



Altair

HyperWorks

HM-3600: Morph Tube to Different Configurations

Objective

Use morphing to create multiple configurations of a model.

Model Files

This exercise uses the `tube.hm` file, which can be found in the `hm.zip` file. Copy the file(s) from this directory to your working directory.

Tools

Domains, morph

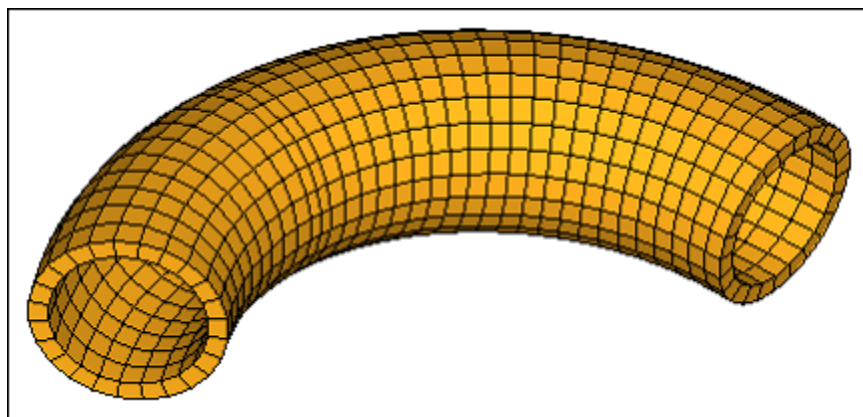


Figure 1: Tube to morph

Step 1: Open the file.


1. Open the file, `tube.hm`.

Step 2: Create domains and handles.

1. From the menu bar, click **Morphing > Create > Domains**.
2. Go to the **create** subpanel.
3. Switch the domain type to **3D domains**.
4. Toggle the element selector to **all elements**.
5. Activate the **partition 2D domains** option.

6. Click **create**.

Step 3: Partition the outer domain.

1. Make sure you are still in the **Domains > create** subpanel.
2. In the **Model Browser**, hide the component **solid**.
3. Using the **Mask** panel (), display only the outer elements of the component **^morphfaces**.

HINT: Select a couple of elements on the face you want to keep. Select **elements >> by face**, and then select **elements >> reverse**. This will reverse the selection to the elements you do not want and will allow you to mask those elements with the **mask** button.

4. Click **return** to return to the **Domains** panel.
5. To reduce the number of domains and handles shown on the screen, click the **Mask** tab.
6. Click the **+** next to **Morphing** to expand it.
7. Click the **+** in the **Show** column for the **Local Domains/Handles** to display the domains and handles for only the displayed elements.
8. Change your view to a left view.
9. Change the domain type to **2D domains**.
10. Change the elements selector from **all elements** to **elems**.
11. Select the elements as displayed in the following picture.

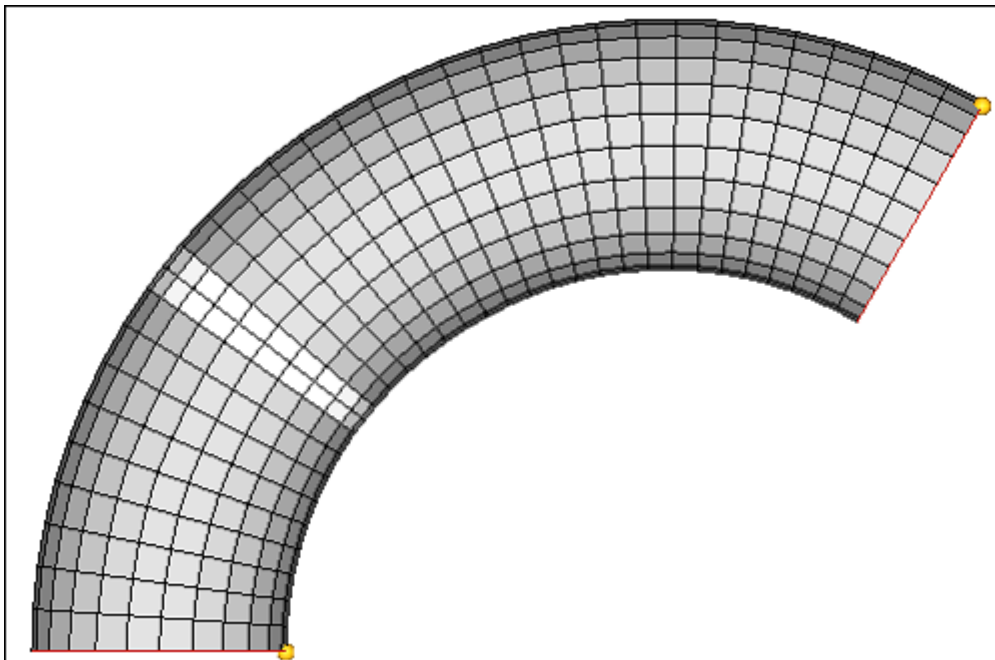


Figure 2: Elements to partition

12. Click **create** to create the new domain.

13. Click **return** to exit the panel.

Step 4: Increase the outer diameter of the middle section of the tube.

1. Click **Morphing > Morph** to open the **Morph** panel.
2. Go to the **alter dimensions** subpanel.
3. Set the dimension type to **radius**.
4. Set the **center calculation** to **by edges**.
5. Switch the mesh to wireframe.
6. Select the two edge domains and the 2D domain as shown in the following figure.

