Deep Exploration 5.0 Tutorial

Markups and Measurements

Welcome to the world of 3D with Right Hemisphere!

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

- Add markups to a model.

Update and rename model views

- Hide markups.
- Add a measurement to a model.
- Modify measurement settings.

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

- Adding markups and updating model views.
- Adding measurements.

Requirements

The software required for this tutorial is:

- Deep Exploration CAD Edition version 5.0.x.

The files required for this tutorial are:

- The Gearbox-8c.rh and Gearbox-8c_annotations.rh 3D files accessible to your computer.

Completion Time

This tutorial should take approximately 40 minutes to complete.

Before You Begin

- Save the Gearbox-8c.rh file that is delivered with this tutorial to ‘My 3D Models’ folder. This folder is created when you install Deep Exploration.
  - Gearbox-8c.rh is the file required to complete this tutorial. Gearbox-8c_annotations.rh can be used to compare your end results.

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Adding Markups and Updating Model Views

Markups are particularly useful in manufacturing as they allow us to send the same file to numerous people, while ensuring that each person sees the information specific them. They help to make communication clear and useful.

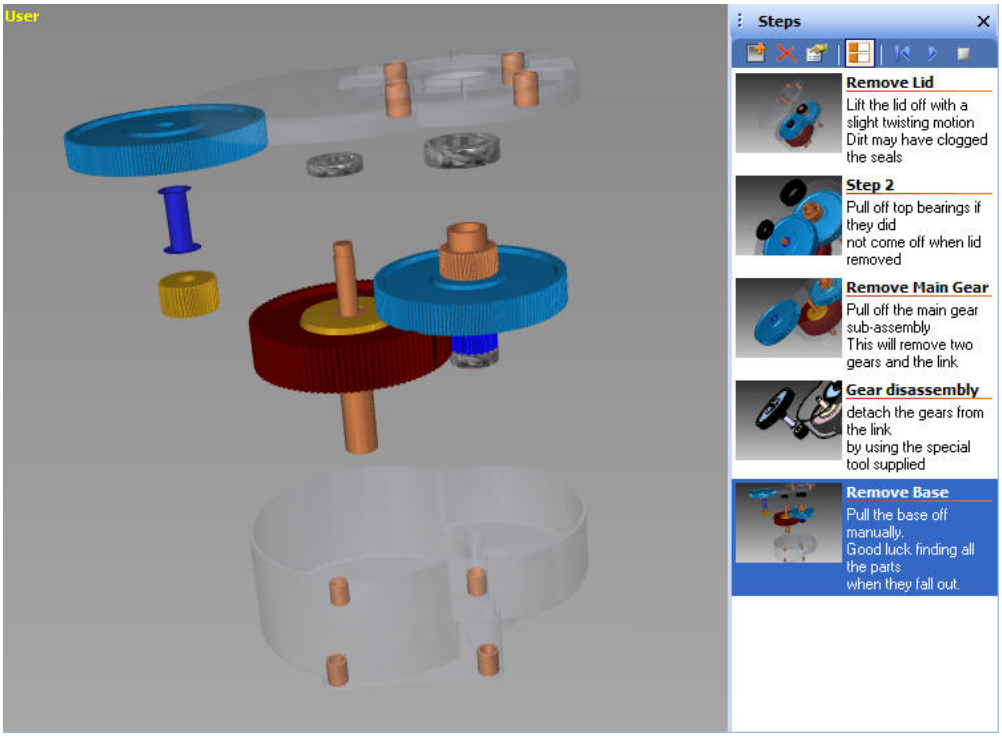
Procedure: Add Markups to a Model

Here, we add markups to a model to ensure the people that manufacture assembly understand the way in which it should be manufactured, and are able to correct certain errors.

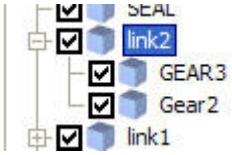
1 Open the Gearbox-8c.rh file.

2 Double click the last step (Remove Base) in the Steps panel, the step is automatically played; notice that the model is partially exploded.

Tip: You can also play the step by right-clicking the step and clicking Play.



3 Select the link2 object in the Scene Tree and click the plus sign, +.



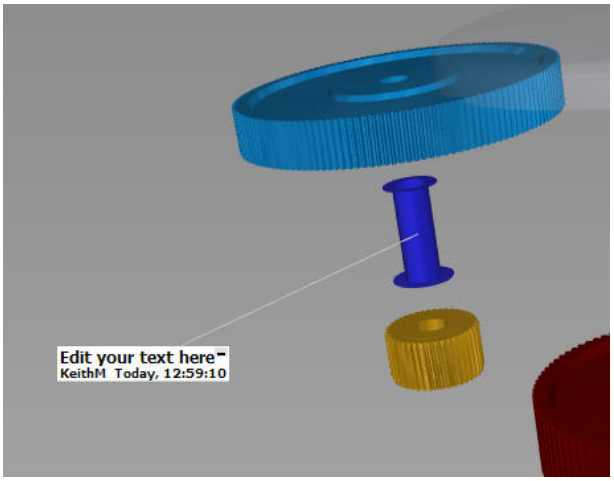
Note: While the link2 object contains sub-objects, it also has associated geometry. This means that in the Scene Components panel it displays as a mesh object and not as a group

The link2 object holds the two gears together so that power can be transferred from one shaft to the other. We now add the markup.

