Deep Exploration 5.0 Tutorial

Materials, Animation and Vector Illustration

Welcome to the world of 3D with Right Hemisphere!

The aim of this tutorial is to learn how to use Deep Exploration 5 CAD Edition to:

- Edit existing materials and create a new material to highlight the model's components.
- Correct the animation to improve the display of the part operation.
- Create a Bill of Materials (BOM) and save it inside a vector illustration.

Assumptions

Certain assumptions have been made regarding this tutorial:

- You should be familiar with 3D concepts.
- You should be familiar in the use of Deep Exploration.
- Note that the display of the model on your computer during this tutorial may be different depending on the graphics card installed on your computer, the screen geometry, and the colors and placement of objects that you choose.

Features Covered

- Editing and creating materials.
- Editing model animation.
- Creating a BOM.
- Saving a vector illustration.

Requirements

The following software and files are required for this tutorial are:

- Deep Exploration CAD Edition version 5.0.x.
- A 3D file accessible to your computer.

Completion Time

This tutorial should take approximately 1 hour to complete.

Before You Begin

- Save the Switch-1.rh, Switch-1a.rh, Switch-1a.swf, and Switch-1a.htm files that are delivered with this tutorial to My 3D Models folder. This folder is created when you install Deep Exploration.

Note: Switch-1.rh is the file required to complete this tutorial. Switch-1a.rh, Switch-1a.swf, and Switch-1a.htm can be used to compare your end results.

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Editing and Creating Materials

Three 'gray' materials are defined for the model. This procedure edits these materials for each of the different part types; the lids will be one color, the pots another, and the top and bottom halves yet other colors.

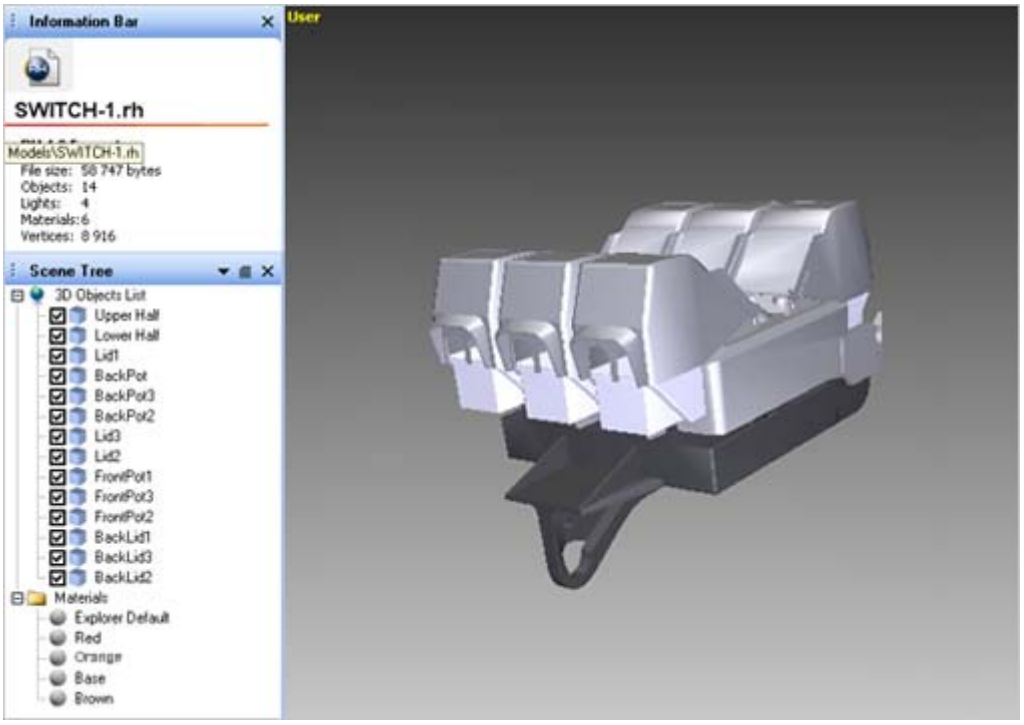
Procedure: Edit Existing Materials

1 Open the Switch-1.rh file and click Forward  on the Animation controls to play the animation.

2 Notice that the 'lower half' of the model opens and several objects move. In addition, some of the lids rotate open with one moving away from the model.

3 Choose **Display > Grid > No Grid** to turn off the grid and open the Scene Components panel. You will notice that there are four existing materials. At this time, we will work with the 'gray' materials and look at the default material later.

Tip: This is generally a good idea to ensure clarity of the 'default material when merging scenes at any point.



4 Expand the Materials folder node and rename the existing materials as follows:

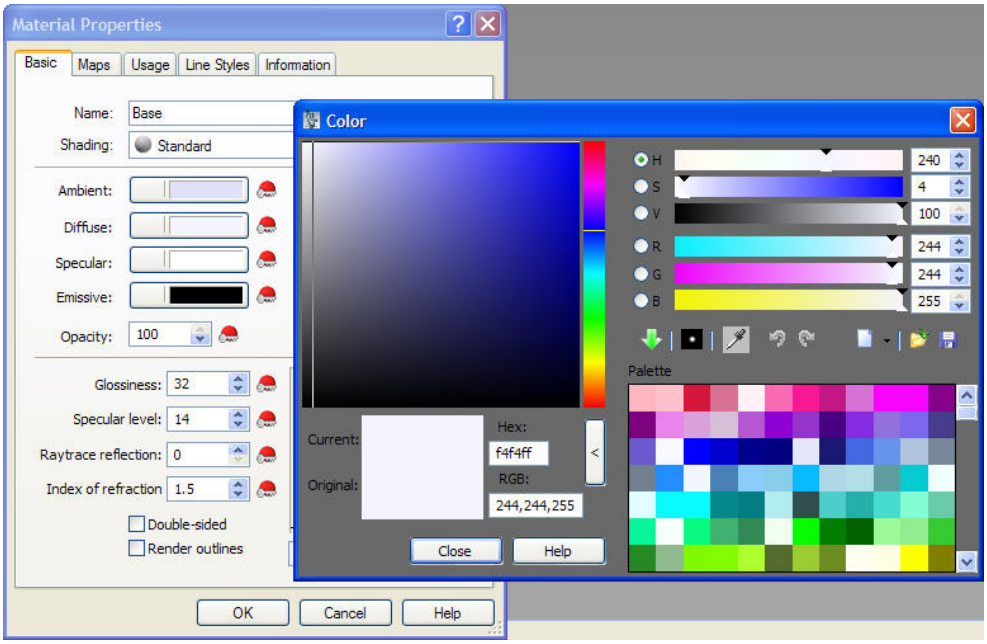
a) Right-click the first material, click **Rename**, and enter 'Red'.

b) Click the second material in the Scene Components panel, press **F2**, and enter 'Orange'.

c) Double-click the third material and enter 'Base' in the Name field.

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5 With the Material Properties dialog open, click the Diffuse color selector in the Basic tab.



6 Select a color of your choice, click **Close** and then **OK**. The objects to which the Base material is associated change to the selected color.

