

It's All in the Presentation

By Neil Munro

Presentation files enable you to show exploded views of the components in Autodesk Inventor™ assembly files. Using the tools and techniques described in this tutorial, you can create and save how-to-assemble animations of these components as they move into their exploded positions. Use these animations to help market your products, as training materials for production personnel, or to help maintenance personnel work on complex systems.

Download File

First download, unzip, and save to a folder on your hard drive the Presentation.zip file. The zipped file contains a small assembly that we'll use for our presentation.



[Presentation](#) (zip - 627Kb)

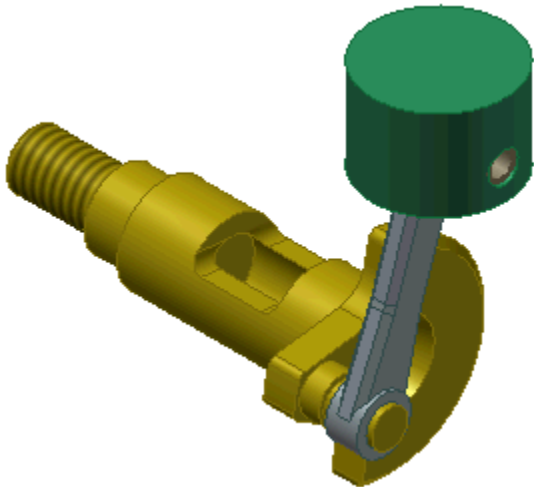





Figure 1: Assembly on opening.

Create a New Presentation

A presentation file is based on an assembly file, but as with other Autodesk Inventor files, it is saved separately from the assembly file. Although one presentation can contain multiple exploded views of the same assembly, in this tutorial you'll be working with a single explosion. Begin by opening a new presentation file:

1. Start a new Presentation file by clicking the arrow next to New on the Standard toolbar, then select Presentation  Presentation .
2. From the Presentation panel bar, click Create View .
3. In the Select Assembly dialog box that displays:

- Click the Browse button to the right of the File edit box .
- Browse to, and open, the downloaded Presentation.iam assembly file.

Tip: Leave the explosion method set to Manual. Automatic explosions rarely result in appropriate component movement.

- Click OK to import the assembly into the Presentation. The file should look like the one in Figure 1.

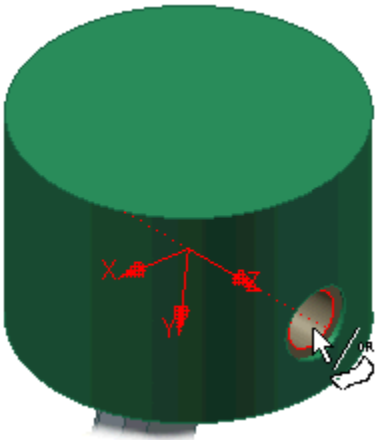


Figure 2: Defining the tweak coordinate system.

Planning to Blow Things Up

The Presentation panel bar contains only four tools:


- Create View: Creates an exploded view of the assembly.
- Tweak Components: Moves components to create the exploded view.
- Precise View Rotation: Provides precise control of camera location.
- Animate: Reviews and records component movement in an explosion.

As always, having a plan of action usually results in fewer mistakes along the way. To create the assembly animation you must:

1. Move the piston into position over the connecting rod.
2. Insert the wrist pin.
3. Assemble the connecting rod/piston assembly to the crankshaft.

Note: The components are imported in an assembled state, so you disassemble the parts in reverse order. The presentation file orders the disassembly movements; when you animate the explosion, the components return to their original positions in the correct order.

The browser is a key tool when you're editing and managing exploded views. You can view the hierarchy of the exploded view in a number of ways by selecting different browser filters. I find the Sequence View browser filter to be the easiest to work with, so let's activate that before we start disassembling the components.

1. Click the Browser Filter tool at the top of the browser .
2. Select Sequence View from the drop-down list.


Note: Think of a sequence as one movement of one or more components in the assembly.

Tweak Those Parts

You translate and rotate components in logical steps to create the finished exploded view. The order should mimic the actual process for assembly/disassembly of the real parts. Creating each movement consists of three steps:

1. Click any component to define a coordinate system for tweak directions.
2. Click one or more components to define a selection set.
3. Drag one of the components, or an axis arrow, to translate or rotate the selected components with respect to one of the coordinate axes. (You can optionally enter precise values in the dialog box.)