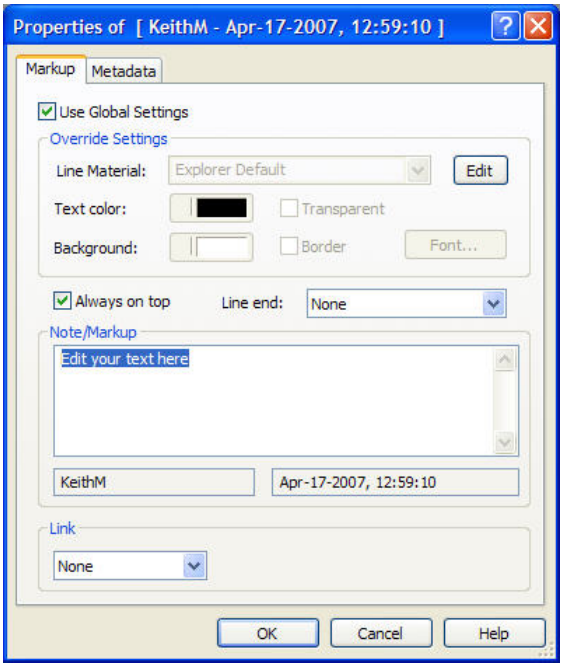
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4 Display the Drawings and Markups toolbar and click **Markup Line**, .

5 With the link2 object still selected, click the link2 object in the viewport window, hold down the mouse button, and drag it to the left. The markup is displayed when the mouse button is released.



6 Double-click the markup to edit it. The Edit markup dialog is displayed.



Tip: Markups are 'billboard' type markups because they always face you however you rotate the scene.

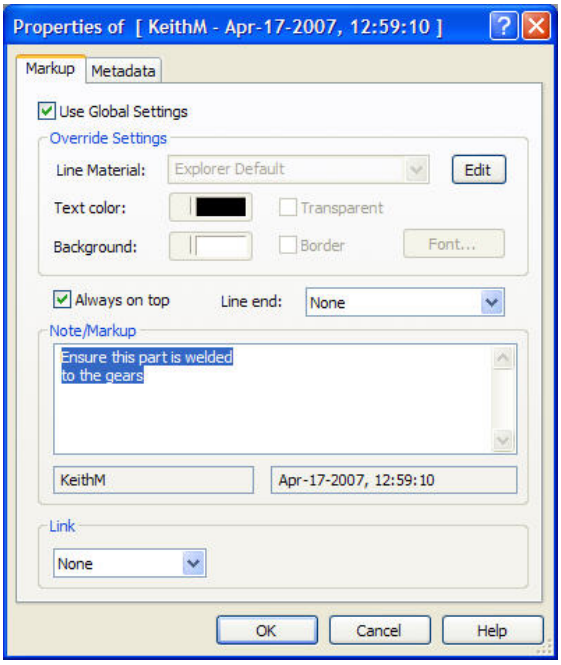
7 Enter the text you require. For example, 'Ensure this part is welded to the gears'.

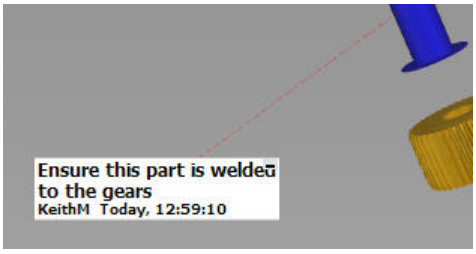
Note: You can add a return between words to split the message over two lines.

8 Modify the note style as required and then click **OK**. For example, you can change:

- The line ending style.
- The color of the lines, text, and background.
- The font, font style, and font size. For example, Arial, regular, 10pt.

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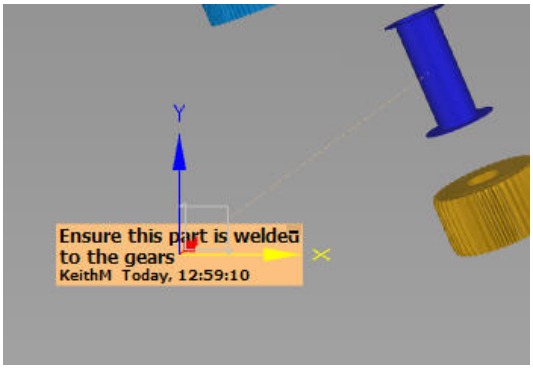




Now we manually move the callout into a better position using the 'Move' tool.

