ACE 2024

STUDENT TRAINING GUIDE

Introduction to 3D Visualization

aras

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Introduction to 3D Visualization

Overview

Aras 3D Visualization (3DV) is a business-ready solution for converting and visualizing native 3D computer-aided design (CAD) files in Aras Innovator. Users upload 3D models from a CAD authoring tool into Aras Innovator as native 3D CAD files. The system automatically converts the uploaded native files into Stream Cache Single (SCS), 3D PDF viewable files, and other optional output formats. The users can view, manipulate, manage, and visually collaborate on the 3D models from the viewable files.

Objectives

- Overview of 3D Functionality (Monolithic or Dynamic)
- 3D Scene
- Item Sidebars
- 3D Viewing and Markup Toolbars
- Context Menus for Models and Individual Part
- Model Viewing Capabilities (zoom, rotate, exploded views, cross section, measure)
- 3D Viewer Preferences
- Adding & Sharing Markup, Discussion threads

Overview of 3D Functionality

Monolithic Viewer

- Shows a static 3D CAD Model (HOOPS Stream Cache Single Model, SCS)
- Can display product manufacturing information
- Supports:
  - Display 3D Rendered Model (as-saved resolution)
  - Simple Model Browser
  - Single Item Selection (part, surface, or subassembly)
  - Annotate and Add Markup
  - Collaboration using Discussion Panels
- Model Browser uses AML to execute a recursive search for the entire CAD BOM structure

Dynamic Viewer

- Shows an assembly dynamically generated on the fly from multiple viewable SCS files attached to the Items
- Supports:
  - Shattered Viewing
  - Various Structure Resolution
  - Custom Rendering
  - Saved Views
  - Digital Mockup
- Model Browser uses configurable Query Definitions and Tree Grid View (TGV) functionality
- Supports multi-selection of more than one part, surface, subassembly, etc.

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Overview of 3D Functionality

Aras provides three built-in file viewers that allow users to display standard PDF's, 3D PDF's of CAD models generated by the Aras Conversion Server, or standard image files (e.g., jpg, gif, etc.) A viewing markup tool is incorporated into the file viewer to allow you to highlight and add comments or notations that can be captured as a snapshot and visible to other users. The original file is untouched, all snapshots are stored separately for each item.

Both Monolithic and Dynamic Viewers show a 3D model in Aras Innovator by rendering 3D component geometries stored in viewable SCS files.

Monolithic Viewer

The Monolithic Viewer is the core 3D Visualization functionality and a requirement for the Dynamic Viewer. It shows a static 3D model of a component or assembly. The Viewer shows one viewable SCS file attached to a given component. For an assembly, a file is created from the files attached to all sub-assemblies and parts included in this assembly when it was loaded into the Viewer. The shown 3D model is a static assembly view because it cannot contain geometry changes to components made after the assembly view file had been created. The Monolithic Viewer features basic functionality for viewing the 3D model, isolating, hiding assembly components, adding markup, and creating snapshots for visual collaboration.
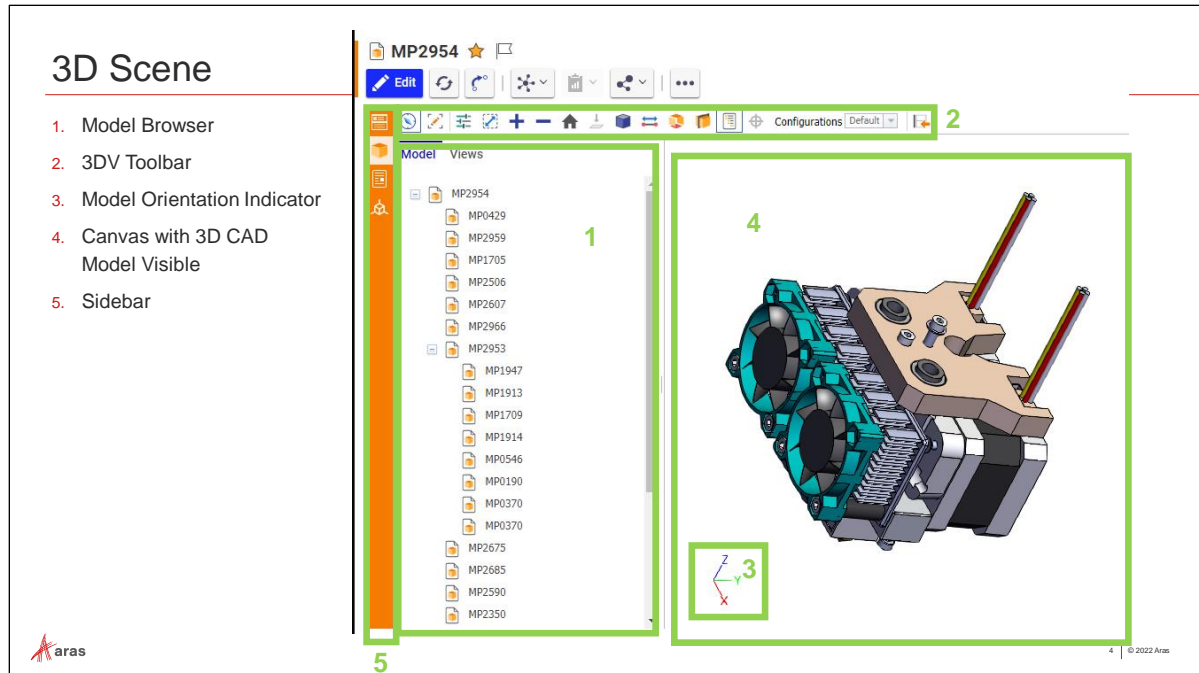
Dynamic Viewer

The Dynamic Viewer shows additional 3D Visualization functionality added to the Monolithic Viewer. It can show a dynamic 3D model of an assembly. This Viewer shows multiple viewable SCS files attached to all sub-assemblies and parts included in this assembly when it was loaded into the Viewer. Since a given model is a set of SCS files, displaying product manufacturing information is not included. The shown 3D model is a dynamic assembly view because it can contain geometry changes to components made after the assembly view file has been created according to various structure resolutions: Latest, Released, and so on. Thus, in addition to the functionality included in Monolithic Viewer, the Dynamic Viewer features capabilities for manual geometry transformations and annotations. Aras Innovator Admins can also customize what content and how it is displayed in the Dynamic Viewer.
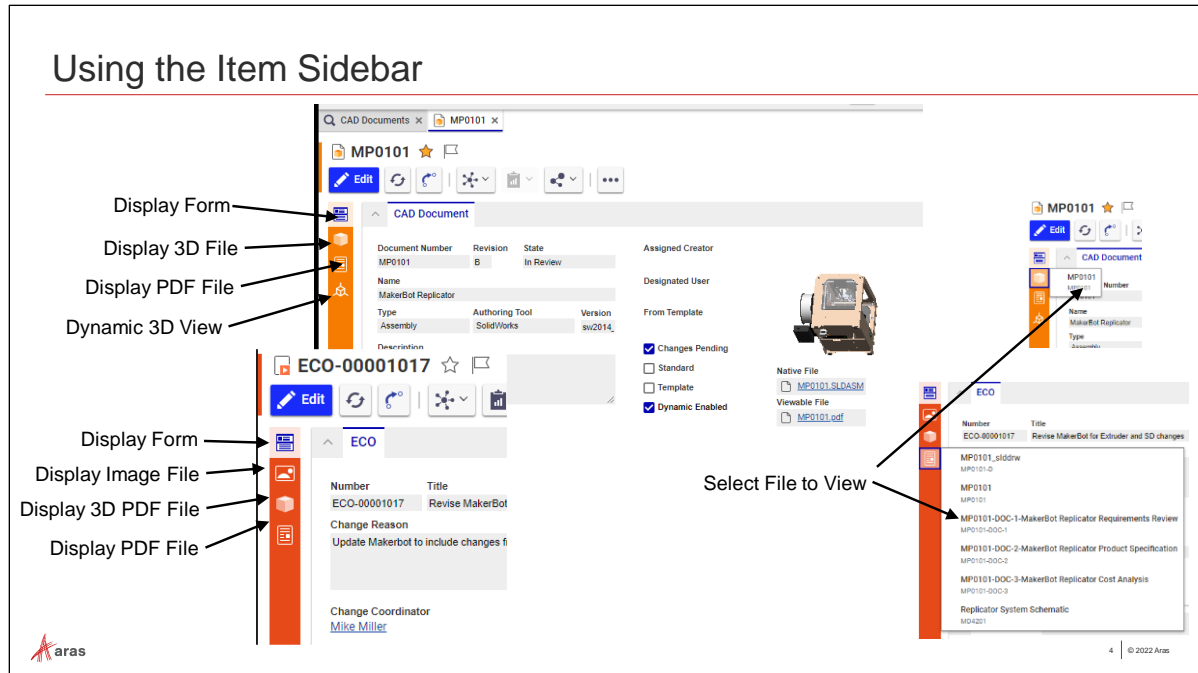
Using the Item Sidebar