Let's get started.

1. From the Presentation panel bar, click Tweak Components , which opens the Tweak Component dialog box.
2. Click inside the wrist pin to define the tweak coordinate system (see Figure 2).

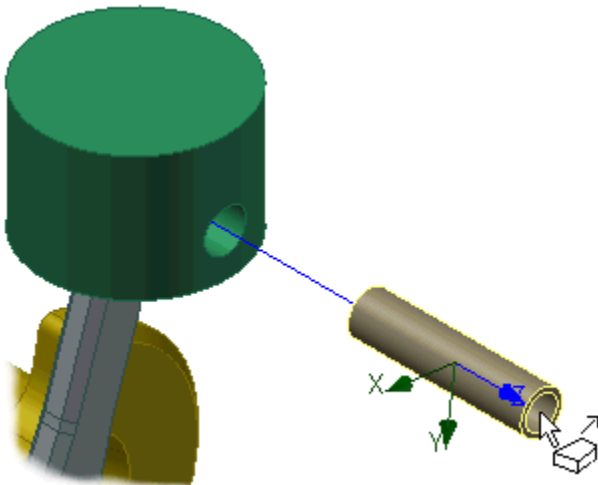


Figure 3: Wrist pin tweak.

3. Click and drag inside the wrist pin to move it along the Z-axis.
4. Drag the wrist pin to the right to match the position shown in Figure 3.

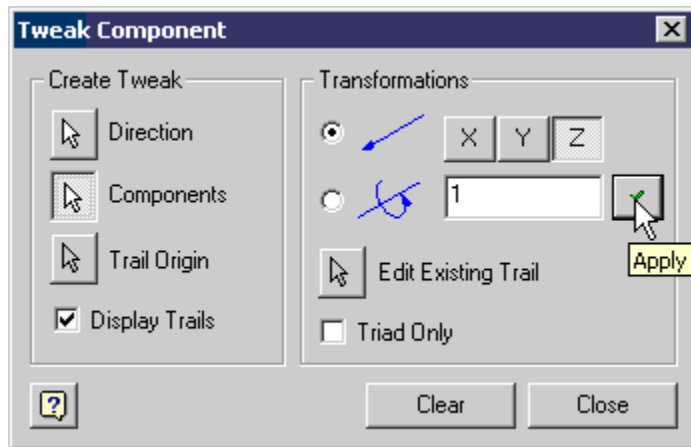


Figure 4: Precise tweak distance entry.

The tweak remains active when you release the mouse button. You can drag the component(s) along the same axis, or enter a precise movement in the Tweak Component dialog box. If you drag along another axis, a new sequence is created.

5. Enter 1 in the Transformations edit box, which specifies a precise tweak distance, and click the green check mark to apply the tweak (see Figure 4).

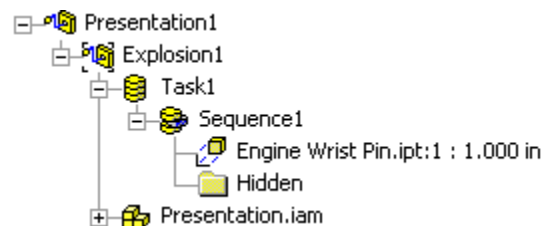


Figure 5: Tweak display in Sequence View browser mode.

6. In the browser:

- Expand Task1.
- Expand Sequence1.

The movement of the wrist pin is stored under Sequence1 (see Figure 5).

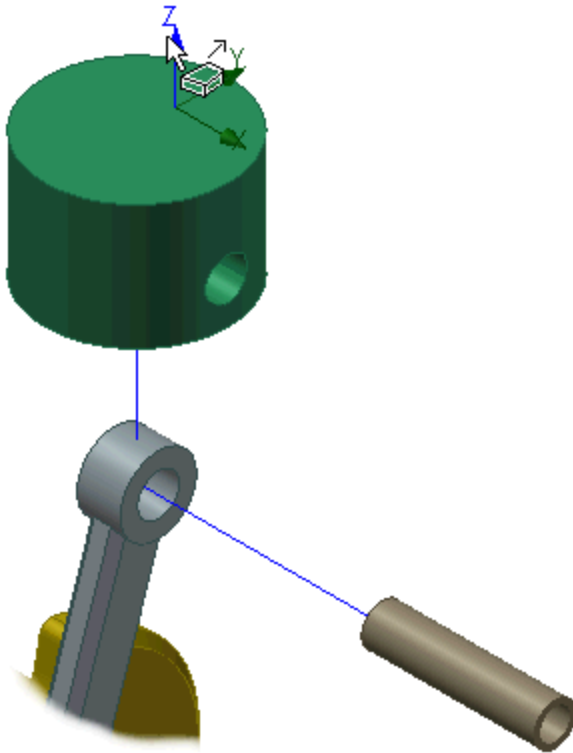


Figure 6: Piston tweak along Z-axis.