9 Select the Screen  coordinate system on the 3D Editor toolbar to make moving the callout easier.

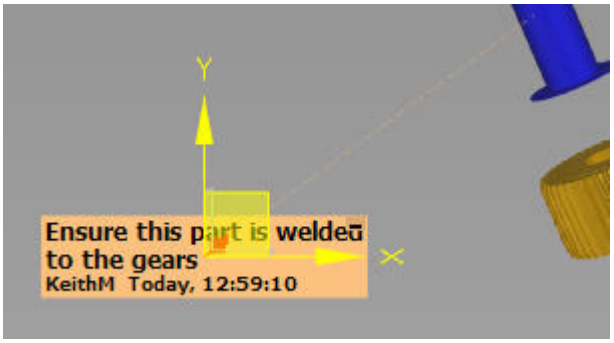
10 Select the note and click **Move**  on the 3D Editor toolbar. The object's axes are displayed.



Axes 'connections' are displayed between each axis when you transform (move, scale, or rotate) an object. The type of connection that is displayed depends on the transform tool and the axes on which you are transforming. When you select an axis, it is highlighted in yellow. If you select more than one axis, the axes connection is also highlighted in yellow.

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For example, the Move tool displays a ‘square’ between each axis and if you select more than one axis, both axes and the squares between them are displayed in yellow. In the following image, both the Y and Z axes are selected for the Move tool.



11 Drag the note object to the position you require.

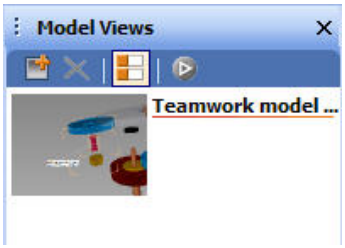
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Procedure: Update and Rename Model Views

Deep Exploration automatically creates a 'model view' whenever you create a markup. Model views are based on the current view of the scene. This is useful to for viewing the scene and markup at the same camera angle at a later stage. We now display the markup's model view.

1 Right-click the menu bar and click **Model Views**. The Model Views panel is displayed.

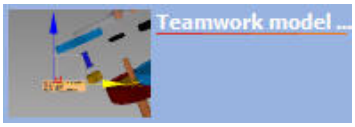
Tip: You may want to hide the Steps panel to see a larger viewport.



The Model Views panel displays the original thumbnail of each markup. We now update the thumbnail so that it reflects the markup's new properties. Note that the name of the user who created the markup does not get updated. This ensures that the origin of markups can be traced as part of the collaboration effort.

2 Right-click the model view in the Model Views panel, and then click **Update Model View**. The thumbnail is refreshed.

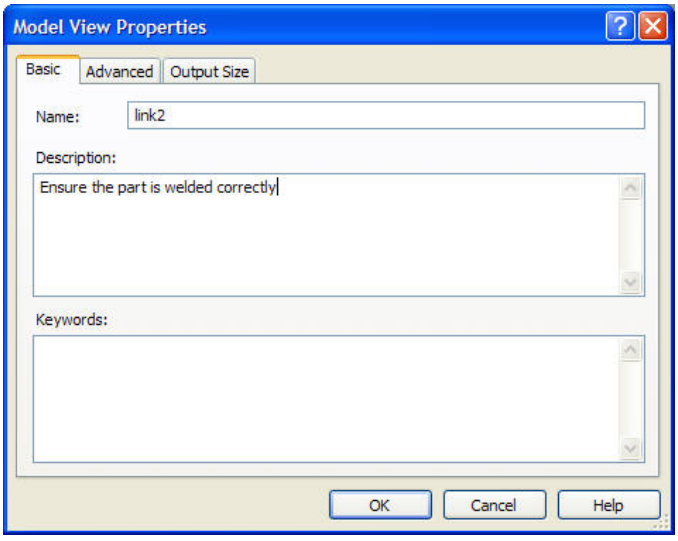
Tip: You can create your own model views using the Create button  in Model Views panel.



We now rename the model view and add a description for it.