Once an ItemType is enabled for Visual Collaboration, you will see a sidebar on the left-hand side of the item window. The sidebar contains the following features described below based upon associated items (either attached directly to item or a related item).

| Feature	Function
Display Form	Displays the item form window.
Display 3D PDF	Displays a 3D PDF file using the built in 3D PDF viewer.
Display PDF File	Displays a standard PDF file using the built in PDF viewer.
Display Image File	Displays an Image file using the built in Image viewer.
Select File to View	Select the file attached to the item to open using the appropriate viewer.
Display 3D with Dynamic Viewer	Displays a 3D PDF file allowing manual geometry transformations.

3D Scene

1. Model Browser displays a tree hierarchy based upon the structure of the CAD BOM assembly. It can be configured using Query Builder and Tree Grid View when using the Dynamic Viewer.
2. 3DV Toolbar allows the user to switch between the canvas display settings or add markup.
3. Model Orientation Indicator displays the rotation axis for 3D Model.
4. The Canvas displays the 3D CAD Model and context menus that change based upon what is selected.
5. The Sidebar displays different buttons to return to the form information or select the appropriate viewer based upon filetype.

Try it … View a Model

1. Login to Aras Innovator as the user Mike Miller (*mmiller, PW= innovator*).
2. Navigate to Documents > CAD Documents and open MP2954 for viewing.
3. Click the Display 3D file button and select MP2954 in popup to the right.
4. The model will open in a blank canvas area.
5. Notice the tool tips when you hover over the buttons in the 3DV Toolbar or the option to single out a part if you hover over the CAD document items in the Model Browser pane.
6. Leave this tab open as we will demonstrate some of the 3DV functions in following exercises.

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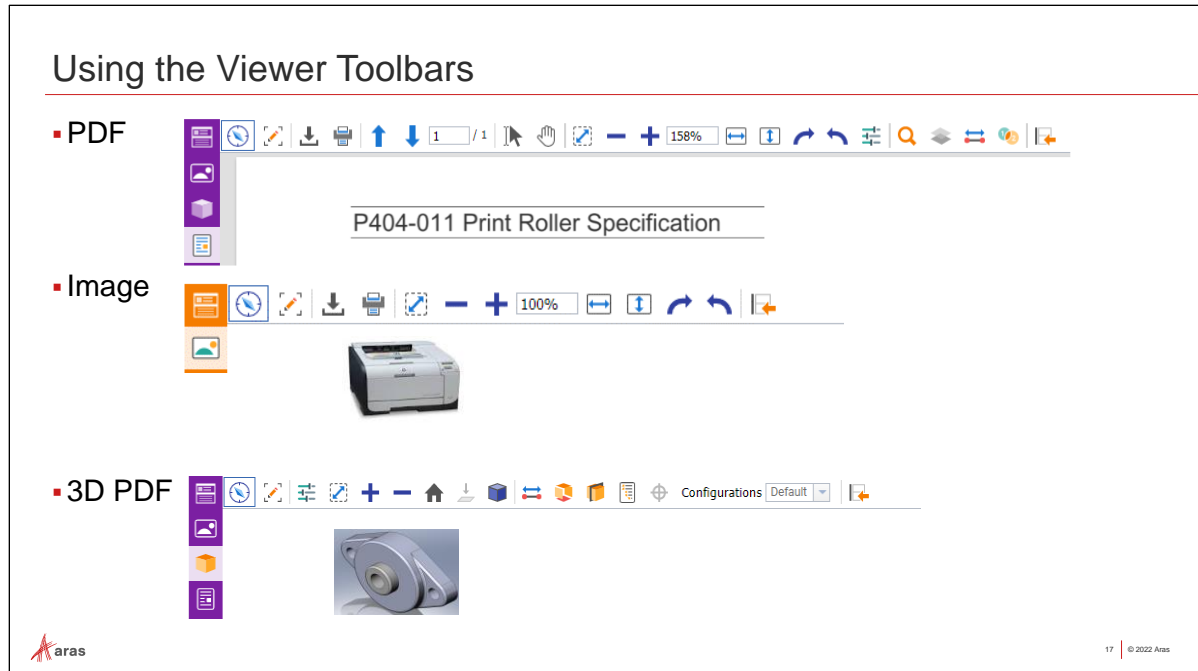
Using the Viewer Toolbars

Each viewing tool contains an integrated toolbar, allowing you to resize, rotate and change the perspective of the viewed file on the screen. The Viewer toolbar is different than the Markup toolbar.
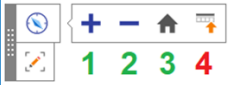
All viewers support two styles of toolbars, basic and standard. Basic toolbars have only a few commands to make it easy to use for occasional users. Standard toolbars provide all available commands.

Try it … View Different Filetypes

1. Navigate to Change Management > ECOs and open ECO-00001013, titled Release MakerBot, for viewing.
2. Notice the different icons in the Sidebar.
3. Click the Image Viewer icon and select the Replicator Photorealistic image, MD4233, to the right.
4. Notice the toolbar is showing the options for manipulating an image file.
5. Click the Display 3D file button and select MP0101 in popup to the right.
6. The model will open in a blank canvas area.
7. Click the Model Browser button to display the structure of the CAD model in left pane.
8. Click on the Display PDF button and select MD`4201, Replicator System Schematic, in the popup to the right.
9. Notice that the toolbar has changed to show the options when viewing a 2D PDF.

3D Viewing Toolbars

Basic Toolbar   Standard Viewing Toolbar

1. Zoom Up   9. Point to Point Measure
2. Zoom Down   10. Exploded View
3. Reset View   11. Cross Section
4. Switch to Standard Toolbar   12. Model Browser
5. 3D Viewer Preferences   13. Product Manufacturer Information
6. Zoom to Selected Area   14. List of Configurations
7. Orient to Selected Face   15. Switch to Basic Toolbar
8. Set Display Style

3D Viewing Toolbars

1. Zoom Up increases a 3D CAD model size on the canvas along the viewpoint center.
2. Zoom Down decreases a 3D CAD model size on the canvas along the viewpoint center.
3. Reset View sets the default 3D CAD model orientation and size on the canvas.
4. Switch To Standard Toolbar hides the Basic Viewing toolbar and shows the Standard Viewing toolbar.