7. In the Tweak Component dialog box, click the Clear button. This completes the sequence and restarts the tweak process. The Direction tool is activated, and you must select a component to define a coordinate system for the new tweak.

Multiple Direction Moves

You will next move the piston away from the connecting rod, and then position it over the wrist pin.

1. Click the flat top of the piston to define a new tweak coordinate system. The Z-axis should be normal to the flat surface.
2. Click and drag the Z-axis arrow to move the piston away from the connecting rod (see Figure 6).

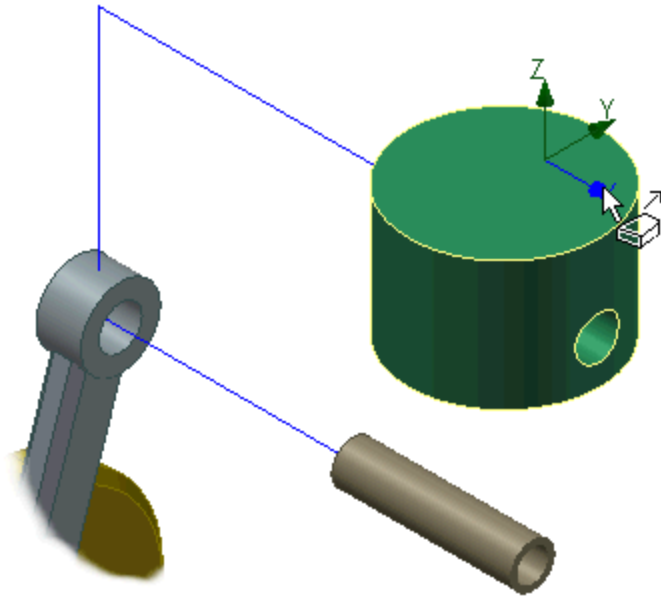


Figure 7: Piston tweak along X-axis.

3. Click and drag the X-axis arrow, and move the piston above the wrist pin (see Figure 7). Optionally, you can click a different axis button in the Tweak Component dialog box to change the active axis.

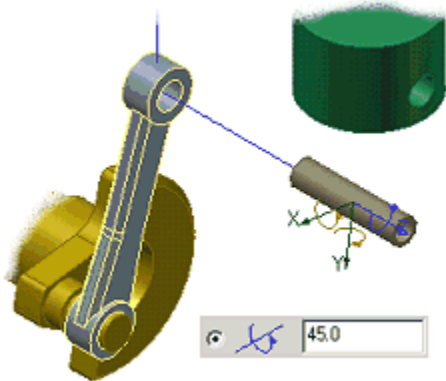
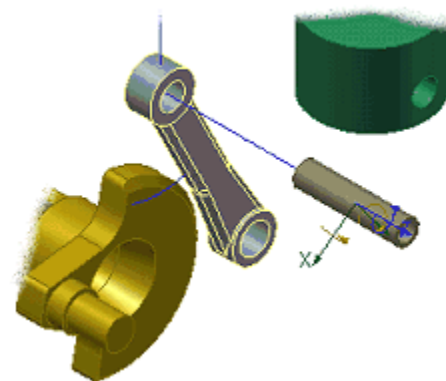


Figure 8: Rotation tweak for connecting rod.





4. In the Tweak Component dialog box:

- Click Clear.
- Click Close.

Examine the browser. Task1 now consists of three sequences, one for each discreet movement of component(s). Tasks are containers for sequences and are useful for dividing longer explosions into manageable sections.

Rotation Tweak

You can also rotate components during a tweak.

1. Click the Tweak Components tool .
2. Click the wrist pin to define the tweak coordinate system.
3. Click the connecting rod. It should be the only component selected. If the wrist pin is also highlighted, hold down the Shift key and click the wrist pin to deselect it (see Figure 8).
4. In the Tweak Component dialog box, click the Rotation option  in the Transformations pane, and enter 45 in the edit box, which rotates the rod 45 degrees (see Figure 8).

