



PD20713-L

Inventor—Presenting in a New Fashion

Jerry Berns
4D Technologies, LLC

Learning Objectives

- Explore the Inventor 2017 Presentation environment
- Learn how to create storyboards and snapshot views for use in drawing views
- Learn how to create actions to show others how to assemble or repair models
- Learn how to publish presentations to share with downstream recipients

Description

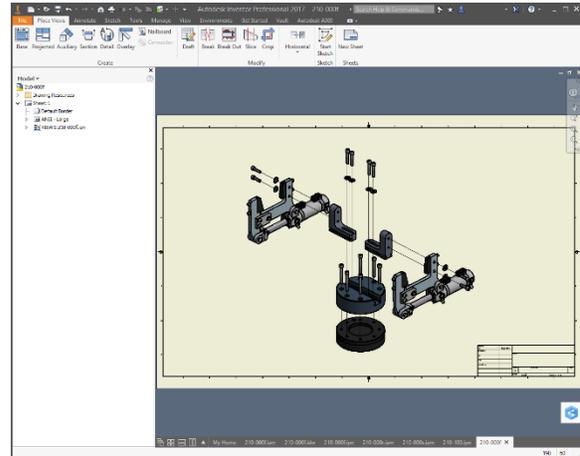
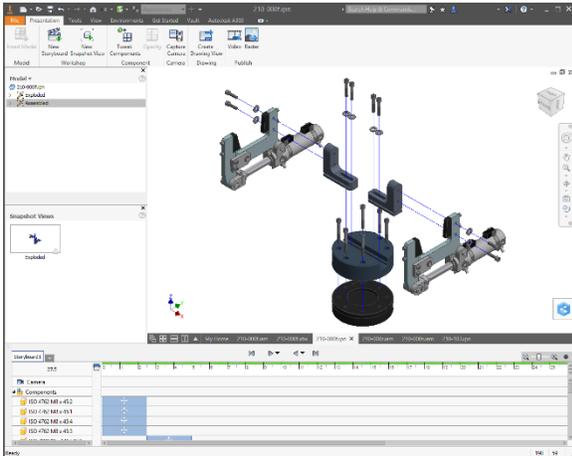
The Inventor 2017 Presentation environment has had a major upgrade, and you need to get up to speed quickly on the interface tools to create your exploded views and animations. In this hands-on lab, users will discover the new Inventor 2017 Presentation environment and experience its new editing and publishing tools. Attend this class to learn how to create the presentations you could only dream of showing your clients before now! This session features Inventor Professional.

Your AU Expert

Jerry Berns is the Manufacturing Content Manager for all CADLearning manufacturing products from 4D Technologies, developing on-demand learning material for Autodesk Software users, including Inventor and Fusion 360. An Inventor Certified Professional and Autodesk Certified Instructor, he has amassed a wealth of expertise at engineering firms and Autodesk value added resellers (VARs) in the implementation, use and support of Autodesk products since 1985. Jerry has worked at a number of Autodesk Resellers, where he worked with hundreds of clients, including several Fortune 100 companies. Jerry has presented several times at Autodesk University since 2006, earning a Top Rated Speaker in 2013.

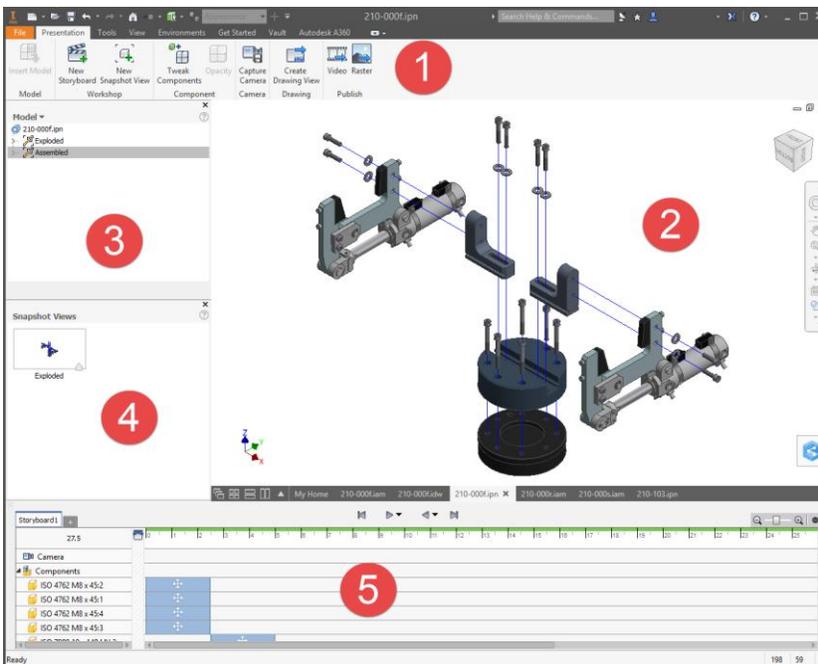
Inventor 2017 Presentation Environment

The Inventor Presentation environment is used to create exploded views and animations of your Inventor assembly models. These views are used to show assembly instructions or reveal internal components. Animations can be developed to show assembly, disassembly, or maintenance operations.



Interface

The Presentation environment consists of five main elements; the ribbon, the graphics window, the Model browser, the Snapshot Views panel, and the Timeline. Each element can be positioned or adjusted to suit.



- 1 Ribbon
- 2 Graphics Window
- 3 Model Browser
- 4 Snapshot View Panel
- 5 Timeline

Presentations contain scenes, which are independent of each other. They are associated to a source model and its model representations.

Application Setup

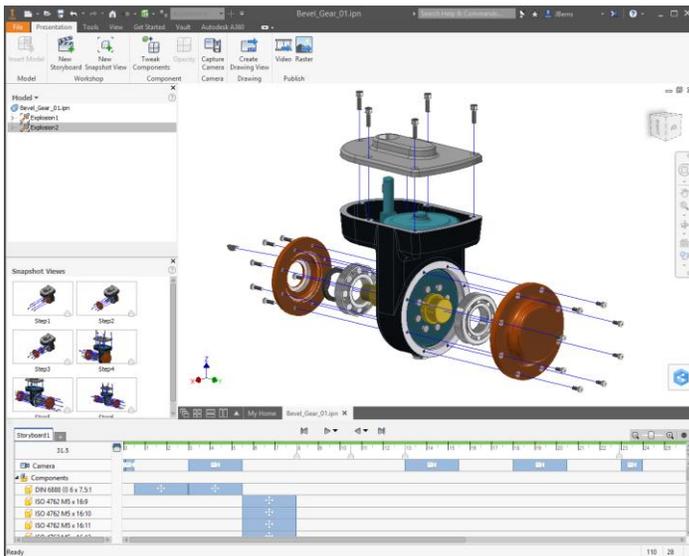
It will be necessary to set the Inventor project file to complete the exercises.