Standard Viewing Toolbar

5. Preferences shows the 3D Viewer Preferences pop-up dialog box for configuring the projection and zoom preferences.
6. Zoom Window enables a user to select an arbitrary area on the model to zoom into this area.
7. Orient to Face shows a given 3D CAD model zoomed into a selected surface or part and oriented to a user.
8. Set Display Style shows or hides a toolbar with options on how to display a given 3D CAD model.
9. Measure shows or hides a toolbar with options for measuring a given 3D CAD model.
10. Exploded View shows or hides a toolbar with the slider exploding a given 3D CAD model.
11. Cross Section shows a toolbar with options for cross-section viewing of a given 3D CAD model.
12. Model Browser shows or hides the Model Browser section with quick viewing options as trees. The Monolithic and Dynamic Viewers have different Model Browser sections.
13. Product Manufacturer Information displays annotations and attributes contained in a 3D solid model which complements the geometric definition and completes the digital data set. This button is visible only in the Monolithic Viewer.
14. Configurations is the list of configurations available within the given 3D CAD model.
15. Switch to Basic Toolbar hides the Standard Viewing toolbar and shows the Basic Viewing toolbar.
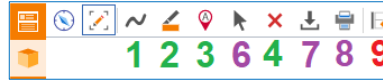
3D Markup Toolbars

Basic Markup Toolbar
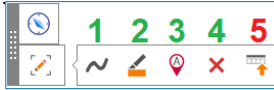
1. Scribble
2. Highlight
3. Label
4. Delete Markup
5. Switch to Standard Toolbar

Standard Markup Toolbar

1. Scribble
2. Highlight
3. Label
4. Delete Markup
5. Missing
6. Select
7. Download JPG image including markup
8. Print
9. Switch to Basic Toolbar

3D Markup Toolbars

The Markup toolbars are consistent and limited to a few options when adding markups to images and 2D or 3D PDFs.

1. Scribble is used for drawing arbitrary lines on a given 3D CAD model.
2. Highlight is used to draw attention to an area by drawing rectangular areas on a given 3D CAD model that will be filled in with transparent shading.
3. Label is used to add annotation bubbles by adding labels to a given 3D CAD model.
4. Delete removes selected markup items from a given 3D CAD model.
5. Switch To Standard Toolbar hides the Basic Markup toolbar and shows the Standard Markup toolbar.
6. Select allows a user to select markups on a given 3D CAD model.
7. Download File downloads a JPG image of a given markup.
8. Print uses the standard browser print function for markups. Depending on a given browser and its specific configuration, various print choices, such as printing on a printer or saving to PDF, are available.
9. Switch to Basic Toolbar hides the Standard Markup toolbar and shows the Basic Markup toolbar.
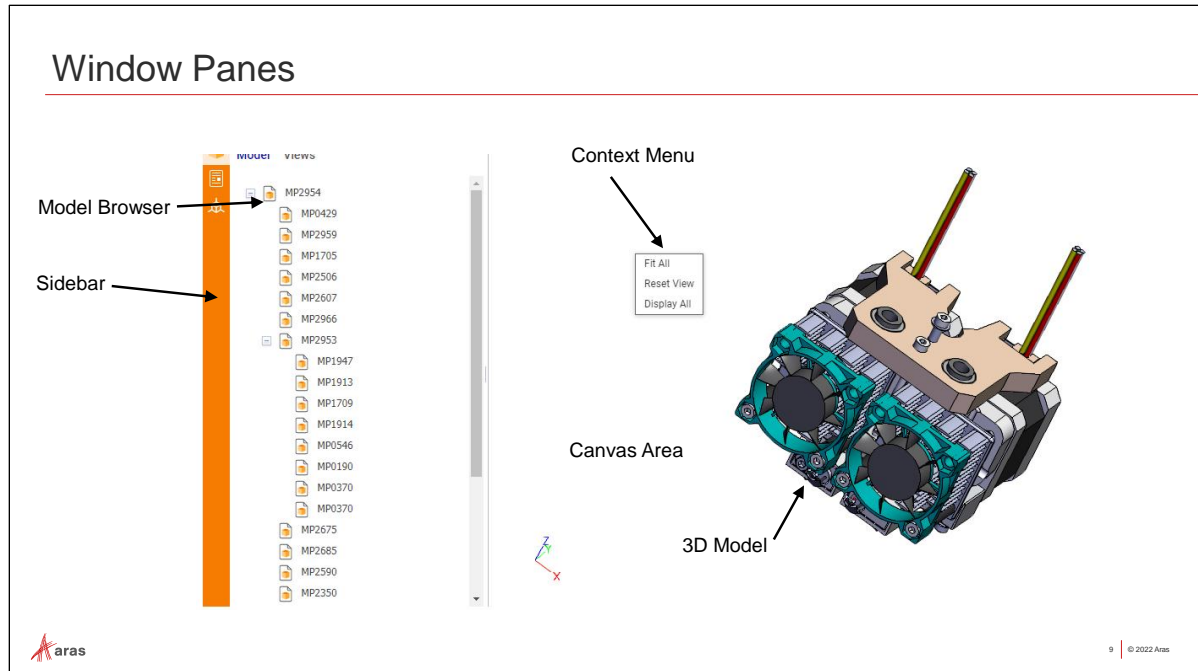
Window Panes

When the Model Browser button is toggled on, the left pane of the visible window displays a hierarchical view of the CAD structure that makes up the model. This pane displays different information whether you are using the Simple or the Dynamic viewer.

The pane on the right is called the canvas area. The 3D Model appears here. This is also referred to as the 3D Scene.

Try it … Working with the Model Browser

1. Return to the tab labelled MP2954. If closed previously, navigate to Documents > CAD Documents and open MP2954 for viewing.
2. Click on the 3D View Button and then the Model Browser Viewing Button.
3. Expand the hierarchy to see the CAD documents affiliated with the model.
4. Click on the Views tab in Model Browser pane to see the options for changing the visible view.
5. Move your cursor into the right pane.
6. Without selecting anything, use the context menu, right mouse button (RMB), to see the selections for resetting or forcing the entire model to be viewed.
7. Select the model using the RMB and drag to a new position.
8. Select and hold the model using the left mouse button (LMB) and rotate to see a different view of the model.
9. Right-click in the canvas area and select Reset View to return to the original model display.
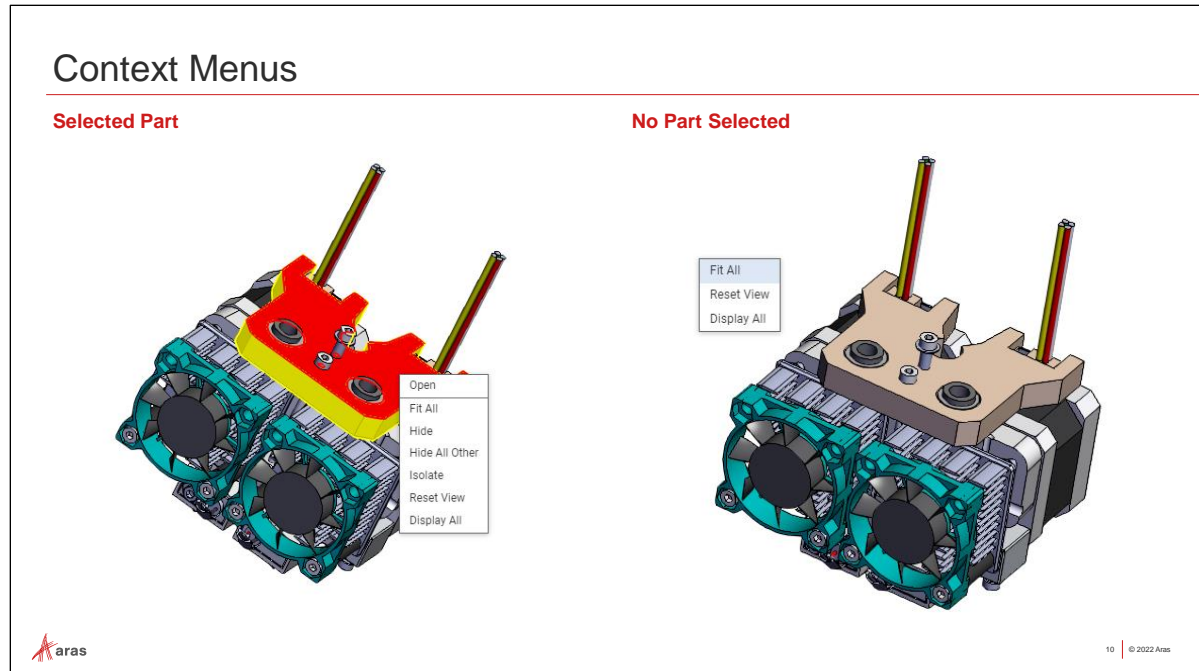
Context Menus