7 Edit the color properties of the Red and Orange materials to reflect their names.

Tip: Specular color is the color of the highlight. By selecting a very different color to the Diffuse color, you will get an anodized aluminum look. Ambient refers to the general light that illuminates the objects to which the material is applied, and is generally set to black. Emissive sets the color of the objects' glows, and is also generally set to black. Glossiness indicates how bright the highlight will be and Specular level sets the highlight's shininess. The effect of changing these levels can be seen in the Material Properties dialog graph.

We now apply the materials to the model to be able to see them in the Deep Exploration viewport.

8 Do one or more of the following to apply the materials:

- Drag the material onto the objects in the viewport.
- Select the objects in the viewport or Scene tree, and then drag the material anywhere in the viewport. This applies the material to all the selected objects.

Note: You can continue editing materials after they are applied.

Tip: Holding down CTRL when selecting objects, enables the selection of multiple objects in the Scene tree or viewport. The shape of the selection area can be modified via the 3D Editor toolbar; the Lasso Selection tool can be very useful for selection. By selecting the 3D Editor's 'Window/Crossing Selection' tool, holding down CTRL+L and dragging, you can select objects by intersection. The functionality changes to selecting objects by enclosing when the tool is inactive.

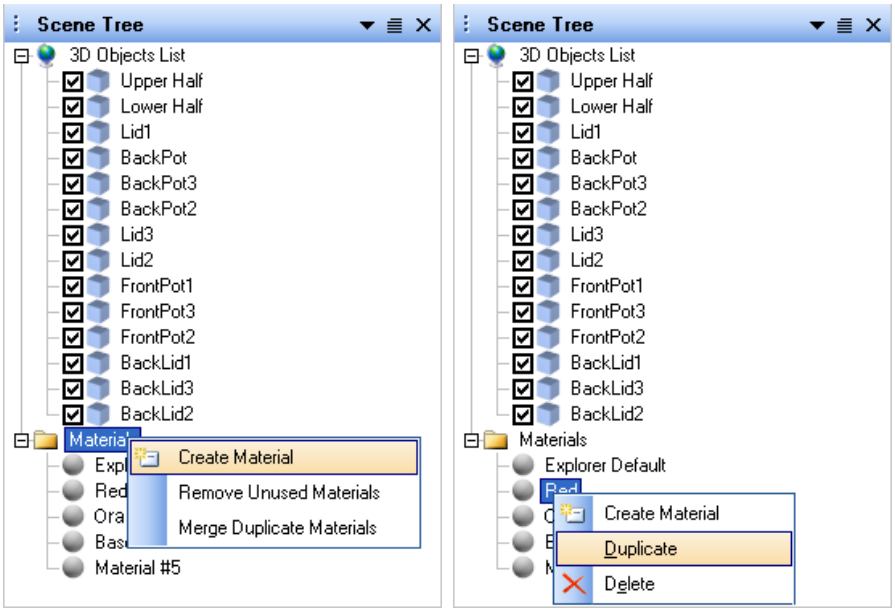
The materials are now applied to the various models' objects (parts). We now create a new material.

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Procedure: Create a New Material

1 Do one of the following:

- Right-click the Materials folder and click **Create Material**.
- Open up the Materials folder, right-click an existing material, and click **Duplicate**.

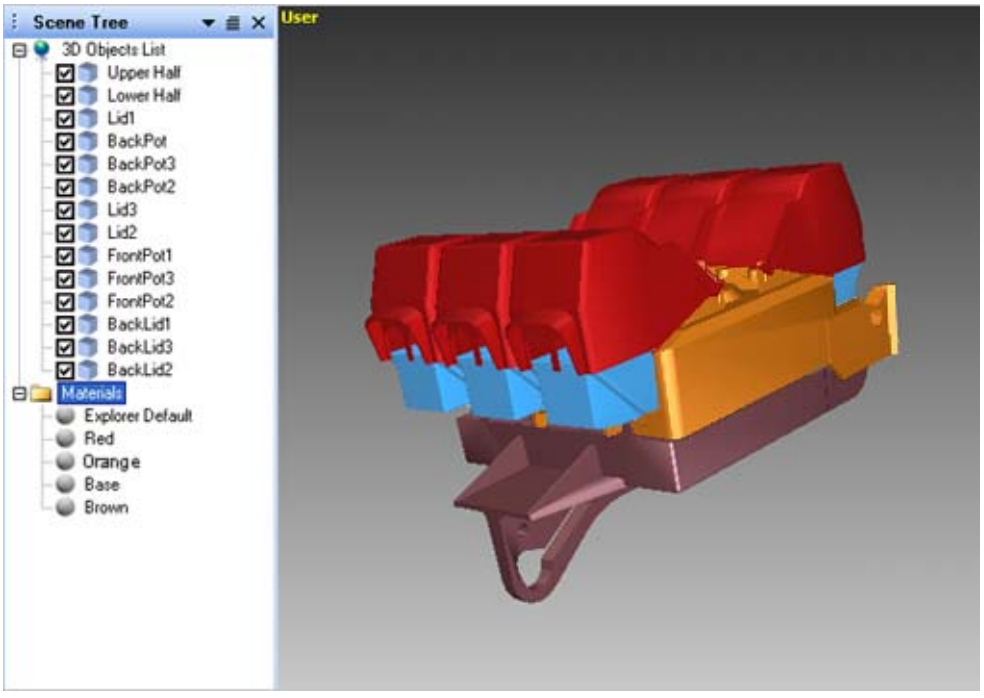


2 Rename the material ‘Brown’, select a brown color for the material, and apply it to the ‘Lower half’ of the model.

3 Clean up the scene by deleting any extra materials that you may have created.

Tip: Materials that are applied to objects cannot be deleted. Therefore, you should apply the new material before deleting any extras to ensure you delete only the ones that are not needed. The Remove Unused Materials and Merge Duplicate Materials option are also helpful when cleaning up scenes.

You have just completed the assignment of materials! The model should look similar to the following image. We can now correct the model’s animation.



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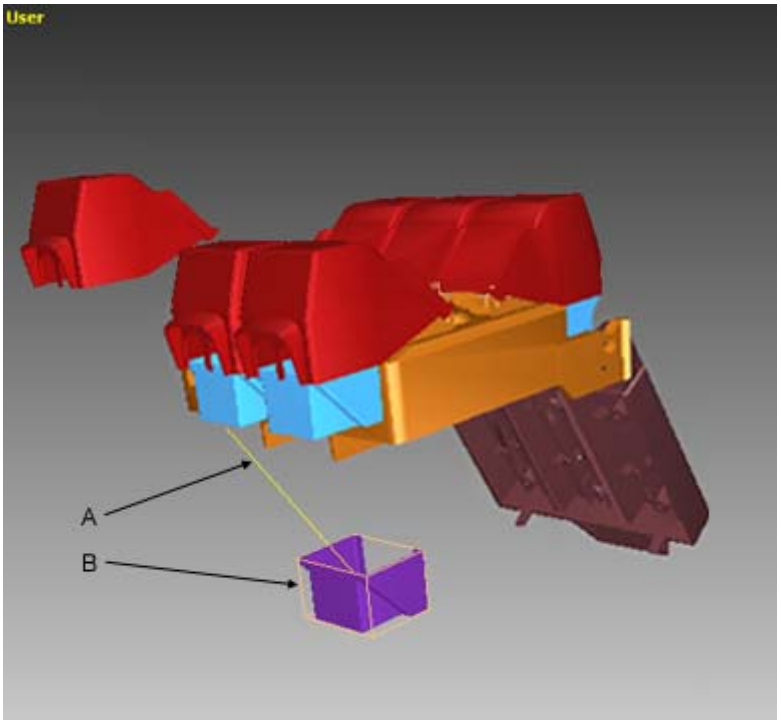
Editing Model Animation

This model already contains an animation, which moves several parts in an exploded view. To make the model more useful, we will edit the animation to show how the model parts move. Specifically, we will remove the animation from the FrontPot3 object and modify the Lid1 object so that it rotates around its pivot point in the same way as the other Lids.