3 Right-click the model view in the Model Views panel, and click **Properties**.

4 Enter 'link2' as the name and enter a meaningful description.

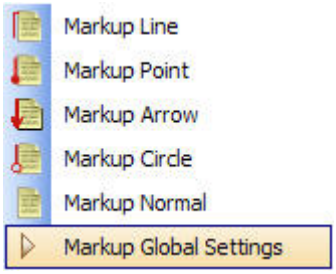


5 Click **OK**. The name and description are displayed in the Model Views panel.

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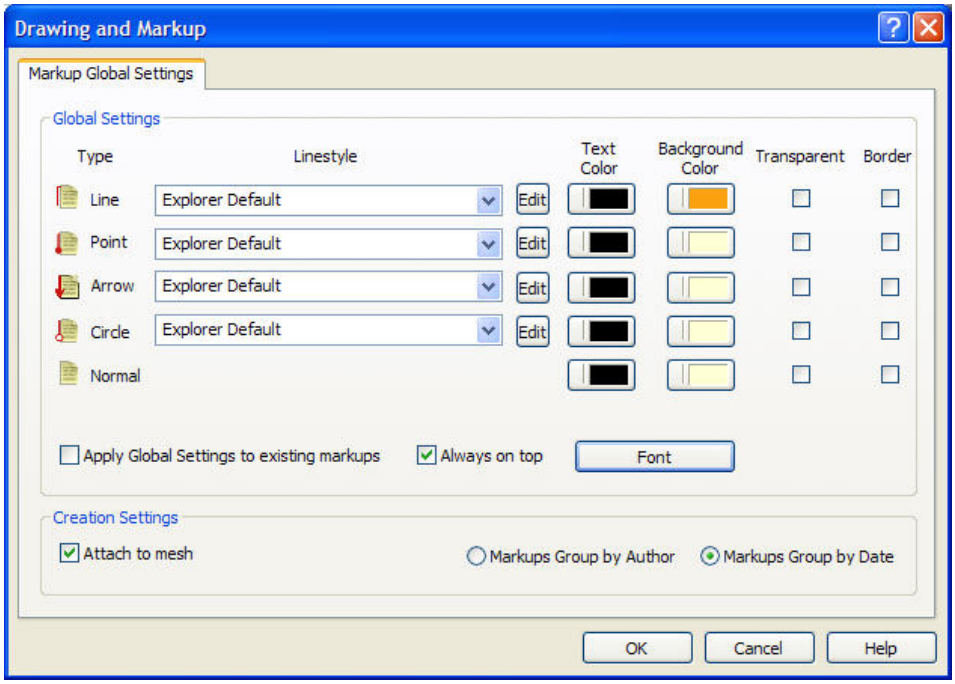
Now we will add another markup to the scene using different settings.

6 Click **Markup Global Settings** on the Drawings and Markups toolbar for the Markup tool. The Markup Global Settings dialog is displayed.



7 Change the settings as follows:

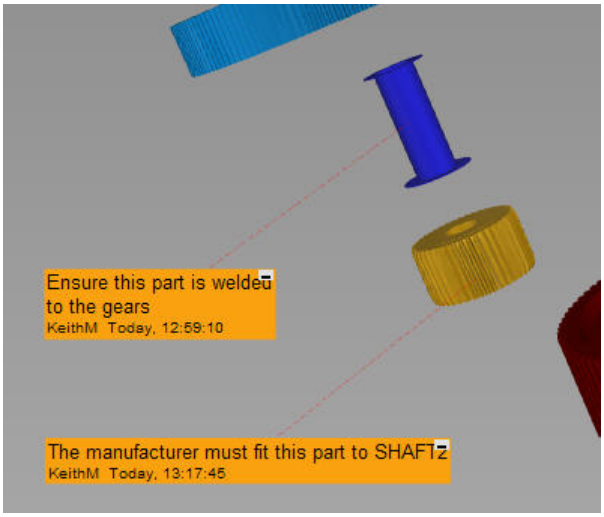
- **Edit** the line style, for the Line type, to red and the background color to orange.
- Select the '**Attach to mesh**' check box. This ensures the note is always attached to its object.
- Select '**Apply Global Settings to existing markups**'.
- Change the font to **Arial**, **regular**, **10pt**.



8 Click **OK**.

9 Add a new markup to GEAR3 indicating that the manufacturer must fit the part to the SHAFT2 part. The note should have an orange background and red leader line pointing to the object.

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Notice that another model view is created as soon as you add the note. We want this second markup to be incorporated into the first model view, so we now delete the second one.

10 Right-click the second model view and click **Delete**.

11 Update the first model view. Both markups are now incorporated into the model view.

Now we will add another markup using a different camera view.

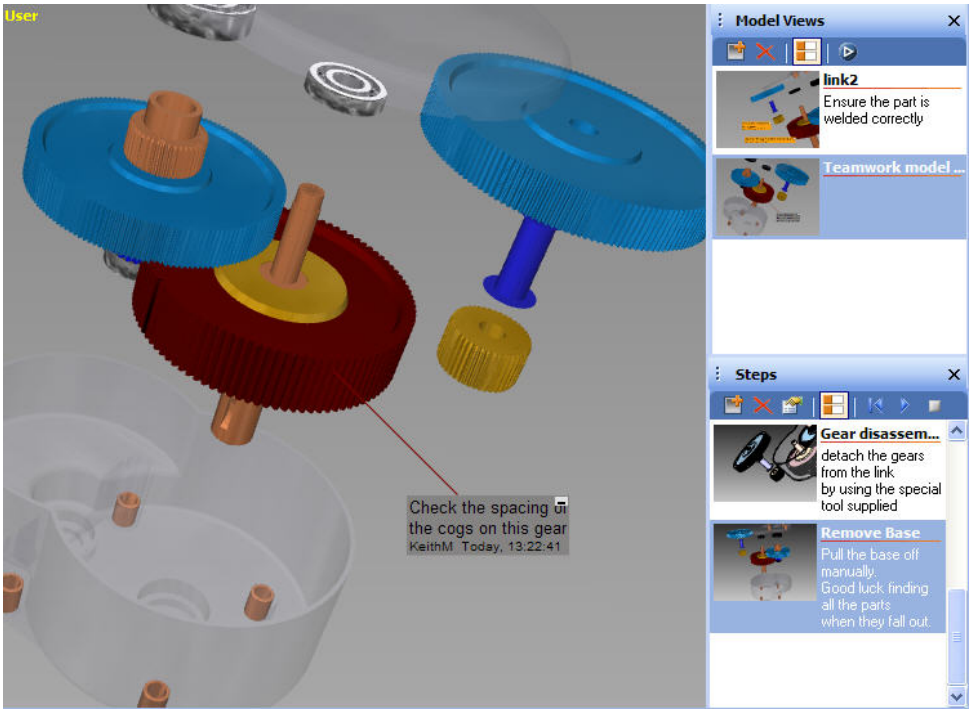
12 Do one of the following to play the 'Remove Base' step:

- Select the step in the Steps panel and click **Play**.
- Double-click the step in the Steps panel.

13 Rotate and move the scene to focus on the **GEAR6** object.

14 Add another markup to the object, change the background color to gray, and edit the text as required.

15 Update the new markup model views.



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16 Close the Steps view panel.

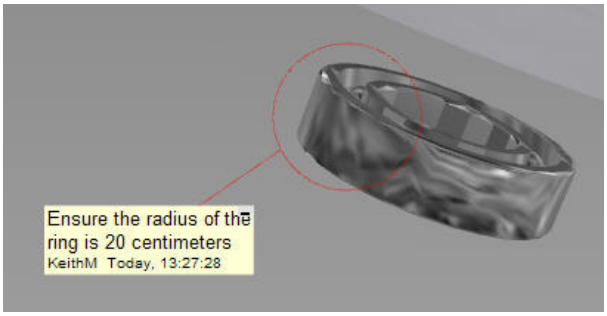
Now we will add a different shape of markup to the scene.

17 Select the **BALLB1** object and press V on your keyboard.

18 Click **Markup Circle**, , on the Drawings and Markups toolbar. Note that the cursor becomes a cross when placed in the viewport.

19 Place the cursor where you want the center of the circle to be, and then drag the mouse to draw the circle to the size you require.

20 Release the mouse button and drag the line to where you want to place the markup, and then edit the note as required and update the model view.



Procedure: Hide Markups

We now hide some markups for certain model views.

1 Activate the third model view.

Tip: Either select the model view in the Model Views panel and click Activate , or double-click the model view.

Notice that only the markup objects that belong to this model view are displayed in the viewport.

2 Select the note attached to the GEAR6 object and do one of the following:

- Clear the markup objects check box in the Scene tree.
- Right-click the object in the Scene tree or viewport and click **Hide Selection**.

3 Update the model view and save the model.

Congratulations! You have created a number of markups in the scene, and you have hidden the markups that are not relevant for each model view.

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Adding Measurements

Measurements allow for accurate measurement and dimensioning of objects; retrieval of length, diameter, and radius dimensions. This next procedure shows the various ways you can create and edit measurements.

When performing a measurement, the elements that can be measured within the object are highlighted when your cursor moves over them. The elements are vertices, edges, faces, and arcs, and you can limit the element types from selection.

Procedure: Add a Measurement to a Model

1 Hide all markups using the Scene tree check boxes.

2 Modify the view to display the link2 and GEAR2 objects in the viewport.

Tip: Drag the mouse to orbit the scene; left+right-click and drag to pan; right-click and drag into the scene to zoom.

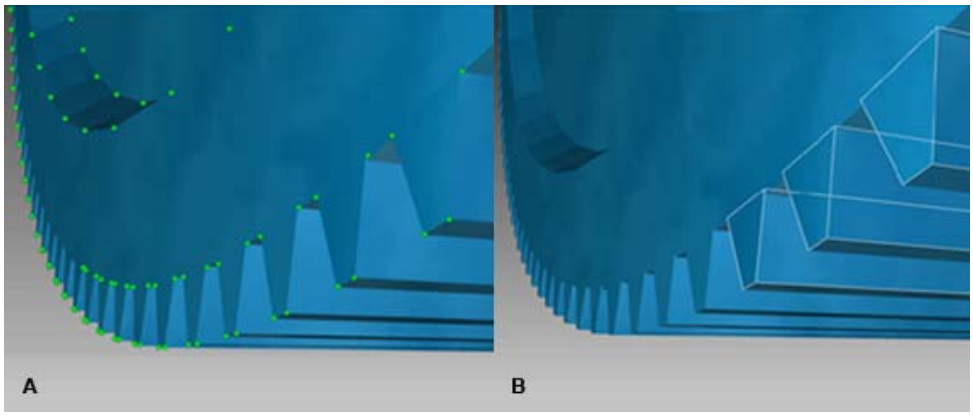
3 Display the Measurements toolbar and click **Distance**.