The menus get built with different options to support the different viewers. The context menus are also dependent upon any selections before using the RMB.

The **3D Scene** context menu includes the following commands:

- **Fit All** sets the default 3D CAD model size so that all visible model parts are shown on the 3D scene.
- **Reset View** makes all 3D CAD model parts visible on the 3D scene and sets the given 3D CAD model to its default orientation and size.
- **Display All** makes all 3D CAD model parts visible on the 3D scene (shows them).

The selected **Part** context menu includes the following commands:

- **Open** opens the **CAD Document** Item view of a selected part.
- **Isolate** makes everything transparent except the selected part and zooms into this part.
- **Hide** makes a selected part invisible on the 3D scene.
- **Hide All Other** makes unselected parts invisible on the 3D scene.

Try it … Working with the Model Browser
1. MP2954 should still be opened from the previous exercise.
2. Click on a single part in the Model Browser or in the part canvas area.
3. Use the RMB to see the options on the context menu.
4. Click in the canvas area to deselect the model.
5. Use the RMB to see the options on the context menu.
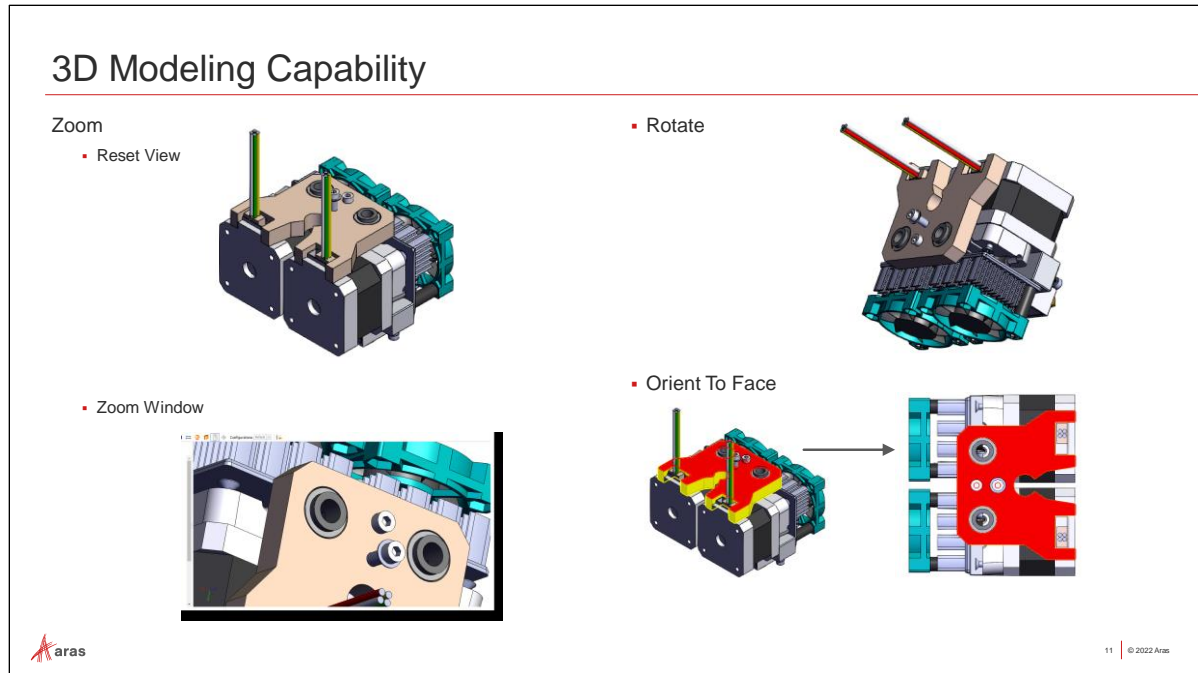
3D Modeling Capability

Once the View button has been selected, end users are able to view and annotate 3D CAD models taking advantage of the functionality of 3D Visualization. (3DV)

We will explore some of the common functions in the following exercises.

Try it … Working with the Model Browser

1. MP2954 should still be open for viewing.
2. Use either the zoom in and out buttons on the viewing toolbars or the mouse wheel to zoom in/out from the 3D scene viewpoint center.
3. Click the Zoom window button and then select an arbitrary rectangular area to zoom to the maximum zoom allowed keeping the displayed section in 3D scene area.
4. Click on the blank canvas area and use the RMB to select Reset View to return to normal view.
5. Click and hold to select a point on the model and move in any direction to rotate along the axis.
6. Without selecting anything, use the context menu RMB to reset.
7. Click on a single surface to select and then click Orient to Face button.
8. Use any of the zoom features to zoom in/out.
9. Right-click in the canvas area and select Reset View to return to the original model display.
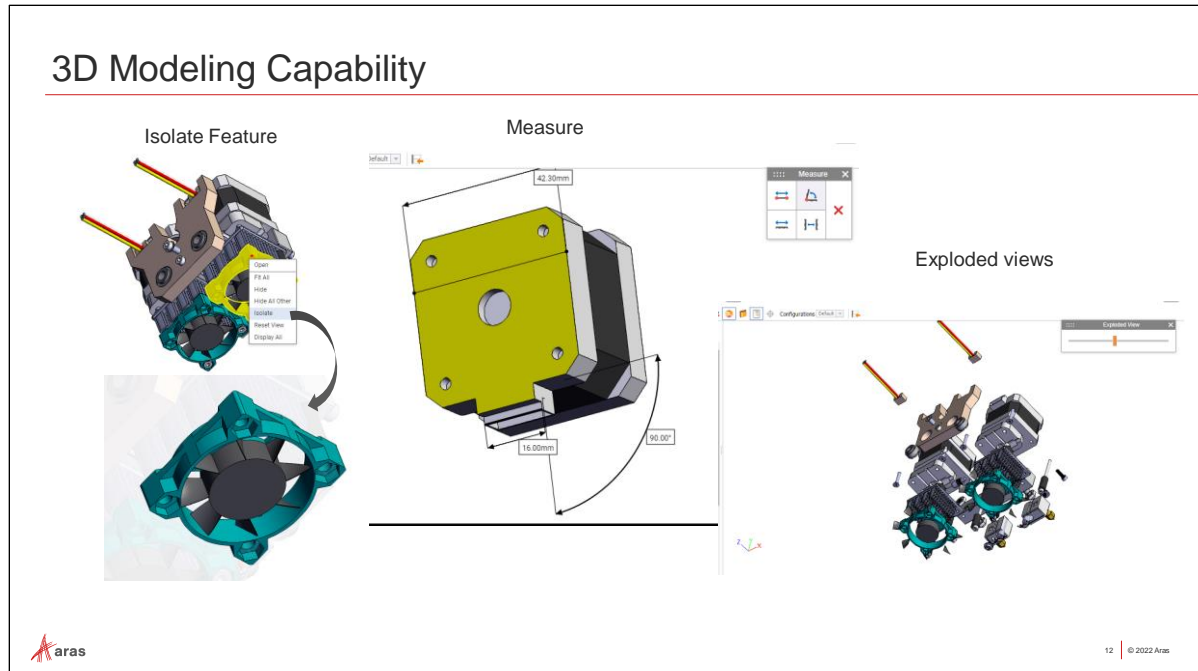
3D Modeling Capability Continued

Isolate Feature, Measure and Exploded views expand the functionality of 3DV further.