Procedure: Remove an Existing Animation

1 Move to a frame of the animation by dragging the Animation controls slider so you can see where the FrontPot3 object in the position as shown below.

2 Slect the FrontPot3 object. Notice that the object's position in the animation is incorrect.



A: Motion path of selected object
B: Selected object with active highlight

Tip: You can view selected objects as highlighted and see their motion paths using the Tools > Options dialog. Specifically, select a color for the 'Selection highlight' in the Colors tab and select the Highlight and 'Show motion paths' check boxes in the 3D View tab.

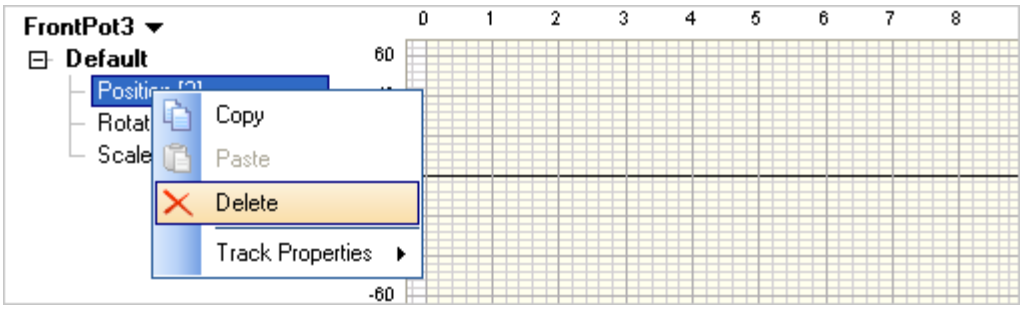
3 Right-click in the menu bar and click **Animation Timeline**. The timeline shows the animation tracks associated with the selected object.

Tip: This right-click option is also available via the Tools > Customize Layout dialog.

4 Move back to frame 0 of the animation using the slider.

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5 Right-click the Position track and click **Delete** to remove it from the animation.



6 Play the animation and notice that the FrontPot3 object no longer moves.

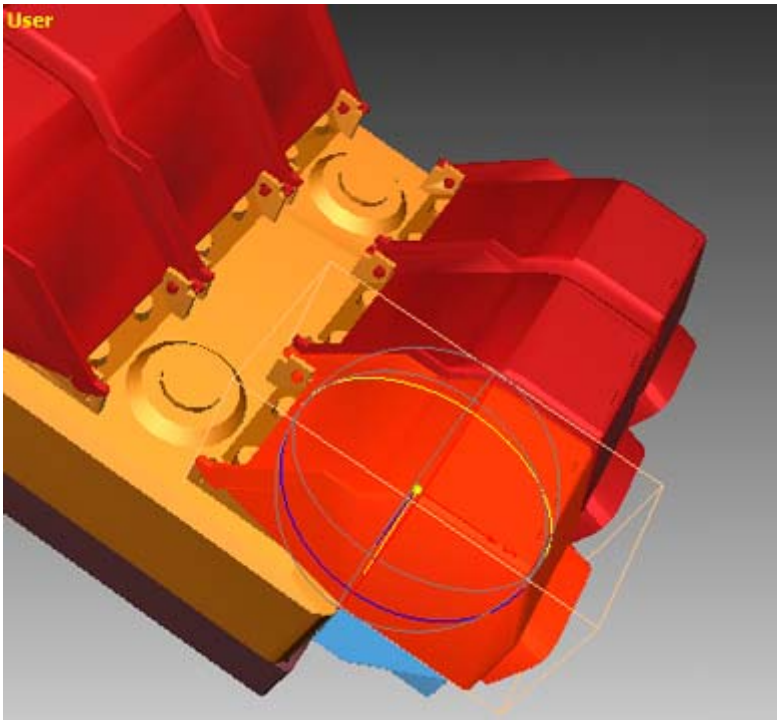
Procedure: Edit an Incorrect Animation

1 Select the Lid1 object to see the associated 'position' animation in the Animation Timeline.

We will now change this to a rotation animation.

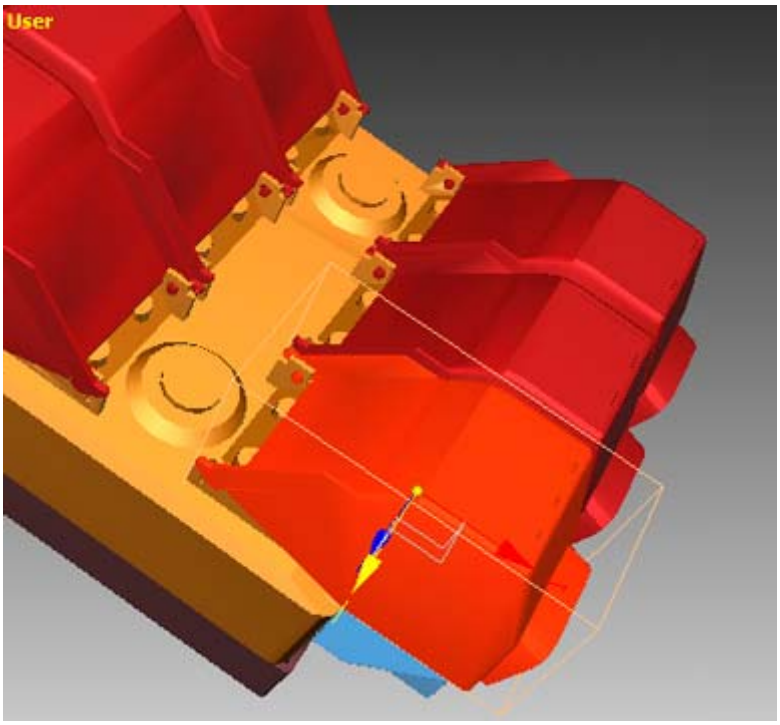
2 Move the animation to the first frame (frame 0 of 400) using the Animation controls slider. This positions the object where we want it for the rotation.