4 The Object Elements toolbar is displayed.



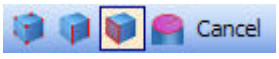
The Objects Distance toolbar includes the elements that are used to detect all of the possible bounds of measurement on the 3D objects. For example, Vertices enables you to detect all vertices (points), and faces enable you to detect all faces, as shown below.



A: Vertices element selected
B: Faces element selected

Note: You must have at least one element type activated for the Measurement tool to function correctly, and you can choose multiple element types so that you can select from many different elements. Another way of displaying only those scene elements from which you want to select is to toggle the visibility of those objects in the Scene Components panel.

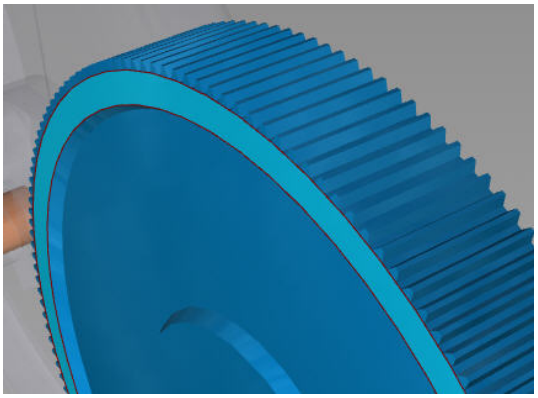
5 Click **Vertices**, **Edges**, and **Arcs** on the Object Elements toolbar to disable everything except 'Faces'. This ensures the measurement is made between faces only.



Note: Faces are planar surfaces of a geometric solid. These are displayed as white lines surrounding the selected face.

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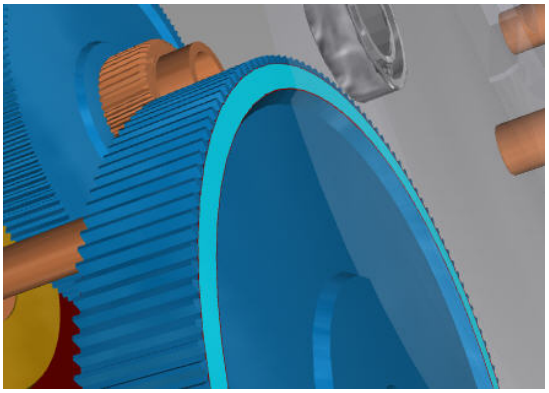
6 Move the cursor over the gear object and click when a ‘face’ element is highlighted on the gear’s side. It can now be selected as part of the measurement. Note the cursor remains active.



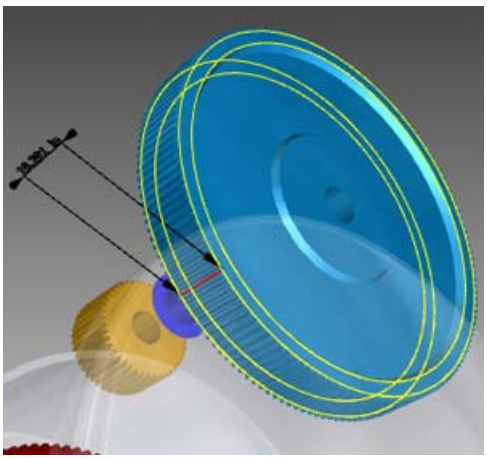
7 Rotate the model until you can see the second side of the gear.

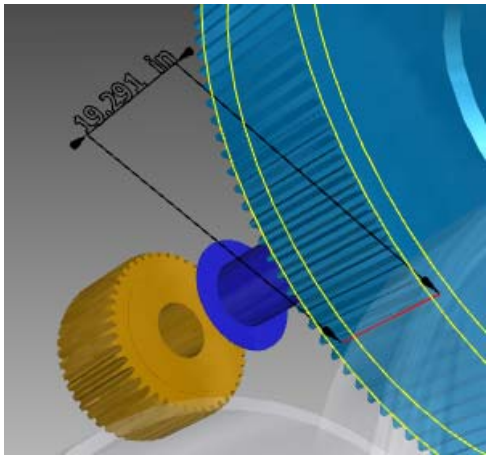
Note: You can rotate, pan, and zoom the model without affecting the measurement.

8 Move the cursor over the other side of the gear and click when a ‘face’ element is again highlighted. Note the cursor remains active.



9 Move the cursor out from the object and click in the position where you want the measurement to be displayed, and then zoom in to see the measurement more clearly.