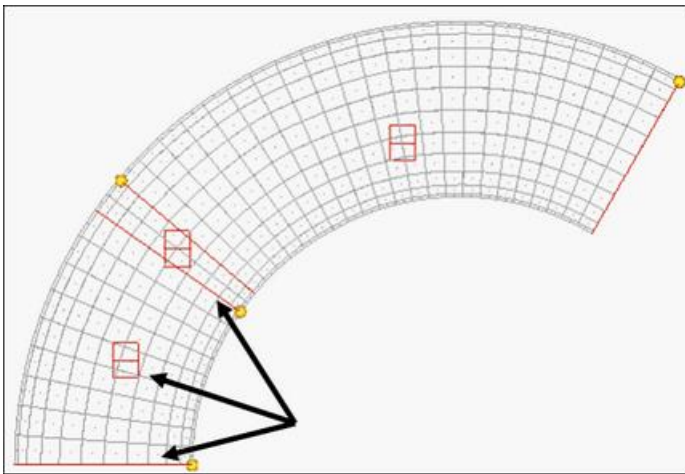


Figure 3: Select the following Edge and 2D domains.

7. Set the **radius=** value to 27.
8. Click **morph** to morph the part.
9. Remain in this panel for the next section.

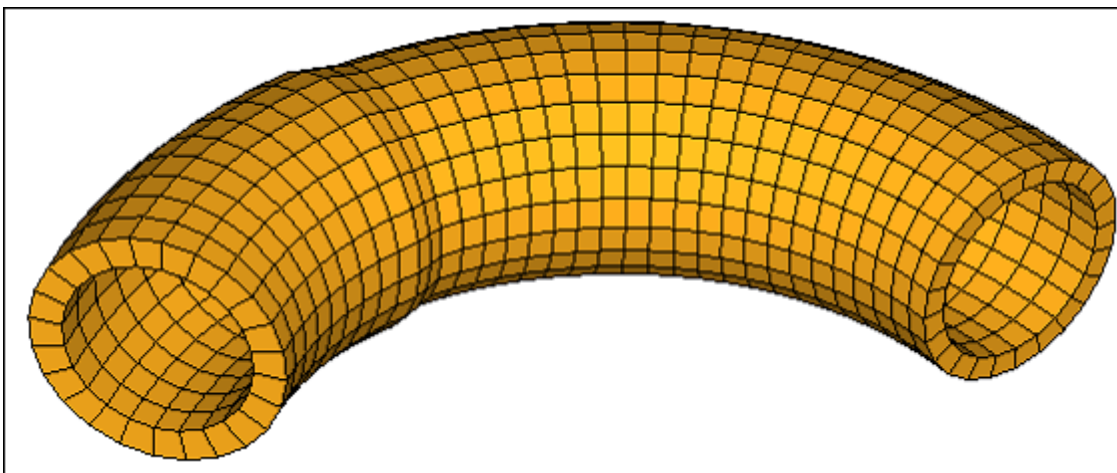



Figure 4: New profile of the part

Step 5: Offset the inner diameter of the tube.

1. Click **unmask all**  to display all the elements.
2. Use the **Mask** panel to display only the tube inner elements of the component **^morphfaces**.
HINT: Select a couple of elements on the face you want to keep. Select elements by face followed by elements reverse. This will reverse the selection to the elements you do not want and will allow you to mask out those elements.
3. Click **return** to return to the **Domains** panel.
4. To reduce the number of domains and handles shown on the screen, click the **Mask** tab.
5. Click the **+** next to **Morphing** to expand it.
6. Click the **+** in the **Show** column for the **Local Domains/Handles** to display the domains and handles for only the displayed elements.
7. Click **Morphing > Morph** to open the **Morph** panel.
8. Go to the **alter dimensions** subpanel, set the dimension type to **radius**.
9. Select **domains >> displayed**. This selects the two inner edge domains as well as the 2D domain for the tube inner.

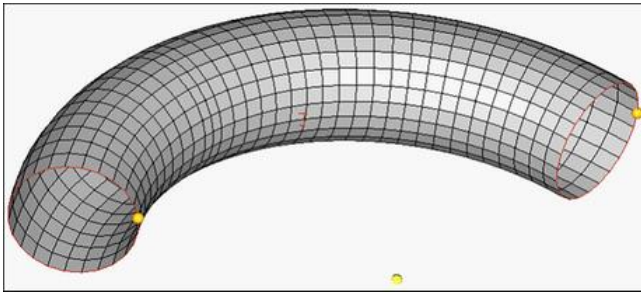


Figure 6: edge domains on the inner radius

10. Change the **center calculation:** to **by axis**.
11. For the axis, switch to the **y-axis**.
12. For base point, select the temp node at the center of the tube arc.
13. For **radius=** enter 3.
14. Check **add to current**.
15. Click **morph** to morph the inner diameter of the tube.

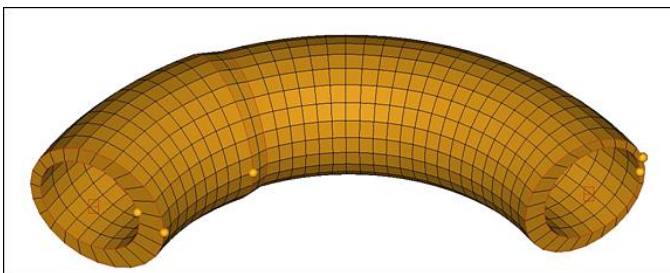


Figure 7: Tube with offset inner

Summary

Using morphing operations, dimension changes have been successfully performed on a tubular mesh.