



Altair

HyperWorks

HM-3620: Shaping a Bead Using Cyclic Symmetry

Model Files

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

Exercise: Creating a Circular Bead on the Bottle

In this exercise you will first create a bead using the default **continuous** edge connectivity. You will then update the edges to free and see how it affects the bead creation.

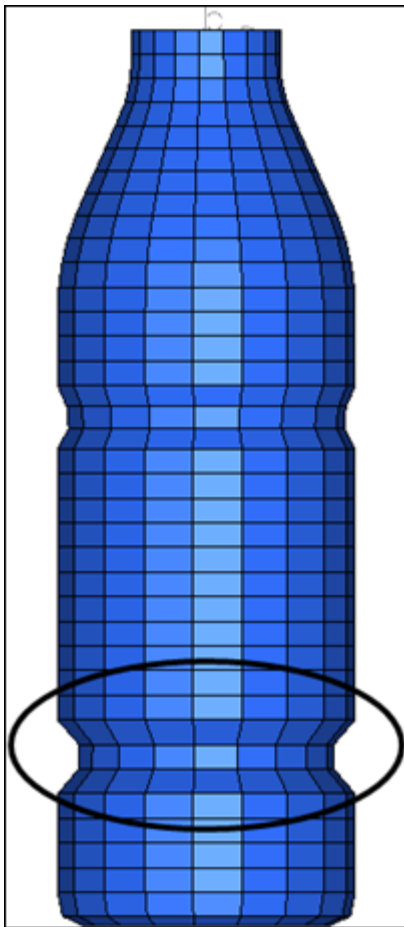


Figure 1: Adding beads to the bottle

Step 1: Load and review the model.

Open the HyperMesh file `bottle.hm`

Step 2: Create morph volumes.

1. From the menu bar, select **Morphing > Create > Morph Volumes**.
2. Switch **create morphvol** to **create matrix**.
3. Set:
 - **x density** = 3
 - **y density** = 8
 - **z density** = 5
 - **buffer %** = 5
4. Select **elems >> displayed**.
5. Toggle **global system** to **local system**.
6. For **syst**, select the system located at the top of the bottle.
7. Use the default values for the remaining settings.
8. Click **create** to create the morph volumes.

Note: Morph volumes are created encompassing the bottle, with red colored handles created at the corners of each morph volume.

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

Step 3: Create symmetry.

1. From the menu bar select **Morphing > Create > Symmetries**.
2. Under **domain**, activate **morph volumes & mapping**.

Symmetries can either be linked to domains or to morph volumes. In this case, you are associating the symmetries to the morph volumes.
3. Change **1 plane** to **cyclical**.
4. Change **180 degrees** to **set freq**.
5. Set **# of cycles** to 8.
6. For **syst** select the cylindrical coordinate system located at the top of the bottle.
7. Click **create**.

Note: A **cyclical** symmetry is created.
8. Click **return** to exit the panel.

Step 4: Split the morph volumes.

1. On the toolbar, click **XZ Left Plane View** .
2. From the menu bar, select **Morphing > Create > Morph Volumes**, then select the **split/combine** subpanel.

3. Set the toggles to **split mvol**s and **by edges**.
4. Set **single split** to 0.8.
5. Select an edge of **Morph Volume 1** (Figure 2).
6. Click **split**.
7. Set **single split** to 0.2.
8. Select an edge of **Morph Volume 2** (Figure 2).
9. Click **split**.
10. Click **return** to exit the panel.

