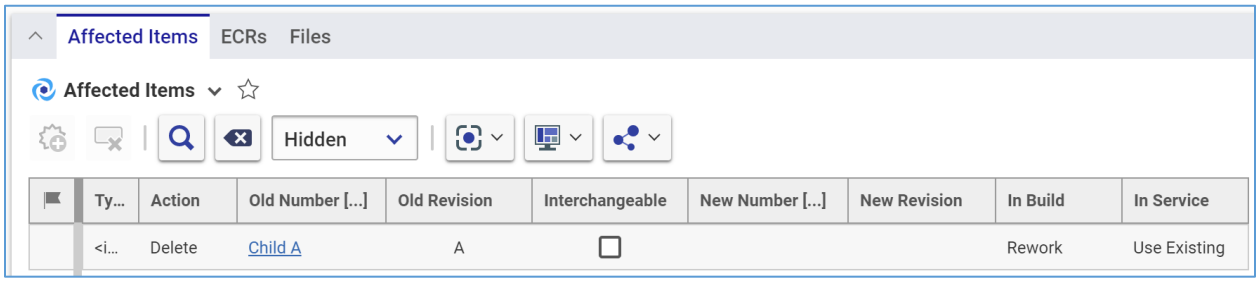
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13.1.3.6 Removing an Affected Item from an ECN

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.



3. Click **Save** or **Done** on the ECN toolbar. The **Affected Item** disappears from the grid.

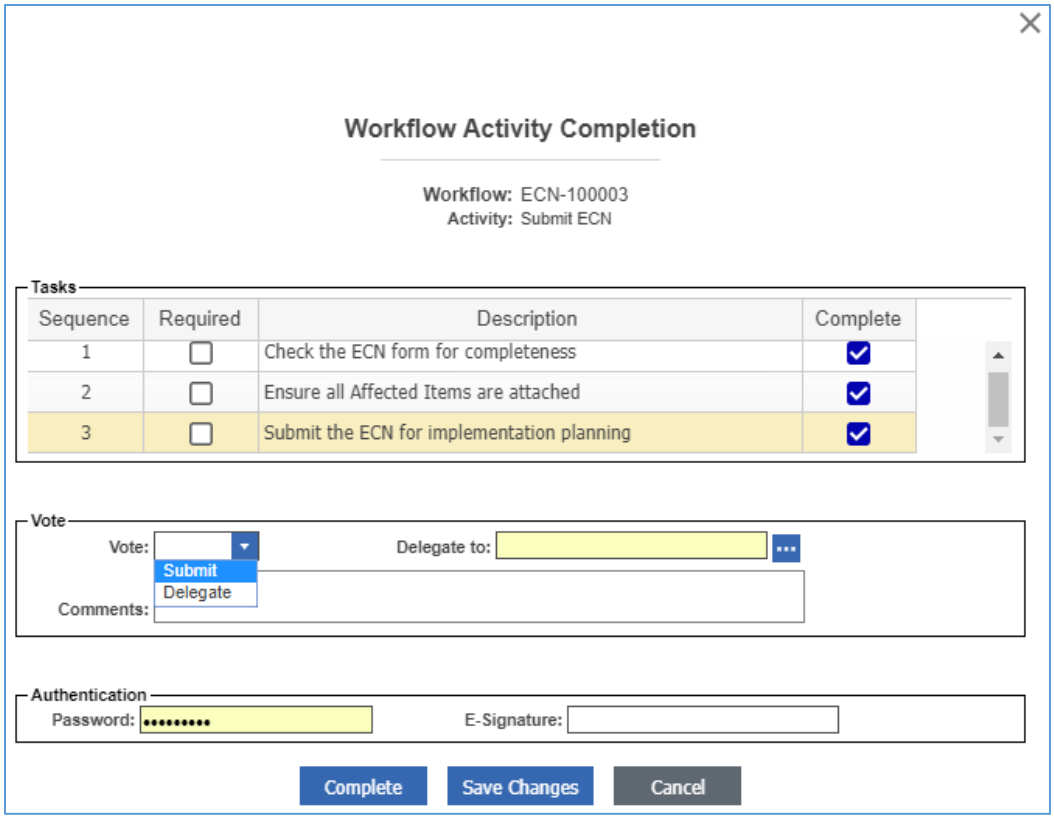
Note: The **Affected Item** disappears if the ECN was not saved after it was added.

13.1.3.7 Submitting an ECN

Use the following procedure:

1. Go to **Contents > My Innovator > My InBasket > Search My InBasket**.
2. Double-click the Workflow Task to open the **Workflow Activity Completion** dialog for the ECN.

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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:

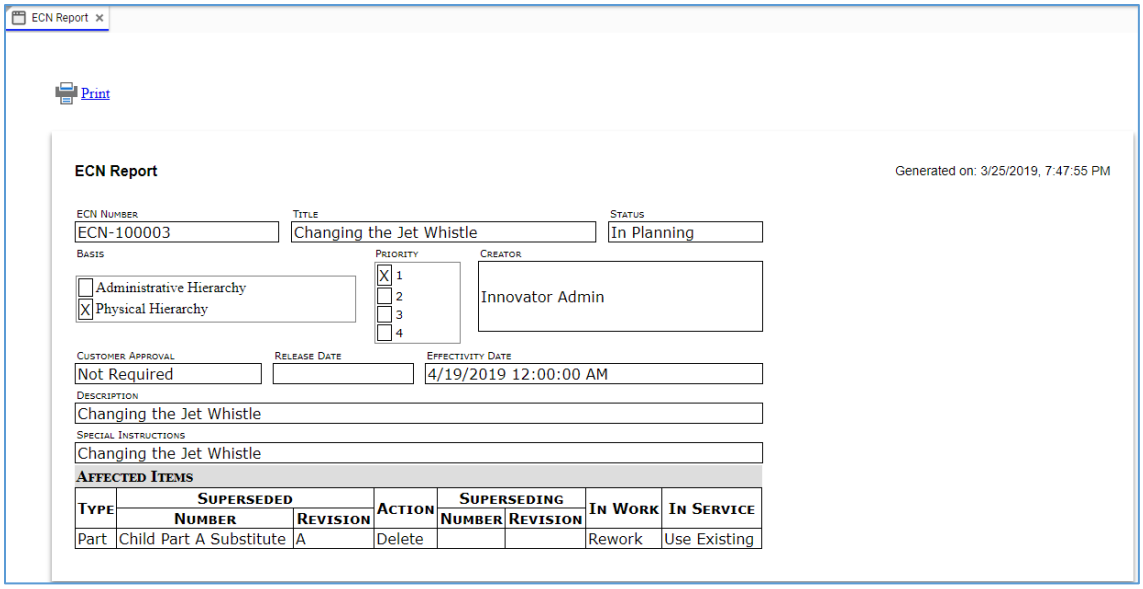
14. There are new part numbers for the non-interchangeable parts changes.
15. The ECN has all other affected items in the hierarchy.
16. Affected Items up the hierarchy tree from the actual Item are changed.
17. Affected Documents of the parent assemblies (such as BOMs) are changed.

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

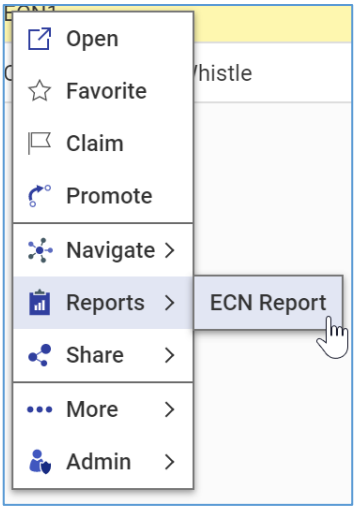
You can print or share an ECN using the ECN Report.

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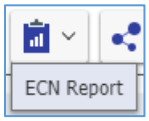


There are several ways to access the ECN Report:

18. Go to **Contents > Change Management > ECNs > Search ECNs**, right-click an **ECN** to be reported, and then click **ECN Report**.



19. Open the view of an ECN to be reported. On the **ECN** toolbar, click **Reports**, and then click **ECN Report**.



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.

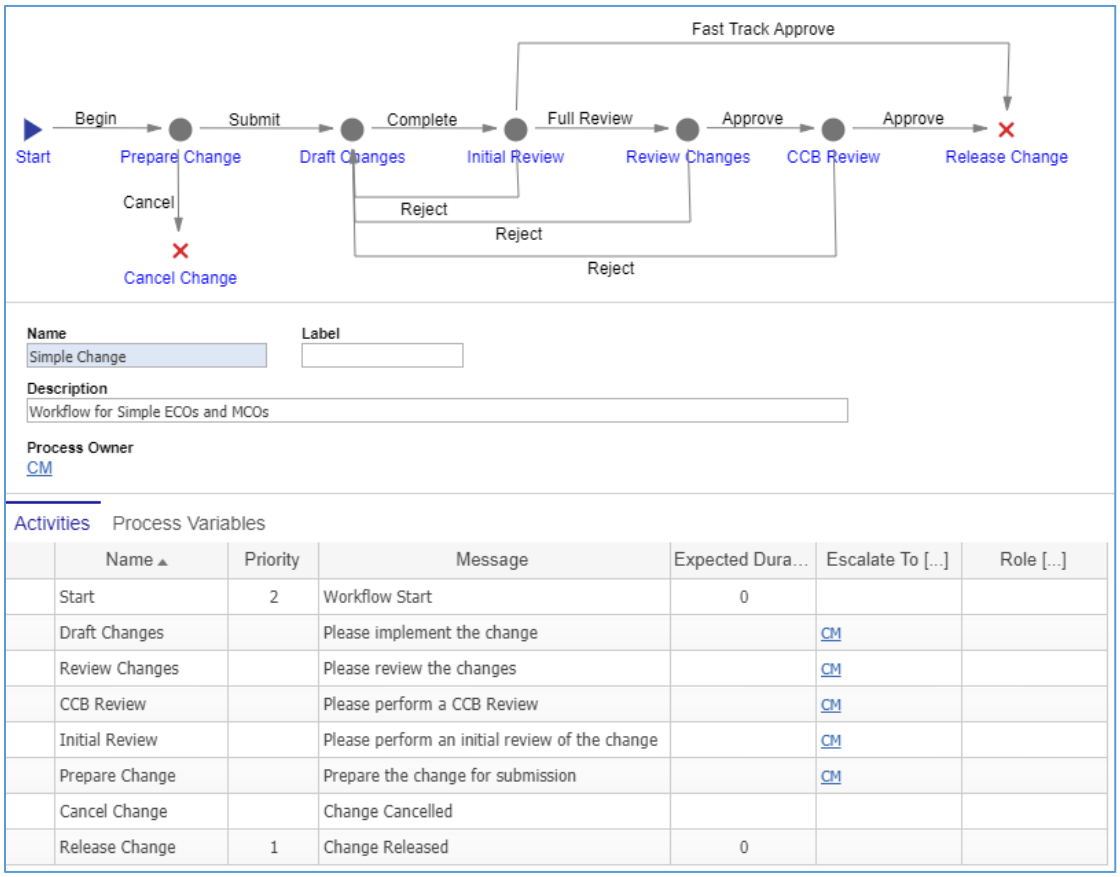
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13.2 Simplified Change Management

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 for 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		

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**.
- **Change**: An affected existing Item is modified. The Item becomes **Superseded**, **Obsolete**, or incremented to a new revision level to allow modification.

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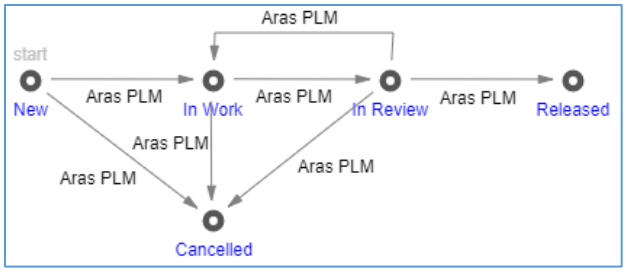
- **Delete**: An existing affected Item is obsolete. The Item becomes **Superseded** or **Obsolete**.

13.2.1.1 Understanding the Simple ECO Process

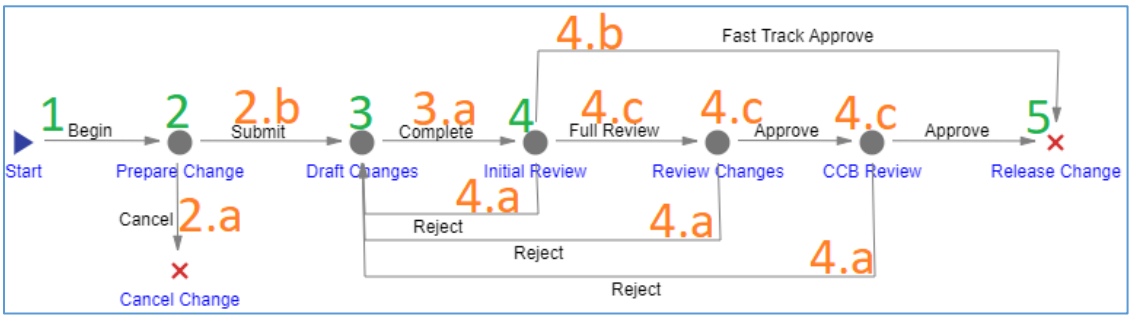
The Simple ECO workflow has the following roles:

- 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.



The Simple Change Management workflow and Simple ECO life cycle together produce the following scenario:



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.
    a. The CSI can **Cancel** the Simple ECO.
    b. Once the CSI votes **Submit**, the Simple ECO goes further.

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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 6: The Simple ECO lifecycle and workflow activities with corresponding 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	

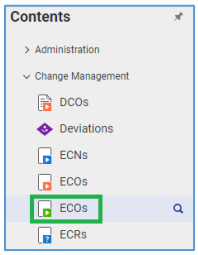
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13.2.1.2 Creating a Simple ECO

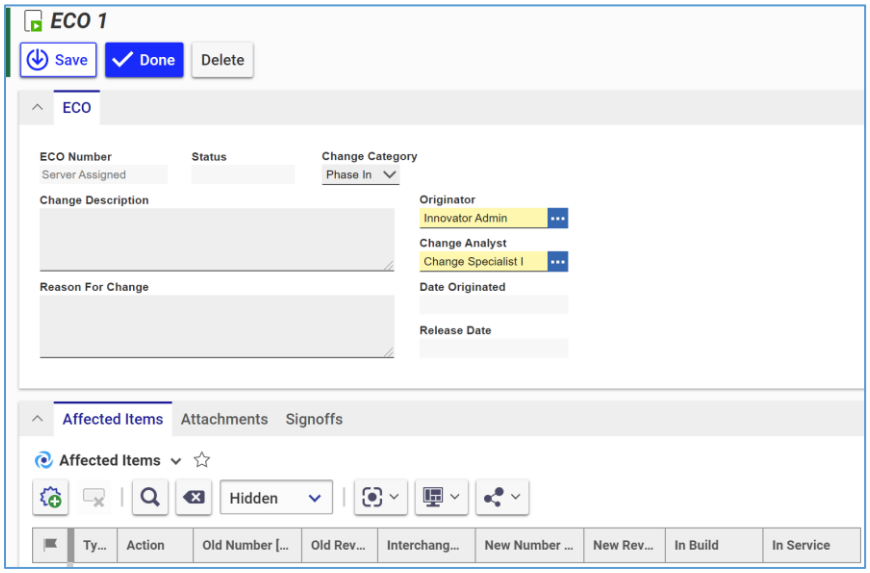
Because a Simple ECO can be used to add, change, or delete affected Items, the Simple ECO creation process can be conventionally divided into general and specific procedures. This section defines the general steps you should use for creating a Simple ECO. The specific procedures are outlined in sections *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*.

To create a Simple Engineering Change Order:

1. Go to **Contents > Change Management > ECOs** (one with the green icon).

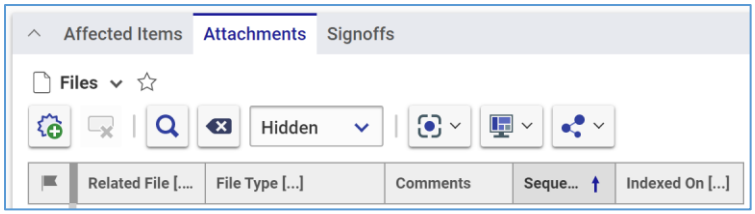


2. Click **Create New ECO**. The view of a new Simple ECO appears.

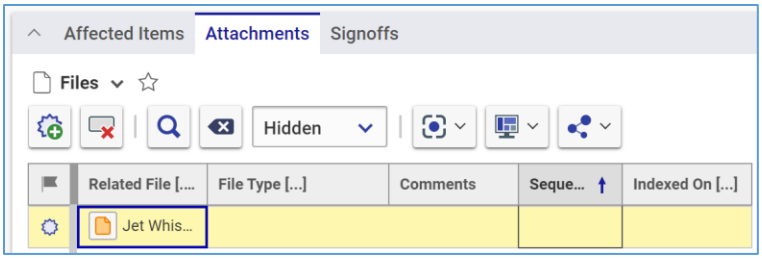


3. Keep the default **Phase In** value in the **Change Category** list.
4. Describe the change in the **Change Description** text box.
5. Describe the reason for the change in the **Reason For Change** text box.
6. Keep the ***default*** value in the **Originator** box. This is the Simple ECO Creator.
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 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.