1. Using Windows Explorer, browse to the folder:
2. **C:\Datasets\Lab02 San Polo 3403\PD20713-L**
3. Double-click **PD20713-L.ipj** to launch Inventor.
4. Click **Open** to review workspace and frequently used folders.
5. Press **ESC**.

Exercise 1

In this exercise, you will explore the interface elements of the presentation environment.

1. In Inventor, select **Open**. Browse to the folder **Designs\Bevel Gear**.
2. Open the presentation named **Bevel_Gear_01.ipn**.



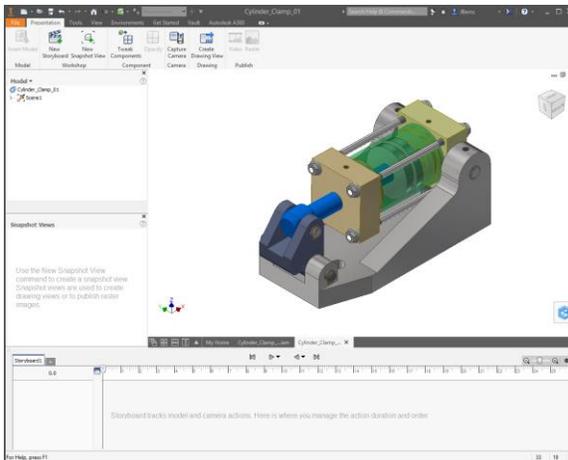
3. Activate *Explosion1* scene and then **Play** the current storyboard.
 - ? Which is the first component to be disassembled? _____
 - ? Which is the last component to be disassembled? _____
4. Activate *Explosion2* scene.
 - ? How many storyboards are contained in this scene? _____
5. **Play** the first storyboard.
 - ? Which component is simultaneously moved and rotated? _____
6. Activate *Explosion1* scene.
 - ? How many snapshot views does this scene contain? _____
7. Close the file. No save required.

Exercise 2

In this exercise, you will explore two methods of creating a presentation. The first method uses the Home Page.

1. In Inventor, select **Open**. Browse to the folder **Designs\Cylinder Clamp**.
2. Open the assembly named **Cylinder_Clamp_01.iam**.
3. Explore the Design View Representations. Leave **Master** as active.
4. On the Inventor Home Page, click **Presentation**.
5. In the Insert dialog box, browse to the folder **Designs\Cylinder Clamp**.
6. Select, but do not open, **Cylinder_Clamp_01.iam**.
7. Click **Options**.
8. Select the following **File Open** representation options:
 - Design View = Default (Associative)
 - Positional = Master
 - Level of Detail = Master

? How many Positional Representations are available? _____
9. Click **OK**.
10. Select **Open**. The model appears in the presentation. One scene and one storyboard have been created.



11. In the Model browser, right-click **Scene1**. From the context menu, select **Representations**.
NOTE: You can only modify the Design View and Associative status.
12. Select **Piston** and then click **OK**. Note the visibility state changes.
13. Close the file. No save required.

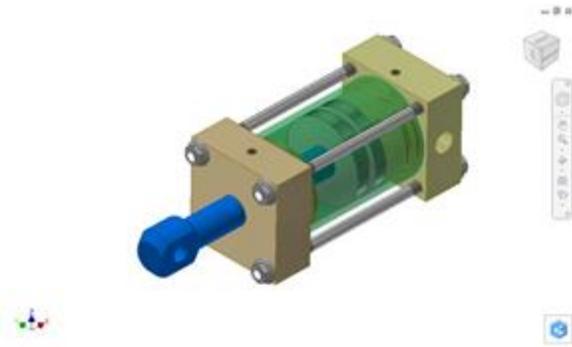


R2

The second presentation creation method, added in Inventor 2017 R2, uses the assembly context menu.

1. Switch to the **Cylinder_Clamp.iam** document.
2. Activate the following representations:
 - Design View Representation = **CylinderBody**
 - Position = **Retract**
3. Right-click the top-level browser node. From the context menu, select **Create Presentation**.
4. Select the default presentation template.

In the graphics window, only the cylinder body is visible. Note the visibility states of the parts in Scene1.



NOTE: Only the design view rep was input, not the positional rep.

5. Close the file. No save required.

Scenes, Storyboards, and Snapshot Views

Presentations contain scenes, which establish an associative link to an assembly. You can have multiple scenes within a presentation. Scenes can link to the same or different assemblies. A scene contains at least one storyboard.

Storyboards store the actions you create to explode an assembly. Actions consist of moves and rotates, which transform the components into their disassembled positions. You can also create camera, visibility, and opacity actions. Your scene can contain multiple storyboards.

New storyboards can be created as one of two types: “Clean” or “Start from end of previous”. Use the second method when you want a new storyboard to continue from the exploded state of another storyboard. However, the storyboards are not associated, so changes in one will not affect the other.

Snapshot Views are a capture of the storyboard at a particular instant on the Timeline. A Snapshot can be independent of the storyboard or associated with it. If the storyboard changes, an associative snapshot view can be updated. You can use the Timeline Scratch Zone to easily build independent snapshot views.

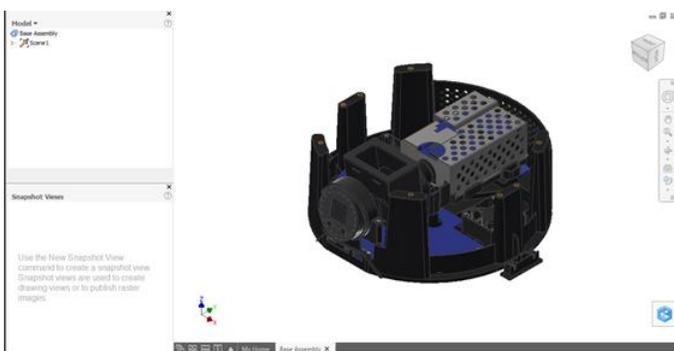
Once created, storyboards are used to publish animations. Snapshot Views are used to create drawing views, which can be essential to communicate assembly information.

The following exercises will step you through the process of creating these elements.

Exercise 3

In this exercise, you will create the scenes for a presentation.

1. On the Home Page, create a new **Presentation**.
2. In the **Insert** dialog box, browse to the **Designs\Ember\Data** folder, and select **Base Assembly.iam**. Click **Open**.



