



Altair

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**HyperWorks**

## HM-3590: Morph Adhesive Layers

### Objective

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Use morphing to change the thickness of the middle layers of a four-layered solid, while maintaining the thickness of the outer layers.

### Model Files

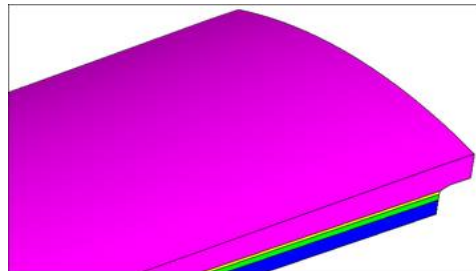
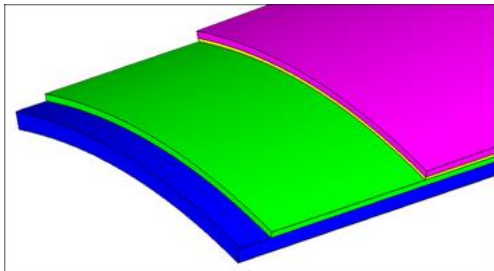
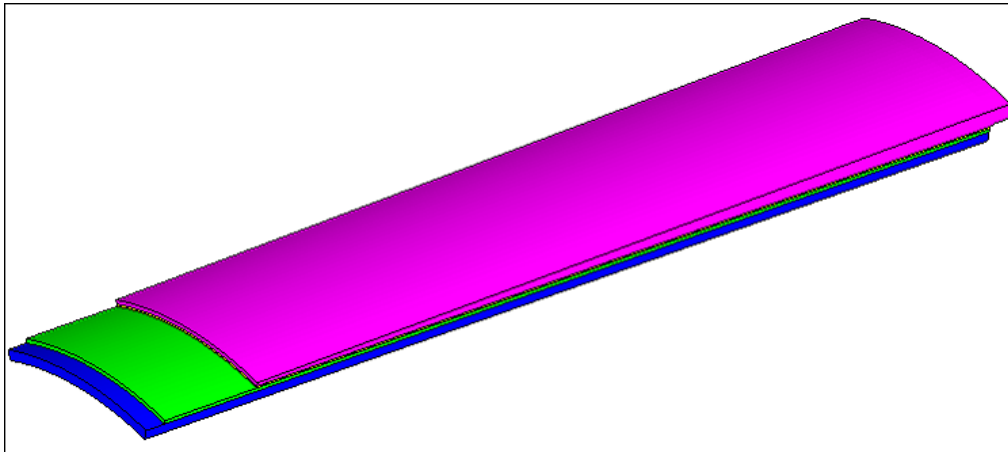
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This exercise uses the `Morph_Adhesive_Layers.hm` file, which can be found in the `hm.zip` file. Copy the file(s) from this directory to your working directory.

### Tools

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Domains will be created using **3D domains > by component**. Thickness will be altered using **alter dimensions**.

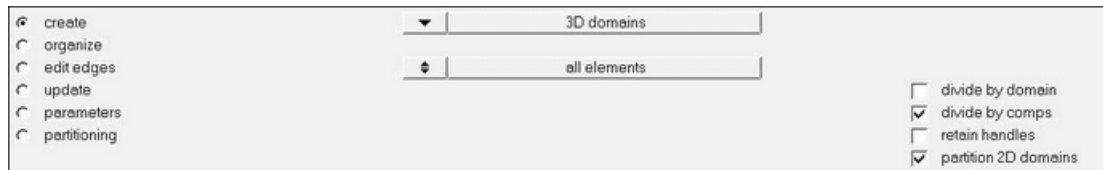


### Step 1: Open the file.

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

### Step 2: Create domains and handles.

1. Click the **Morphing** menu and pick **Create > Domains**.
2. Switch the domain type to **3D domains**.
3. Toggle the element selector to **all elements**.
4. Activate the **divide by comps** and **partition 2D domains** options. The panel should appear as in the following image:

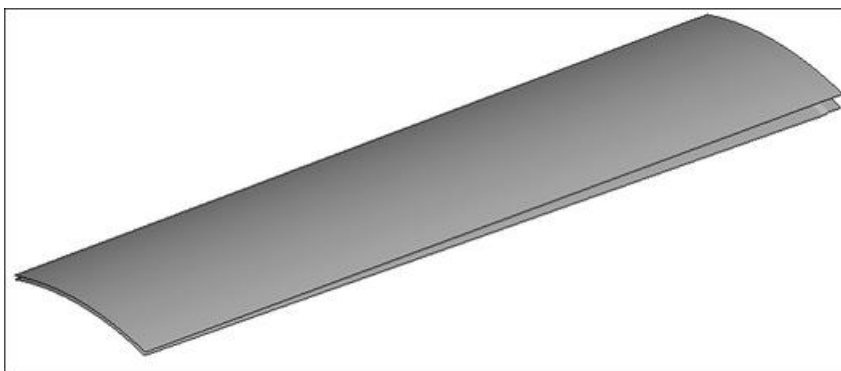


5. Click **create** to create the domains.
6. Click **return** to exit the **Domains** panel.

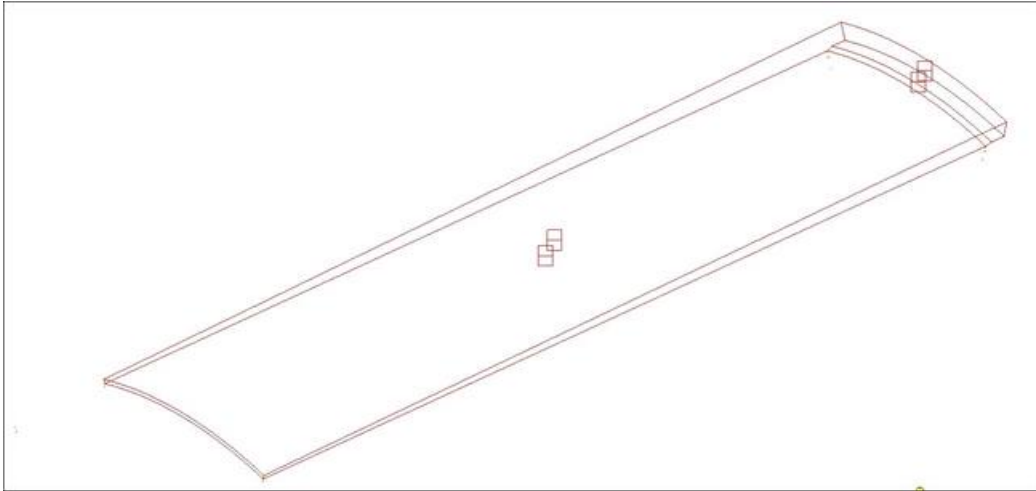
### Step 3: Display only the morph faces of interest.

1. Using the **Model Browser**, hide all the components except **^morphface**.
2. Mask all **^morphface** elements except those on the outer layer and the layer between the **Outer** comp and the **Adhesive\_Outer** to leave all the elements shown in the following image.

**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.

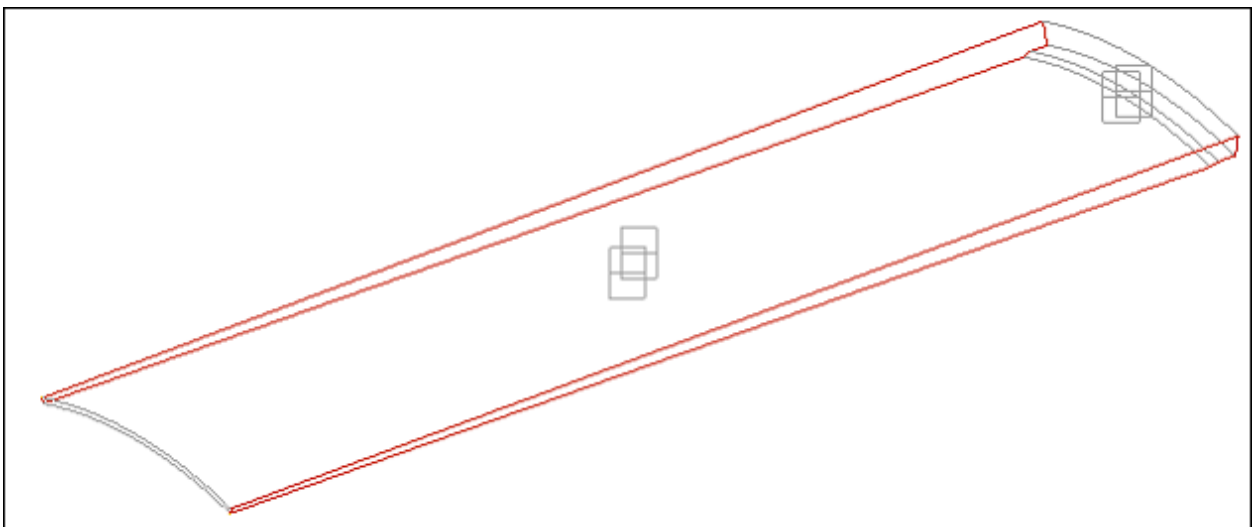


3. To reduce the number of domains and handles shown on the screen, click the **Mask** tab.
4. Click the **+** next to **Morphing** to expand it.
5. Click the **+** in the **Show** column for **Local Domains/Handles** to display the domains and handles for only the displayed elements.
6. Hide the **^morphface** component in the **Model Browser**.



#### Step 4: Increase the thickness of the outer adhesive layer by 5 units.

1. Click the **Morphing** menu and pick **Morph** to open the **Morph** panel.
2. Open the **alter dimensions** subpanel.
3. Change the dimension type to **radius**.
4. Activate the **add to current** checkbox.
5. For **domains**, select the curved edge domains as well as the 2-D domains representing the curved surfaces as seen in the following image.



6. Set the **center calculation** to **by axis**.
7. For the axis, use the **z-axis**.
8. For **B** select the temp node that represents the center of the cylinder.
9. In **radius=** box, change value to 5 units.
10. Click **morph**.
11. Go to the **save shape** subpanel.
12. For **name=** enter sh1.
13. Switch to **as node perturbations**.
14. Click **save**.
15. Click **undo all** to revert back to the original model configuration.
16. Show all components except the **^morphface** component.
17. Go to the **apply shapes** subpanel.
18. For **shapes** select **sh1**.
19. Click **select**.
20. Click **animate**.  
This takes you to the **Deformed Shape** panel.
21. Change the animation scale from **model units** to **scale factor**.
22. Set the **scale factor** to 1.
23. Click **linear** to start the animation.
24. Once you are done viewing your animation and verifying that it is as intended, you can return to the main panel area.

With this step you have successfully completed morphing one of the middle layers of the four-layer model.

**Optional:** Using the process shown above, increase the thickness of **Adhesive\_Inner** component by 5 units.