

How-To Guide

SAP 3D Visual Enterprise Author

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Thrustlines

Document History

Document Version	Description
1.0	First version

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1 Introduction

This guide describes how to do the following:


- Create and delete thrustlines
- Modify thrustline styles
- Hide and show thrustlines
- Adjust the principal axis of a thrustline
- Move thrustline segments, bound points, and end points

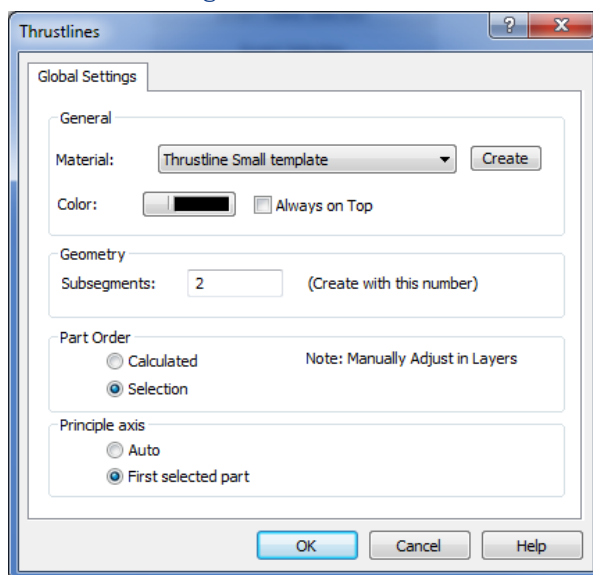
2 Thrustlines

Thrustlines present a visual representation of how various components of a model fit together by indicating the direction of movement (animation) of assembled parts:

- Thrustlines consist of line segments, each segment connecting two objects; two bound points indicate where the thrustline segments are connected to that object, the start and end points of each segment. End points are located at each the end of the centerline.
- Each line segment consists of three straight lines: two parallel lines along the principle direction that radiate from the bound points, and another line (centerline) that connects these two lines. Each line segment has its own plane, which can be different for other line segments and in simple cases collapses to a single line.
- Thrustlines appear as a single node/object in the Scene tree, and all the line segments are the same color and style.
- Each thrustline has an axis/direction called principle direction indicating the thrustline's primary direction.
- All line segments within each thrustline share the same primary direction.
- Each thrustline has its own layer.
- The way in which objects are connected by the thrustline depends on the object order within the thrustline layer; the thrustline begins from the first object in the layer, connects to the second object, then the third, and so on.

2.1 Creating a Thrustline

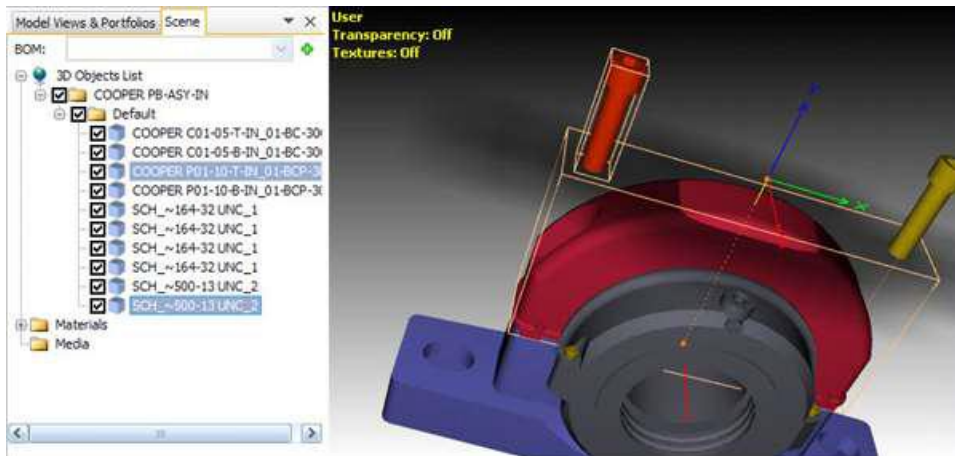
1. Open the COOPER_PB-ASY-IN - steps.rh file from *My 3D Models* tab of *Files* panel.
2. Make sure the Scene tree panel is displayed and enable the *Thrustlines* toolbar.
3. Click *Global Settings*  on the *Thrustlines* toolbar.