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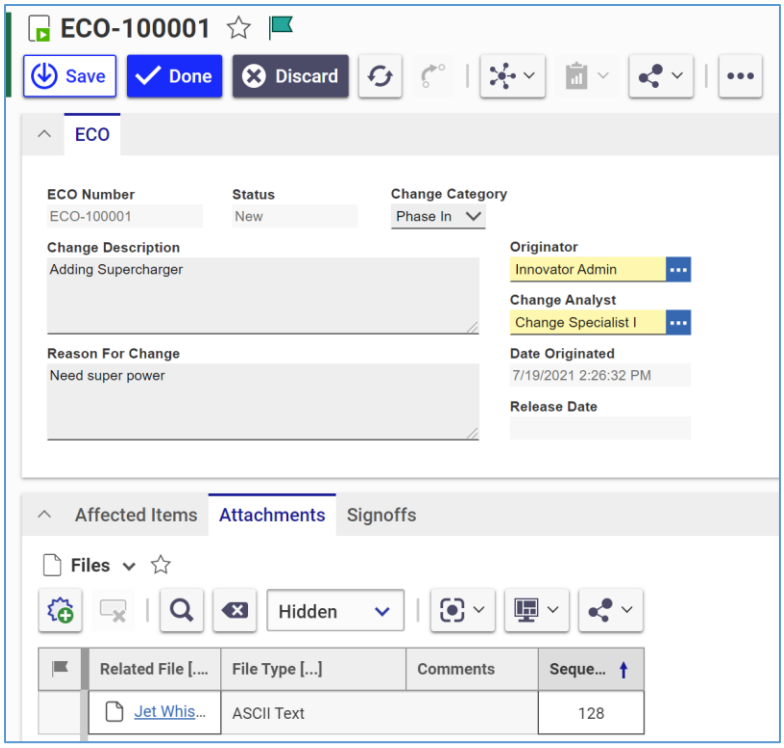
10. Click **New File** on the Attachments accordion toolbar. The standard operating system dialog for file browsing and selection appears.
11. Search for and select a file. A new row appears in the **Files** grid with the file attached.



Note: Aras Innovator will automatically assign a file type depending on File's extension when you save the ECN.

12. If it is necessary to provide additional information about the File, enter it in the **Comments** cell.
13. Repeat steps 10-12 for other files associated with this Simple ECO.
14. 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*.
15. 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*.
16. 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*.
17. Click **Done** on the **Simple ECO** toolbar. The Simple ECO is created and awaits to be submitted as defined in the section *13.2.1.7 Submitting a Simple ECO*.

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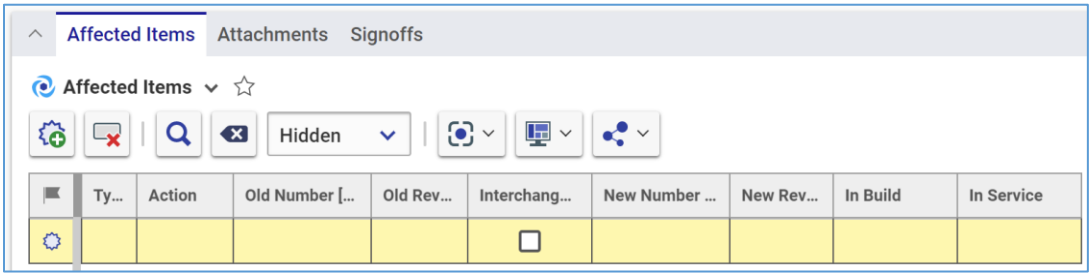
13.2.1.3 Adding an Item within a Simple ECO

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.

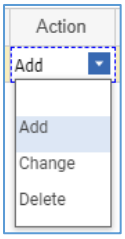
To assign a new affected Item for adding when creating a Simple Engineering Change Order:

1. Open the Simple ECO.
2. Click **Edit** on the Simple ECO toolbar.
3. Go to the **Affected Items** accordion tab.
4. Click **New Affected Item** on the **Affected Items** accordion toolbar. A new row appears at the bottom of the **Affected Items** grid.

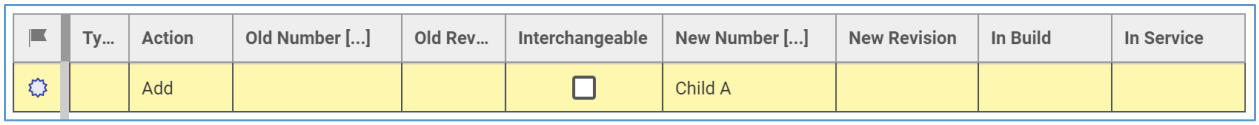


5. Select **Add** in the **Action** cell.

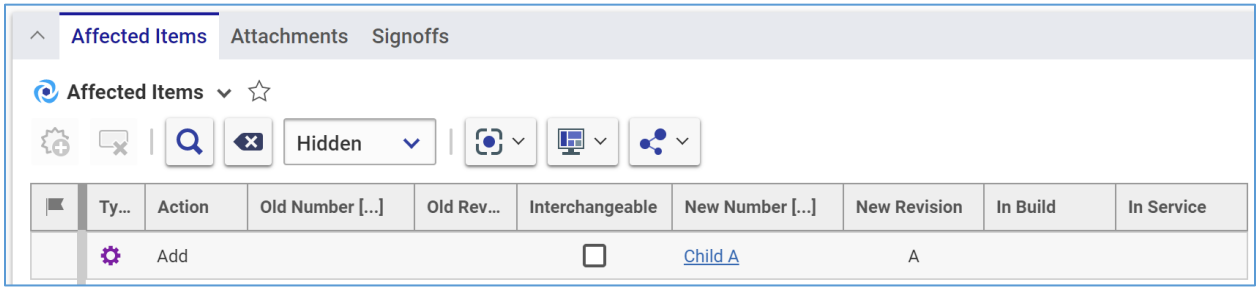
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6. Click the **ellipsis** button in the **New Number** cell. The **Search dialog – Change Controlled Item** appears.
7. Search for and select the new affected Item. The affected Item populates the **New Number** cell.



8. Click **Save** or **Done** on the Simple ECO toolbar. The Simple ECO has an affected Item assigned for adding.



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*.

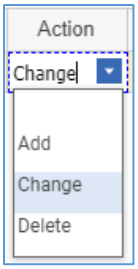
A change for an already Released Item can be either:

20. **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.
21. **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.

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.

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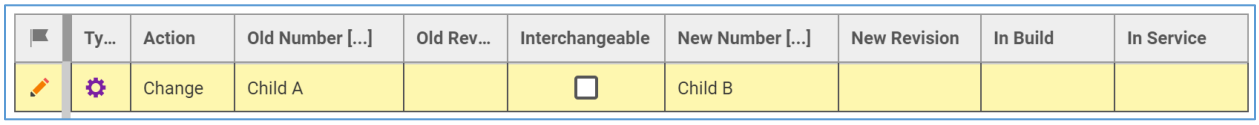


3. Click the **ellipsis** button in the **Old Number** cell. The **Search dialog – Change Controlled Item** appears.
4. Using the standard search procedure, search for and select the affected Item to be changed. The selected affected Item populates the **Old Number** cell.

	Ty...	Action	Old Number [...]	Old Rev...	Interchangeable	New Number [...]	New Revision	In Build	In Service
		Change	Child A		☐				

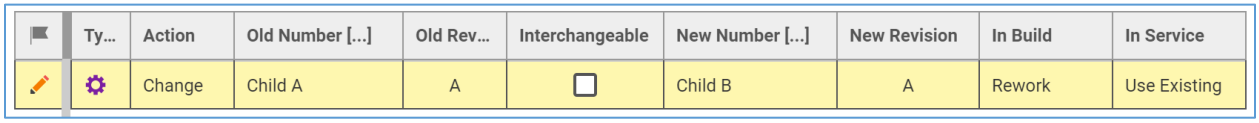
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5. Select the **Interchangeable** cell check box if the old and new Items are interchangeable, e.g., if there is no Fit-Form-Function change. The new Item version can be replaced or modified without causing any change in functionality to the surrounding 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.



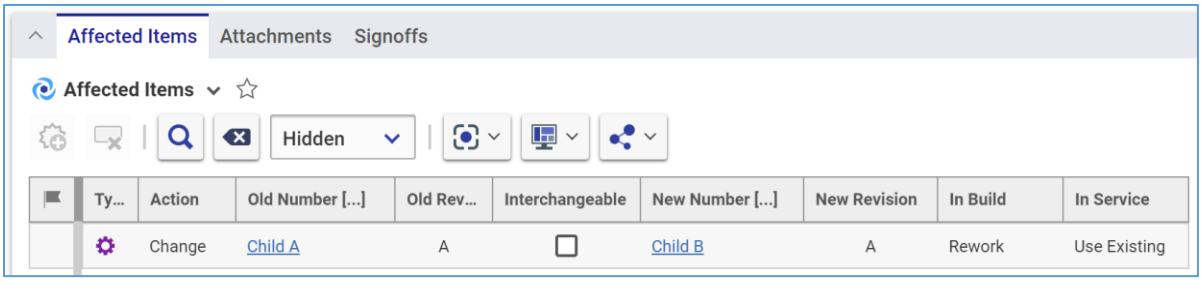
Ty...	Action	Old Number [...]	Old Rev...	Interchangeable	New Number [...]	New Revision	In Build	In Service
	Change	Child A		☐	Child B			

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**.



Ty...	Action	Old Number [...]	Old Rev...	Interchangeable	New Number [...]	New Revision	In Build	In Service
	Change	Child A	A	☐	Child B	A	Rework	Use Existing

10. Click **Save** or **Done** on the Simple ECO toolbar. The Simple ECO has an affected Item assigned for changing.



13.2.1.5 Deleting an Item within a Simple ECO

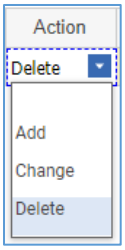
Because a Simple ECO can be used to add, change, or delete affected Items, the Simple ECO creating process can be conventionally divided into general and specific procedures. This section defines the steps you should use for deleting affected Items when creating a Simple ECO. Section *13.2.1.2 Creating 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.

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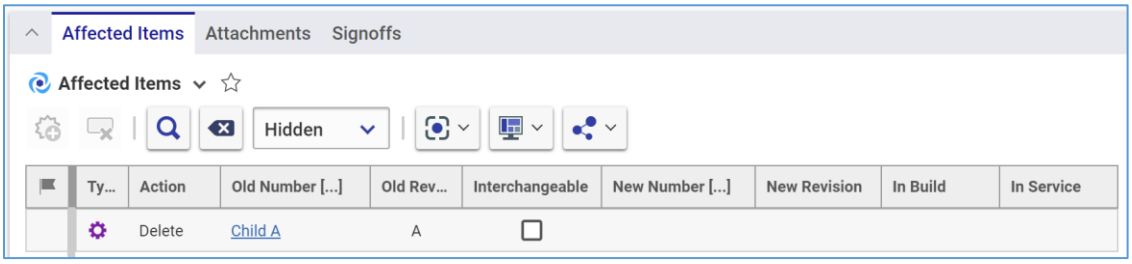
3. Click the **ellipsis** button in the **Old Number** cell. The **Search dialog – Change Controlled Item** appears.
4. Using the standard search procedure, search for and select the affected Item to be deleted. The selected affected Item populates the **Old Number** cell.

	Ty...	Action	Old Number [...]	Old Rev...	Interchangeable	New Number [...]	New Revision	In Build	In Service
		Delete	Child A	A	☐				

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**.
7. Select the action to take on the Items that are currently in service in the **In Service** cell: **Use Existing**, **Rework**, or **Scrap**.

	Ty...	Action	Old Number [...]	Old Rev...	Interchangeable	New Number [...]	New Revision	In Build	In Service
		Delete	Child A	A	☐			Rework	Use Existing

8. Click **Save** or **Done** on the Simple ECO toolbar. The Simple ECO has an affected Item assigned for deleting.

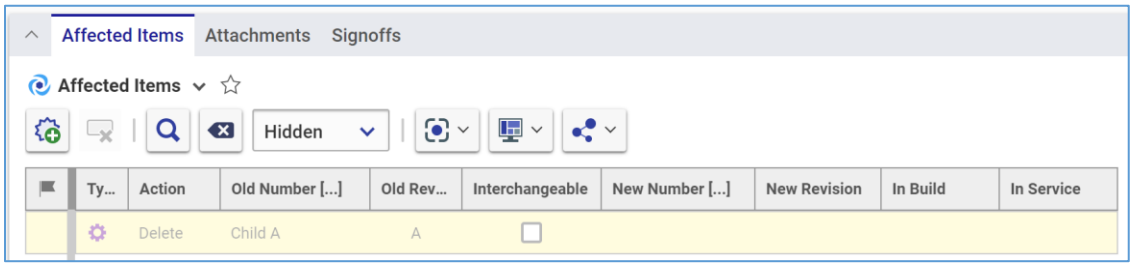


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13.2.1.6 Removing an Affected Item from a Simple ECO

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.



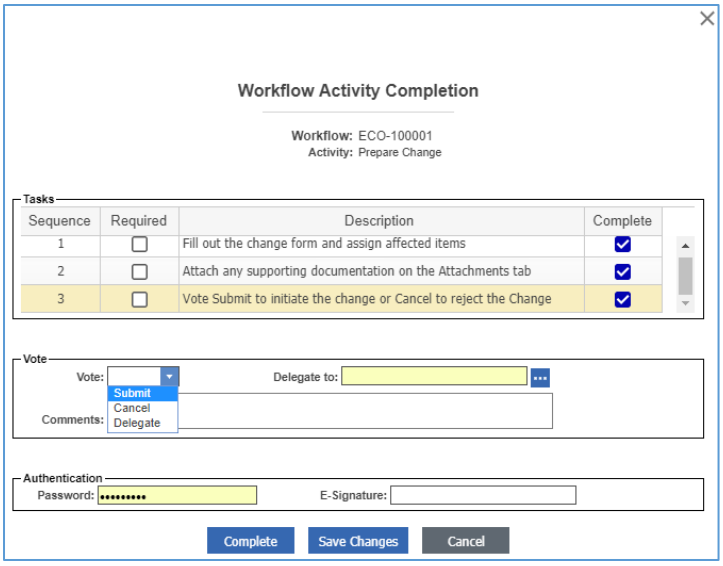
3. Click **Save** or **Done** on the Simple ECO toolbar. The **Affected Item** disappears from the grid.

Note: The **Affected Item** disappears 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. Double-click the Workflow Task to open the **Workflow Activity Completion** dialog for the Simple ECO.



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.

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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:

22. There are new part numbers for the noninterchangeable parts changes.
23. The ECN has all other affected items in the hierarchy.
24. Affected Items up the hierarchy tree from the actual Item are changed.
25. Affected Documents of the parent assemblies (such as BOMs) are changed.
26. 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 changes. 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.

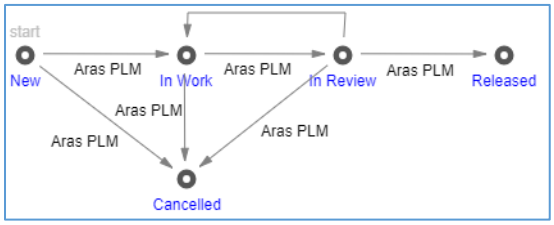
The MCO process provides a specialized user interface to enable editing the AML without the ability to edit Part properties or relationships.

13.2.2.1 Understanding the MCO Process

The MCO workflow has the following roles:

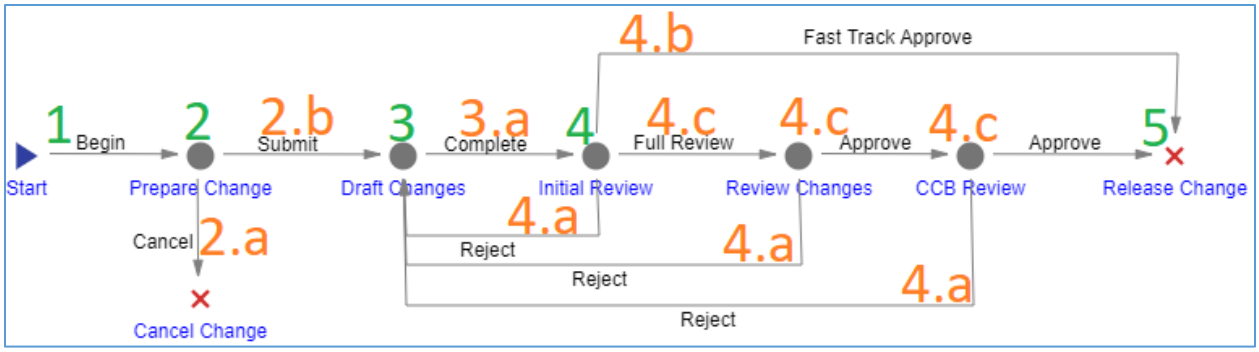
- An MCO Creator (**Originator**), is the user who initially created the MCO in the system. This may or may not be the same person as other roles.
- An MCO Owner (**Assigned Creator**), is the person responsible for the AML change.
- A Change Specialist I (CSI) coordinates and prepares MCOs through the 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.



The Simple Change Management workflow and MCO life cycle produce together the following scenario:

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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:
   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 states and workflow activities in terms of Roles and Permissions.