3 Click **Rotate**  on the 3D Editor toolbar (ensure that the coordinate system is set to Local). You will notice that the center of rotation is defined as being the object's center. However, we want it to rotate around the hinge.



4 Click **Move Pivot Point**  on the 3D Editor to begin repositioning the pivot point. The 3D cursor changes to display a point and position control instead of rotation controls. The point is the current pivot point location.

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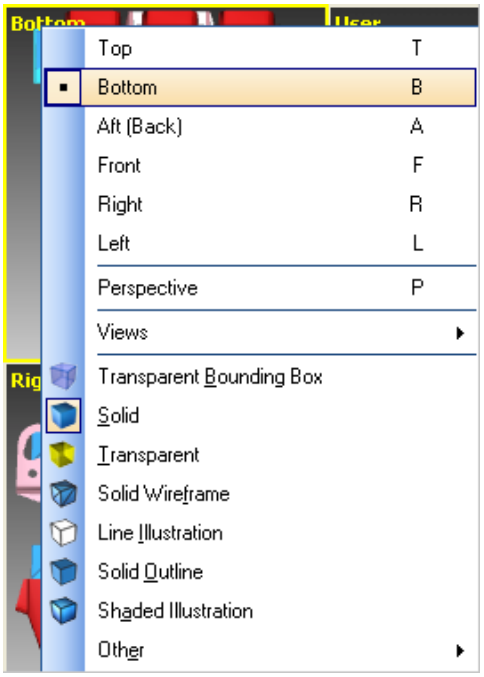


When we use this tool, we can reposition the pivot point without moving the object. We want the pivot point at the hinge location.

5 Rotate scene to help you to place the pivot point properly.

6 Choose **View > Viewports > 3 Views Left Split** on the menu bar to display multiple viewports.

7 Select different camera views by right clicking on the viewport label (in the top, left corner of each viewport) and select the views you want.

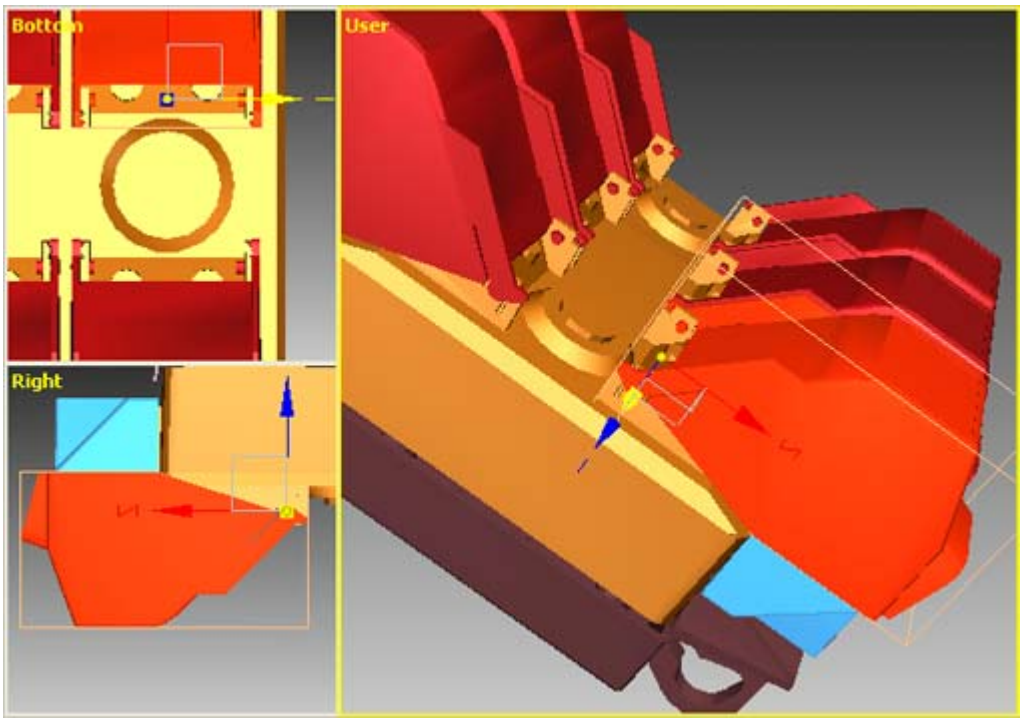


Tip: Multiple viewports can help to see the pivot point moving along several orthographic axes at the same time. The V and SHIFT+V keys (all viewports) can help to center the camera on the object. This may help with visually positioning the pivot axis.

8 Individually pan and zoom each viewport until you have a good view.

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9 Use the axes arrows to help you move the pivot point into position on the hinge. Only the location of the X-axis (yellow arrow) really matters, as this will become our rotation axis. Therefore, it should lie on the same axis as the hinge.



Now that the pivot point is correctly located, we can animate the Lid1 object.

10 Select the 'User' viewport, and then press F12 to display it as a single viewport for clarity.

11 Ensure the Lid1 object is selected.

12 Click **Rotate** again in the 3D Editor.

13 Ensure the scene is located at frame 0 in the animation so that the object is in the correct unanimated position.

14 Delete the Position track in the Animation Timeline as performed previously.

You will notice that the Rotation track in the Animation Timeline is empty. We now add the new rotation track.

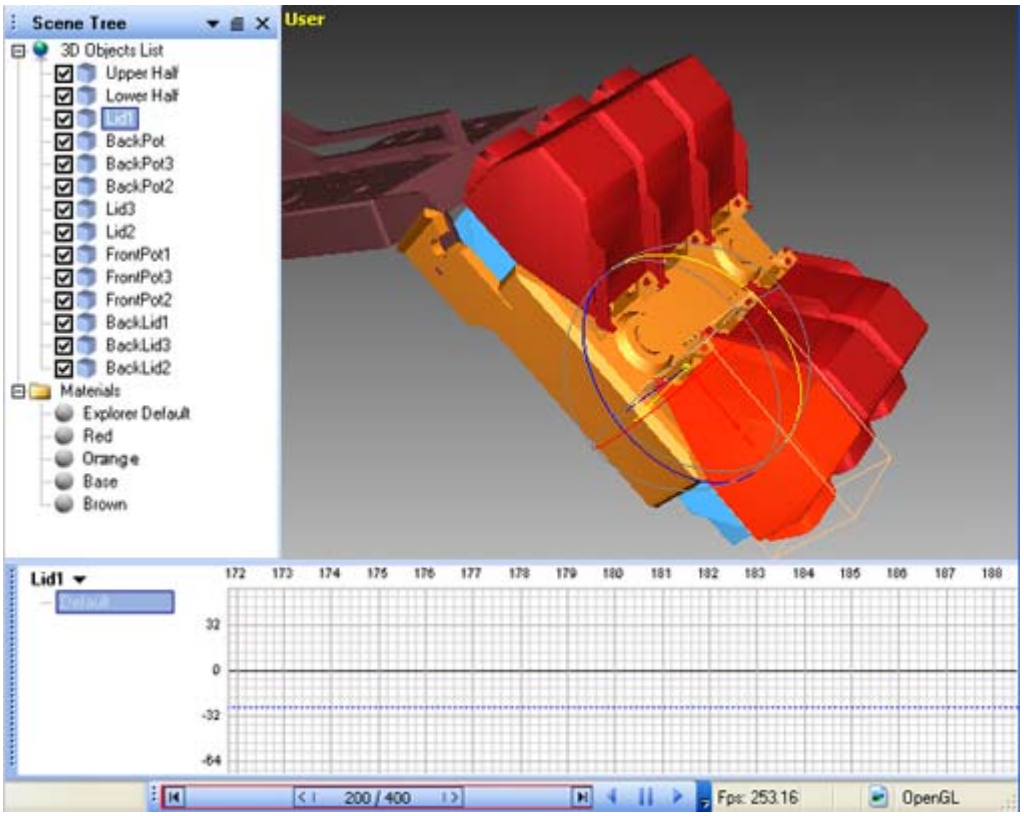
15 Click **Edit Keyframes**  in the 3D Editor. The Animation controls are displayed with red outline. This is a warning you that any changes will be added to the animation.