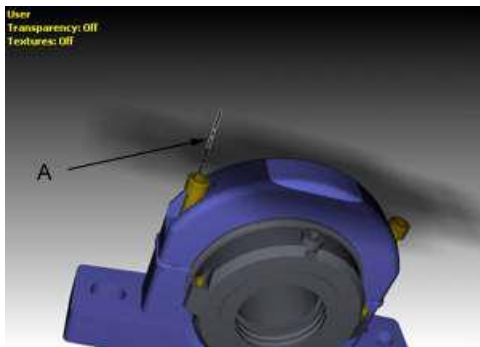
4. Edit the settings. For example, modify the material, color, and thrustline sub-segments.
5. Play the animation to the end, orient the mode so you can easily select the moving objects, and then move the animation to the beginning.
6. Select one of the SCH_~500-13 UNC_2 objects for the start of the thrustline
7. Hold down **CTRL** and select the COOPER_P01-10-T-IN_01-BCP-300 object for the end of the thrustline.

Note

There must be at least two parts selected to draw a thrustline. The order in which parts are selected determines the structure of the thrustline.

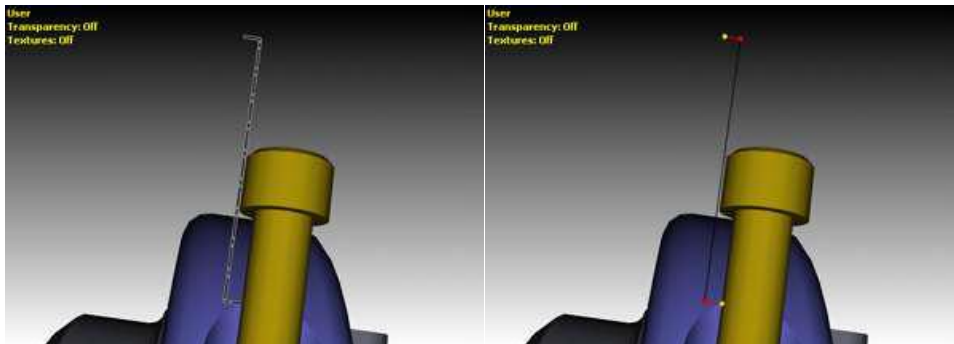


8. Click *Create*  on the *Thrustlines* toolbar.
9. Deselect all objects and move the animation slider so you can see the new thrustline.



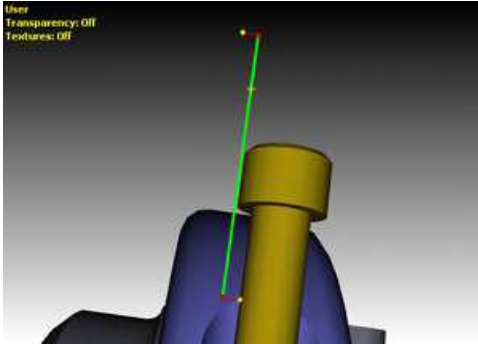
A: Thrustline

10. Rotate the model to view the thrustline in more detail, and then click the thrustline. Note the change in color and the segment structure.



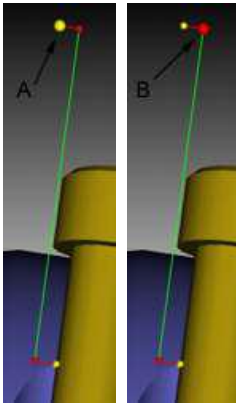
A: Unselected thrustline/B: Selected thrustline

11. Click the thrustline again and note the change in color.




Selected thrustline with mouse hover

12. Move the cursor over the bound and end points and note the changes in color and size.



A: Selected bound point/B: Selected end point

13. Experiment with adding a thrustline to non-moving parts, animating those parts and playing the animation.
14. Use the *Show/Hide* tool  to vary the display of the thrustline, and then save the file.