Table 7: The MCO lifecycle and workflow activities with corresponding 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

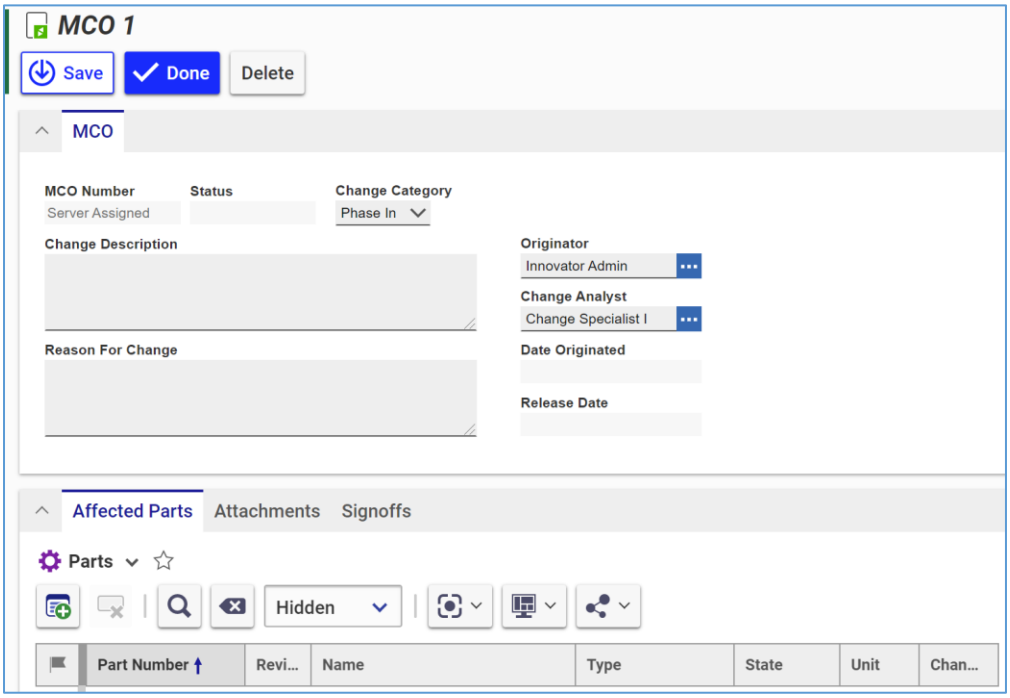
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Life Cycle State	Workflow Activity	Can Add	Get	Update	Delete	Change access	Can be promoted	Update responsible
In Work	Draft Changes		Aras PLM, CM, Manager, Owner, World	Aras PLM, CM, Manager, Owner	Aras PLM, CM	Aras PLM, CM	Yes	Owner
In Review	Initial 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

To create a Manufacturing Change Order:

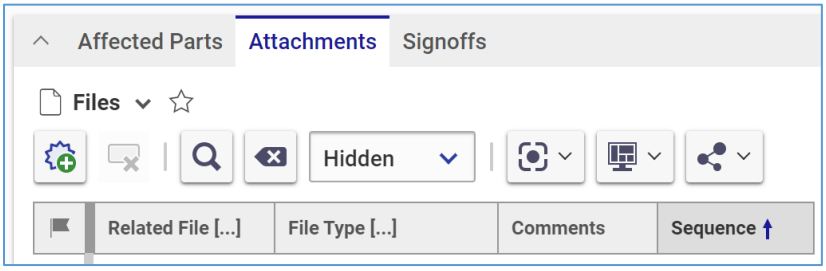
1. Go to **Contents > Change Management > MCOs**.
2. Click **Create New MCO**. The view of a new MCO appears.



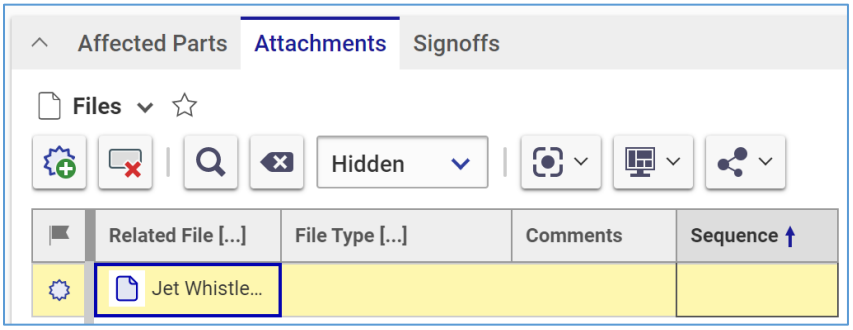
3. Keep the default **Phase In** value in the **Change Category** list.
4. Describe the change in the **Change Description** text box.

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5. Describe the reason for the change 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.

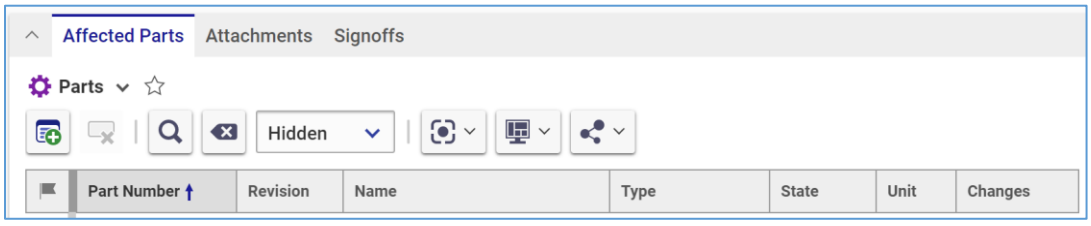


10. Click **New File** on the Attachments accordion toolbar. The standard operating system dialog for file browsing and selection appears.
11. Search for and select a file. A new row appears in the **Files** grid with the file attached.



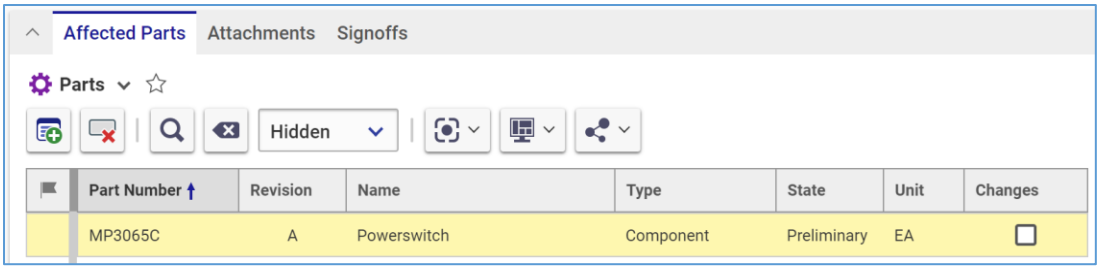
Note: Aras Innovator will automatically assign a file type depending on File's extension when you save the ECN.

12. If it is necessary to provide additional information about the File, enter it in the **Comments** cell.
13. Repeat steps 10-12 for other files concerning this MCO.
14. Go to the **Affected Parts** accordion tab to assign Parts with AMLs this MCO should change.



15. Click **Add Parts** on the Affected Parts accordion toolbar. The **Search dialog – Part** appears.
16. Search and select Parts with AMLs this MCO should change. The selected Parts appear under **Affected Parts**.

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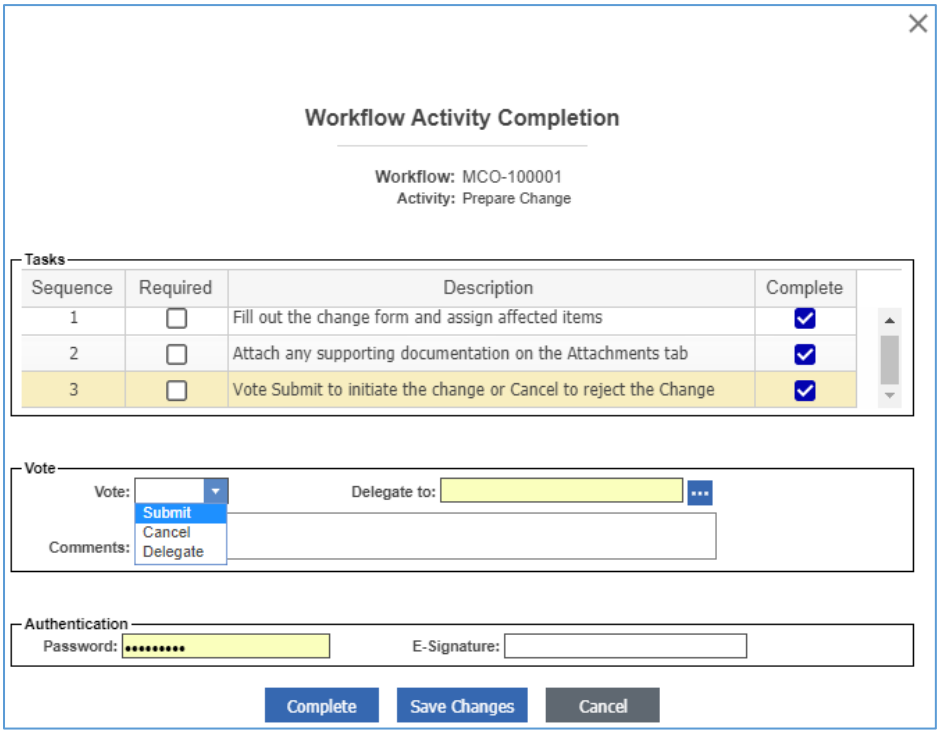


17. Click **Done** on the MCO toolbar. The MCO is created and waits to be submitted as defined in the section *13.2.2.2 Submitting an MCO*.

13.2.2.3 Submitting an MCO

To submit a Manufacturing Change Order:

1. Go to **Contents > My Innovator > My InBasket > Search My InBasket**.
2. Double-click on the Workflow Task to open the **Workflow Activity Completion** dialog for the MCO.



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.

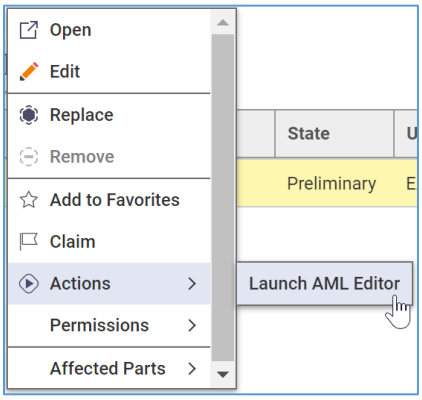
13.2.2.4 Drafting Changes Within an MCO

Use the following procedure:

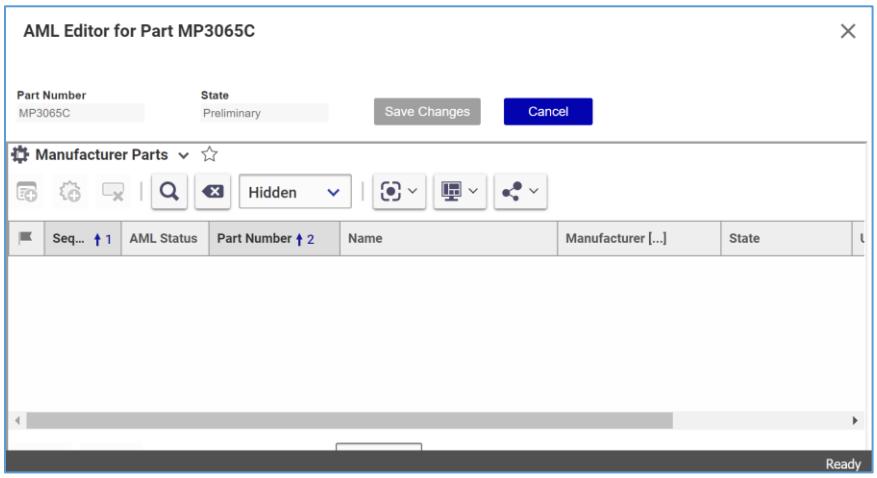
1. Open the **MCO** view.
2. Go to the **Affected Parts** accordion tab.

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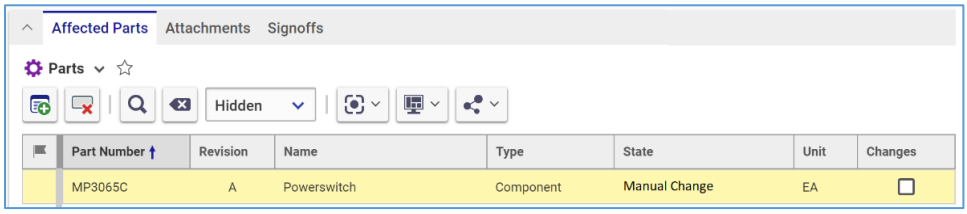
3. Right-click a **Part** in the **Affected Parts** grid and select **Actions > Launch AML Editor**.



The AML Editor appears with the AML of the given Part in a separate dialog box.

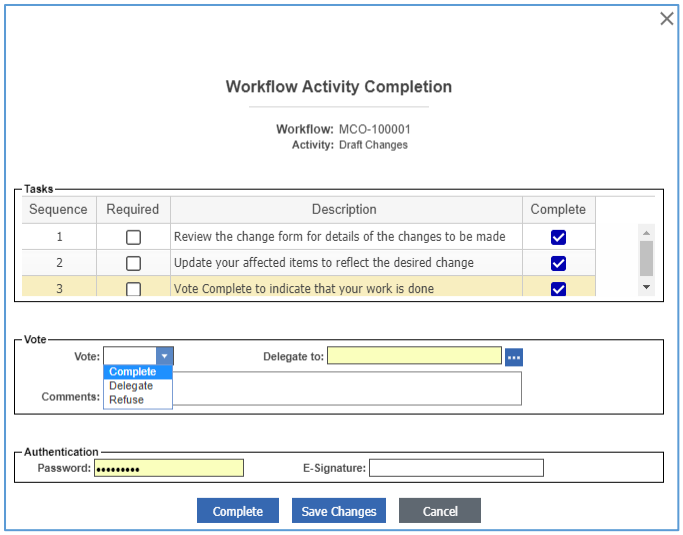


4. Edit the AML as described in section *7.7 Approved Manufacturer List (AML)*.
5. Click **Save Changes**. The AML Editor disappears. The given Affected Part gets the **Manual Change** State.



6. Go to **Contents > My Innovator > My InBasket > Search My InBasket**.
7. Double-click on the Workflow Task to open the **Workflow Activity Completion** dialog for the MCO.

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8. Mark the tasks you completed in the **Tasks** field.
9. Select **Complete** in the **Vote** list.
10. Click **Complete**.

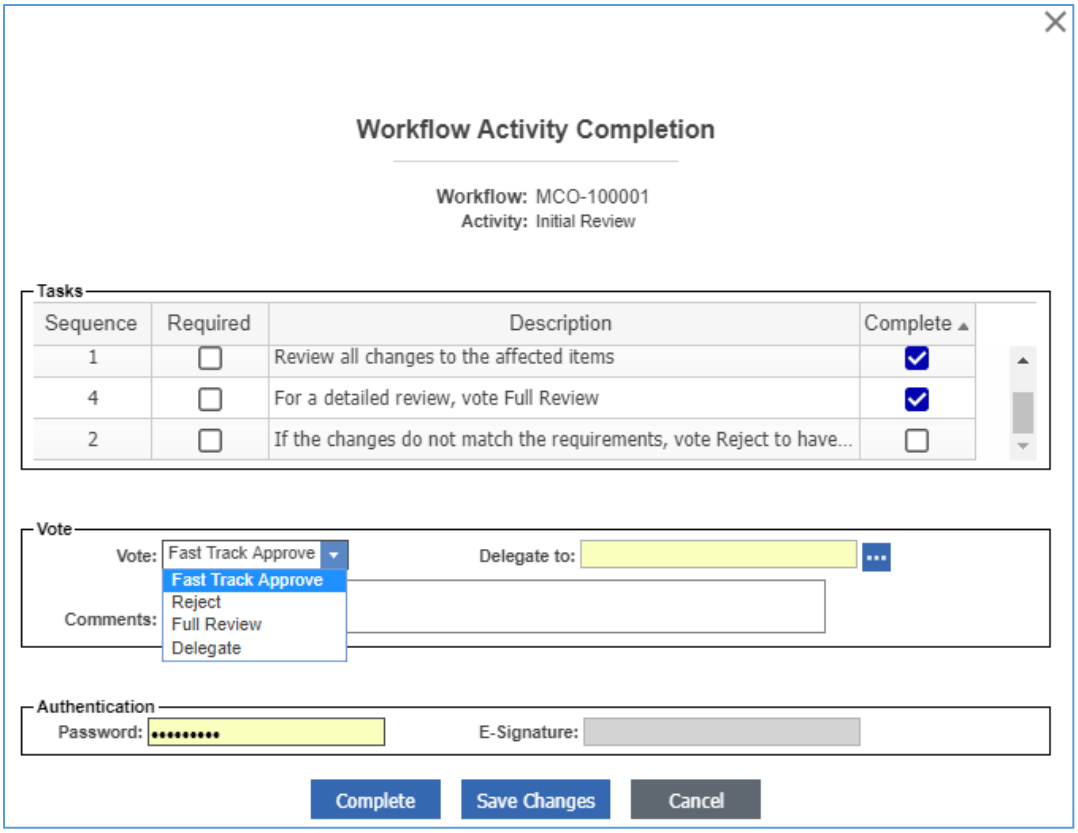
    The MCO enters the **Initial Review** activity assigned to the CA.

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.

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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.

13.3 Express Change Management

Express Change Management (CM) complements the CMII and Simple CM as an approach for Change Management. It is ideal for organizations that may not require all the rigorous steps of the CMII. An Express CM process can work in parallel with CMII and Simple CM processes.

The Express CM provides two types of items to manage changes:

- The **Express Engineering Change Order (ECO)** is an authorization and execution of 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.

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:

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- Team
- Team Manager
- Team Member
- Team Guest

Engagement of each role depends on the Express Change item.

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 using the Impact Matrix.

13.3.1.1 Understanding the Express ECO Process

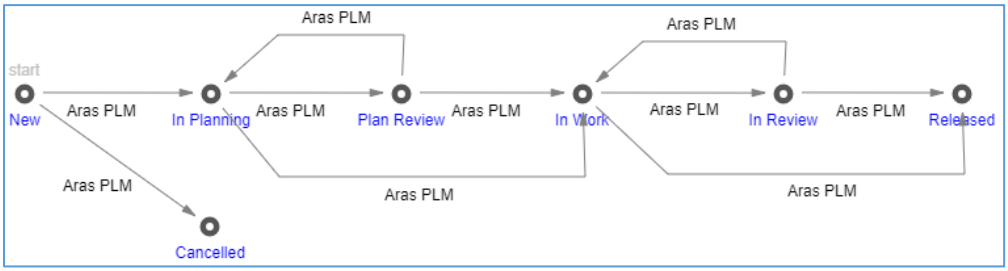
The **Product** Team roles are engaged in the Express ECO workflow as follows:

- **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:

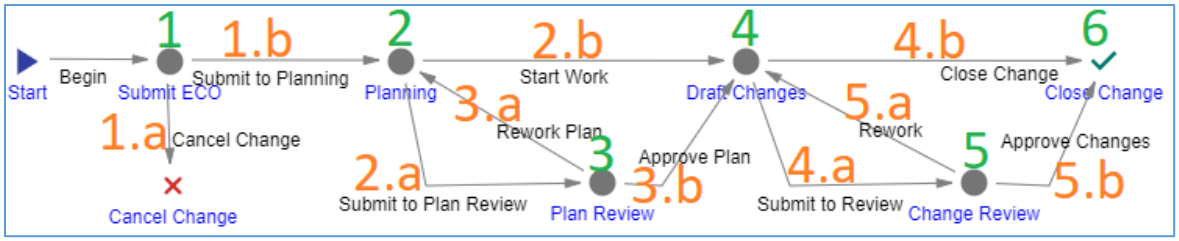
- An Express ECO Creator is a user who initially created and submitted the Express ECO in the system. This may or may not be the same person as other roles.
- An Express ECO **Change Coordinator** (Owner) is a person responsible for managing the ECO from start to finish.
- The Configuration Management (CM) group.
- 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.