16 Move the slider to frame 200. This will be the frame where the rotation ends.

Tip: You can also select frames by clicking in the Animation Timeline. The related frame number will be highlighted in blue.

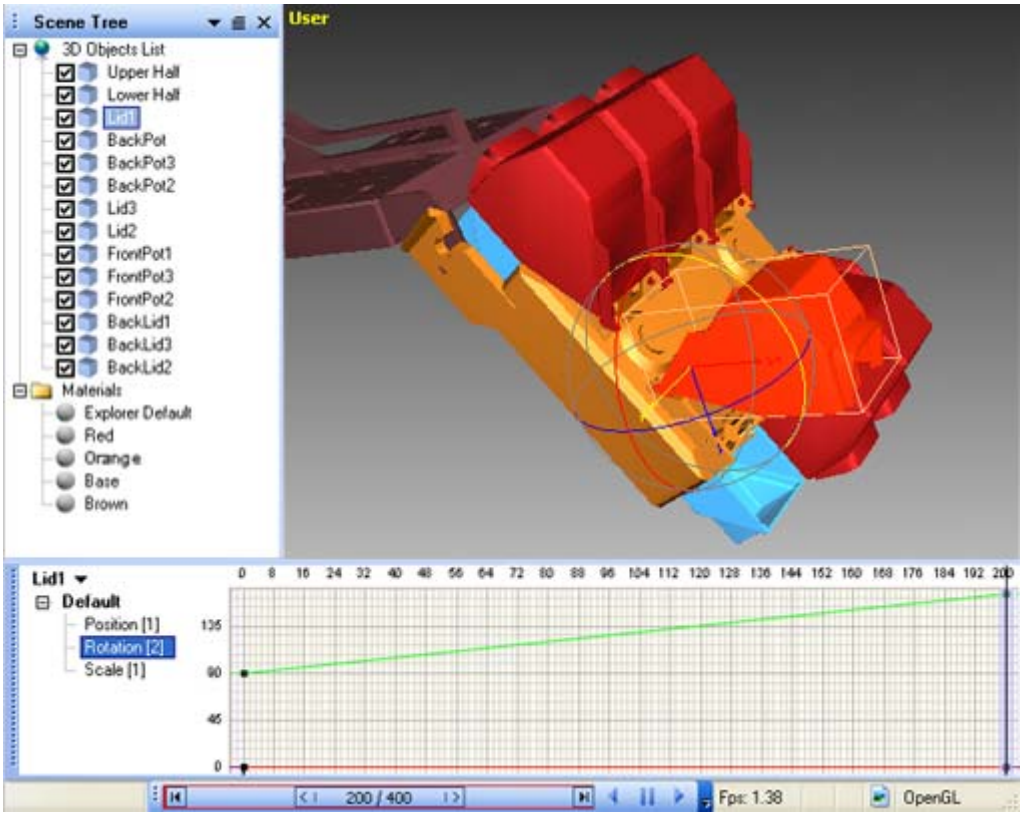
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17 Drag the X-axis (highlighted in yellow) to rotate the object in the viewport. As you do, an arc is drawn showing you how far you have moved from the original position. The Rotation track is added to the animation and displayed in the timeline.

18 Select the Rotation track in the timeline and rotate the object to the point where you want the lid to finish opening.

Tip: You can see the rotation's numerical value changing in the Object Position controls.

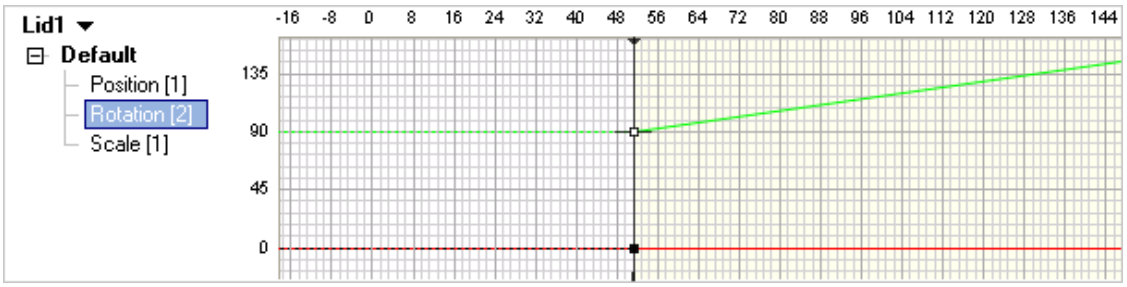


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19 Click **Edit Keyframes** again to clear it from selection and play back the animation.

Note: You can leave the Edit Keyframes tool selected but you must be careful not to start to move other objects and edit the animation again.

Tip: After a key is created, you can move its position or value when the timeline is in Selection mode (right-click timeline and click Selection Mode). You can edit the key values or you can add new keys on different frames. You can see the rotation's numerical value changing in the Object Position controls. Double clicking a key in the timeline when in Selection mode, enables you to enter numeric values for that key. Below, we have moved the start frame to frame position 52 so that the rotation starts later in the animation.



You have now completed the animation improvements! The model now shows how the parts move.

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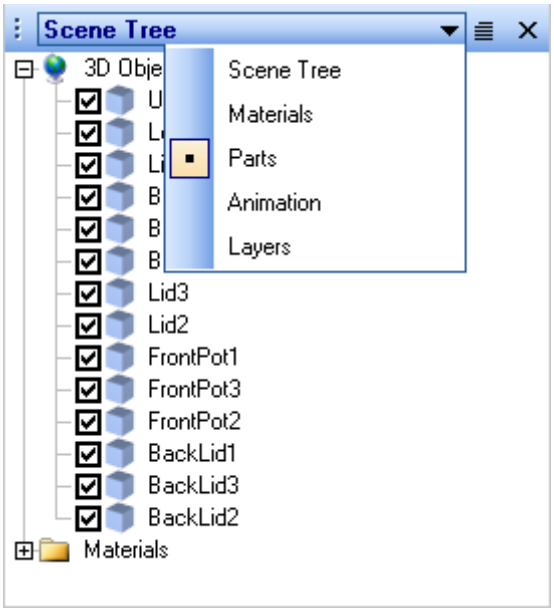
Creating a BOM

For our vector output image, we want to incorporate a Bill of Materials (BOM) into the image. In this model, a number of parts have similar names. This makes it easy for us to classify them as the same part and create a simple parts list.

