
Global Twist Modeling

In this task, you'll be introduced to Global Shape Modeling (GSM) techniques to modify surfaces while maintaining continuity constraints. This is a high level task intended for those users who have a good understanding of surfacing and would like to learn how GSM could help them. You will use the **Global Twist** command to modify a data set imported from a foreign data source.

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1. Step 1: Creating reference geometry

In the first step, we will be using the Associative option when twisting this model, and our goal is to have a manifold solid when we are done, it's better to perform this operation now than later.

NOTE:

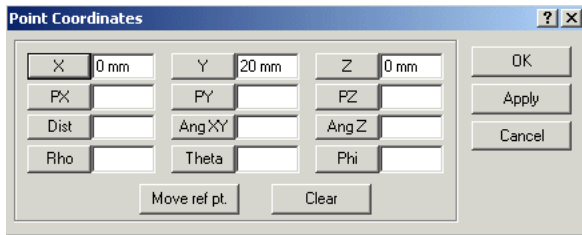
With a double click on the exe file you can run the webtraining session. ThinkDesign will be open with the right model to start.

If request to open a file, you can find it in the C:\MyTraining path.

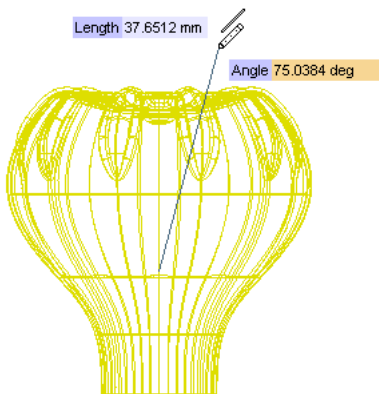
We are going to twist our model around an axis. To do this, we will need to create an axis line through the middle of the knob. The axis line is not necessary but adding this will give us better control of the model. We will then know that the axis we are going to twist around is centered in the model and is perfectly vertical. Another option is to pick two points, but this would not give us the accuracy we are looking for.

Let's create our axis line.

- Change to **Top View** orientation.
- Start the **Two-point Line** command.
- Set the Type to Limited.
- Set the Sequence to Single.
- Snap the start point of the line using the **Enable Point Coordinates**.
- Enter the following values: X = 0, Y = 20, Z = 0
- Click OK.



- Set the Length40
- Set the Angle90
- Hit **[Esc]** to end the command.




2. Step 2: Twisting the model

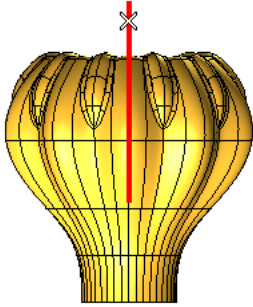
In this step we are going to perform Global Shape Modeling (or GSM) using the **Global Twist** command. We will twist the solid but maintaining the better continuities between all faces.

Now that we have our reference line created we can go head and start using GSM to twist this door knob.

- Select **Show Work Plane** if it isn't visible already.
- Change to the **Shaded View and Boundaries** view if not already in this mode.
- Change back to **Top View** orientation if you have rotated your model.
- Start the **Global Twist** command.


The first option we will define will be the axis of twist.

- Select the  **Axis of Twist** text (it turns orange). Make sure its set to Line.
- Pick the axis line we created in the previous step.



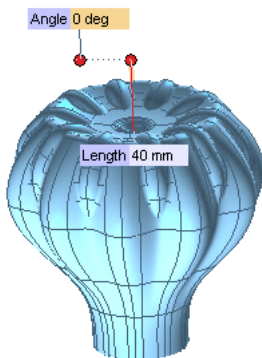
Note: Axis as line or points

The selection of the axis and its orientation define what side you want to twist. If you don't remember what it is, we suggest you to use two endpoints of the line but first the inner one and then the outer endpoint.

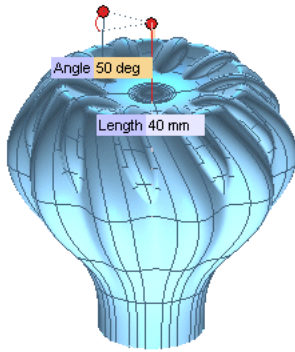
- Check the Associative option.
- Select the  Entities as solid and pick it in the workarea.
- Under 'More Options' select Curvature as First - Continuity.

Note:

As soon as you pick the solid the model disappears from the screen to calculate the pre-modification state and then re-appears, displaying all of the mini dialogs. Any geometry between the bottom and the top point of the axis line will change. Any geometry underneath the bottom point of the axis line will be locked in place and will not change. By default the transition from the locked surfaces to the modified surfaces will be curvature (G2). We can set this to G0, G1, G2, G3 or even G4!!



- Now we can either enter a set angle value (as shown below), or dynamically drag the angle handle to twist the model to an arbitrary angle.



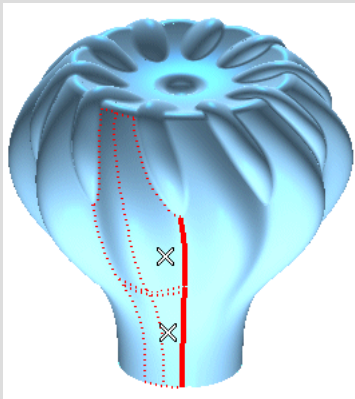
As you are making the changes to the geometry you will notice that all the surfaces maintain their continuities and all gaps are maintained and they can be changed in a 3D view.

Let's dynamically twist the model.

- Now, expand 'More Options' and under the first continuity, modify the curvature value to position. Notice the change in the model.
- Now modify the length of the twist and reduce it down to 30. Now modify the second continuity to position, tangency or any of the other levels. Notice the change in the model.

NOTE: Continuity

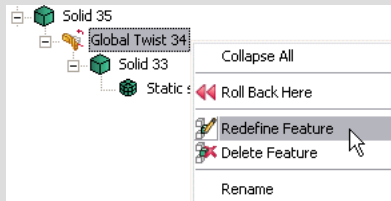
Some information about the continuity. Using **Check Continuity** command select two boundaries as shown below; the upper has been changed while the lower has been fix.



The 'Curvature difference' (G2) will be to 0% but the Torsion (G3) and Curvature plot (G4) will be values higher than 0. How to improve them?

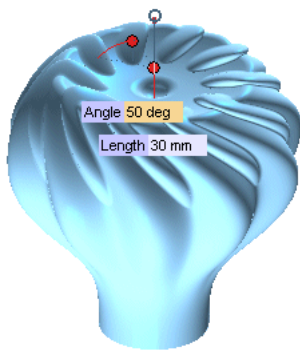
Once the GSM function is complete, you will notice that there is a Global Twist feature in your History Tree. Because we checked the Associative option, we can redefine the GSM feature at any stage in our modeling process. Let's go ahead and do that now.

Right click on the Global Twist feature in the History Tree and select Redefine Feature. The mini dialogs should appear as previously defined.



- Expand 'More Options' and under the first continuity, choose the G3 mode and hit Rebuild All.
- Check again same boundaries with **Check Continuity** command; all data will be better.

Eventually, changing the length value, you redefine the length of the axis of twist, which defines the portion of the selected geometry to be twisted and the possibility to accelerate, more or less, the twist factor.



- When you are done with the changes, click OK to accept the modifications.