The Express ECO workflow together with the Express ECO life cycle produces the following scenario:

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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. **Submit** it. A workflow is automatically started to assign tasks and track the changes to the Express ECO.
    b. **Cancel** it. The Express ECO cannot be restored in the future.
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 **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 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 the **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:
    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 updated according to the specified Action.

The following table shows the Express ECO lifecycle states and workflow activities in terms of Roles and Permissions.

Table 8: The Express ECO lifecycle and workflow activities with corresponding Roles and Permissions

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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
Released	Closed Change		Team Manager, Team Member,	Administrators		Administrators	No, a final state	

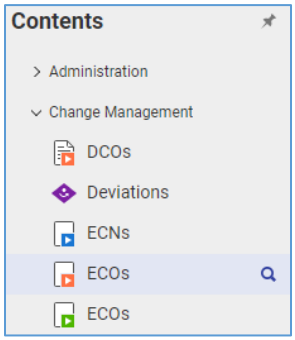
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Life Cycle State	Workflow Activity	Can Add	Get	Update	Delete	Change access	Can be promoted	Update responsible
			Administrators, Owner, All Employees, Creator					

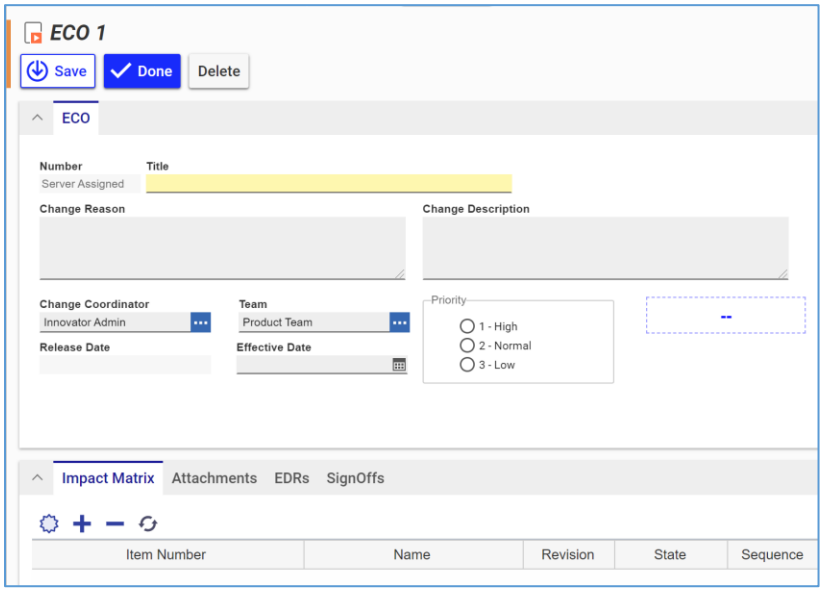
13.3.1.2 Creating an Express ECO

Use the following procedure:

1. Go to **Contents > Change Management > ECOs** (one with the orange icon).



2. Click **Create New ECO**. The view of a new Express ECO appears.



3. Enter the Express ECO title in the **Title** text box.
4. Describe the reason for the change in the **Change Reason** text box.
5. Describe the change 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:

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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.

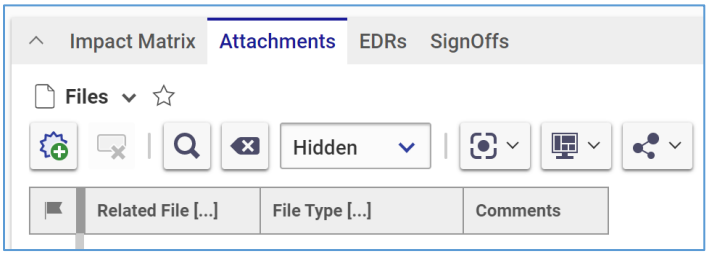
   b. Using the standard search procedure, search for and select a Team. The selected Team replaces the default identity.

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.

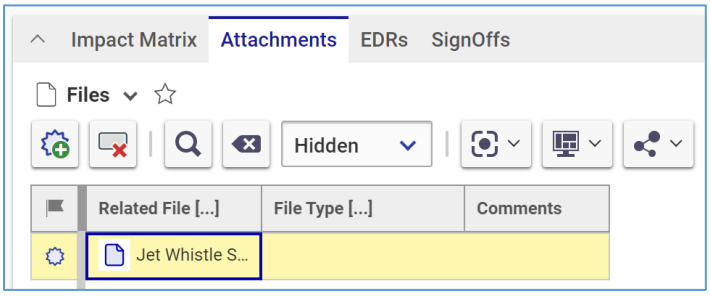
Note: The effective date is often when items are put into use based on decisions in the organization.

11. Go to the **Attachments** accordion tab to attach all the files concerning this Express ECO.



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.



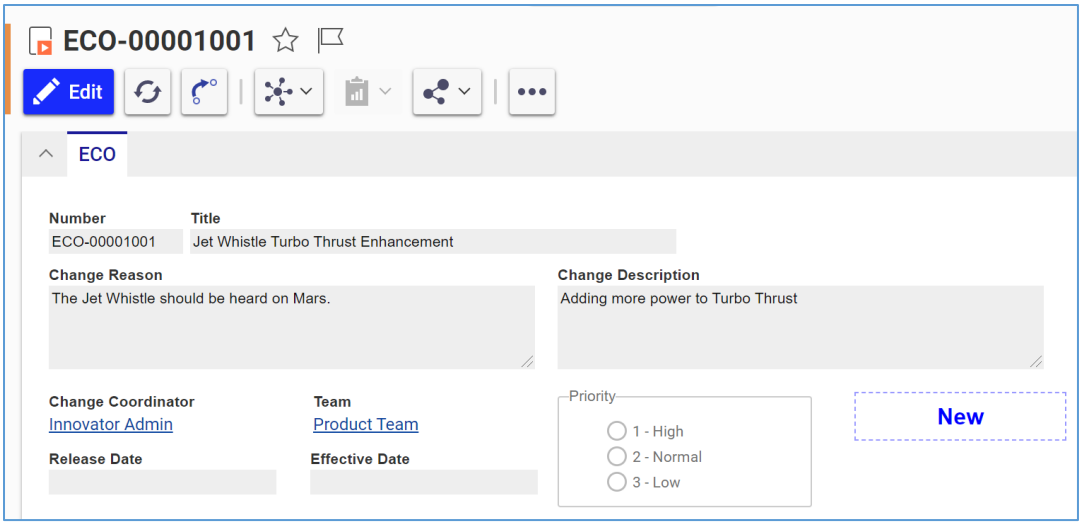
Note: Aras Innovator will automatically provide a file type to the **File Type** cell depending on the File's extension when you save the Express ECO.

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*.

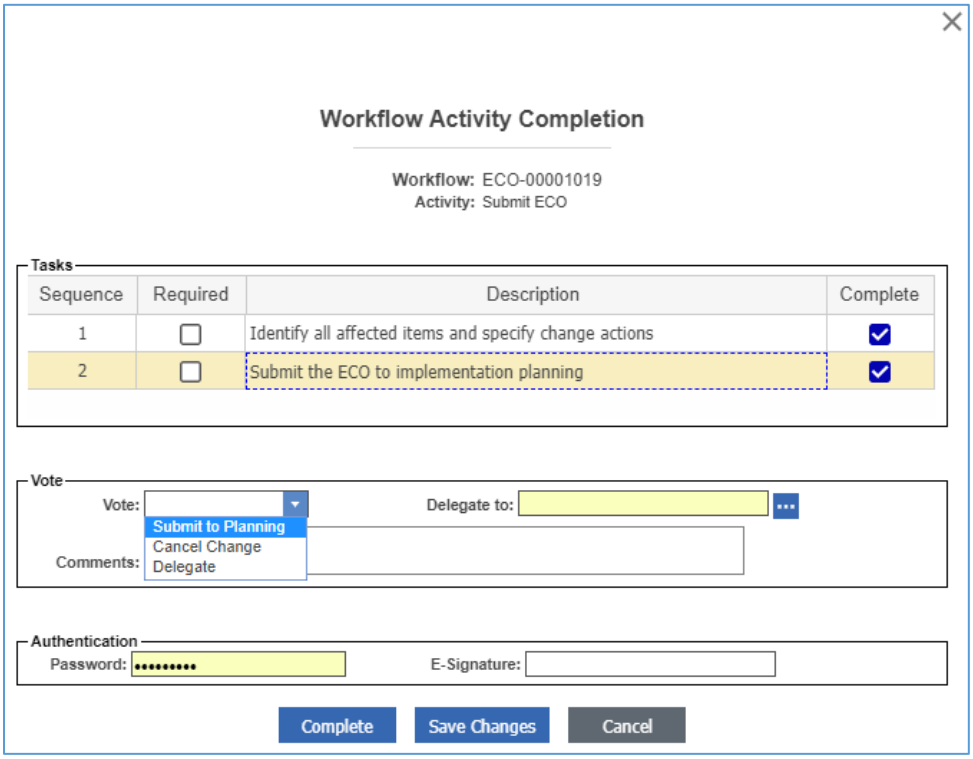
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13.3.1.3 Voting on an Express ECO

To vote on an Express ECO:

1. Go to **Contents > My Innovator > My InBasket > Search My InBasket**.
2. Double-click the Workflow Task to open the **Workflow Activity Completion** dialog for the Express ECO.



3. Mark the completed tasks in the **Tasks** field.
4. Select the option per your decision in the **Vote** list.
5. Click **Complete**.

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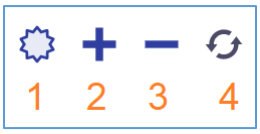
The Express ECO enters the next activity as defined in the Express ECO workflow.

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.

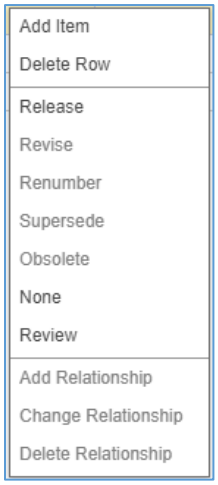
You can manage the change in a quick way using the **Impact Matrix** accordion toolbar and context menu.

The **Impact Matrix** accordion toolbar displays the following buttons:



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.
4. **Refresh** shows the latest updates.

The Impact Matrix context menu features:



- 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** performs the initial release of a Part, promoting the Part from the **Preliminary** state to the **Released** state.
  - **Revise** creates a new revision of an existing released Part. The new revision supersedes the existing 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.
  - **Supersede** provides a new part number for the original part. The original Part is superseded.
  - **Obsolete** promotes an existing released or superseded Part to the **Obsolete** state.

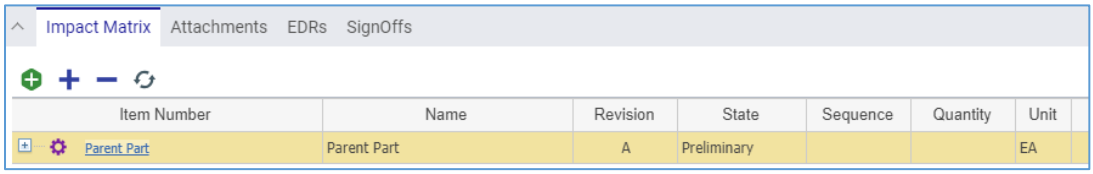
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- **Review** puts the Part under **Review**. Action needs to be selected on the Part before the ECO can be processed. The ECO cannot be completed if any Part is under **Review**.
- **None** states that the Part is explicitly not affected or impacted by the change. The system takes no action on the Part. Under certain circumstances, this action may not be allowed if an Affected Item requires this Part to be modified.

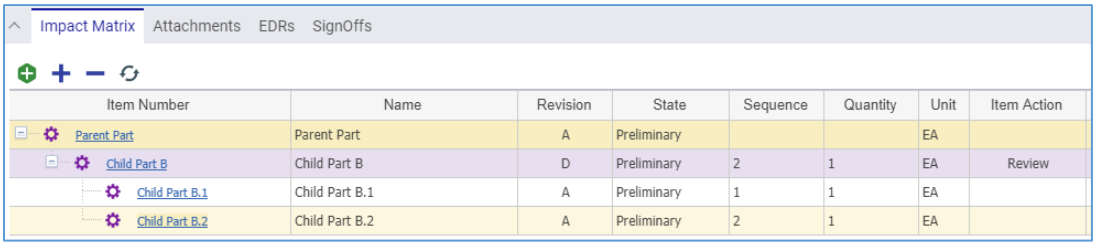
- Actions for a BOM relationship of a previously released Part (each selected action appears in the **Relationship Action** column of the Impact matrix once the ECO is processed):
  - **Add Relationship** adds another released Part to the BOM of the given released Part.
  - **Modify Relationship** modifies 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.

The following procedure explains the main Impact Matrix management features:

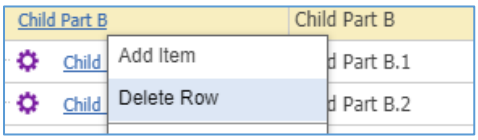
1. Open the **Express ECO**.
2. Click **Edit** on the **Express ECO** toolbar.
3. Go to the **Impact Matrix** accordion tab.
4. Click **Add Item** on the Impact Matrix accordion toolbar. The **Search dialog – Change Controlled Item** appears.
5. Search for and select an Affected Part. The selected Affected Part and Parts Impacted by this Part appear in the Impact Matrix tree.



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 violet-highlighted. The given Part's Parents are above the Part. The given Part's Children are below the Part.



7. Right-click the **given Part** and then click **Delete Row**. The given Part and its children disappear from the Impact Matrix.



8. Click **Save** or **Done** on the **Express ECO** toolbar to save the changes in the Express ECO.

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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:

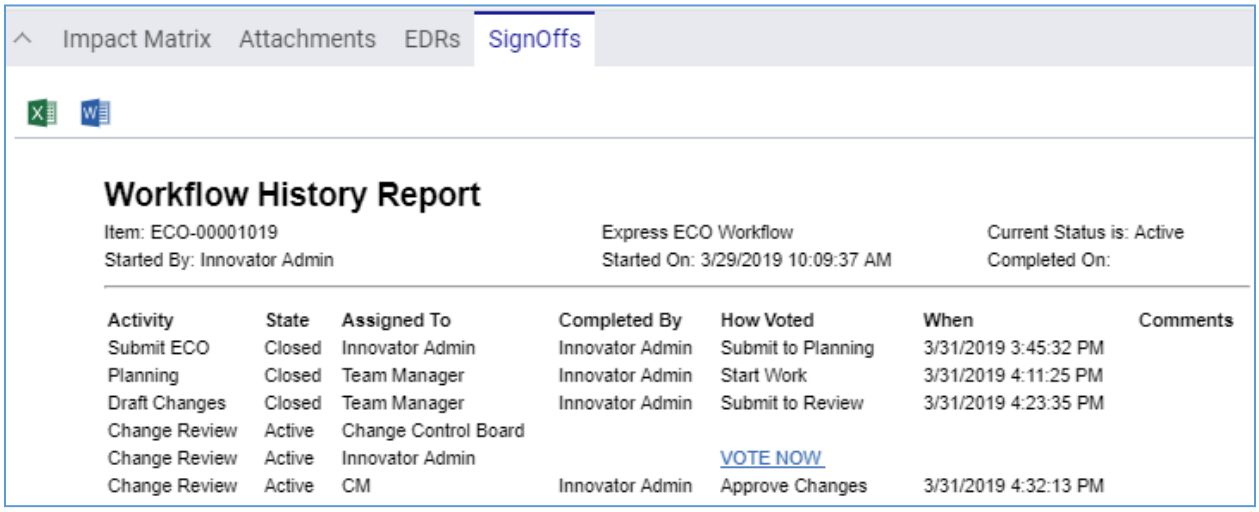
1. Open the **Express ECO**.
2. Click **Edit** on the Express ECO toolbar.
3. Go to the **Impact Matrix** accordion tab.
4. Check whether each Part has an Action.
5. Check set Actions for validity.
6. Right-click a **Part** and then click the proper **Action**. For Actions details, refer to *13.3.1.4 Managing the Impact Matrix*.
7. Click **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.



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.

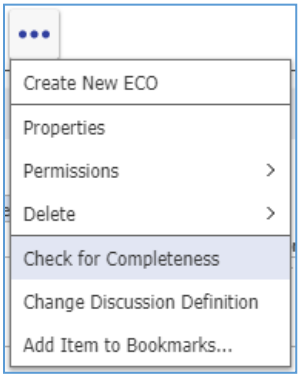
There are several ways to access the **Completeness Check Results** dialog for an Express ECO:

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0. Go to **Contents > Change Management > ECOs**, right-click the **Express ECO** to be checked, and then click **Check for Completeness**.



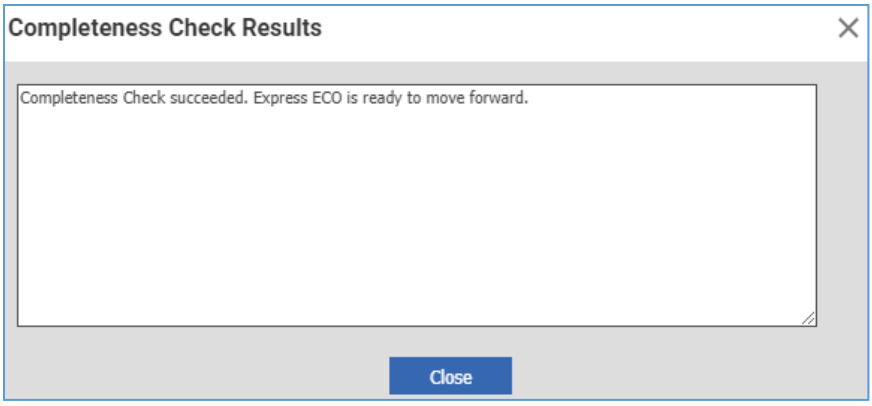
1. Open the view of an Express ECO to be checked, on the **Express ECO** toolbar, click **More**, and then click **Check for Completeness**.