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Procedure: Modify Measurement Settings

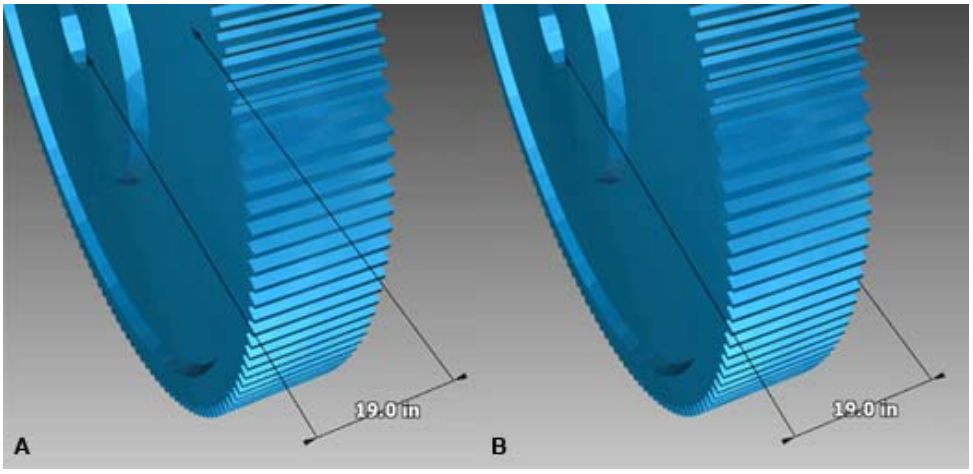
We now measure between vertices using different measurement settings.

1 Click **Measurement Global Settings**  on the Measurements toolbar. The Measurement Global Settings dialog is displayed.

2 Clear the 'Always on top', 'Draw construction lines', and Draw surface features' check boxes. This ensures the model looks cleaner in the viewport, and is helpful for when you render the model to an image.

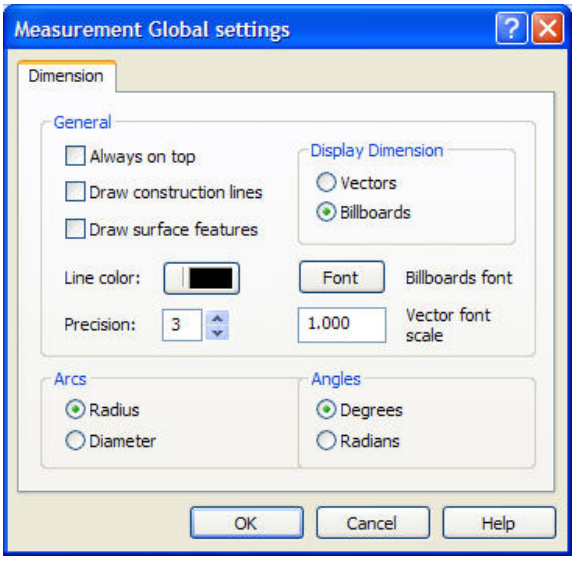
Note: When a measurement is selected, all hidden parts of that measurement are displayed by default.

Tip: 'Always on top' ensures the measurement remains in front of the model as shown in view A. Otherwise, the measurement may be obscured by the model as shown in view B.



A: Always on top 'on'
B: Always on top 'off'

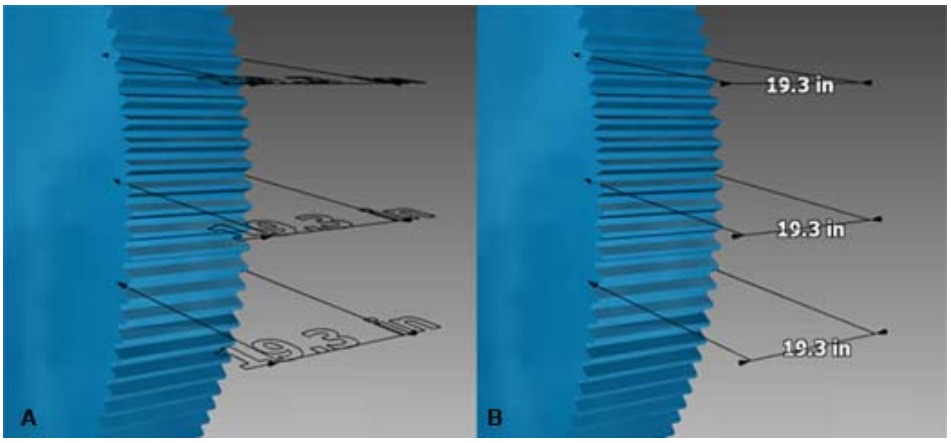
3 Select 'Billboards' as the display dimension to ensure the measurement always faces the camera.



Note: You can also edit the font, line color, and the measurement precision (numbers after the decimal point).

Tip: Vector measurements are drawn as fixed relative to the model as shown in A in the image below; billboard measurements are drawn the dynamically facing the camera, as shown in B.

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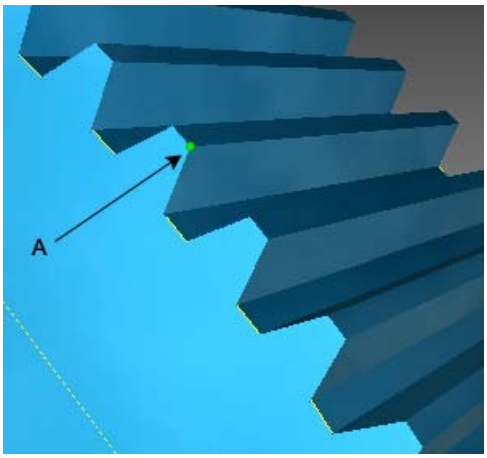
A: Vectors
B: Billboard

4 Click **Distance** on the Measurements toolbar.

5 Click **Faces** to turn face selection 'off', this ensures that only **Vertices** is selected, and then zoom in very close to the gear.