2.2 Editing a Thrustline

You can edit thrustlines as follows:

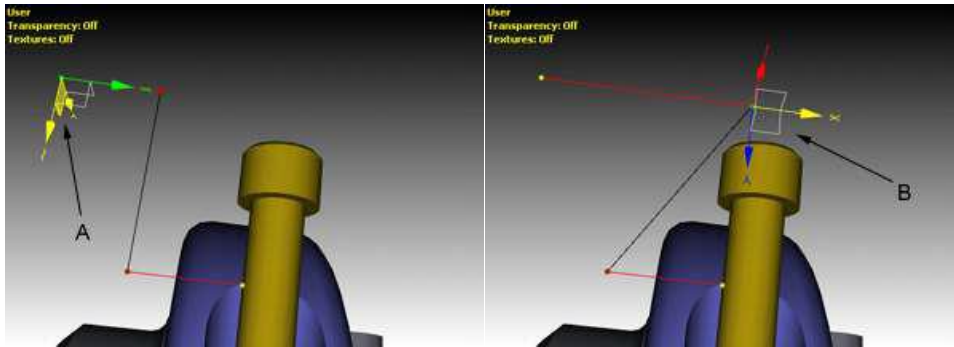
- Move
- Modify the settings
- Modify the principle axis and the bounding points

When a thrustline is first created, a default principle direction is calculated. You can modify this axis using the direction of the object's face normals for the axis direction.

1. Select the thrustline for which you want to straighten the axis.
2. Click *Adjust Principal Axis* on the toolbar.
3. Click the surface to which the thrustline should be perpendicular. The thrustline is straightened.
4. Experiment with moving the segments using the 3D Editor *Move* tool to remove any minor bends.
5. Try moving the thrustline bound and end points in the same way.

Note

Thrustline bound points can be moved in any direction. The end points of the center line can only be moved in the direction of the line segments from the bound points.

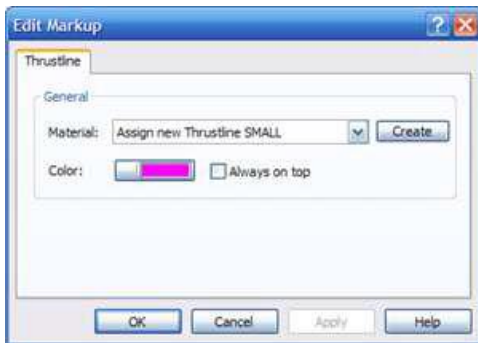


A: Move bound point along Y/Z axes/B: Move end point along X-axis

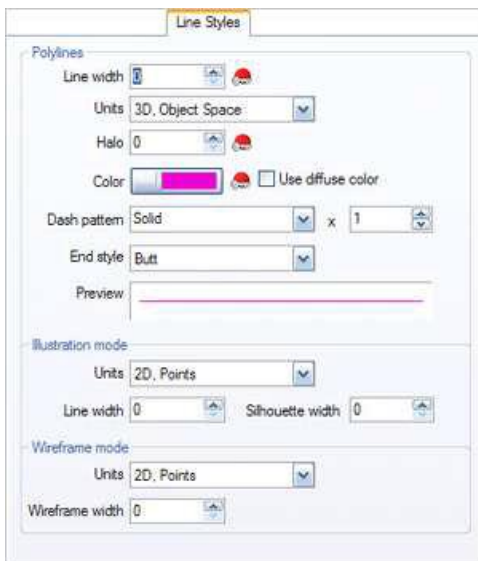
2.3 Line Styles

Each thrustline has an associated material, which is used to control the line's appearance (style). For example, you can define line's appearance thickness, whether it is dashed or solid, and whether the line ends are rounded. The Global Settings tool on the *Thrustlines* toolbar, is used to establish settings for all thrustlines. Here, we edit the single thrustline created earlier.