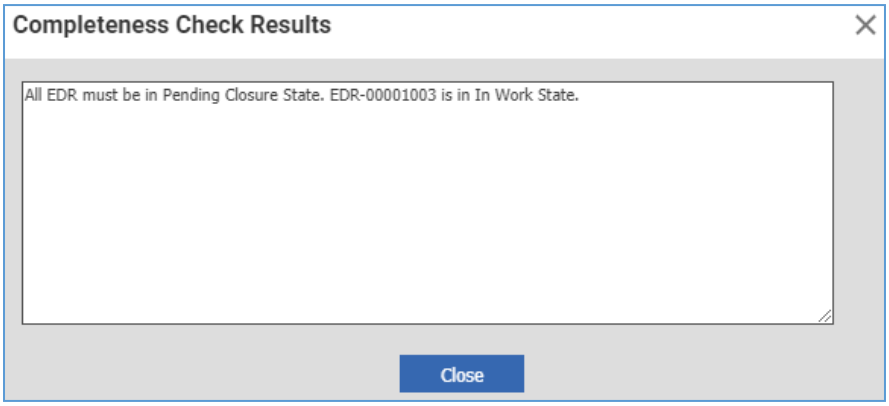
When accessed, the **Completeness Check Results** dialog shows you checking results:

- 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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- 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.



13.3.1.8 Viewing and Revising Parts Released Within an Express ECO

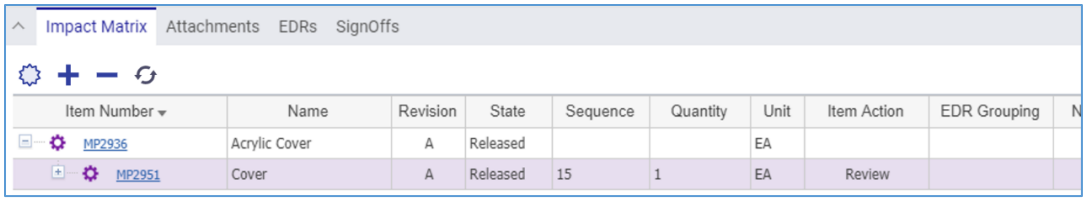
Once the Express ECO workflow is completed, you can search for the released Parts and check that they all are **Released**.

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**.
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. Search for and select an Affected Part(s). The selected Affected Part appears in the Impact Matrix tree.

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Item Number	Name	Revision	State	Sequence	Quantity	Unit	Item Action	EDR Grouping
MP2936	Acrylic Cover	A	Released			EA		
MP2951	Cover	A	Released	15	1	EA	Review	

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			

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			

8. Click **Done** on the Express ECO toolbar. The Express ECO is ready for revising Parts.

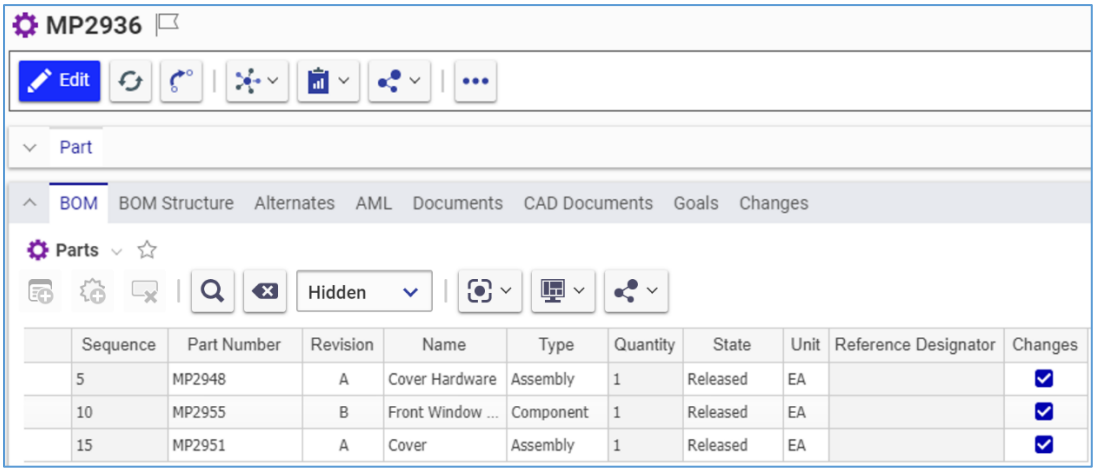
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13.3.1.9 Processing Parts Within an Express ECO

This section describes the revision of released Parts as an example of processing Parts within an Express ECO.

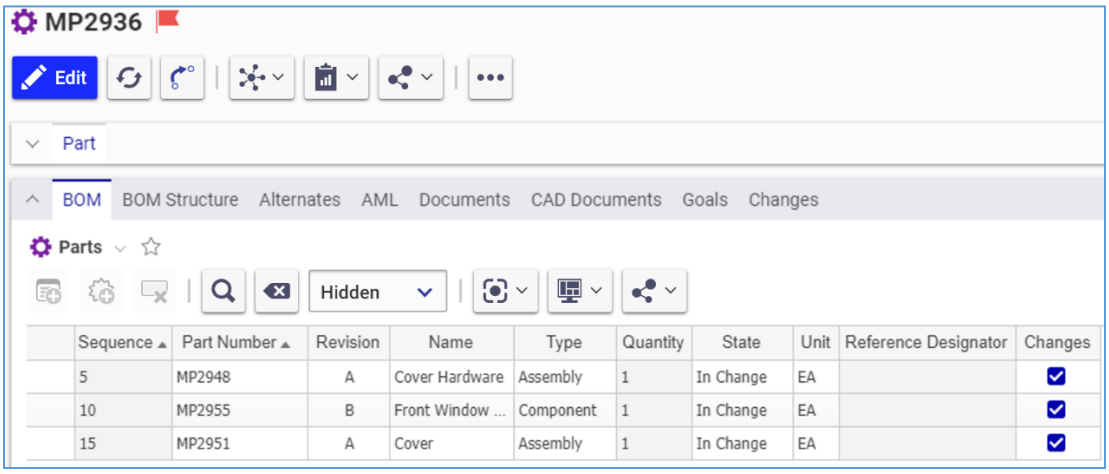
To process Parts, follow the Express ECO workflow as explained in section *13.3.1.1 Understanding the Express ECO Process* and notice how the state of Parts is changing:

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		☑

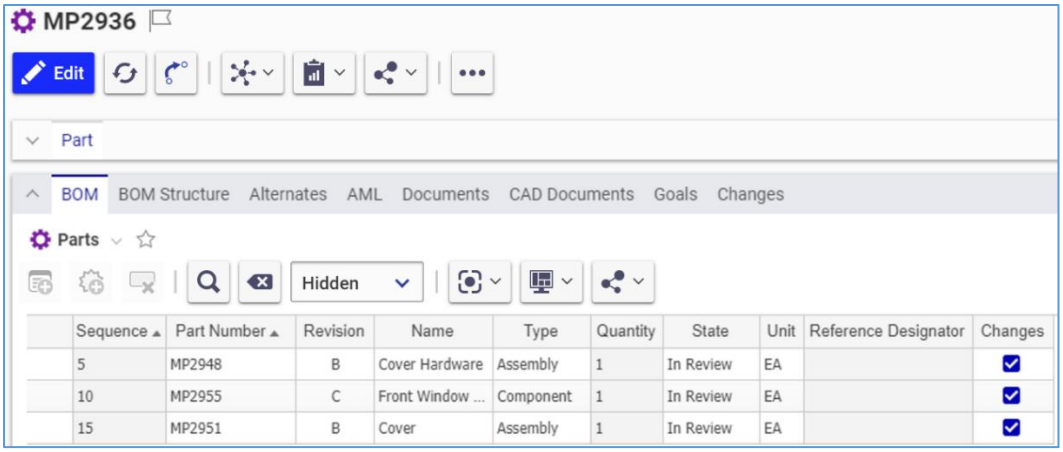
2. **Planning**. After submission, the Affected Parts are set to the **In Change** state and are not allowed to be edited, note the **red claiming flag**.



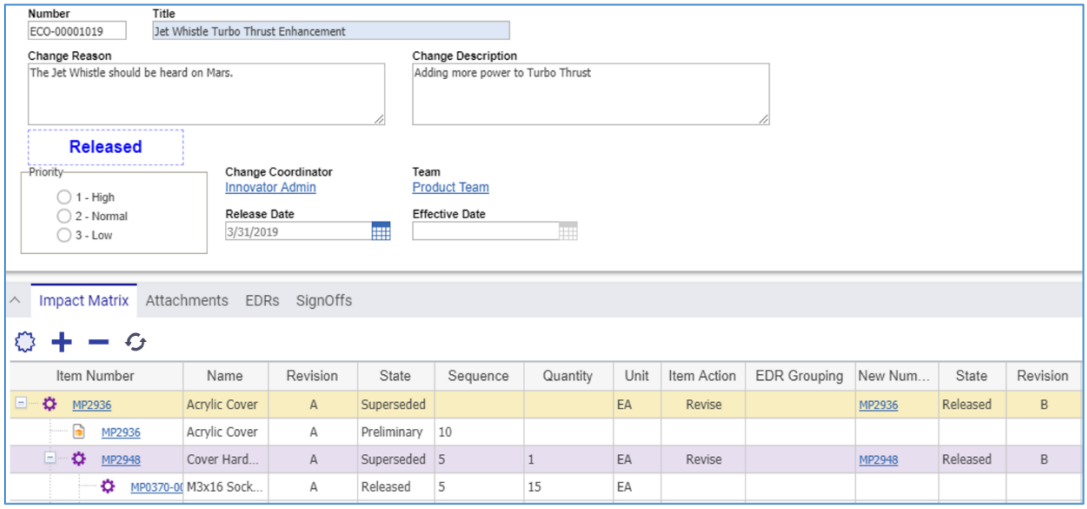
Sequence	Part Number	Revision	Name	Type	Quantity	State	Unit	Reference Designator	Changes
5	MP2948	A	Cover Hardware	Assembly	1	In Change	EA		☑
10	MP2955	B	Front Window ...	Component	1	In Change	EA		☑
15	MP2951	A	Cover	Assembly	1	In Change	EA		☑

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 on the original revision.

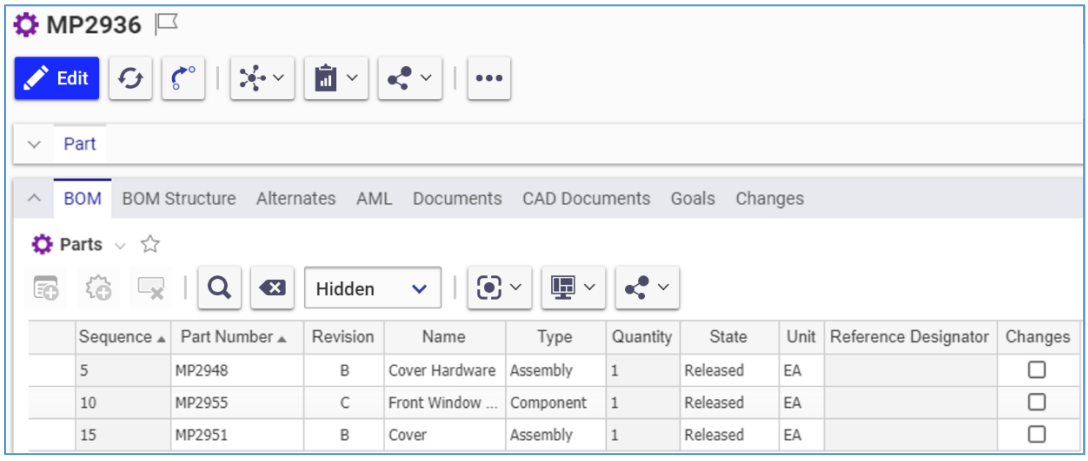
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4. **Close Change**. The Express ECO is **Released**.

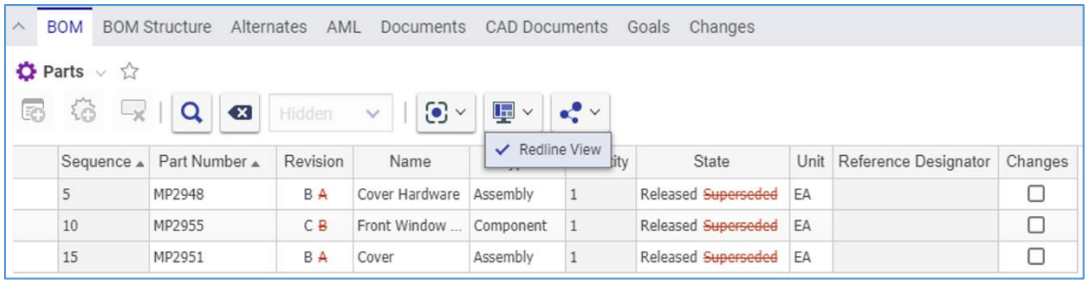


5. The newly revised Parts are **Released** at the new major Revision.



You can use **Redline View** for displaying the current Part changes in a Parent BOM.

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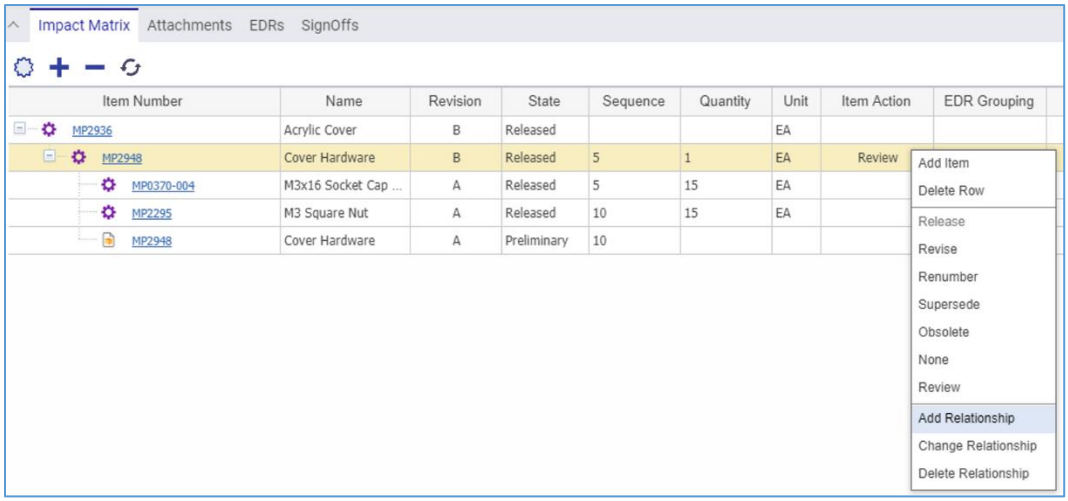


13.3.1.10 Modifying Part BOM Relationships Within an Express ECO

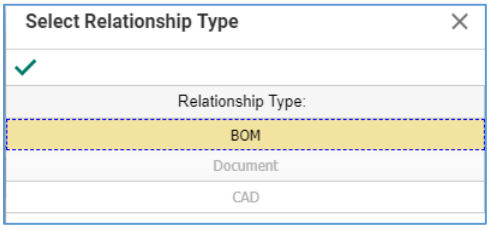
Using specialized Relationship Actions on the Impact Matrix, which are discussed in section *13.3.1.4 Managing the Impact Matrix*, you can add, change, and remove Parts from an BOM, as well as modify information on the BOM Entry itself (e.g., Quantity and Sequence Number).

To modify a BOM, follow the Express ECO workflow as explained in section *13.3.1.1 Understanding the Express ECO Process* and notice how the BOM is changing:

1. Create an Express ECO with a Relationship Action.

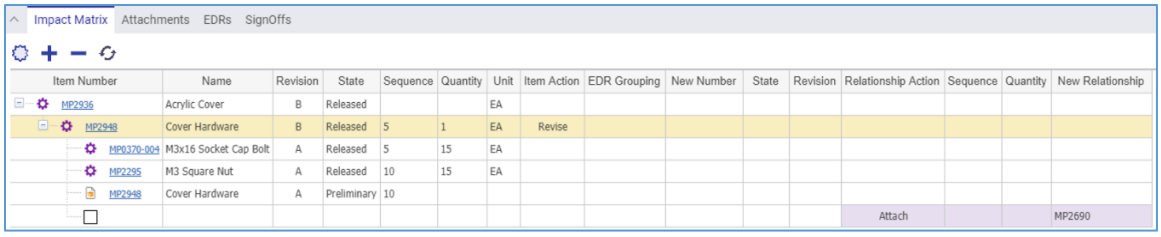


2. Select BOM in the **Select Relationship Type** dialog.

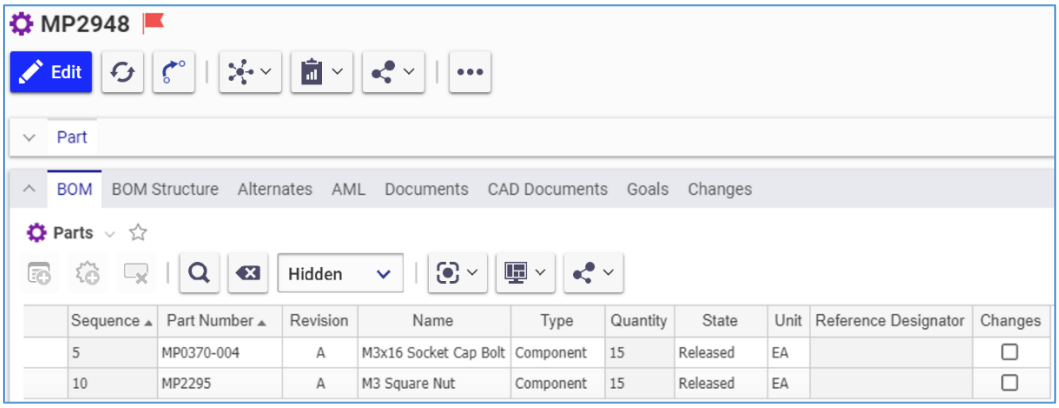


3. When adding or replacing a Part, select a new Part in the **Search Dialog – Part**. The Affected Parent should have **Revise** action set as its BOM change will create a new Revision. Notice the changes in the Impact Matrix.