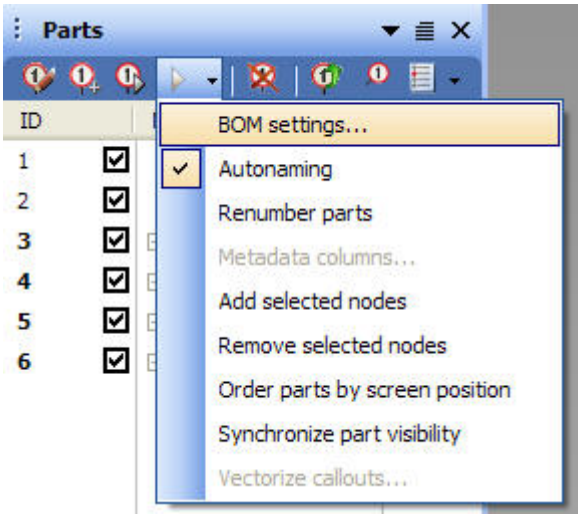
Procedure: Create a BOM

1 Move the animation frame to the beginning of the animation sequence, and then close the timeline to give you more space to work.

2 Click the arrow in the title bar of the Scene Components panel, and then click **Parts**.



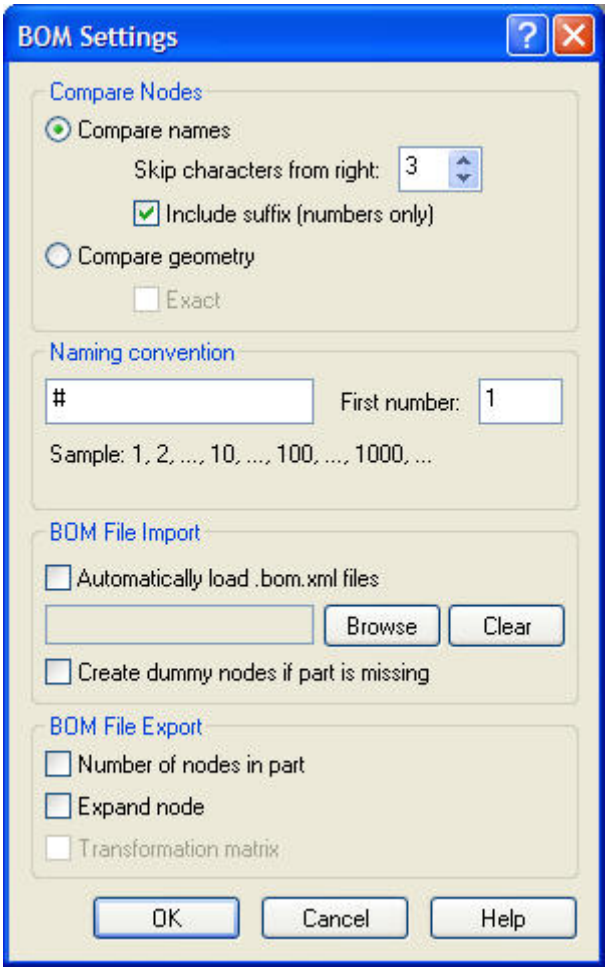
3 Click the Action down arrow  on the Parts panel toolbar, and then click **BOM Settings**. The BOM Settings dialog is displayed.



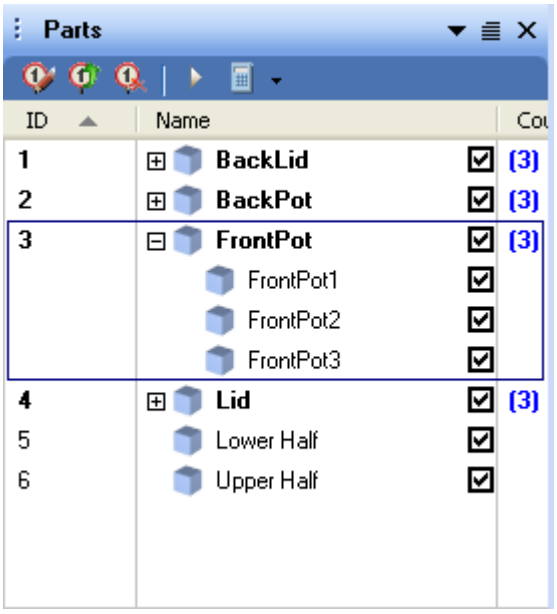
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4 Ensure the ‘Compare names’ check box is selected, and set to skip three characters from the right. The parts should be grouped into six part nodes.

Tip: This comparison helps to display the parts by excluding the specified number of characters from the end of each part name and then comparing the names. Experiment with these values using different models.



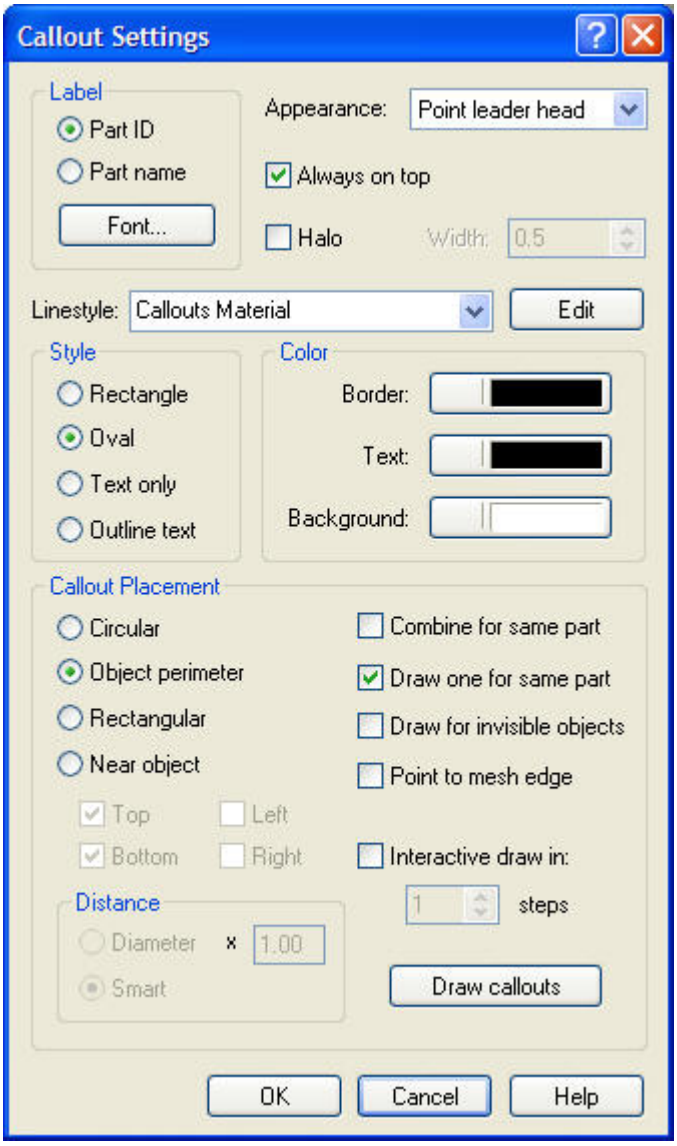
5 Expand the FrontPot parent node. Notice that all the FrontPot parts are all grouped together because the names match when the last three characters are excluded from the comparison.