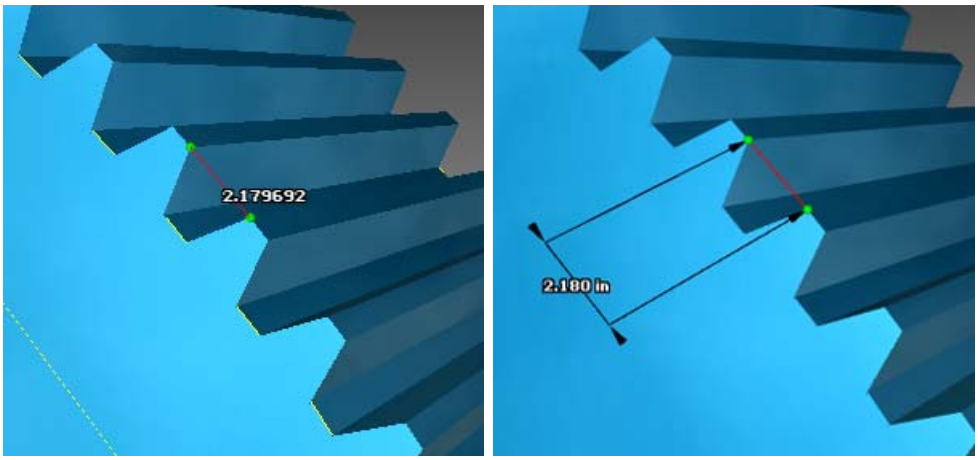
Note: Vertices are corners of a polygon where two edges meet or, of a polyhedron where three or more faces meet. These are displayed as green 'points' when selected. Edges are lines of intersection between two faces; arcs are lines that curve around a face with a center point displayed in red.

6 Position your cursor over the first vertex you want to select and click the vertex.



7 Move your cursor over the second vertex and click the vertex.

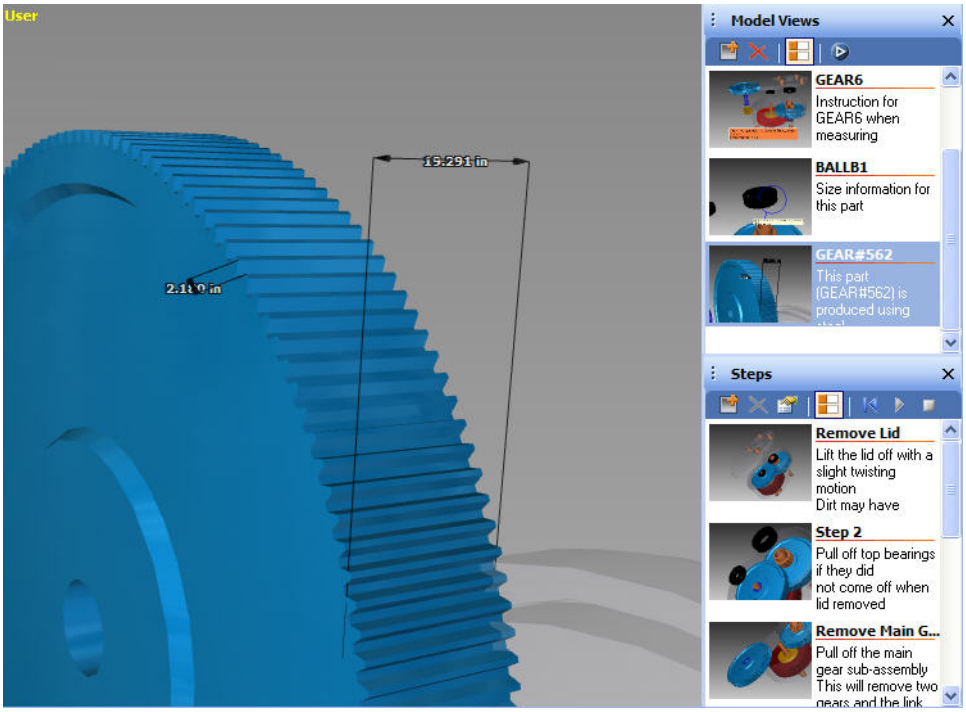
8 Move the cursor out from the object and click in the position where you want the measurement to be displayed.



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9 Modify the view of the model until you can see both measurements.

10 Rename the measurement's model view, add a description, and update the model view.



11 Save the model.

Congratulations! You have just added various annotations (markups and measurements) and entered appropriate information in the related model views from which a manufacturer can create model components.

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