- The **Isolate** feature, available from the Part context menu, allows each user to zoom into this part or surface and make all other parts and surfaces transparent

- The **Measure** button on the Standard Viewing toolbar provides access to the separate Measure toolbar with options for measuring the geometrical parameters of a given 3D CAD model.
    - Measure point to point or the distance between two arbitrary points.
    - Measure edges calculates the length or radius of an arbitrary edge.
    - Measure Angle Between Faces calculates the angle between two adjoining surfaces.
    - Measure Distance Between Faces calculates a distance between two arbitrary surfaces.
    - Delete All clears the measurements visible on the model.
- The **Exploded View** allows users to drag a slider to separate the parts accordingly.

Try it ... Working with the Model Browser
1. MP2954 should still be open for viewing.
2. Click on a single part and then use the RMB to select Isolate.
3. Click the Measure button, click the Measure Point to Point button, and then select two arbitrary points. Drag the measurement and place it on the canvas at the desired location.
4. Click the Measure Distance Between Faces button and select two adjoining faces. Drag the measurement to a location on the canvas.
5. Continue to select other measuring buttons and locate the measurements on the canvas.
6. Click to reset view.
7. Click the Exploded View button. Drag the slider to separate the parts by the desired distance.
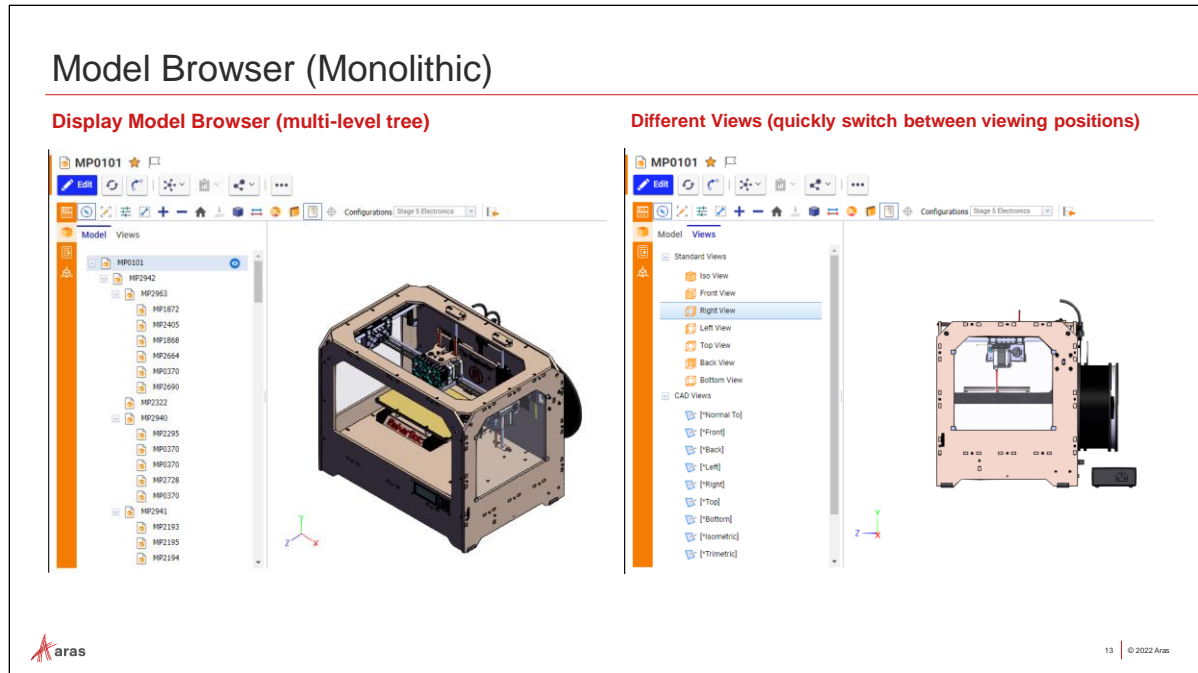
Monolithic Model Browser

The Monolithic Viewer fully reuses the 3D scene canvas, 3DV toolbars, and context menus. It also features the simple Model Browser for browsing assembly parts and model views. The Monolithic Viewer can show a 3D model and Product Manufacturing Information (PMI), if included, that are both sourced from an SCS file.

The Monolithic Viewer does not support multi-selection: only one subassembly, part, or surface can be selected during viewing.
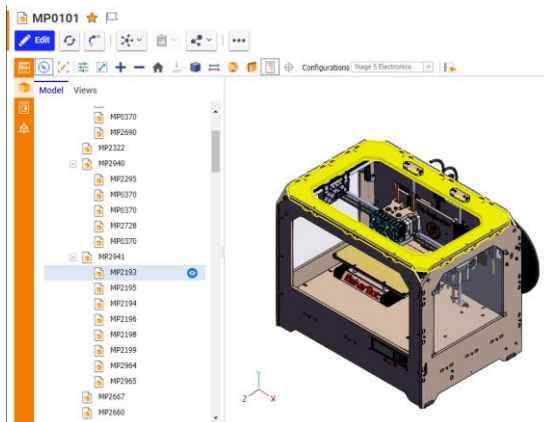
By default, the Model Browser section is hidden at the first opening of the Monolithic Viewer for a given CAD Document.

Try it … Working with the Model Browser

1. Find and open the CAD Document **MP0101** for viewing.
2. Click on the 3D button in the sidebar and select the MP0101 model.
3. Click the Model Browser button to open the Model Browser hierarchy pane.
4. Click on individual parts from the pane to see the selections highlighted in the canvas pane.
5. Double-click on a subassembly to see those items highlighted.
6. Use the context menu to select other functions.
7. You can Reset View at any time to return to the original model display.
8. Select the Views Tab to see the options for changing the display.
9. Continue to select other view options to see the changes on the canvas.
10. Click to reset view.
11. Return to the Model tab to select a subassembly and then modify the Views options.
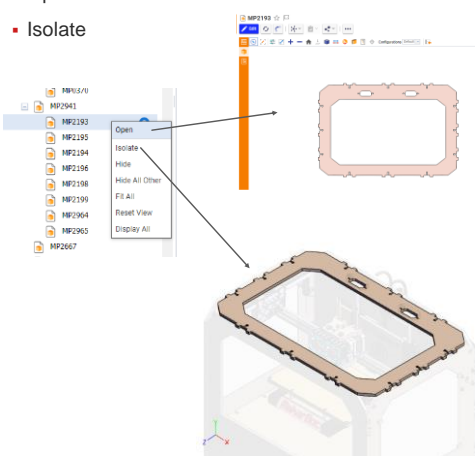
Selecting Parts in Model Browser

Users may want to select a single part (Monolithic viewer) or multiple parts (Dynamic viewer) to segregate or isolate for further analysis. Parts can be selected from the Model Browser pane or directly from the model on the canvas. The context menu, with allowed options, is available from both.