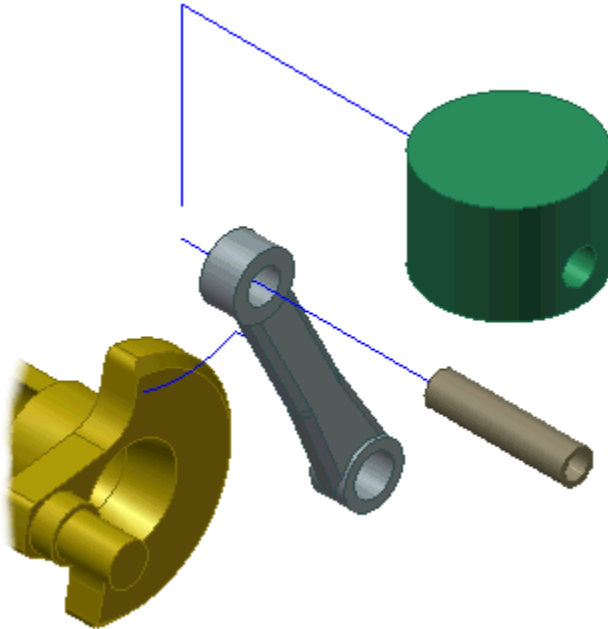


Figure 9: Multiple component tweak.

5. Click the green check button to apply the tweak.

6. Click Clear.

7. Click Close.

Multiple Component Tweak

The rotation of the connecting rod interferes with the pin on the crankshaft. Let's set up a correction for that by moving the three previously tweaked components as a group.

1. Click the Tweak Components tool.
2. Click the outer surface of the wrist pin to set the coordinate system.
3. Click the wrist pin, piston, and connecting rod.
4. Ensure the Z-axis button is active in the Tweak Component dialog box.
5. Enter 0.25 in the Transformations edit box to define a precise movement, then click the Apply button . The result should match that shown in Figure 9.

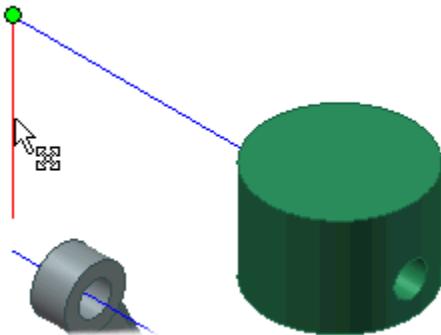


Figure 10: Trail selected for editing.

Tweak Editing

You often need to fine-tune the distance or angle of one or more tweaks, which you can accomplish using a number of different techniques:

- You can click the Edit Existing Trail button in the Tweak Component dialog box and then click one of the blue lines (trail). Edit the tweak value in the Transformations edit box.
- Change the Browser Filter to Tweak View. Highlight the appropriate tweak in the browser and edit the value in the edit box at the bottom of the browser.
- Click and drag a trail segment in the graphic window to move the components associated with that tweak.

Let's use the drag method to adjust the vertical tweak of the piston.

1. Click the vertical trail attached to the piston (see Figure 10).

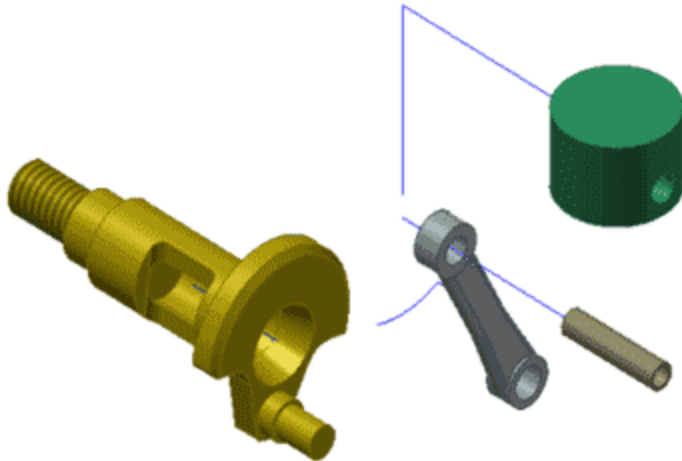


Figure 11: All tweaks added.

2. Drag the trail up a short distance.
3. Click in the graphics window to complete the edit.

One More Before Resequencing

Before we tidy up the order of the tweaks, let's perform move and rotation tweaks on the crankshaft.