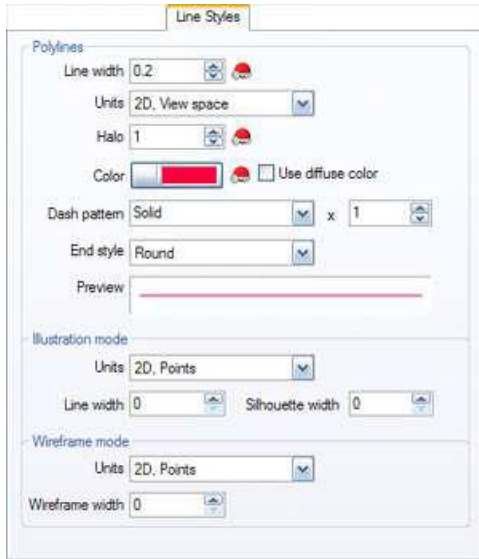
1. Reopen the COOPER PB-ASY-IN - steps_thrustlines model, and display the thrustlines in the scene.
2. Double-click the thrustline in the scene. Note that the window displays a material template with which you can edit to create more materials.



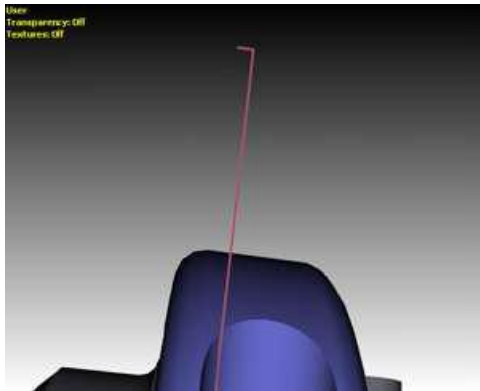
3. Click *Create*, and then click the *Line Styles* tab. The *Create* button changes to *Edit* if you are editing an existing material.



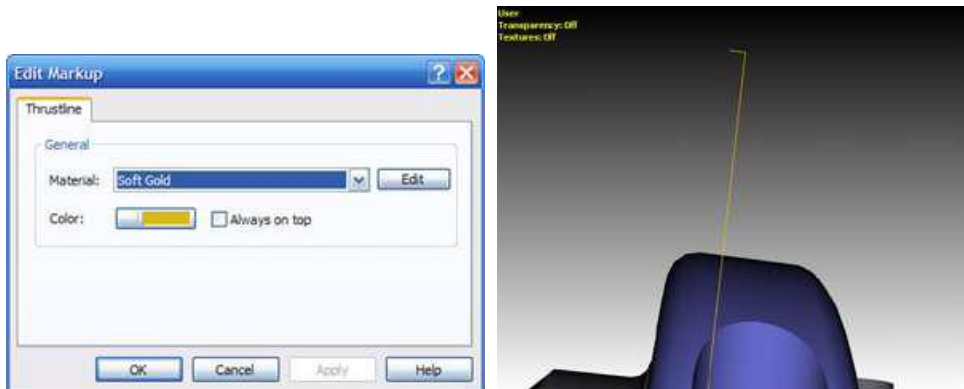
- Adjust the line style. Here we have changed the line width, color, and dash pattern.



- Rename the material on the *Basic* tab and click *OK*. The thrustline reflects your changes.

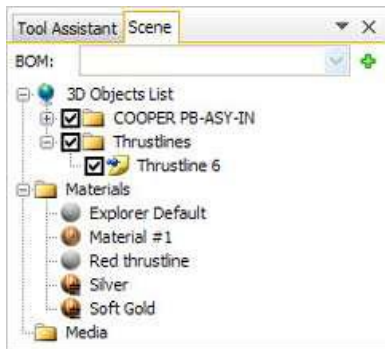


- Open the *Edit Markup* window again, select the *Soft Gold* material, and click *OK*.



Soft gold material selected/Soft gold material applied

-
7. Look at the new materials in the Materials list.



8. Save the file.
9. Experiment with the different line styles.



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