3. Right-click in the Model browser and select **Create Scene**.
4. In the **Insert** dialog box, same folder as above, select **Build Assembly.iam**. Click **Open**.
5. Repeat the process to create a scene for **Case Assembly v16.iam**.
6. Double-click **Scene1** to activate it. On the ribbon, select **New Snapshot View**.
7. Repeat this process for **Scene2** and **Scene3**.

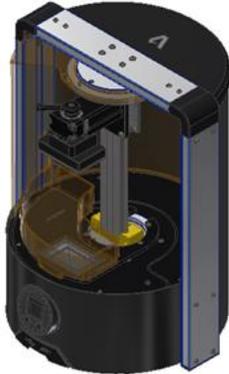
Note the unique storyboard and snapshot view for each scene.

8. Close the file. No save required.

Now you will create a presentation with multiple scenes using the same assembly.

9. Create a new presentation.

10. In the **Insert** dialog box, browse to the **Designs\Ember\Data** folder, and select **EMBER_Assembly.iam**. Use **Options** to select **Default View Representation**, and then deselect **Associative**. Click **OK** and then **Open**.



11. In the Model browser, expand **Scene1 > EMBER_Assembly.iam**.

12. The playhead should be at 0.0 s in the Timeline. In the browser, toggle off the visibility of **Build Assembly** and **Case Assembly v16**. Create a snapshot view.

13. To create a new scene using the same assembly, drag and drop **Scene1** onto the top node in the browser. The scene and snapshot are copied.

14. Expand **Scene2 > EMBER_Assembly.iam**.

15. Toggle off the visibility of **Base Assembly**. Toggle on the visibility of **Build Assembly**.

16. **Delete** the copied snapshot view. **Zoom All** the model, and then create a new snapshot view.

17. Repeat the drag-and-drop process to create a third scene.

18. Set **Case Assembly v16** as the only visible subassembly.

19. Delete the copied snapshot view and create a new one.

20. Double-click a different scene to activate it. Review each scene.

21. Close the file. No save required.

Use the Create Scene command to select the same assembly or a different assembly. Use Options to select representations. Drag and drop a scene in the browser to create a quick copy of a scene to use the same assembly and representation.

? TRUE or FALSE: When you drag and drop a scene in the browser onto the top node, you can choose the design view, positional, or level of detail representation.

? TRUE or FALSE: When you use the context menu to create a scene, you can choose the same or different assembly. _____

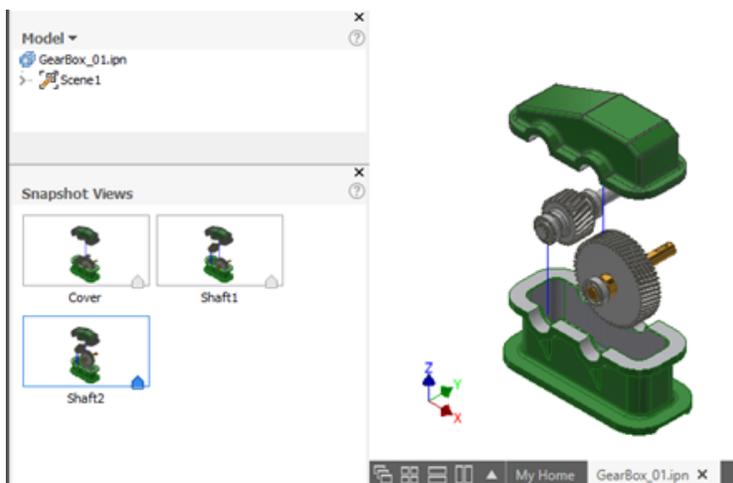
Exercise 4

In this exercise, you will create the storyboards and snapshot views for a GearBox.

1. **Open** from the **GearBox** folder, **GearBox_01.ipn**.



2. Select the cover. Right-click and select **Tweak Components**.
3. Move the cover vertically a distance of about **250 mm**. Set the **Duration = 1 s**. Click **OK**.
4. **Zoom All** and then use **Capture Camera**.
5. From the ribbon or Marking menu, select **New Snapshot View**. Name the snapshot view, **“Cover”**.
6. View the model from the front. Window select the shaft components on the left. Start **Tweak Components**. Set **UCS = World**, **Trails = Single**, and **Duration = 1 s**.
7. Move the components vertically **125 mm**. Click **OK**.
8. Create a similar tweak for the shaft components on the right. Use a distance of **75 mm**.
9. Drag the playhead to **2 s** or just after the left shaft component actions. Right-click the playhead and select **New Snapshot View**. Name the snapshot view, **“Shaft1”**.
10. Create a snapshot view for the right shaft components. Name the view, **“Shaft2”**.



Snapshot views can be created using the ribbon, marking menu, or the playhead context menu.

11. From the ribbon, marking menu, or Timeline, select **New Storyboard**.

12. In the **New Storyboard** dialog box, select the **Clean** storyboard type and then click **OK**.

This creates a storyboard with all components in their assembled positions.

13. Click in the **Scratch Zone** to move the playhead there.

14. Select the gearbox cover and case. Right-click and select **Visibility**. This hides these parts.

15. Turn off the Visibility for the shaft components on the right.

With the playhead in the Scratch Zone, no actions were recorded.

16. Move the playhead to **1 s**. Add tweaks to disassemble the shaft 1 parts. Add a snapshot view for the disassembled state.

17. Activate **Storyboard1**. Start **New Storyboard**. For the type, select **Start from end of previous**.

The storyboard has been inserted between storyboards 1 and 2. This can be useful to insert an instruction animation.

NOTE: Storyboards currently cannot be renamed or reordered.

18. Click in the **Scratch Zone**. Turn off the visibility of the cover, case, and shaft 1 components.

19. Add tweaks to disassemble the components on shaft 2. Create a snapshot view at the end.

20. Save as **GearBox_Practice_02.ipn**. Close the file.

The snapshot views could now be used to create drawing views.

? TRUE or FALSE: You can drag thumbnails in the Snapshot View panel to change the order. _____

Exercise 5

In this exercise, you will create associated and independent snapshot views.

1. From the **GearBox** folder, open the file **GearBox_02.ipn**.

2. In Storyboard1, drag the playhead to **1 s**. Right-click the playhead and select **New Snapshot View**.

An associated snapshot view is created, as indicated by the playhead on the snapshot view thumbnail.



3. Activate **Storyboard2**. Click in the **Scratch Zone**. Select **New Snapshot View**.

Because the playhead was in the scratch zone, an independent snapshot view is created, as indicated by the absence of the playhead on the thumbnail.