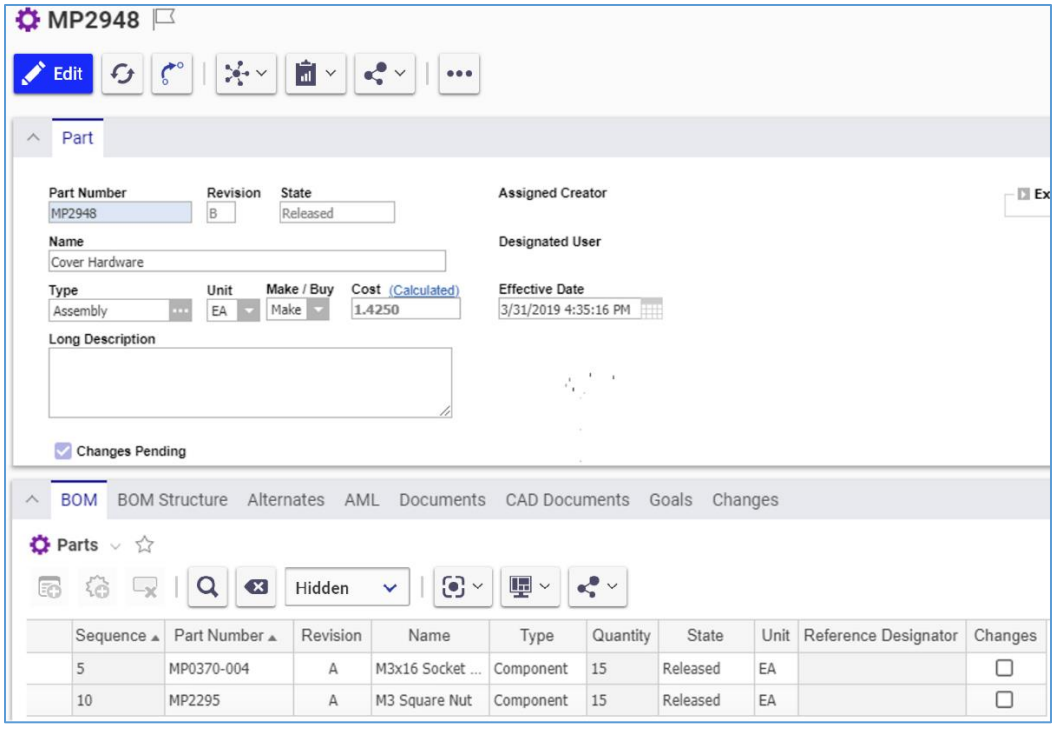
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4. Complete the Express ECO creation. Check the BOM under changes. Note the **red claiming flag**.

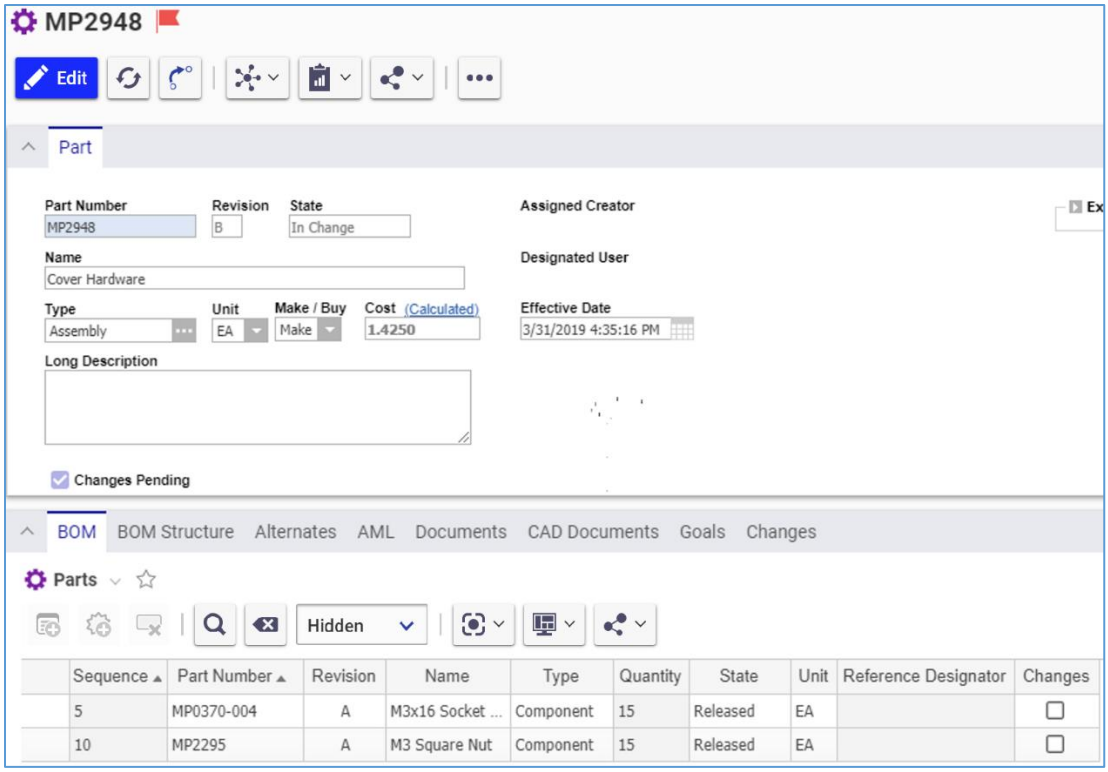


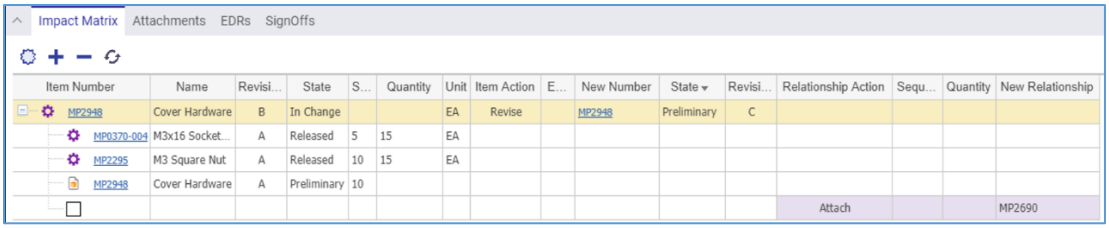
5. **Submit the Express ECO**.



6. **Planning**. After submission, the Affected Parts are set to the **In Change** state and not allowed to be edited.

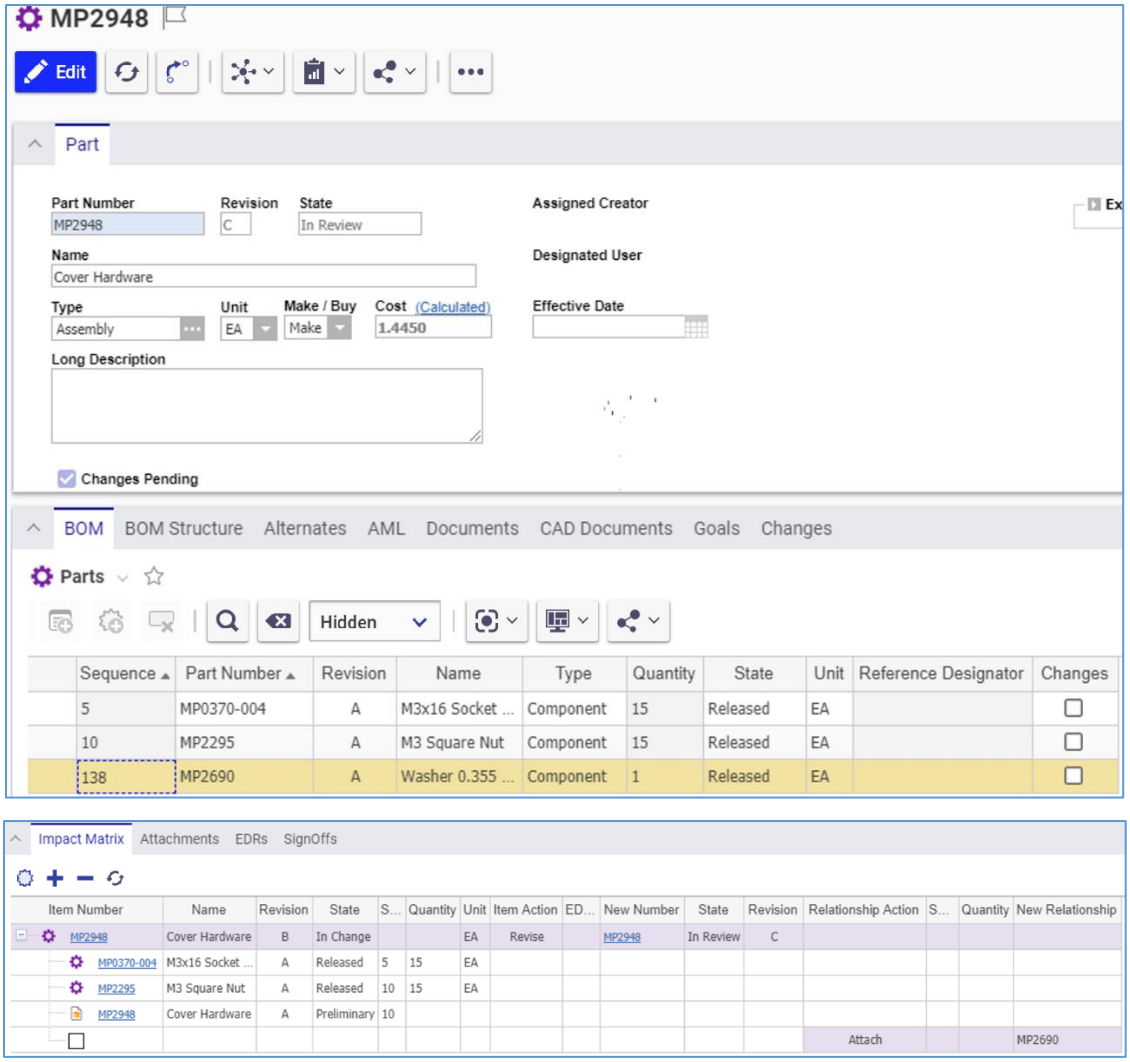
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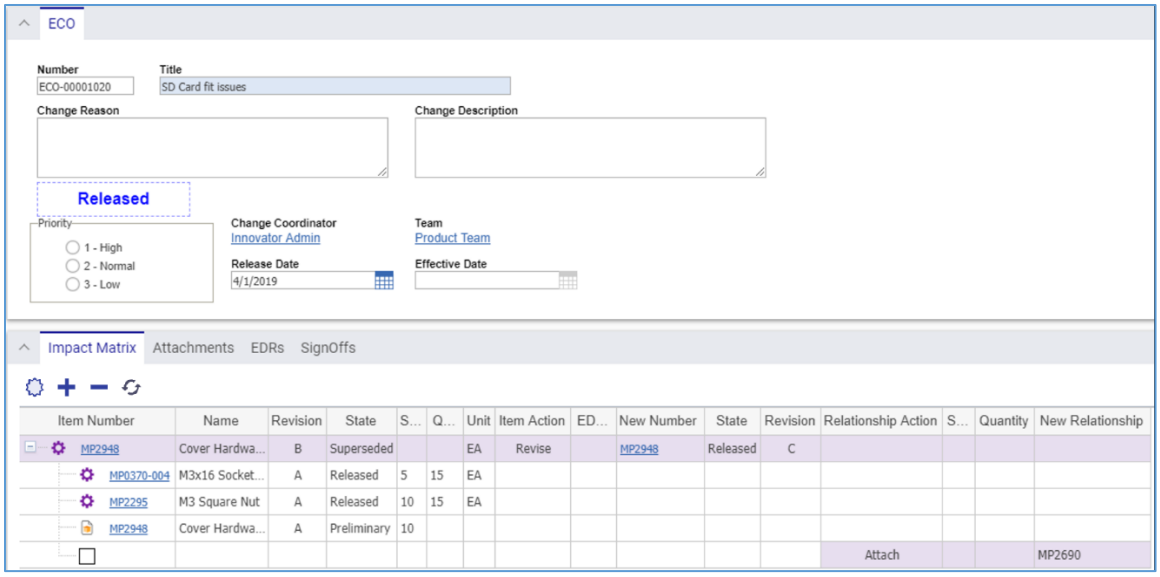
7. **Change Review**. During the review process, the Affected Parts are promoted to the **In Review** state and a new major revision, which has the new BOM with changes. No edits are allowed on the original revision.

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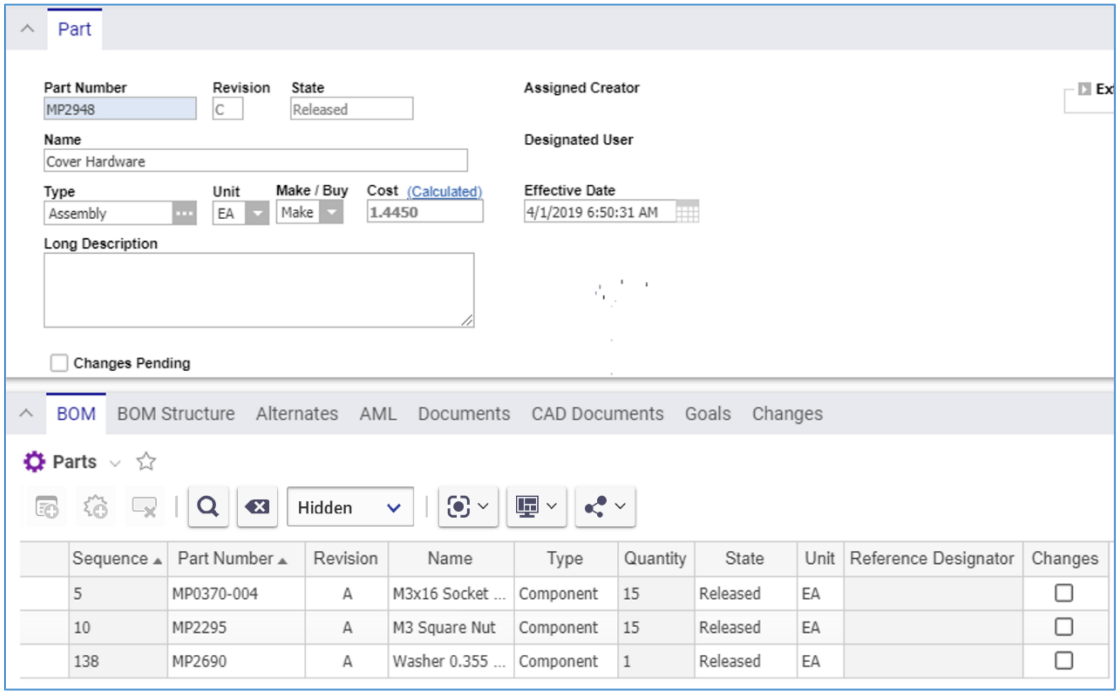


8. **Close Change**. The Express ECO is **Released**.

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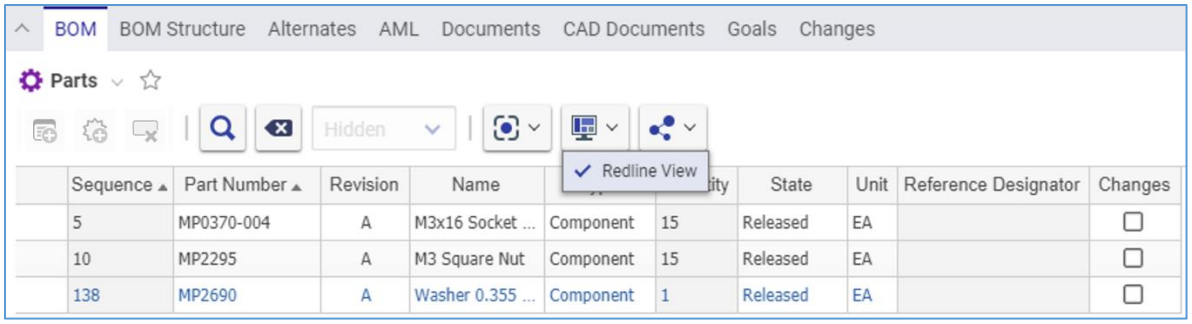


The newly revised Parts are **Released** at the new major Revision.



You can use **Redline View** for displaying the current Part changes in a Parent BOM.

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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. You can quickly release a new Document, change, revise, or obsolete an existing Document.

In this section, the term Document means an item of both Document and CAD Document ItemTypes.

13.3.2.1 Understanding the Express DCO Process

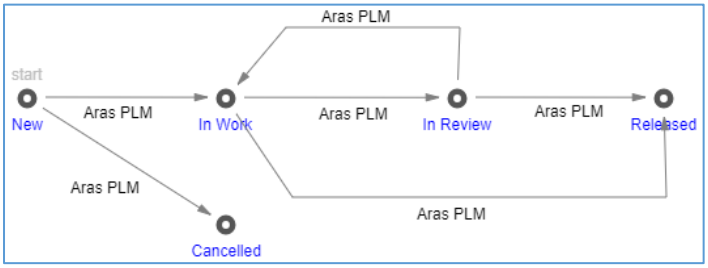
The **Product** Team roles are engaged in the DCO workflow as the following:

- **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:

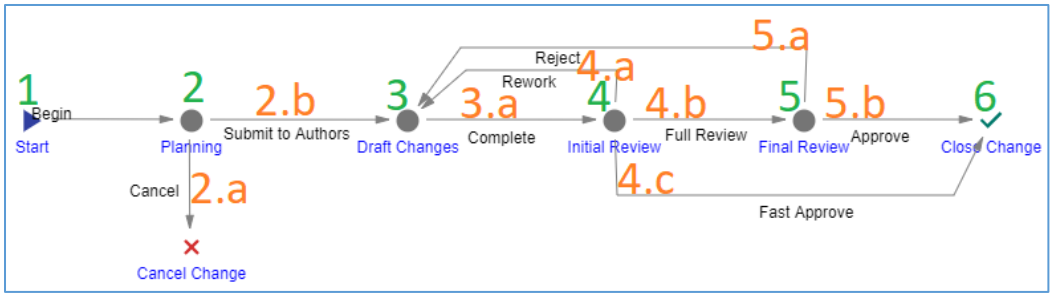
- A DCO Creator, is a user who initially created and submitted the DCO in the system. This may or may not be the same person as other roles.
- A DCO **Change Coordinator** (Owner), is a person responsible for managing the DCO from start to finish.
- The Configuration Management (CM) group.
- The Change 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.