1. Click the Tweak Components tool.
2. Click the threaded cylinder on the crankshaft.
3. Enter 0.25 in the Transformations edit box and apply the tweak.
4. Select the Rotation option .
5. Enter -90 in the Transformations edit box and apply the tweak.
6. Select the Move option .
7. Enter 0.25 in the Transformations edit box and apply the tweak. The exploded assembly should match the one shown in Figure 11.



Figure 12: Play Task animation.

Play the Animation

Now that all the movement has been defined, let's clean up the order of movement and view the results. You should get into the habit of reviewing the movement regularly during the creation of an explosion.

Viewing the tweaks using the Sequence View filter in the browser is the easiest way to review component movement and edit tweak order.

1. Double-click Task1 in the browser. The Edit Task & Sequences dialog box appears.
2. Move the dialog box if it obscures any of the components.
3. Click the Play Forward button to the right of the Task list (see Figure 12). All sequences in the Task play, reassembling the components.

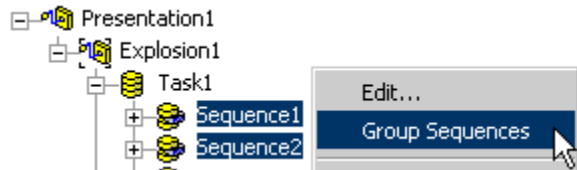


Figure 13: Grouping sequences.

4. Click the Reset button to return all parts to their exploded state.
5. Click OK.

Managing Tweaks

The connecting rod still interferes with the crankshaft. We also want to clean up the crankshaft tweaks by combining one of the moves with the 90-degree rotation.

1. In the browser, expand Sequence1 and Sequence2. Confirm that they represent a 0.25 movement and a -90-degree rotation of the crankshaft.
2. Click Sequence1 in the browser.
3. Hold down the Shift key and click Sequence2 in the browser.
4. Right-click and select Group Sequences from the pop-up menu (see Figure 13). Sequence2 becomes part of Sequence1 and later sequences are renumbered.

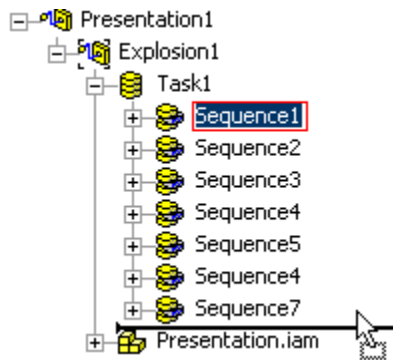


Figure 14: Drag and drop resequencing.

5. Double-click Task1 in the browser.

6. Ensure Sequence1 is selected in the sequences list and click the Play Forward button to the right of the sequences list.

Note: Sequence1 is replayed, showing the combined rotation and movement of the crankshaft. You can review any sequence by selecting from the list and then playing it.

7. Click Cancel.

Resequencing Tweaks

The first two sequences deal with the crankshaft; the remaining sequences move the other components. Moving the crankshaft sequences to the end of the explosion will eliminate the interference problem between the crankshaft and connecting rod.

1. In the browser, click Sequence1. Drag and drop it below Sequence7 (see Figure 14).

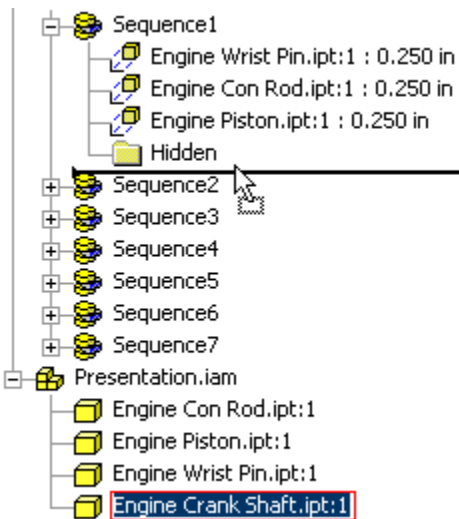


Figure 15: Drag and drop to hide components.

2. Click the new Sequence1. Drag and drop it below Sequence7.

3. Double-click Task1 and play the complete task to review the animation.

Tip: You can rename tasks and sequences in the browser to make it easier to identify them.

Component Visibility

We don't want to see the crankshaft during the piston and connecting-rod assembly steps. But we

do want to view the crankshaft assembly steps from a different location.