View2

4. Activate **Storyboard1**. Click in the **Scratch Zone**. Hover the cursor over the view marker in the Timeline. The associative snapshot view name is displayed. Click the marker to see the thumbnail highlight in the Snapshot View panel.
5. Move the playhead to **1 s**. In the graphics window, double-click the trail for the **GearBoxCover Move** action. Change the distance to **225 mm**. Click **OK**.

The snapshot view now requires updating, as indicated by the update icon on the thumbnail.



View1

6. Right-click the thumbnail and select **Update**.

The view is updated with the new component position.

Next, you will update the independent view:

7. Double-click the snapshot view named **View2**. Switch to a Top, Front, Left isometric view.
8. On the ribbon or from the marking menu, select **Update Camera**. The thumbnail updates.
9. Click **Finish Edit View**.
10. Close the file. No save required.

Both views could be used for drawing views. Use an associated snapshot view when you want to maintain a link between the view and changes in the model.

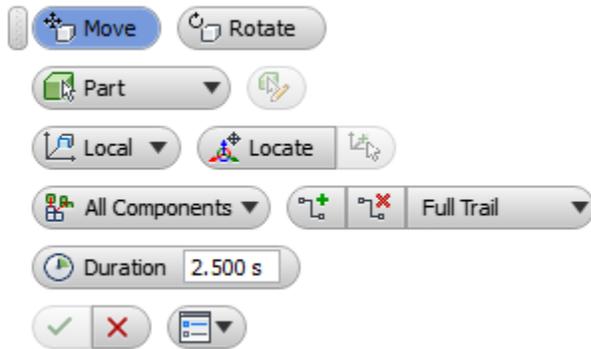
- ? TRUE or FALSE: You can change an associative snapshot view to independent.
- ? TRUE or FALSE: You can change an independent snapshot view to associative.

Create Actions

Actions tell the story of how to assemble or disassemble the model. Actions can also be changes to the camera view, or to the visibility or opacity of a component.

Tweak Components

The Tweak Components command uses a mini-toolbar interface to select the transform type, selection type, UCS, triad positioning, trail style, trail customization, and duration.



On the Timeline, tweaks are usually inserted after the position of the playhead.

Camera

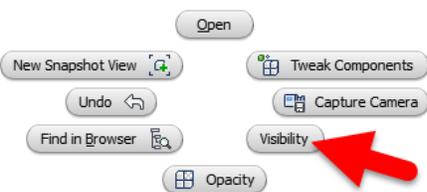
Camera actions are created with the Capture Camera command. These are useful to change the viewpoint of the model to see components that were obscured or at a different magnification. They can be instant or duration type actions.

On the Timeline, camera actions are usually inserted before the position of the playhead. The exception is when the playhead is at 0.0 on the Timeline.

To update a camera action, move the playhead to the end of the action. Click **Capture Camera**.

Visibility

The Visibility Command, available on the context menu, toggles off the visibility of the selected components. The action is inserted at the playhead position.



Opacity

Opacity is an alternative visual action. You can choose a component's level of opacity from 0 – 100, with 100 being opaque and 0 being invisible.



After creating, you can edit the action to change to a Duration type. With Duration, you can specify the Start, Duration, or End time.



Appearance

Although not an action, it is worth mentioning here amongst the visual styles. The Quick Access Toolbar contains the Appearance menu. You can override the color or material appearance of selected components.

The following exercises will explore the different actions you can create and how to edit them.

Exercise 6

In this exercise, you will create an exploded view for some of the parts in the Arbor Frame assembly.

1. On the Inventor Home Page, click **Presentation**.
2. In the Insert dialog box, browse to the folder **Designs\Arbor Press**.
3. Select **Arbor_Press_01.iam**.
4. Click **Options**.
5. Select the following **File Open** representation options:
 - Design View = Master
 - Positional = Mid
6. Click **OK** and then click **Open**.
7. On the **View** tab, set the following:
 - Visual Style = Shaded with Edges
 - Lighting Style = Two Lights

Optionally, you could also set the ViewCube Front and Home views.



8. In the graphics window, select **TABLE PLATE**. Right-click and select **Tweak Components**.

Note the alignment of the tweak triad.

9. In the mini-toolbar, change the **UCS** to **World** and **Trail** to **Single**. Ensure **Duration** = **2.5 s**.
10. Use the **Z-axis** arrow to drag the table plate up about 1 inch or enough to clear the **GROOVE PIN**.
11. Use the **Y-axis** arrow to drag the table plate out a suitable distance.
12. Now select the **GROOVE PIN**.

Note the two Move actions created in the Timeline.

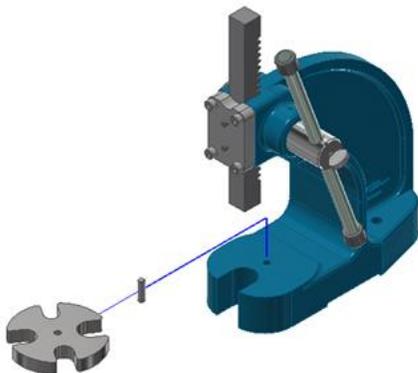
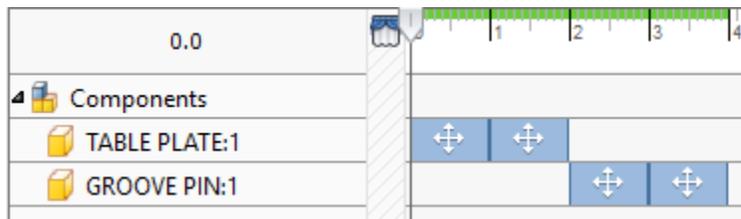
13. Move the groove pin up and out in a similar manner as the table plate. Click **OK**.

The Timeline contains four Move actions.

14. Play the storyboard. The Move actions were created using the default duration time.
15. Double-click the first Move action. In the dialog box, change **Duration** = **1 s**. Click **OK**.

R2 Editing each action duration individually would be time-consuming. R2 is enhanced with multiple action duration editing.

16. On the Timeline, hold **CTRL** and select the other three actions. Right-click and select **Edit Time**. Change **Duration** = **1 s**. Click **OK**.
17. Drag the actions on the Timeline to eliminate the gaps.



18. Click **Forward to Storyboard End**.

Next, you will combine a Move and Rotate action:

19. Orbit to view the left side of the model. Zoom near the **COLLAR** component.

20. Select **ISO 4766 - M5 x 5**. Right-click and select **Tweak Components**.
21. With **UCS = Local** and **Duration = 1 s**, remove the set screw by dragging along the Z-axis a **Distance = 1.6 mm**.
22. On the mini-toolbar, click **Rotate**. Drag the Z-axis grip in a counter-clockwise direction a short distance. Set **Angle = 720°**. Click **OK**.