Try it … Selecting Parts in the Model Browser

1. **MP0101** should already be opened for viewing.
2. Locate and click on MP2193 in the browser pane.
3. Right-click from the browser pane or hover over the part in the canvas to bring up the context menu.
4. Select Open. A new tab will open showing the CAD document for MP2193.
5. Return to the MP0101 tab, where MP2193 was previously selected, and select Isolate using the RMB. The other parts will become transparent.
6. Select the Views Tab to see the options for changing the display.
7. Change the views to select Top View.
8. Use the measure button to measure between a few edges.
9. You can Reset View at any time to return to the original model display.
10. Continue to select other individual parts on the canvas.
11. Click to reset view.
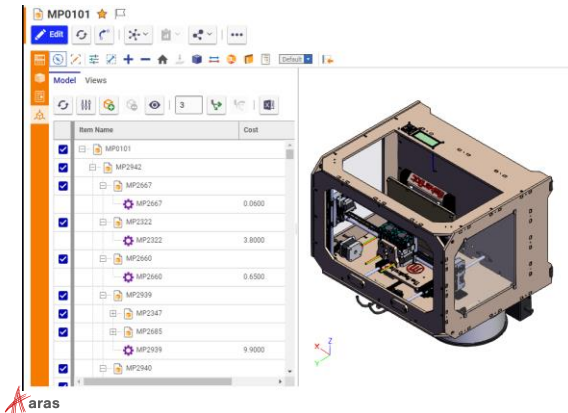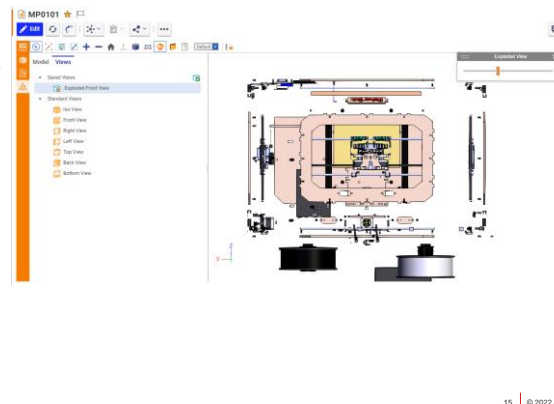
Dynamic Product Navigation (DPN)

A 3D CAD model is dynamic when this Viewer shows an assembly dynamically generated on the fly from multiple viewable SCS files attached to the Items, such as CAD Documents. Relationships include the children of the context Item representing an assembly at the moment of loading into the Viewer. This is also referred to as "shattered" viewing.

The elements that are displayed in the Model Browser pane are configured by building a query using Query Builder and displaying the results using a Tree Grid View.

With features exclusive to the Dynamic Viewer, end-users can:

- Manually move, rotate, and mark up geometry from the Viewer.
- Add and remove additional parts and assemblies from the 3D scene using Digital Mockup.
- Configure what is retrieved from the CAD structure and how it is shown in the Viewer.

Try it … Visualize using DPN

1. **MP0101** should already be opened for viewing.
2. Click on the Dynamic 3D Views button in Sidebar and select the Cost View.
3. Click the Visibility Button to configure Display Settings, toggle off part, and click Apply.
4. Set the value for 3 levels to display and click the Grow Tree button.
5. Select the Views Tab to see the options for changing the display.
6. Select the Front View so that the spools are visible at bottom.
7. Select one of the spools and right-click to select Move by Axis.
8. Click on one of the axis arrows and drag to move the spool in that direction. Repeat with the second spool to drag in the same direction.
9. Select the Bottom View from the Views tab.
10. Hover over one of the spools to select Markup Line by Center, highlight the outer edge of the circle and navigate to the other part to select the same.
11. Click the button next to Saved Views to name and save the current view.
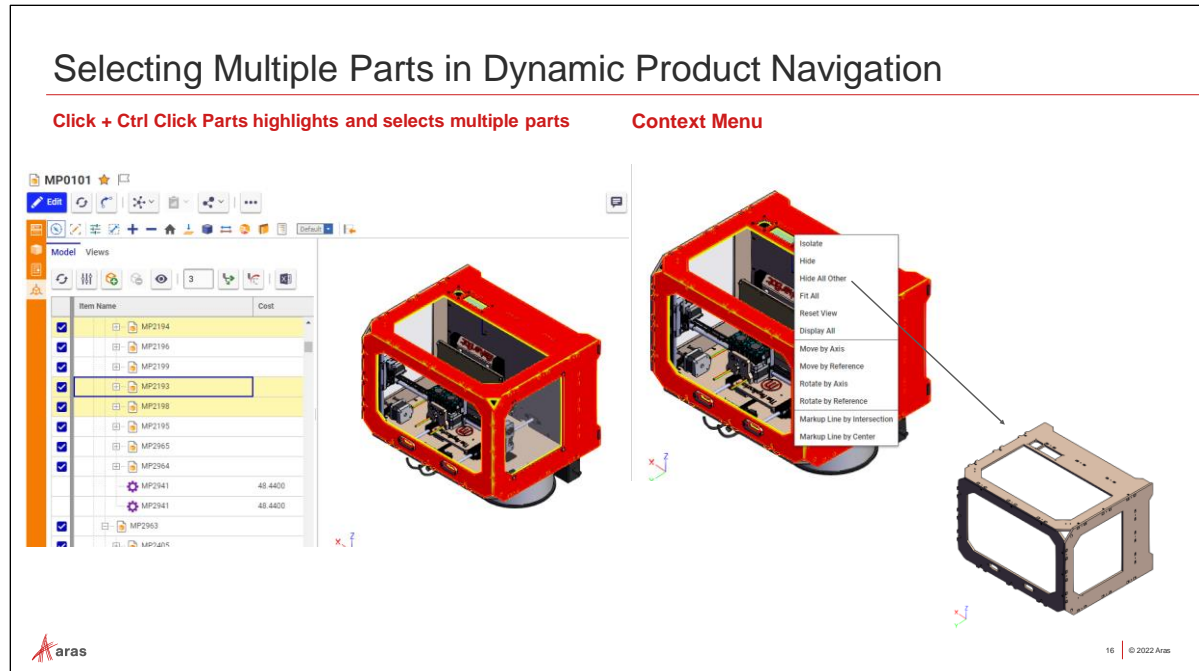
Selecting Multiple Parts in Dynamic Product Navigation (DPN)

The Dynamic Viewer also supports multi-selection in which one or more subassemblies and parts can be selected during viewing.

To select multiple subassemblies and parts, you can either click each object on the 3D scene to be selected while pressing the Ctrl key on the keyboard or use Ctrl key and multi select in the TGV.