The DCO workflow together with the DCO life cycle produces the following scenario:

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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. **Submit to Authors**. The DCO is ready for work and goes to the **Draft Changes** activity.
    b. **Cancel**. The DCO is cancelled and cannot be restored in the future.
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:
    a. **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 DCO and Affected Documents in details to vote either:
    a. **Full Review** if the DCO requires the final review by the CCB. The DCO goes to the **Final Review** activity.
    b. **Fast Approve** if the DCO is ready for release. The DCO goes to the **Close Change** activity.
    c. **Rework** if the DCO or Affected Documents need any further reworking by the Team Manager. The DCO goes back to the **Draft Changes** 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. **Approve** if the DCO process is completed and does not require any further reworking. The DCO goes to the **Close Change** activity.
    b. **Reject** if the DCO needs any further reworking. The DCO goes back to the **Draft Changes** 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 9: The Express DCO lifecycle and workflow activities with corresponding 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	

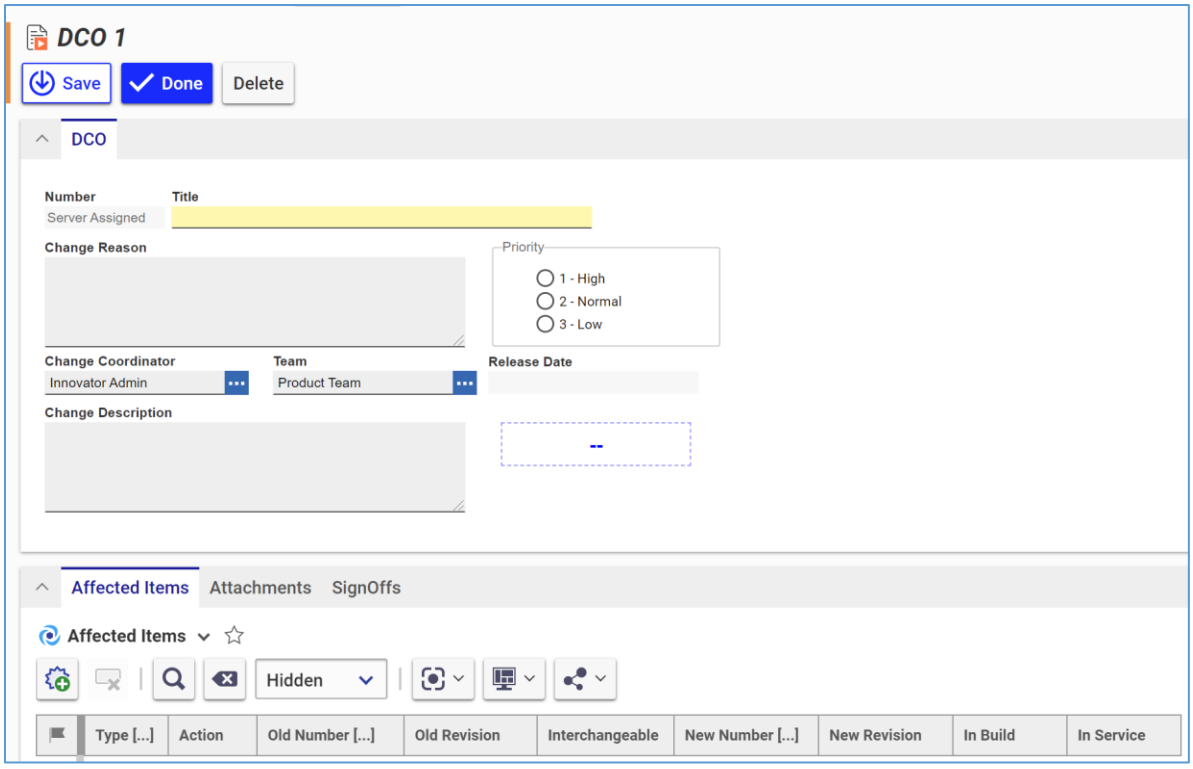
13.3.2.2 Creating a DCO

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 Replacing 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*.

To create a DCO:

1. Go to **Contents > Change Management > DCOs**.
2. Click **Create New DCO**. The view of a new DCO appears.

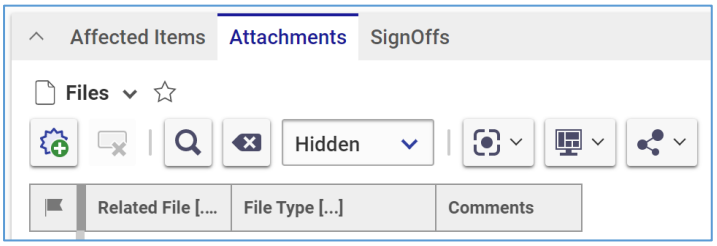
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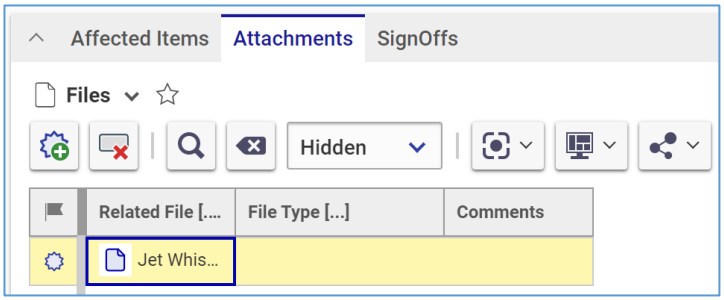
3. Enter the DCO title in the **Title** text box.
4. Describe the reason for the change in the **Change Reason** text box.
5. If it is necessary to set the Change Coordinator other than you:
    a. Click the **ellipses** button In the **Change Coordinator** box. The **Search dialog – Identity** appears.
    b. Search for and select an 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 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 Replacing a Document within a DCO*.
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*.

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14. Go to the **Attachments** accordion tab to attach all the files concerning this DCO.

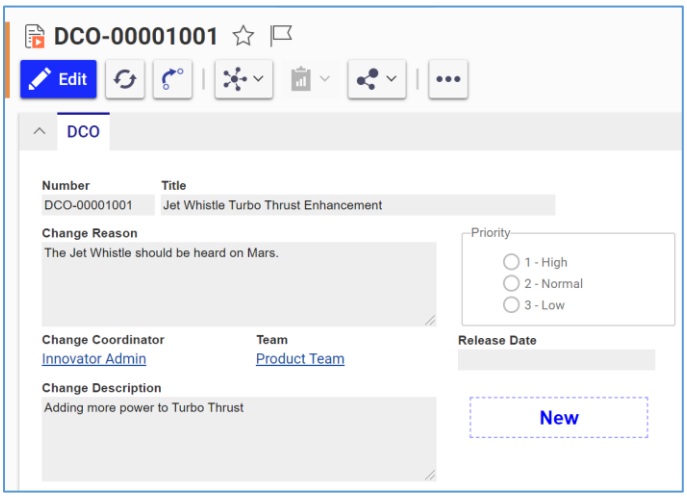


15. Click **Create Item** on the **Attachments** accordion toolbar. The standard operating system dialog for file browsing and selection appears.
16. Search for and select a file. A new row appears in the **Files** grid with the file attached.



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*.



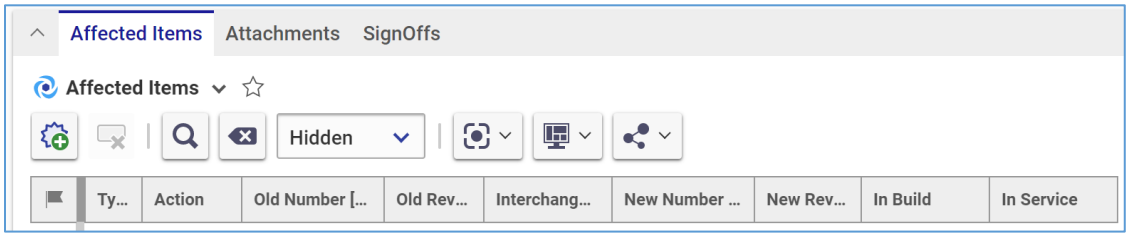
13.3.2.3 Releasing a Document within a DCO

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 for releasing affected Documents with a DCO.

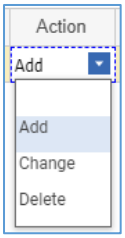
To assign an affected Document in the **Preliminary** state for release:

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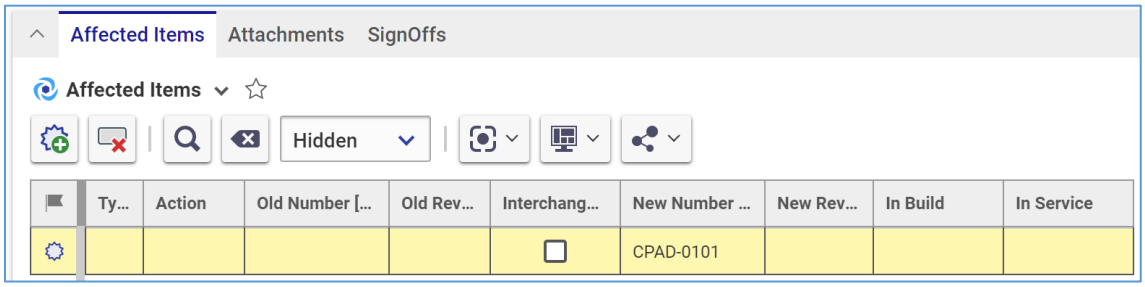
1. Open the **DCO**.
2. Click **Edit** on the DCO toolbar.
3. Go to the **Affected Items** accordion tab.
4. Click **Create Item** on the **Affected Items** accordion toolbar. A new row appears at the bottom of the **Affected Items** grid.



5. Select **Add** in the **Action** cell.

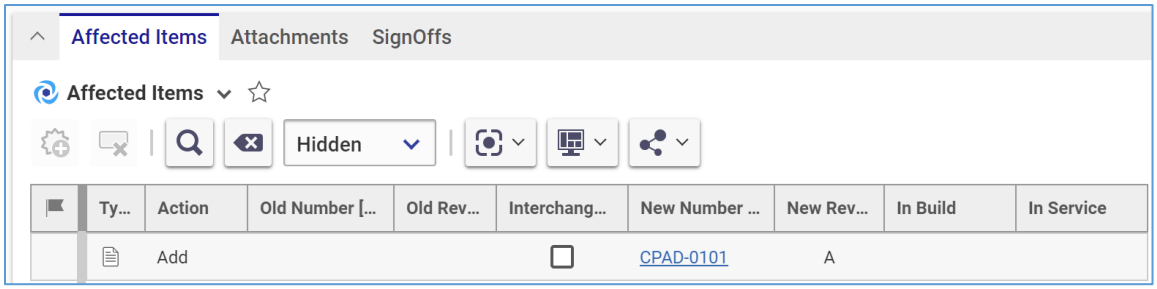


6. Click the **ellipsis** button in the **New Number** cell. The **Search dialog – Change Controlled Item** appears.
7. Search for and select the new affected Document. The affected Document populates the **New Number** cell.



8. Click **Save** or **Done** on the **DCO** toolbar. The DCO has an Affected Document in the **Preliminary** state assigned for release.

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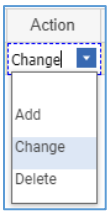


13.3.2.4 Replacing a Document within a DCO

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, and a new document is available.

Use the following procedure to assign an existing affected Document to be changed:

1. Follow steps 1-4 of the Adding a Document within a DCO procedure.
2. Select **Change** in the **Action** cell.



3. Click the **ellipsis** button in the **Old Number** cell. The **Search dialog – Change Controlled Item** appears.
4. Search for and select the affected Document to be changed. The selected Document populates the **Old Number** cell.

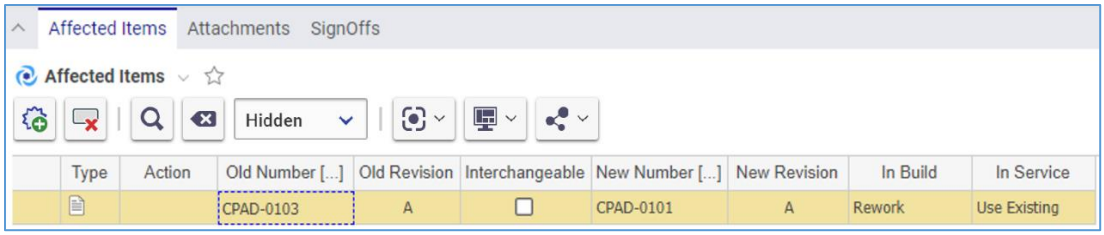


5. Leave the **Interchangeable** cell check box blank.
6. Click the **ellipsis** button in the **New Number** cell. The **Search dialog – Change Controlled Item** appears.
7. Search for and select the new Affected Document. The new affected Document populates the **New Number** cell.

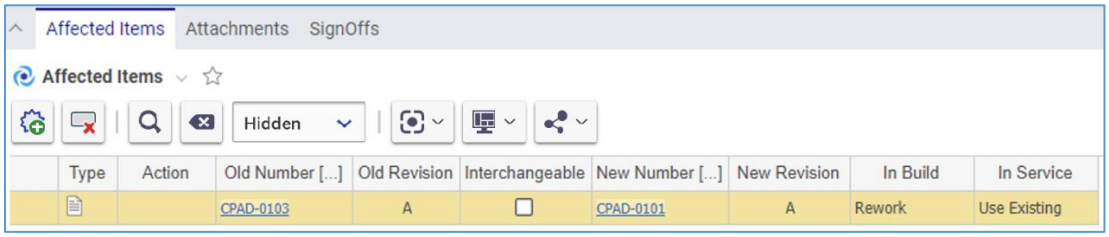


8. Click **Save** two times on the **DCO** toolbar.
9. Select the action to take on the Items that are being built in the **In Build** cell: **Use Existing**, **Rework**, or **Scrap**.
10. Select the action to take on the Items that are currently in service in the **In Service** cell: **Use Existing**, **Rework**, or **Scrap**.

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11. Click **Save** or **Done** on the **DCO** toolbar. The DCO has an Affected Document assigned for changing.

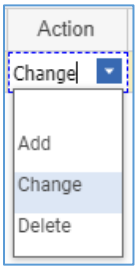


13.3.2.5 Revising Documents within a DCO

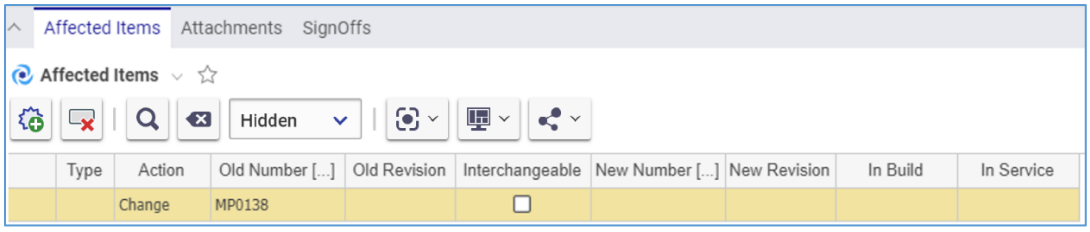
A released Document cannot be changed. A DCO can be issued to increment the revision to the next level and reset the lifecycle back to the preliminary state, allowing modifications. This controls who and when can make edits to a new revision of a Document.

Use the following procedure to assign an existing affected Document to be revised:

1. Follow steps 1-4 of the Adding a Document within a DCO procedure.
2. Select **Change** in the **Action** cell.



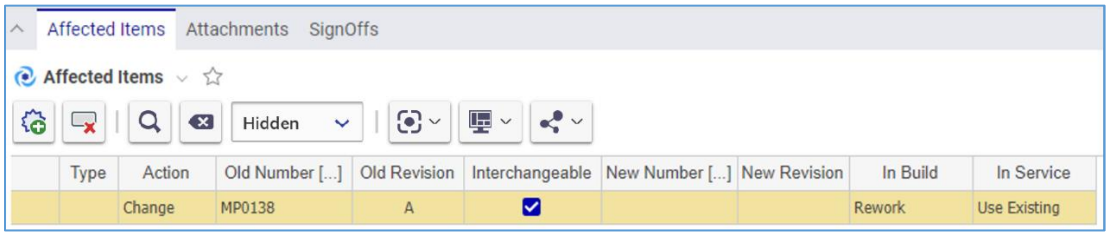
3. Click the **ellipsis** button in the **Old Number** cell. The **Search dialog – Change Controlled Item** appears.
4. Search for and select the affected Document to be revised and updated. The selected Document populates the **Old Number** cell.



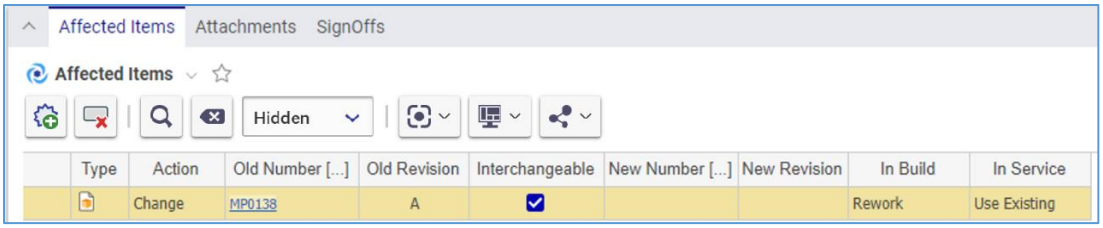
5. Select the **Interchangeable** cell check box.
6. Click **Save** two times on the **DCO** toolbar.