A combination action has been created.

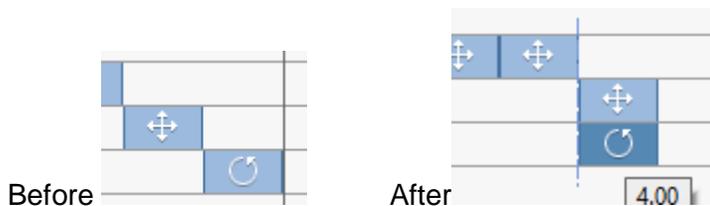


23. Drag the playhead before the action and then click **Play**.

The set screw is moved and then rotated.

Once you create actions, you can edit them to occur simultaneously:

24. In the Timeline browser, expand **ISO 4766 - M5 x 5**. Drag the **Rotate** action so that its start time aligns with the **Move** action start time. A dashed line appears when start/end times are aligned.



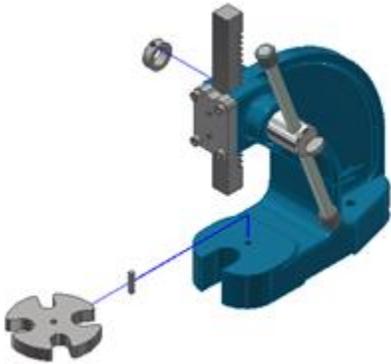
25. Click **Forward to Storyboard End**.
26. **CTRL** select **ISO 4766 - M5 x 5** and **COLLAR**. Start **Tweak Components**.
27. Set **UCS = World** and then drag along the X-axis to remove the collar and set screw. **DO NOT CLICK OK**. Orbit the model to view the right side.
28. In the mini-toolbar, change **Trail Style = All Components**. A trail is created for each part.
29. Change **Trail Style = Single** to produce a single trail for the tweaked components. Click **OK**.
30. Play the storyboard to review your progress.
31. **Save as Arbor_Press_Practice_01**.
32. **Close** the presentation.

? TRUE or FALSE: You can only edit the duration for one action at a time. _____

Exercise 7

In this exercise, you will edit actions and capture camera positions.

1. From the **Arbor Press** folder, open **Arbor_Press_02.ipn**. *This is a slightly altered version from the previous exercise.*



2. In the Timeline browser, expand **ISO 4766 - M5 x 5**. *Referred to here as the set screw.*
The set screw Rotate action needs to align with its Move action. The subsequent actions need to shift left.

3. Right-click the set screw **Rotate** action and select **All After**.

R2 introduced new action selection tools: *All After*, *All Before*, or *Group* (all members of a group tweak).

4. Drag the Rotate action until it is aligned with the Move action for the set screw.

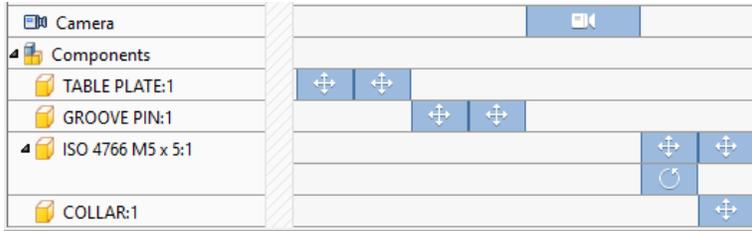


5. Click **ViewCube Home**.
6. **Play** the storyboard.

It is easy to see the TABLE PLATE and GROOVE PIN actions, but the SET SCREW and COLLAR are obscured. Add camera actions to resolve.

Now you can reposition the camera and capture camera actions to see the SET SCREW and COLLAR:

7. Drag the playhead to the end time of the set screw's Move/Rotate actions. (*5 seconds*)
8. Orbit and zoom the model to see the SET SCREW and COLLAR.
9. From the ribbon or context menu, select **Capture Camera**. The Camera action appears on the Timeline. Edit its **Duration = 2 s**.
10. Use **Select > All After** to select the set screw Move action and all following actions. Deselect the Camera action if it is selected. Drag the selected actions so that the set screw Move action start time aligns with the Camera action end time.



11. Move the playhead to the storyboard end. Add another Camera action to return to the Home view. Edit the Camera action. Change **Start Time = 8.5 s** and **Duration = 1.5 s**.

Additional actions could be added to continue the disassembly process.

12. Play the storyboard.

13. Close the file. No save required.

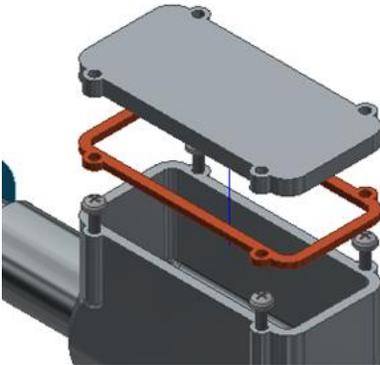
? TRUE or FALSE: Using *Select > All After* will select actions and snapshot view markers on the Timeline. _____

Exercise 8

In this exercise, you will insert actions, grip edit actions, and update camera positions.

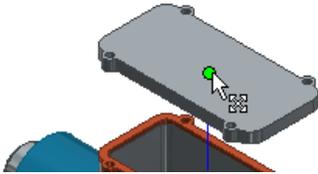
1. **Open** from the **Pump Reservoir** folder, **Pump_Reservoir_01.ipn**.

Fasteners, added after the presentation was created, need to be exploded.



2. Drag the playhead to **0 s** on the **Timeline**. Use **Tweak Components** to move the fasteners up about **100 mm**.
3. Drag the playhead to **1 s** on the Timeline. **Zoom All**. Click **Capture Camera** to update the current camera action.
4. Play the storyboard.
5. On the Timeline, drag the actions for the CAP, GASKET, and COLLARS to occur after the fasteners have moved.
6. Drag the snapshot view markers on the Timeline to advance each one by 1 second.

7. Drag the playhead to **2 s**. Hover the cursor over the center of the CAP. When the trail origin grip appears, click and drag it to reposition the CAP near the fasteners. Update the snapshot view.