Try it … Select Multiple Parts using DPN

1. **MP0101** should already be opened for viewing.
2. Reset to the original View.
3. Return to Model tab, and holding Ctrl key, select MP2193, MP2194, and MP2198.
4. Return to the canvas and use the context menu to select Move by Axis.
5. Drag along one of the axis arrows.
6. Save and name the view on the Views tab.
7. To isolate the parts that are engraved with the product name, return to Model tab and multi-select MP2378 and MP2468.
8. Use context menu to select Hide all others.
9. Save and name the view on the Views tab.
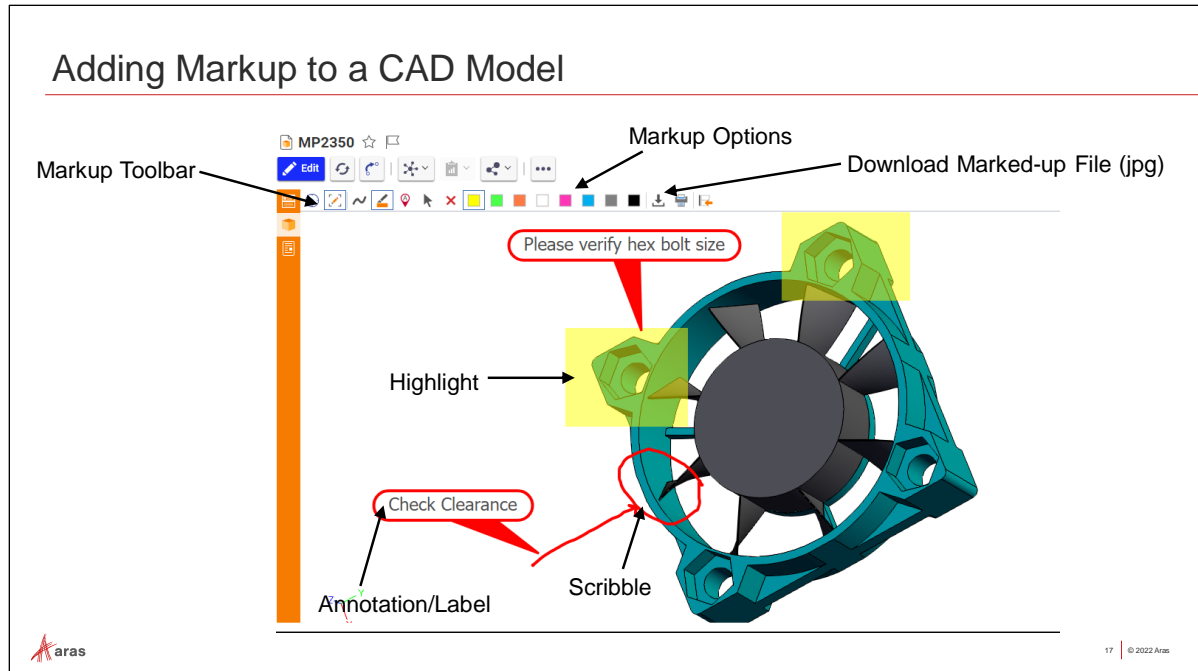
Adding Markup to a CAD Model

The Markup toolbar allows you to use the Scribble, Highlight or Label tools. As you click each tool a subset of options appears enabling you to select other available properties of that tool, such as color. After adding markups, you can use the select tool to select, modify or delete any of the markup.

You can markup and annotate the file in the viewer and create a snapshot of the markups to include in a comment.

Try it … Add Markup to a CAD Model

1. Find and open MP2954 for viewing.
2. Click on a single part and then use the RMB to select Isolate.
3. Select the Markup Toolbar and use the Scribble, Highlight, and Label buttons to add markup.
4. Manipulate the options to select different colors.
5. Click the Download File to export and save the markup as a .jpg file.
6. Close the markup window by clicking on View button.
7. Heed warning by clicking OK to reset view.
8. To see the entire model again, click Reset View in the canvas area.
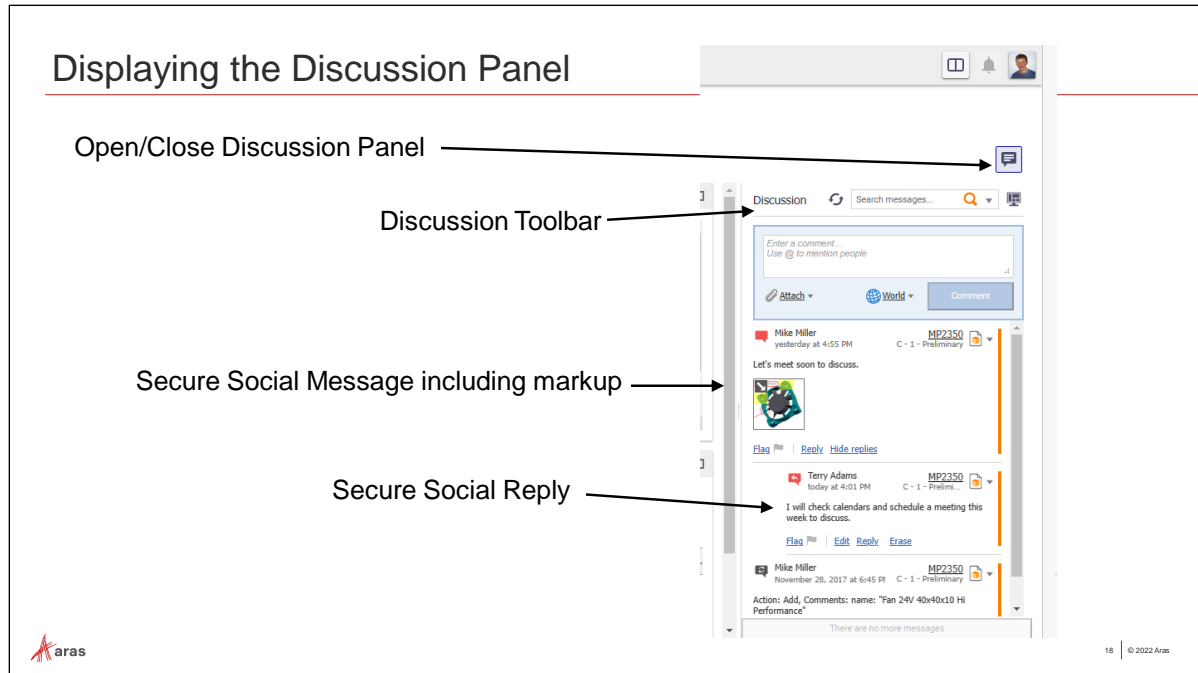
Displaying the Discussion Panel

The Discussion panel allows you to create comments or to respond to an existing comment from another user. To display the Discussion panel, click the Discussion panel toggle button. The Discussion panel includes a Discussion toolbar for searching and sorting messages.

Each message displays the message creator, message date and time, as well as the referenced item, version, and lifecycle state at the time of message creation. You can click the item name to display the corresponding form for that item.

An item does not require editing access to add a comment. Items being edited by other users can also have comments added.

Message Aggregation

Visual Collaboration allows for the aggregation of message comments as well as visual markups from items that are related to the currently viewed item.

This powerful grouping feature allows you to participate in and review the discussion about all aspects of the currently selected parent item.

Message aggregation is a configurable feature that can be modified by an administrator.