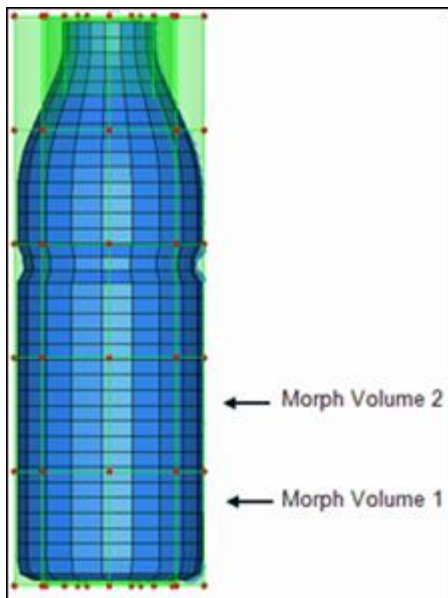


Figure 2: Splitting morph volumes

Step 5: Morph the part.

1. From the menu bar select **Morphing > Morph**, then select the **move handles** subpanel.
2. Switch the morphing method from **interactive** to **translate**.
3. Switch the translate option to **along xyz**.
4. Set **x-val** = -5.0.
5. For **system** =, select the cylindrical coordinate system located at the top of the bottle.
6. Select a handle as shown in figure 3.

7. Click **morph**.

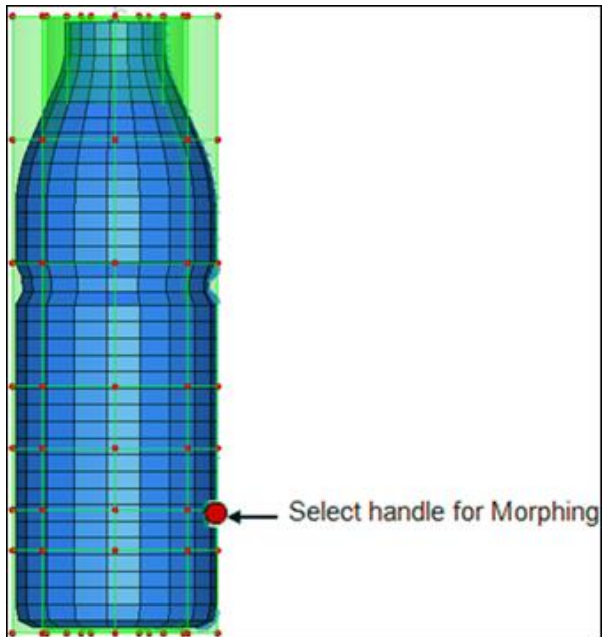


Figure 3: Selecting a handle for morphing

As the bead is created, the upper and lower portions of the bottle deform too (figure 4). This is not the intention, as you want to create a bead without affecting the other parts of the bottle.

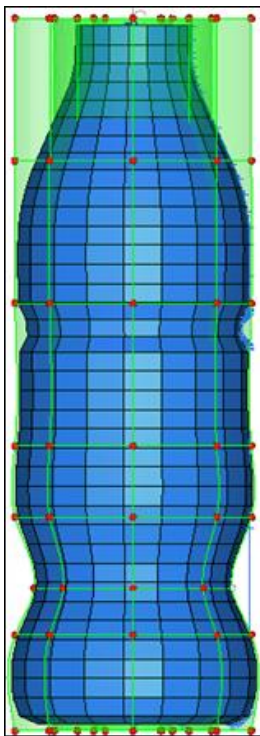


Figure 4: Morphing using continuous morph volumes

- Click **undo** to undo the morphing operation.

Step 6: Update the morph volume edges.

To stop this bulging effect of the upper and the lower portions of the bottle, you will use the free edge connectivity between these morph volumes.

- From the menu bar select **Morphing > Create > Morph Volumes**, and then select the **update edges** subpanel.
- Toggle **update nodes** to **update ends**.
- Switch edge tangency to **free**.
- Update the edges, working your way around the bottle (see figures 5 and 6 below).