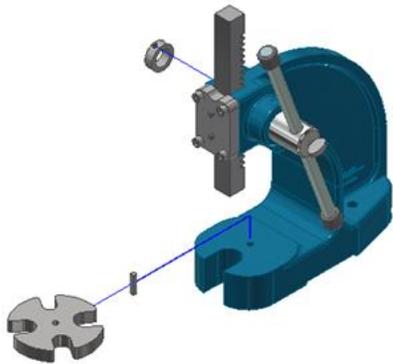


8. Drag the playhead to **3 s**. Use the trail origin to drag the GASKET. Update the snapshot view.
9. Repeat the process for the COLLARS.
10. In the browser, expand the **Scene1 > Tweaks** folder. Review the tweak distances. Click a tweak to edit the value.
11. Close the file. No save required.
 - ? TRUE or FALSE: Inserting a tweak between actions automatically moves the other actions on the Timeline. _____

Exercise 9

In this exercise, you will edit actions, capture camera positions, and create storyboards.

1. **Open** from the **Arbor Press** folder, **Arbor_Press_03.ipn**.



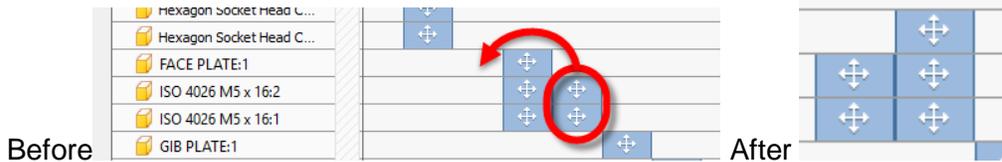
2. Right-click the first **Camera** action and select **All After**. Drag the selected actions near 18 seconds on the Timeline to allow room to insert other actions.
3. Drag the playhead 1 second past the last GROOVE PIN Move action. Zoom to the **FACE PLATE** part.
4. Right-click a **Socket Head Cap Screw (SHCS)** and select **Tweak Components**. Set **UCS = World**, **Trails = All Components**, and **Duration = 1 s**. Drag the **SHCS** away about **9 inches**.
5. In the mini-toolbar, click **Add/Remove Components**. Now select the other three **SHCS** holding the FACE PLATE. Click **OK**.

Use Add/Remove Components to change the selection set while creating the tweak.

6. Zoom as needed to see the disassembled SHCS and the FACE PLATE. Click **Capture Camera**.
7. Use **Tweak Components** to remove the FACE PLATE about **4.5 inches**. Click **OK**.
8. To add the Socket Head Set Screws (SHSS) to the FACE PLATE Move action, double-click the trail of the FACE PLATE. The part highlights to ensure correct selection. Hold **CTRL** and then select the two SHSS. They are moved to the FACE PLATE position. Click **OK**.
9. Create a tweak to remove the SHSS from the FACE PLATE. Move them away about **2 inches**.
10. Create a tweak to remove the GIB PLATE, and then another to move the RAM.
11. Rewind and play the storyboard.

R2

- R2 introduces the ability to drag actions before or after other actions on the Timeline.
12. On the Timeline, locate the Move actions for the **ISO 4026 M5 x 16** parts. Drag the last Move actions before the first Move actions. Drag the actions to reposition their start times.



13. Rewind and play the storyboard.
14. Drag the second camera action so that it occurs after the RAM move.
15. Drag the actions for the ISO 4766 and COLLAR so that they occur after the second camera action. Drag the last camera action to align its end with the COLLAR action end.
16. Drag the playhead to the end. Start **Tweak Components**. In the mini-toolbar, change Selection Type to **Part**. Select the **LEVER ARM**.

Use Selection Type to determine whether parts or subassemblies are selected.

17. Change Selection Type to **Components**. Pick the **LEVER ARM** again and the entire subassembly is selected now.
18. Drag the HANDLE ASSEMBLY away about 12 inches.
19. In the mini-toolbar, change **Trail Style** to **All Parts**. The number of trails increases. Change **Trail Style** to **Single**. Now only one trail is visible. Click **OK**.
20. Add a tweak to remove the remaining SHSS on the left side of the frame. You may wish to include a camera action.

Now a storyboard can be created just for the handle assembly.

21. Close the file. No save required.

Exercise 10

In this exercise, you will add and edit visibility and opacity actions.

1. **Open** from the **Arbor Press** folder, **Arbor_Press_04.ipn**.



2. Create a **New Storyboard** using the **Clean** type.
3. Drag the playhead to **2 s** on the Timeline. Use the browser to select all the parts except the HANDLE ASSEMBLY. Right-click and select **Visibility**. Visibility actions are added to the Timeline.
4. Scrub the playhead from start to end to see the parts immediately become hidden.
5. Click **Undo** to remove the Visibility actions.
6. With the playhead at **2 s**, select the parts again except for the HANDLE ASSEMBLY. Right-click and select **Opacity**. Set the **Level = 50** and then click **OK**.
7. Scrub the playhead from start to end to see the parts immediately fade at 2 s.
8. To change the fade timing, Use **Select > All After** on the first Opacity action in the Timeline. Hover the cursor over the left edge of the action. When you see a double-arrow cursor, click and drag to change the Instant type action to a **Duration** type action. Drag to **0.1 s**. Scrub the playhead to see the effect.

Opacity actions cannot start at 0 seconds. Use 0.1 instead.

9. Select all of the Opacity actions. Drag the start times to **1 s**.
10. Scrub the playhead to see the effect of the Opacity action duration setting.
11. Select all of the Opacity actions again. Right-click and select **Edit Opacity**. Change **Level = 0**. Click **OK**.
12. Scrub the playhead to see the edited effect. Now the components completely disappear.
13. Drag the playhead **1 second** past the opacity actions. Use the ViewCube to view the model from the **RIGHT**.
14. Window select all of the handle assembly parts, and then start **Tweak Components**. In the mini-toolbar, select **Rotate**. Drag the handle so that it is nearly level. Set **Trails = No Trail** and **Duration = 1 s**. Click **OK**.
15. Return to an isometric view. No need to capture any camera changes.
16. Move the playhead 1 second past the last action.

This gives time for the view to settle before more actions occur.

17. Start **Tweak Components**. Change **Trails** to **All Components**. Add a Move tweak to remove a HANDLE CAP. Add another tweak to remove the second HANDLE CAP. Drag the second HANDLE CAP to the left to make room for the handle.
18. Adjust the Move actions so that the HANDLE CAPS remove simultaneously.
19. Add a Move action to remove the THUMB SCREW.
20. Now add a Move action to remove the LEVER ARM from the PINION SHAFT
21. **Rewind** and play the storyboard.
22. Click **Forward to Storyboard End**.
23. Click **Reverse Play All Storyboards** to see the model assemble.
24. Close the file. No save required.