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6 Click **Callout Settings** on the Parts panel toolbar, and modify the settings in the Callout Settings dialog as follows:

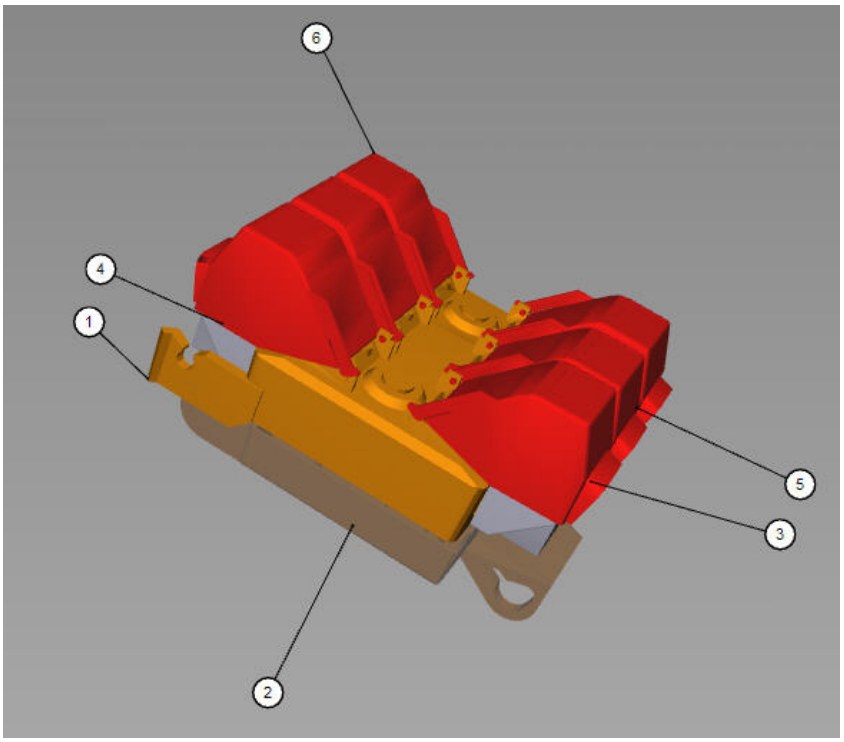
- Label the parts using the part IDs.
- Choose an oval style, and choose the line color to be the same as the objects.
- Choose a circular placement and select the 'Draw one for same part' check box. This will draw a single callout for any duplicate parts.
- Select the 'Interactive draw in' check box to ensure the callouts move to the newly calculated positions when you move the camera, and then click **OK**.



7 Click **Draw Callouts** on the Parts panel toolbar. The callouts are drawn in the viewport. The placement will depend on your screen geometry, but will similar to the following image.

Note: You can experiment with different callout settings and drawing the modified callouts in the viewport.

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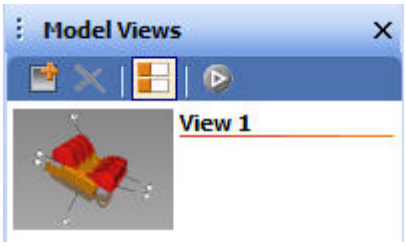
Now we want to make a model view to best show this model and for use later. This way we can return to a known good view.

8 Rotate the camera until you have a good view of the model.

9 Right-click in the menu bar and then click **Model Views** to display the Model Views panel.

Tip: Remember that the Customize Layout dialog can also be used to display panels, toolbar, and controls.

10 Click **Create**  on the Model Views panel. The current view of the model is added as a model view.



11 Right-click the view in the Model Views panel and click **Properties**.

12 Rename the view and add a description.

We now want to reposition the callouts into locations that are more useful.

13 Ensure the 'Interactive draw in' check box is not selected in the Callout Settings dialog. Otherwise, the new locations will be overridden as the camera is moved.

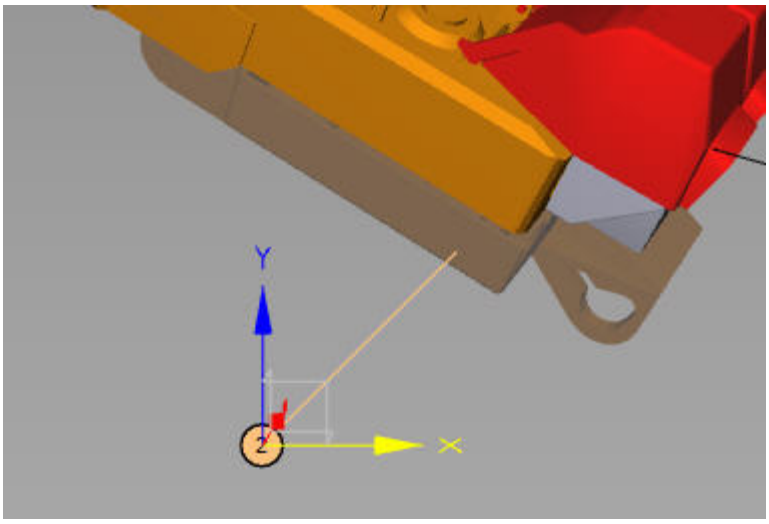
14 Click the Coordinate System arrow on the 3D Editor and click **Screen**. Screen coordinates will be useful for this exercise. However, you can choose different axes along which to move the callouts.

15 Select a callout and click **Move**  on the 3D Editor.

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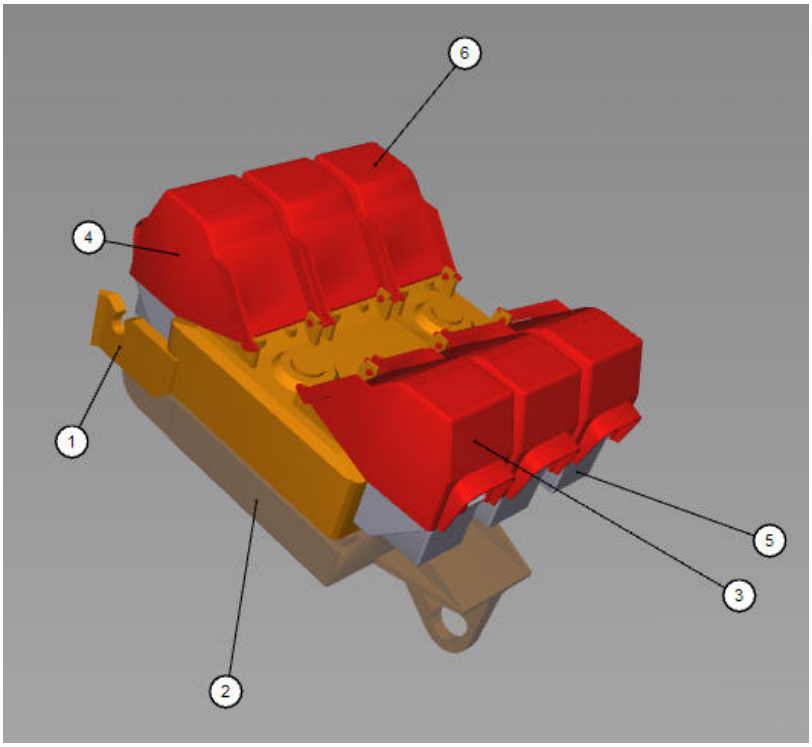
16 Move the cursor over the square in-between the X and Y-axes. The square changes color and enables you to move the callout object in two directions at the same time.