Try it … View and Participate in Discussion Threads

1. Select the ECO-00001013 tab or search and find again in the TOC under Change Management > ECOs.
2. Click on the Discussions button located on the top right corner.
3. Scroll through some of the messages for all related items.
4. To see any of the marked-up files, double-click on the snapshot thumbnail and it will load the marked-up item into the display window.
5. Reply to any of the messages by clicking the Reply link.
6. Click on the Flag link to highlight the message as being important.
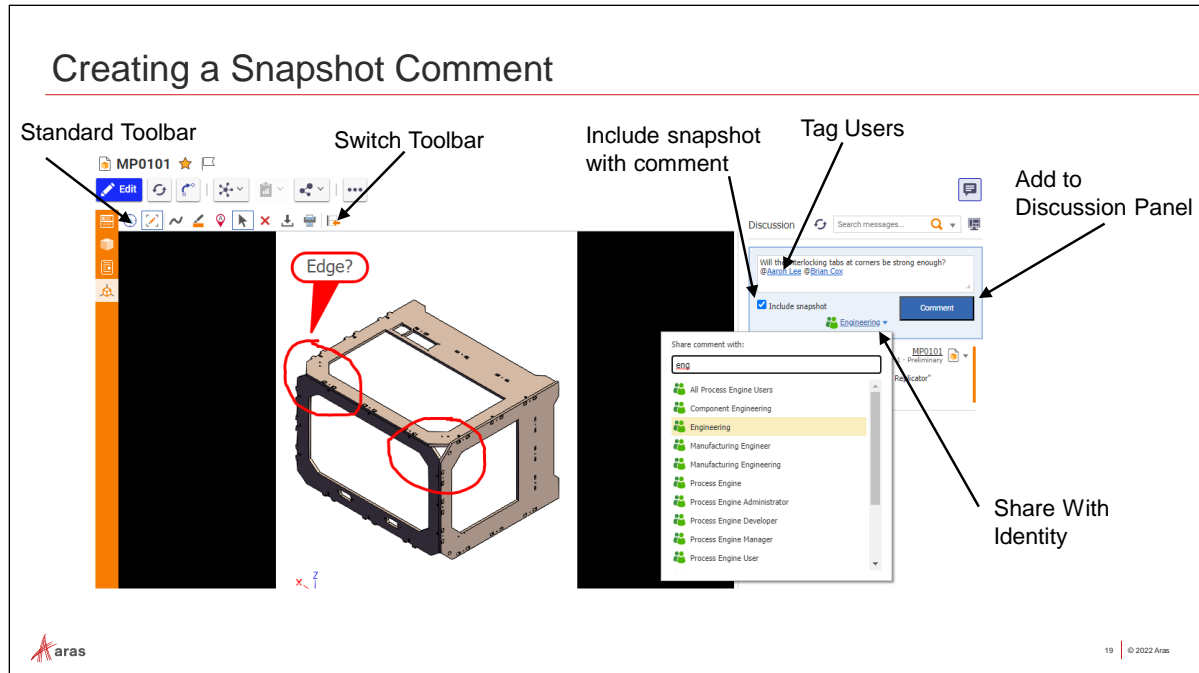
Creating a Snapshot Comment

Text comments are added in the Add Comment field in the Discussion panel. Messages are stored in the database using the Text data type which allows for virtually any size message. Once you type the @ symbol, a list of users appears, and autocomplete narrows the list as you continue typing.

Comment Template

Comment Text	Insert desired text
Share With Identity	Select who can see the comment
Attach a drawn sketch or picture	Attach a picture or a sketchpad sketch
Notify User using @mention	Send a notification directly to another user

Try it … Add a Comment

Log in as various users if you wish to simulate collaborative discussions. To log in as a different user you can either log out of your current session, or leave your current session open and use a different browser to log in.

1. Login to Aras Innovator as user Terry Adams (*tadams, PW= innovator*).
2. Find and open part number **MP0101**.
3. Click the 3D icon in the sidebar and select **MP0101**.
4. Click the Discussion button to display the Discussion panel.
5. You can rotate or explode the model to get a better viewing angle.
6. Add some markup to the model using the markup toolbar.
7. In the text panel, type a message directed at Mike Miller, as follows:
   @Mike Miller. Can we meet to discuss my markup?
8. Click Comment to add the comment to the discussion and include the snapshot.
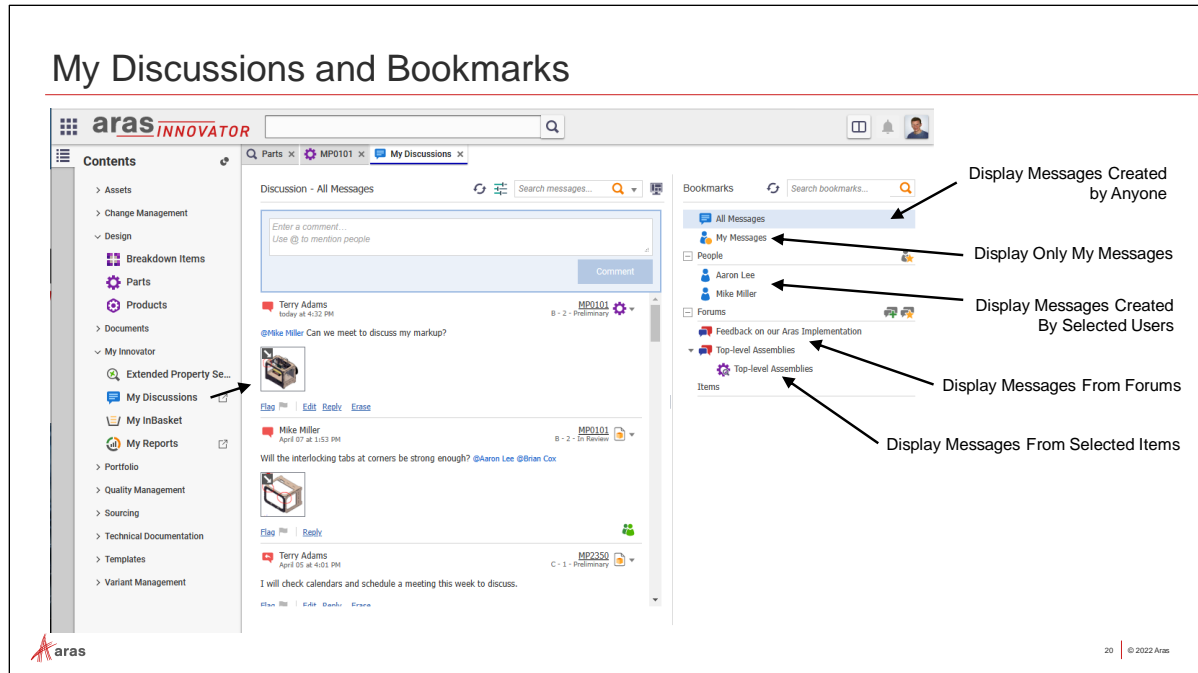
My Discussions and Bookmarks

The My Discussions panel shows all the social content a user is following and provides a powerful, configurable mechanism to aggregate social content, including files, to related items. It also includes discussion content and files from related documents and CAD documents.

You can filter by Bookmarks to follow messages created by you and others as well as comments that have been flagged. My Discussions panel also supports the use of named Forums which allow you to add items individually or in groups to further organize content.

Bookmarks

Bookmarks allow you to filter messages in My Discussions to restrict content to comments you are interested in reviewing. You can set the default display by right-clicking on any of the bookmark filters and choosing the Set as Default action.

All Messages	All Messages display in the Discussion panel by default.
My Messages	Displays messages you have created, replies to your messages, or messages in which you were @mentioned.
Follow Selected Users	Shows messages created by selected users.
Follow Forums	Shows messages from items added to a named Forum.
Items	Only shows messages related to items you have added to your Item Bookmarks.

Try it … Engage with My Discussions

1. Navigate to the TOC and select My Innovator > My Discussions.
2. Read through some of the messages.
3. Click on various items in the Bookmarks area to filter messages.
4. Click on one of the user names to only see the messages that they have created.

Summary

- Overview of 3D Functionality (Monolithic or Dynamic)

- 3D Scene

- Item Sidebars

- 3D Viewing and Markup Toolbars

- Context Menus for Models and Individual Part

- Model Viewing Capabilities (Zoom, rotate, Exploded views, cross section, measure)

- 3D Viewer Preferences

- Adding & Sharing Markup, Discussion threads

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Thank you for participating in this short introduction to Aras 3D Visualization. For more information, please download the Documentation folder on the Aras FTP site found on the Aras 3D Visualization CD Image. You will find Release Notes, a User Guide, and an Administrator Guide.

A Visual Collaboration Administrator Guide is also available as part of the full Documentation set for all the Aras Innovator releases.