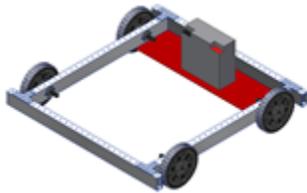


Exercise 11

Presentation trails represent the distance or angular paths that components follow to their disassembled position. In exploded assembly views, trails can provide clarity as to the intended assembled location. Inventor provides controls to manage the trails during tweak creation and for editing after the action has been created.

In this exercise, you will use the various options to create trails for a simplified version of a FIRST Robotics Competition design.

1. From the **FRC Robot** folder, open **FRC_Robot_01.ipn**.



2. In the Model browser, expand the scene and then expand the assembly and subassemblies. The model contains a number of subassemblies.
3. Start **Tweak Components**. On the mini-toolbar, set **Selection = Components** and **Trails = All Components**. Hold **CTRL**, and then select the wheel assemblies on the right side of the robot. Set the tweak type to **Move**.
4. Parallel to the axle, drag the wheels about **300 mm** away from the frame. Two trail lines appear, one for each subassembly.
5. In the mini-toolbar, set **Trails = All Parts**. Every part in all of the subassemblies receives a trail line.
6. Change **Trails = Single**. Now, only a single trail is created for all of the components. The trail is assigned to the first selected component in the tweak.
7. Change **Trails = All Components**. Click **OK**.
8. In the graphics window, double-click one of the trails and a mini-toolbar appears. Change **Trails** to another method and note the difference. Click **Cancel**.
9. Select one of the trails again. Click and drag the trail end manipulator. All components participating in the tweak will be adjusted.

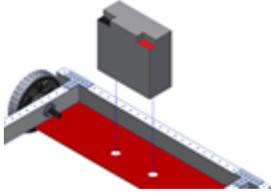
Next, you will remove the battery.

10. Zoom in near the back of the robot and capture the camera action. Be sure the action occurs after the previous tweak.
11. Tweak the battery up a distance of about **250 mm**, but do not select OK yet.

The battery has two alignment pins which seat into the holes of the bottom guard. Use the mini-toolbar to change the trails.

12. Change **Trails = No Trail** and then select **Add New Trails**. Orbit the model so that you can pick the bottom faces of the battery alignment pins. Click **OK**.

Two trails now help to communicate how to place the battery.



13. To return to the previous camera view, drag the playhead over the last camera action. With the view restored, move the playhead about 1 second past the last action. Use **Zoom All** followed by **Capture Camera**.

By default, Full Trails are applied to components when the trails are created. Next, you will explore the segment trail option. For some tweaks, it may not be necessary to record all the paths, so you may want to show only some segments.

14. Start **Tweak Components**, and then select a Gusset. Change **Trails = No Trail** and the **Trail Type = Trail Segments**. Tweak the gusset up about 200 mm.
15. Click **Add New Trails**. Pick the centers for the two outer holes on the straight portion and the middle hole of the leg. You may need to orbit the model slightly to see the three paths. Click **OK**.
16. Close the file. No save required.

? On the Tweak Components mini-toolbar, what button allows you to create custom trails?

Exercise 12

In this exercise, you will discover how to edit trail visibility and start positions. Trails are erased when a tweak is deleted.

1. From the **FRC Robot** folder, open **FRC_Robot_02.ipn**.
2. Start **Tweak Components** and then select a gusset that is still in its assembled position. Using **All Parts** and **Full Trail**, tweak the part up, then forward, and then to the left. Click **OK**.

A tweak with a visible trail has been created for each movement.

3. Select and then right-click one of the trail segments. Select **HIDE TRAIL SEGMENT > Current** to hide just that segment. Now select and right-click the gusset. From the context menu, select **Hide Full Trail**. All the segments disappear.
4. In the Model browser, expand the **Tweak** folder as needed and scroll to the bottom. Notice the appearance of the tweaks that have the trails hidden.
5. Select one of the hidden trails and right-click. Select **Show Trails**. That segment is restored.
6. In the graphics window, right-click the gusset and select **Hide Full Trail**. Right-click it again and select **Show Full Trail**. All the trails are restored.

If you delete a tweak, its trail is also deleted. However, you can control the level of deletion based on the trail that was created.

7. The drive assemblies were tweaked simultaneously as components. Select one of the trails, and then right-click and select **Delete Tweak > Current**. Notice that only one tweak and trail were deleted. Use **Undo** to restore the tweak. Select and right-click the trail again. This time, select **Delete Tweak > Group**. Both assemblies move to their original positions.
8. Close the file. No save required.

Publish Presentations

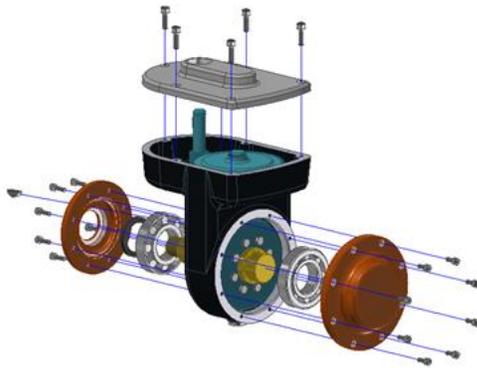
Image

Assembly instructions, whether printed or digital, are still quite common in this video age. You can create raster images for use in these publications using the Raster command.

Exercise 13

In this exercise, you will create raster images from snapshot views.

1. **Open** from the **Bevel Gear** folder, **Bevel_Gear_02.ipn**.



2. In the **Snapshot Views** panel, click in an empty space to deselect any views.
3. On the ribbon, **Publish** panel, select **Raster**.
4. In the **Publish to Raster Images** dialog box, **Scope** group, **All Views** is the only choice.
5. In the **Image Resolution** group, select **1280 x 720**.
6. In the **Output** group, the **File Name** is based on the Scope selection. Expand the **File Format** drop-down and select **PNG**. Click **OK**.

The graphics window will change as each snapshot view is activated to create the raster image. When the screen stops changing, the images have been created.

R2 Publishing images with a transparent background is now available.

7. Use Windows Explorer to browse to the output folder location. Review the images.
8. Return to the presentation.
9. Hold **CTRL** and select any two snapshot views. Right-click and select **Publish to Raster**. Now only the selected views would be published. Click **Cancel**.

You can also publish a custom raster view.



10. Double-click the view named **Step6**. Zoom closer to the model and center in the graphics window as needed. Right-click and from the **Marking** menu, select **Raster**. This time the Scope is set to Current View. Click **Cancel** to close the dialog and then click **Finish Edit View** either from the ribbon or **Marking** menu.
11. Close the file. No save required.

Video

Assembly instructions can often be made more clear when a video shows the assembly process.

Exercise 14

In this lesson, you will explore your storyboard publishing options.