Tip: The head of the callout leader line can also be moved to make it more visible. Hiding the objects may make it easier to see clearly the leader line heads.



17 Move any other callouts to make them clearly visible.

Tip: You can rotate the camera to any view that makes this easier. However, you can display the saved model view again by double clicking it in the panel.



18 Right-click the model view in the panel and click **Update Model View**. The current view and thumbnail are updated.

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19 Ensure that the modified callout placements are correct at both the beginning and end of the animation. This ensures that the callouts move with their associated objects correctly for the duration of the animation.

20 Save the file with a different name in the .rh format version 4.0 to save all your modifications.

Note: Version 4.0 of the .rh format saves all model views within the file.

You should now have a model view showing the model and callouts clearly. We now save the file to a vector format.

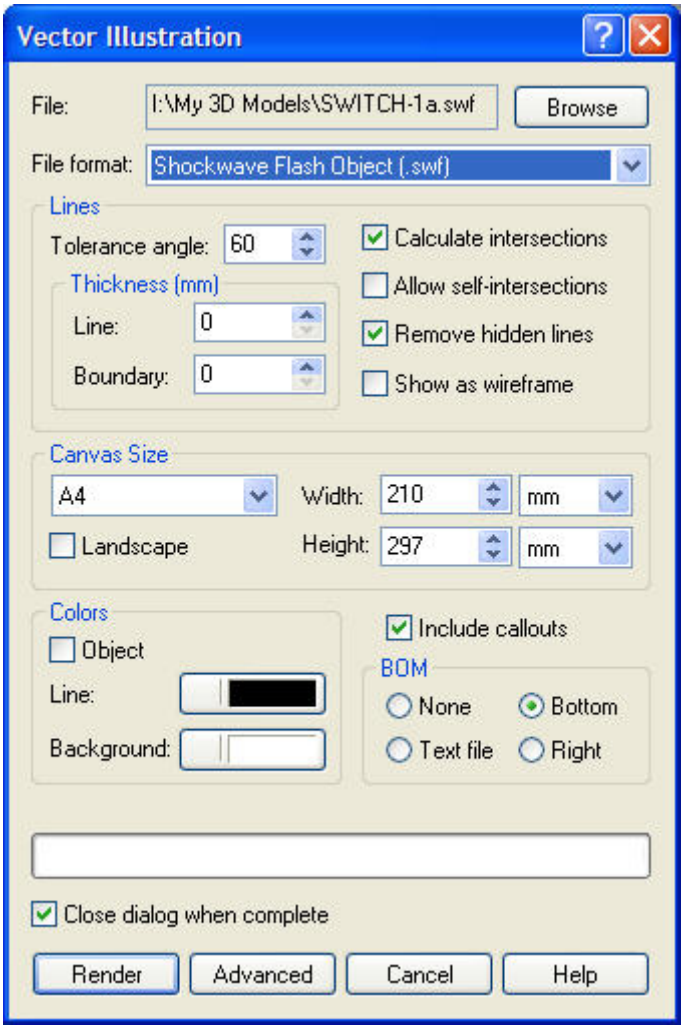
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Saving a Vector Illustration

For delivery, we want a vector illustration of the model view. We choose the .swf format for easy previewing of the saved file.

Procedure: Save the BOM in a Vector Illustration

1. Display the saved model view in frame 0 of the animation.
2. Click **Vector Illustration**  on the Illustration toolbar. The Vector Illustration dialog is displayed.
3. Click **Browse**, and then navigate to and select the path where you want to save the illustration.
4. Select the **Shockwave Flash Object (.swf)** format in the File format field.

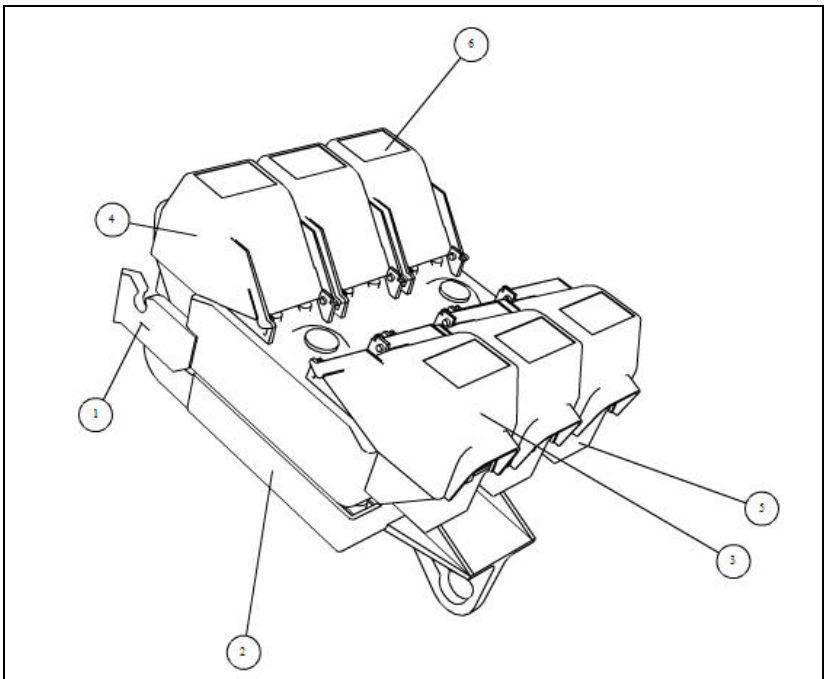


5. Click **Advanced**. The dialog displays advanced functionality specific to the current format.
6. Ensure the HTML File '**Create and open**' option is selected, and click **OK**.
7. Ensure the BOM setting is either '**Bottom**' or '**Right**' depending on where you want to view it in the illustration.

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8 Click **Render**. The SWF file is displayed in your Internet browser.

Note: Deep Exploration automatically creates and saves a .htm file to the same place as the .swf file. This is used to display the .swf file in your browser.



1	1	Upper Half	3	3	Lid	5	3	FrontPot
2	1	Lower Half	4	3	BackPot	6	3	BackLid

Congratulations! You have just saved the animated file with a Bill of Materials as a vector illustration.

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