1. Expand Sequence1 in the browser. A Hidden folder is listed below each sequence.
2. Expand Presentation.iam.
3. Drag Engine Crank Shaft.ipt and drop it just below the Hidden folder under Sequence1 (see Figure 15). The crankshaft will now be hidden during the animation of Sequence1.

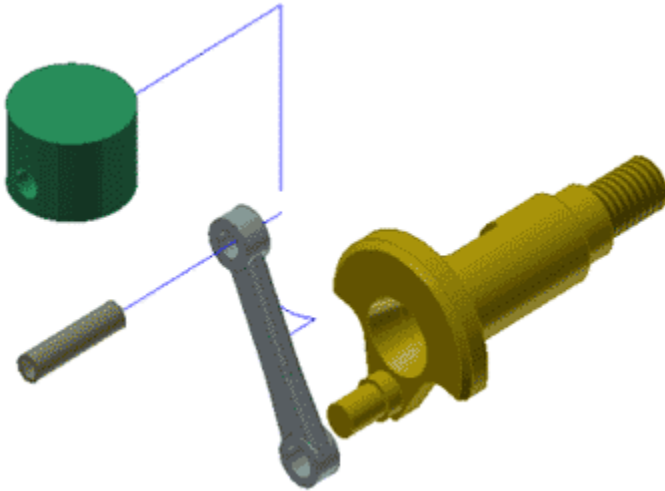


Figure 16: Rotated view for crankshaft sequences.


4. Expand Sequence2 through Sequence5. Drag and drop the crankshaft part into the hidden folder for each of these sequences. Review the animation. The trail for the crankshaft remains visible.
5. Right-click the crankshaft trail and select Visibility from the pop-up menu.

Cameras

You can associate a camera view with one or more sequences to view portions of the assembly animation from different viewpoints.

Tip: You can save and restore a particular viewpoint by right-clicking in the graphics window and selecting Save Camera or Restore Camera from the shortcut menu that appears. Only one camera can be saved; a new save deletes the stored camera viewpoint.

1. Double-click Task1 in the browser to activate the Edit Task & Sequences dialog box.
2. Ensure Sequence1 is selected from the sequences list and click the Set Camera button.
3. Click Apply.

4. Select Sequence6 from the sequences list.
5. Click the Rotate tool .
6. Press the Space bar to change to Common View mode.
7. Click the upper-right arrow. Right-click and select Done. Your view should match the one shown in Figure 16.
8. In the Edit Task & Sequences dialog box, click Set Camera.
9. Click Apply.

Note: You can use the precise View Rotation tool (on the Presentation panel bar) to accurately position a camera viewpoint.

Play the task animation. The crankshaft is invisible during the first part of the assembly, and the viewpoint changes before the crankshaft is assembled.



Timing

When you want to show important steps at a slower speed to ensure understanding, change the Interval setting for the sequence:

1. Select Sequence6 from the sequence list.
2. Enter 50 in the Interval edit box. Larger numbers slow the speed of the sequence.
3. Click Apply.
4. Select Sequence7 from the sequences list.
5. Enter 5 in the Interval edit box.
6. Click Apply.
7. Click OK.

Viewing and Saving Animations

When you have the assembly sequences to your liking, save the animation for downstream use:

1. From the Presentation panel bar, click the Animate tool .
2. In the Animation dialog box that displays, click the More button .

All sequences are listed along with the tweaks they contain. You can move individual tweaks or groups up and down in the animation. You can also group and ungroup tweaks (modifies sequences). We'll skip any more editing in this tutorial.

3. Click the Record button .

4. In the Save As dialog box:

- Enter *MyMovie* as the file name.
- Click Save.

A list of available video codecs (formats) is displayed. You can specify the format and quality of the saved video.

Note: Don't save the animation in a format that your audience can't view. Although the Cinepak and Microsoft codecs are not the best quality, they are available on any Windows-based PC.

5. Minimize the graphics window to as small a size as is practical to reduce the size of the animation file.

6. Click the Play button to record the assembly animation.

Summary

Presentation files can be used to create static, exploded assembly views in a drawing. You can also capture the movement of components as they explode. You can then save the movements as an assembly or disassembly animation. In this tutorial you learned about some of the tools and techniques you can use to create professional assembly animations.

Autodesk Inventor 5 is due to be released in the near future. Next month we'll examine some of the new features and tools in this upcoming release.

My attempt at an assembly animation of the engine components is included in the Presentation.zip file; see Engine.avi.