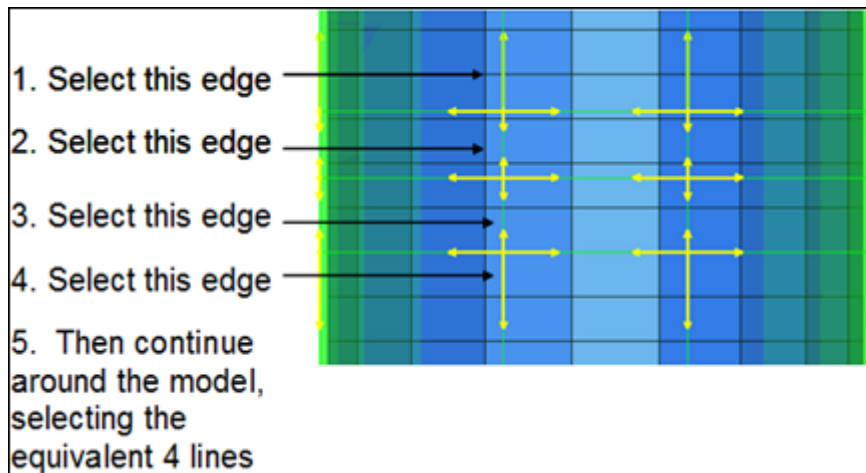


Figure 5: Selecting edges to update the tangencies

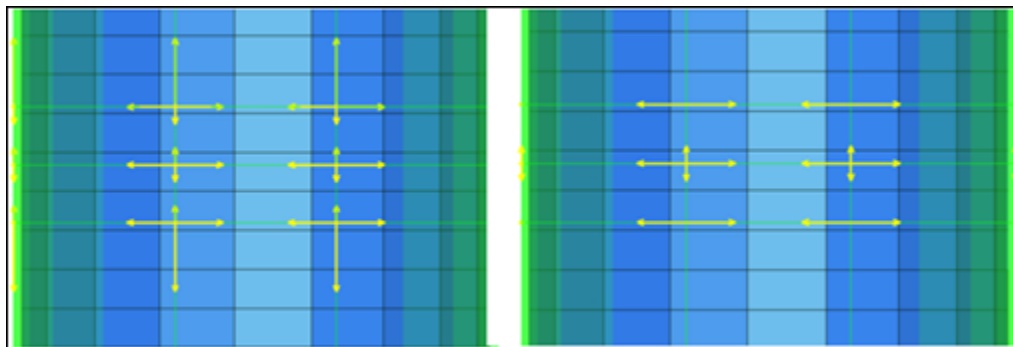


Figure 6: Changing the tangencies from continuous to free

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

Step 7: Morph the part.

- From the menu bar select **Morphing > Morph**, then select the **move handles** subpanel.

2. Verify that the morphing method is **translate**.
3. Switch the translate option to **along xyz**.
4. Set **x-val = -5.0**.
5. For **system =**, select the cylindrical coordinate system located at the top of the bottle.
6. Select the handle as shown previously in figure 3.
7. Click **morph**.

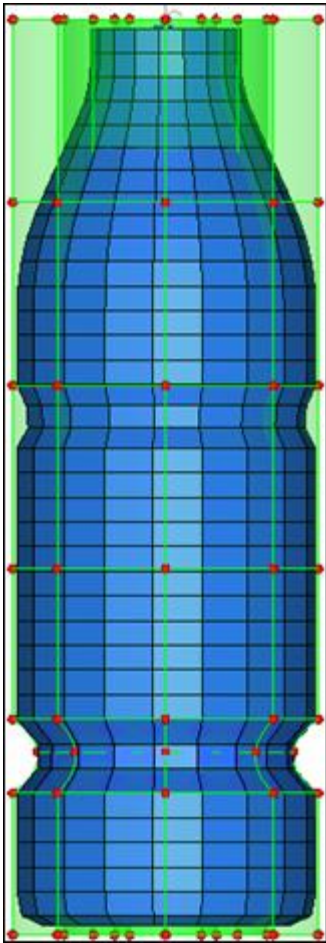


Figure 7: Bead created with free edge connectivity

Summary

Using morph volumes with appropriate tangencies and symmetries you were able to create a bead on the given bottle.