1. From the **Bevel Gear** folder, open **Bevel_Gear_02.ipn**.
2. On the Storyboard panel, select **Storyboard1**. On the ribbon, **Publish** panel, select **Video**.
3. In the **Publish to Video** dialog box, **Scope** group, select the **Current Storyboard** option.

Note the file name in the Output group.

4. Now select the **All Storyboards** option. Inventor updates the file name based on the Scope selection. Select the **Reverse** option.
5. In the **Video Resolution** group, select the **800 x 600** resolution.

Be aware that if you develop your animations using a widescreen format such as a 16:9 ratio, and then publish to a 4:3 format, portions of the screen will be cropped.

6. In the **Output** group, type the name, "**Bevel_Gear_Assembly**". Select **WMV** from the **File Format** menu.
7. Click **OK** to publish the video.

The dialog box closes, and the Publish Video Progress dialog box appears. The storyboards are played as the video is created. You can select Cancel if you notice an issue while the video is being created. Once the video is published, a notification message will appear.

8. Using Windows Explorer, browse to the video folder location. Select and open the video.

If you prefer, you could publish the storyboards as separate videos. Users could select a specific assembly task to watch. This would make it easier than navigating through a large video.

9. Close the file. No save required

? How many snapshot views can be created in a scene? _____

Drawings

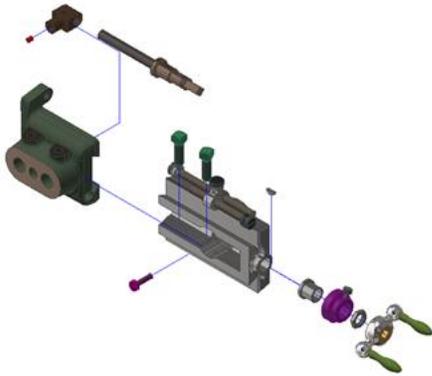
Once you have created your presentation, you can document it in drawing views. The drawing views are based on the snapshot views in your presentation.

In this lesson, you will create a drawing of the assembly and two snapshot views in the presentation. You will use the Slide Tool assembly.

Exercise 15

In this exercise, you will create drawing views from snapshot views.

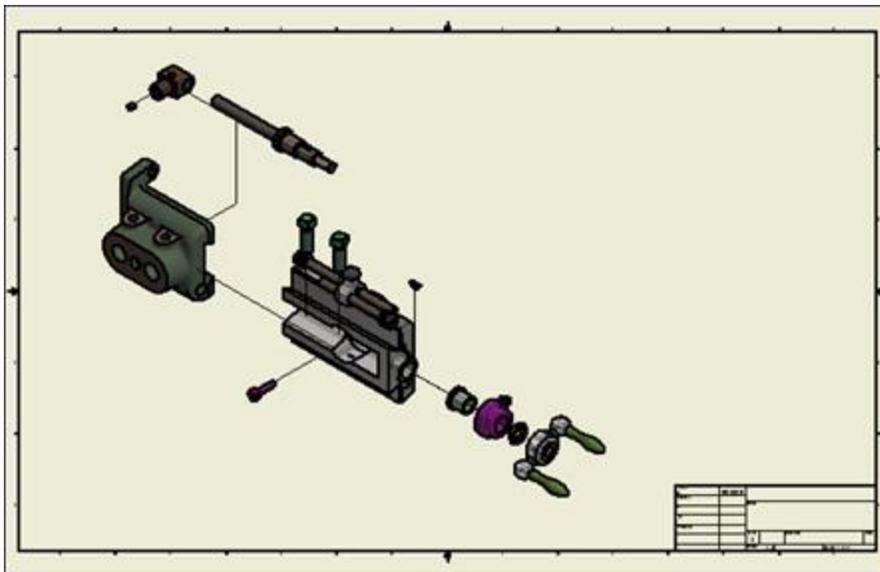
1. From the **Slide Tool** folder, open **Slide_Tool_10.ipn**.



2. In the browser, expand the scene named **Full Assembly**. Select and right-click **Slide_Tool_10.iam**. From the context menu, select **Open**.
3. In the browser, right-click the assembly and select **Create Drawing View**.
4. In the **Drawing Template** dialog box, double-click **Standard.dwg**.
5. Select the **ViewCube FRONT** face.
6. Set view **Style** to **Hidden Line Removed** and **Shaded**. Set view **Scale** = 1:1.
7. Drag the front view to position it on the sheet towards the lower-left corner.
8. Create the top, right, and isometric projected views. Click **OK**.

Company standards vary when it comes to presentation drawings. Some companies prefer a single drawing with multiple sheets containing the assembled and exploded views, while other companies prefer separate drawings. The latter will be the direction for this lesson.

9. Return to the **Slide_Tool_10.ipn** presentation file. In the **Snapshot Views** browser, right-click the **Disassembled** snapshot view and select **Create Drawing View**.
10. Double-click **Standard.dwg** in the **Drawing Template** dialog box.
11. In the **Drawing View** dialog box, enable the **Associative** link option. The drawing view should be based on the scene named **Full Assembly** and the snapshot view named **Disassembled**. You could use the drop-down menu to select an alternate scene/view. Set **Style** to **Hidden Line Removed** and **Shaded**. Set **Scale** = 1:1. Select the option to **Show Trails**.
12. Click **OK**.



13. Right-click the presentation view and select **Open** from the context menu. The associated model becomes the active document. Double-click the trail of the first, green, square head screw. Change the tweak distance to **140 mm**. Click **OK**.
14. Update the **Disassembled** snapshot view.
15. Return to the presentation drawing. Since you marked the drawing view as associative to the presentation snapshot view, the changes you made in the presentation are updated in the drawing.
16. To document the second snapshot view, right-click in the drawing browser and select **New Sheet**. Start the **Base View** command.

This workflow is required since creating the drawing view from the presentation would start a new drawing, which is not desired in this case.

17. In the Drawing View dialog box, ensure Slide_Tool_10.ipn is the selected file. For the Presentation view, select **Handle Assembly : Step6**. Enable the **Associative** and **Show Trails** options, as well as the **Shaded** view type. Scale the view to suit, and then drag it to center it on the sheet.
18. Click **OK**.
19. Close the file. No save required.

? TRUE or FALSE: You must update the snapshot view in order for the associative drawing view to also update. _____

BONUS NOTES:

- Browser Folders are useful in assemblies, but are not visible in presentations
- 2017 R2 allows you to create a presentation from the assembly environment, but you do not get to choose initial representation.
- 2017 adds the ability to create staggered start times of actions.
- Use the Action context menu to align start times or end times of actions.