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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**.



9. Click **Save** or **Done** on the **DCO** toolbar. The DCO has an Affected Document assigned for revising.

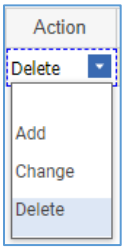


13.3.2.6 Obsoleting a Document within a DCO

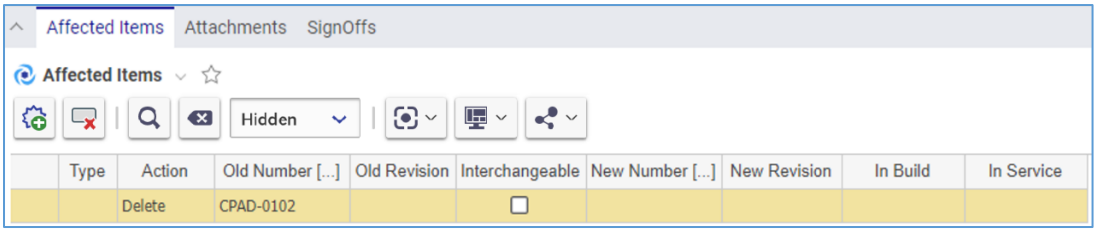
The DCO **Delete** Action for a Document does not delete the Document or its attached files; it informs users that this Document is **Obsolete** and should no longer be used.

Use the following procedure to assign an existing Affected Document to be:

1. Follow steps 1-4 of the Adding a Document within a DCO procedure.
2. Select **Delete** in the **Action** cell.



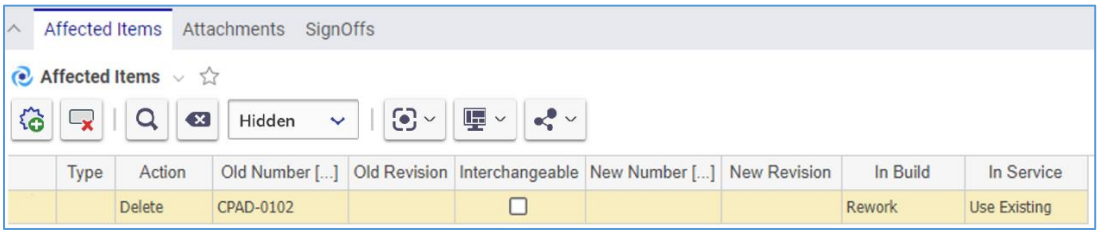
3. Click the **ellipsis** button in the **Old Number** cell. The **Search dialog – Change Controlled Item** appears.
4. Search for and select the affected Document to be deleted. The selected affected Document populates the **Old Number** cell.



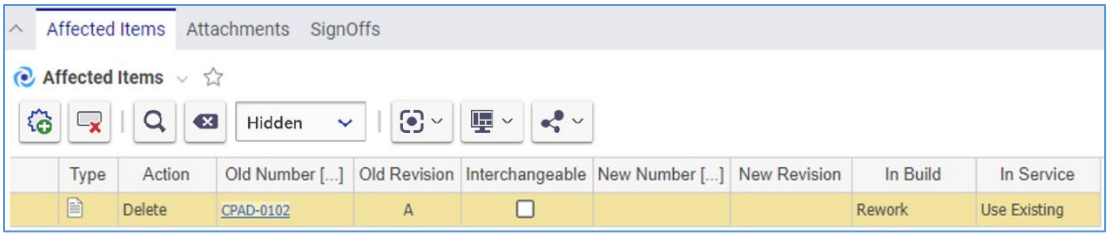
5. Click **Save** two times on the **DCO** toolbar.

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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**.



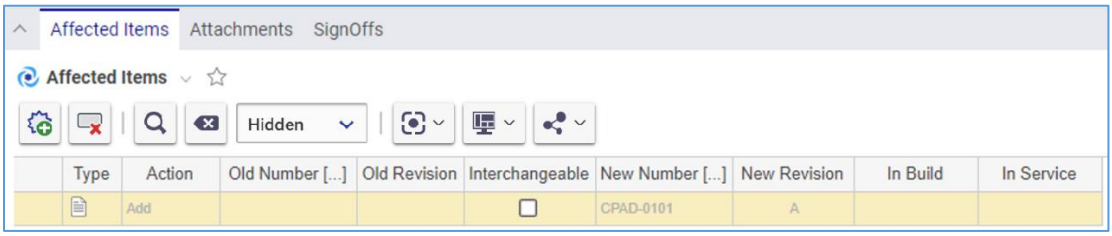
8. Click **Save** or **Done** on the **DCO** toolbar. The DCO has an affected Document assigned for deleting.



13.3.2.7 Removing a Document from a DCO

To remove a Document from a DCO so that it is not processed:

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.



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

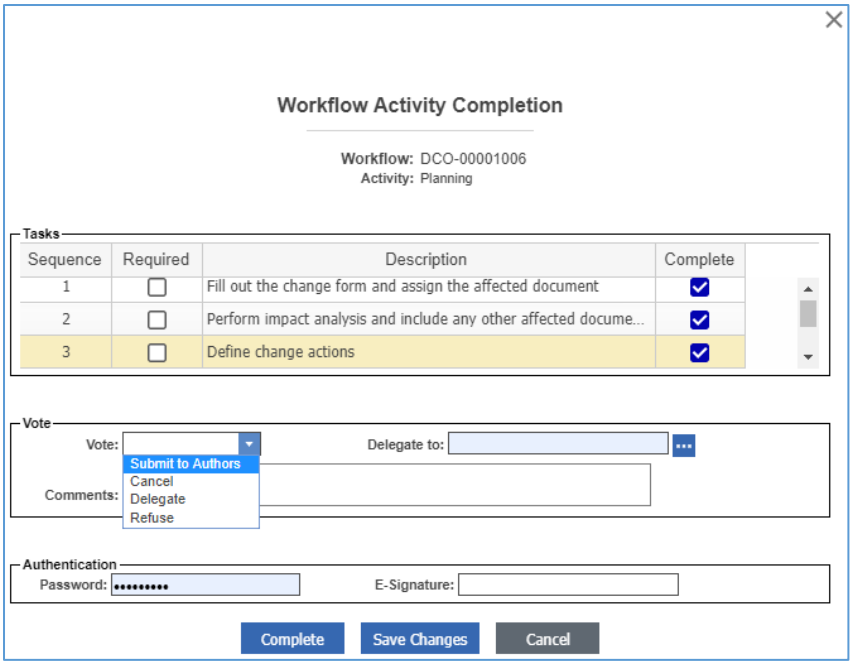
Note: The **Document** disappears if the DCO was not saved after it was added.

13.3.2.8 Voting on a DCO

Use the following procedure:

1. Go to **Contents > My Innovator > My InBasket > Search My InBasket**.
2. Double-click the Workflow Task to open the **Workflow Activity Completion** dialog for the DCO.

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3. Mark the tasks you completed in the **Tasks** field.
4. Select the option per your decision in the **Vote** list.
5. Click **Complete**.

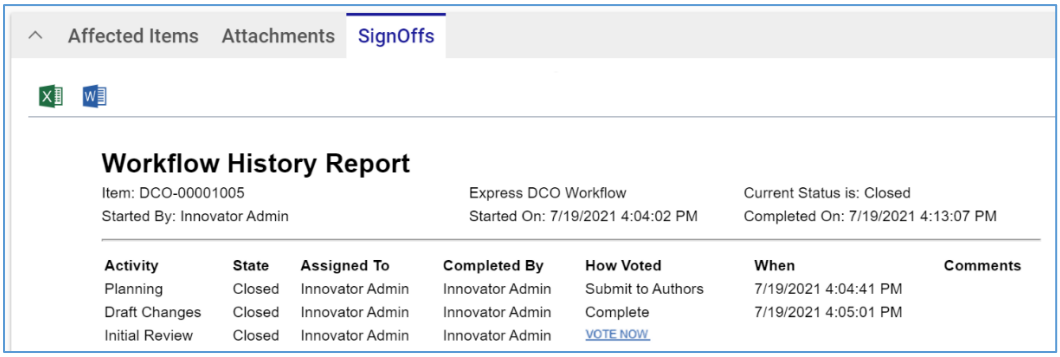
   The DCO enters the ***next*** activity as defined in the DCO workflow.

13.3.2.9 Viewing and Processing 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:

1. Open the DCO.
2. Go to the **SignOffs** accordion tab.



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.

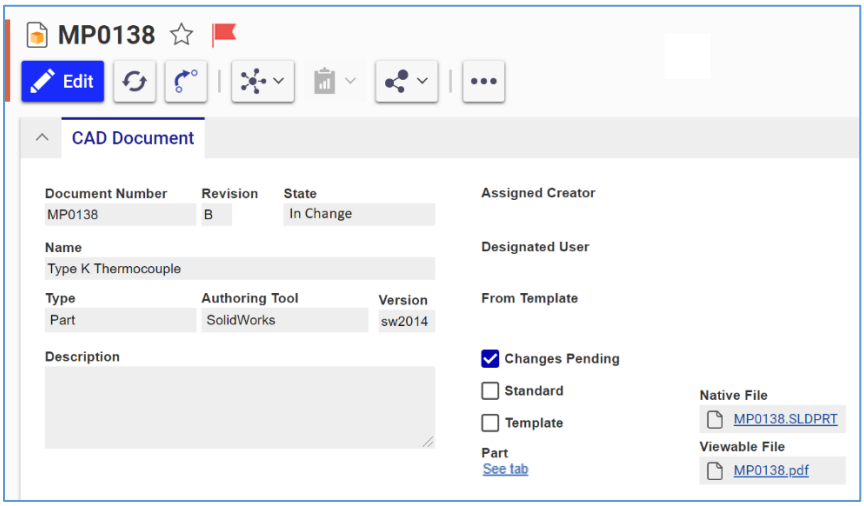
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13.3.2.10 Processing Documents Within a DCO

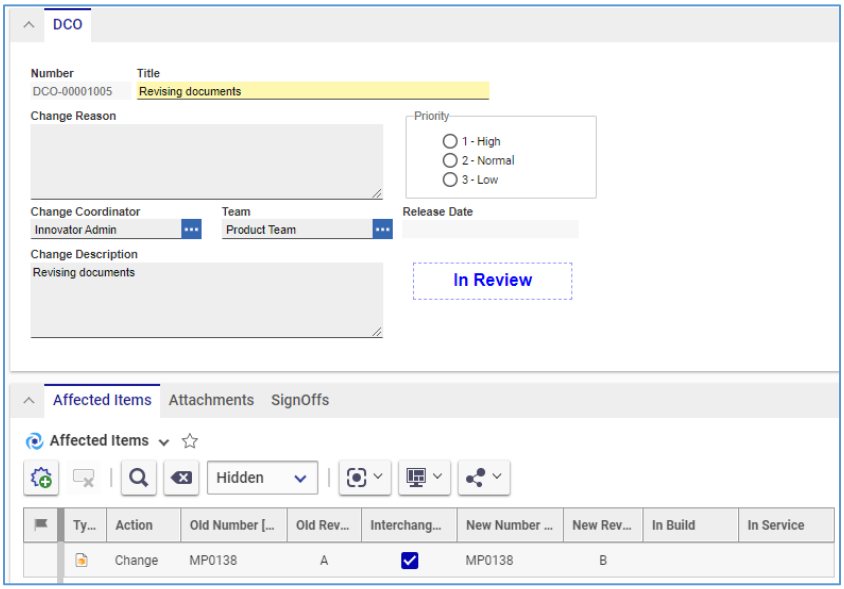
This section describes revising a released Document as an example of processing Documents within an Express ECO.

To process Documents, follow the Express DCO workflow as explained in section *13.3.2.1 Understanding the Express DCO Process* and notice 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.

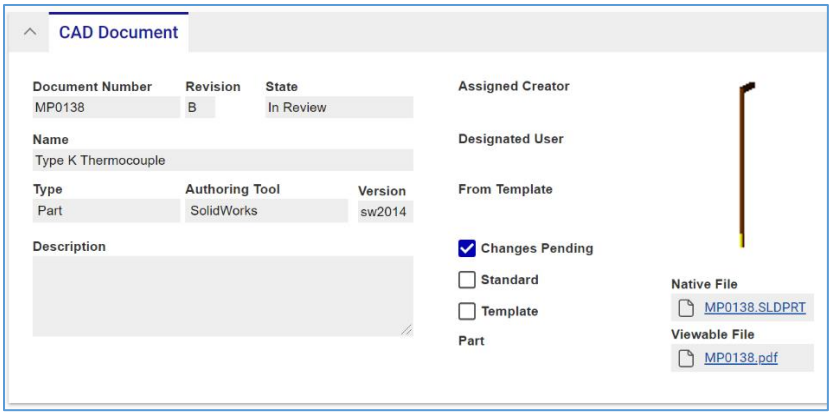


The DCO has a link to the original and new major revisions of the Document.

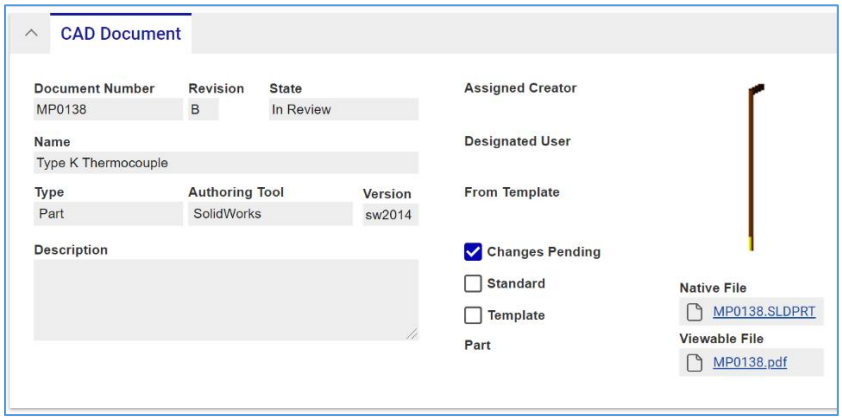


The new major revision of the Document is in the **Preliminary** state and has **Changes Pending** check mark set automatically to indicate that this Document is under a change process.

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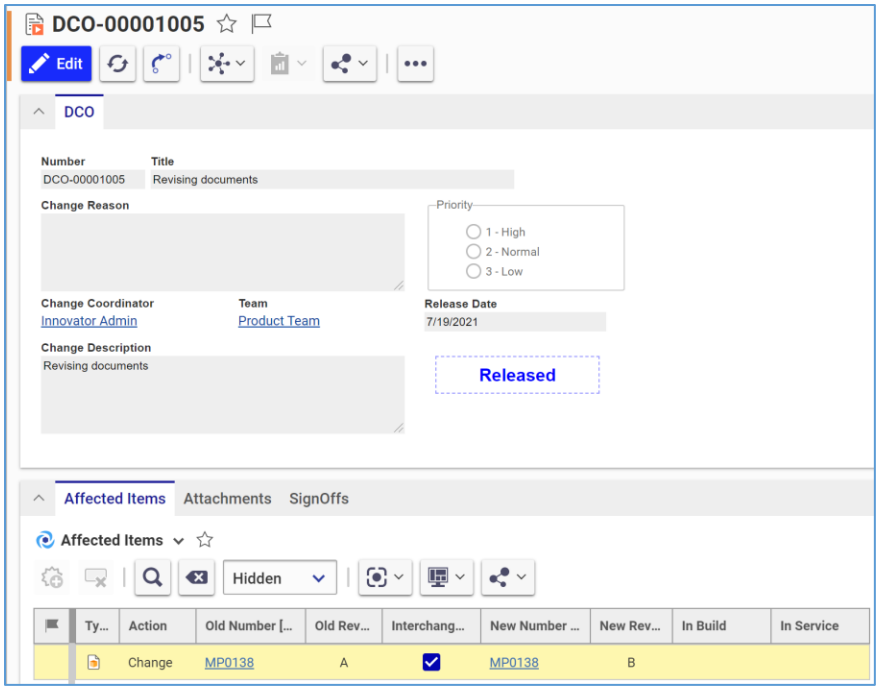


2. The **Initial Review** activity. The Affected Document is set to the **In Review** state and is not allowed to be edited.

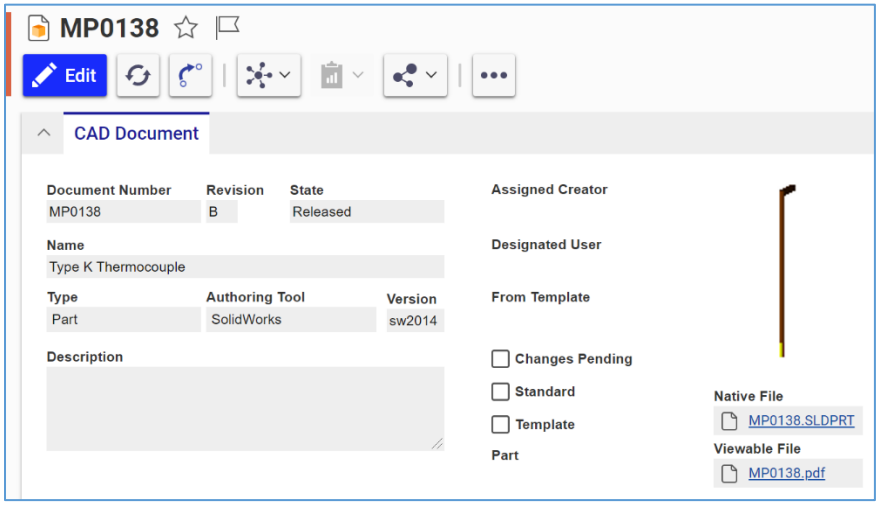


3. The **Final Review** activity. The Affected Document is still in the **In Review** state and is not allowed to be edited.
4. **Close Change**. The DCO is **Released**.

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5. The newly revised Document is **Released** at the new major Revision.



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