



Altair

HyperWorks

HM-3630: Morphing with Shapes

Model Files

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

Exercise: Morphing a Yoke via Morph Volumes and Shapes

In this exercise you will increase the diameter of one of the prongs of a yoke using morph volumes. You will reflect the shape on to the other prong and finally position the combined shapes from one yoke to the other.

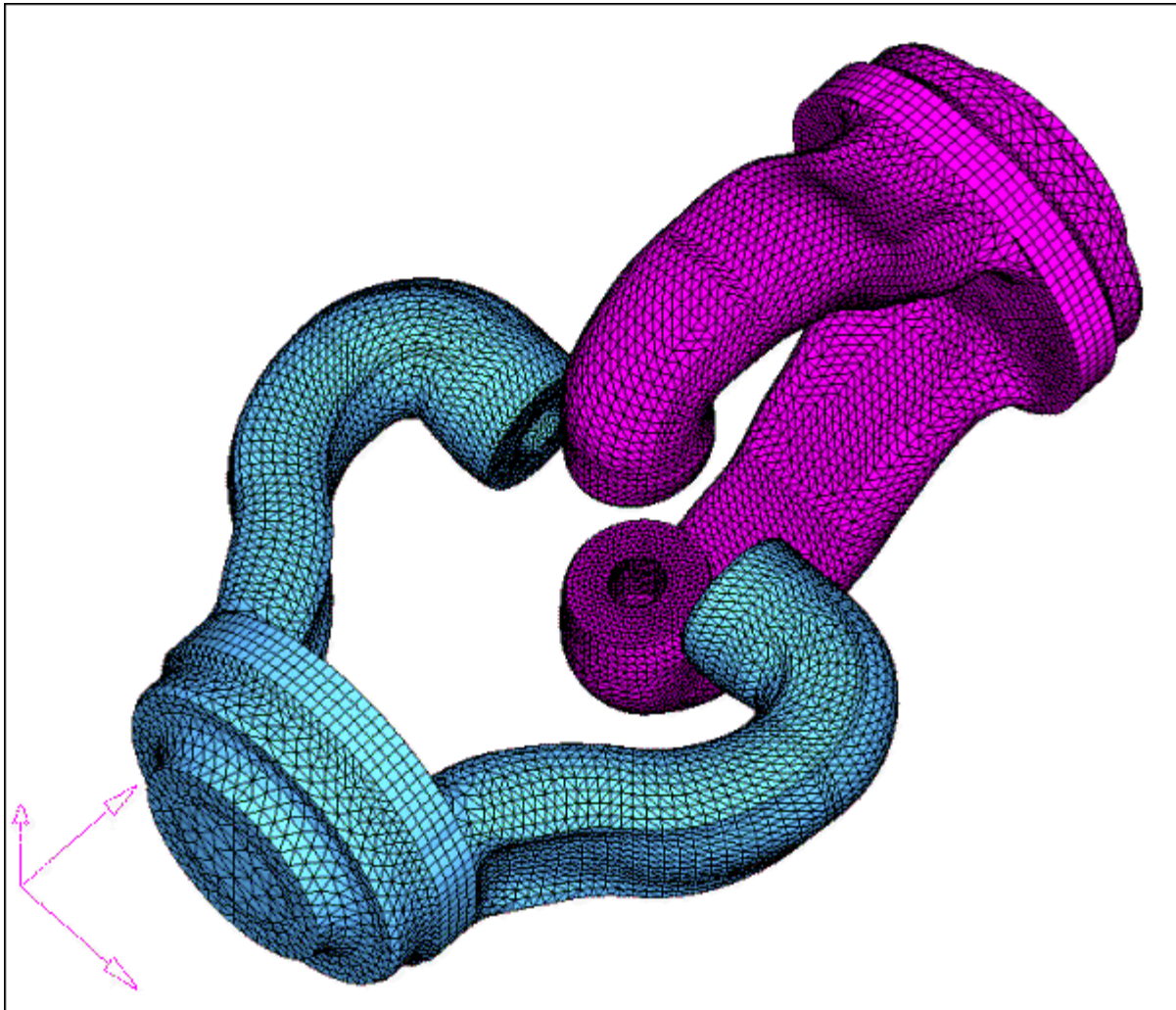


Figure 1: Yoke model

Step 1: Load and review the model.

1. Open the HyperMesh file `yoke.hm`.
2. In the **Model Browser**, right-click component **yoke_2**, then select **Hide**; make sure component **yoke_1** is in **Show** mode.

Step 2: Convert hexas to morph volume.

1. From the menu bar, select **Morphing > Create > Morph Volumes**, then select the **convert** subpanel.
2. Select **elems >> by collector**.
3. Select **hexas**. Make sure that **register all inner nodes** is checked.
4. Click **select**.
5. Click **convert**.

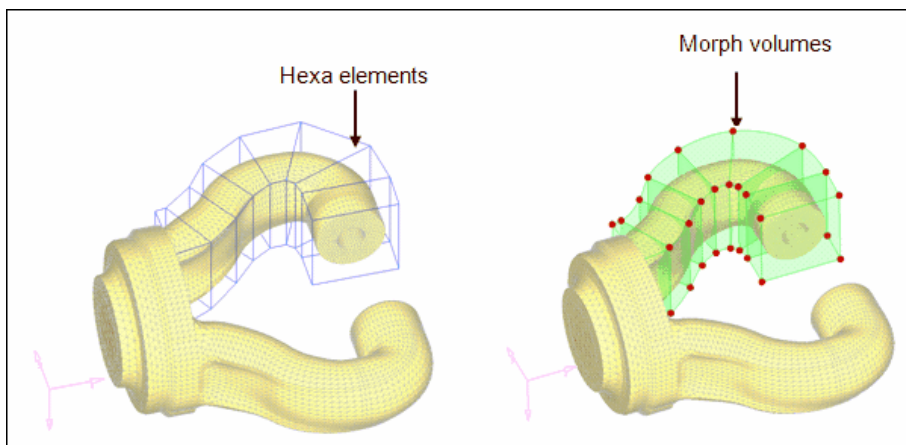


Figure 2: Converting hexas volumes to morph volumes

Note: All the seven hexa elements are converted into morph volumes.

Step 3: Increase the prong diameter.

1. In the **Model Browser**, right-click **Tag** and select **Show** to display all the tags.
2. From the menu bar, select **Morphing > Morph**, then select the **move handles** subpanel.
3. Set the **mode selector** to **move to node**.
4. Click **options** and make sure **morphing>mvols:** is set to **active** (toggle if it is set to **inactive**).
5. Click **return**.
6. For **handle**, click Handle 1, and for **node**, click tag 1'.

- Repeat this process for the other 35 handles.

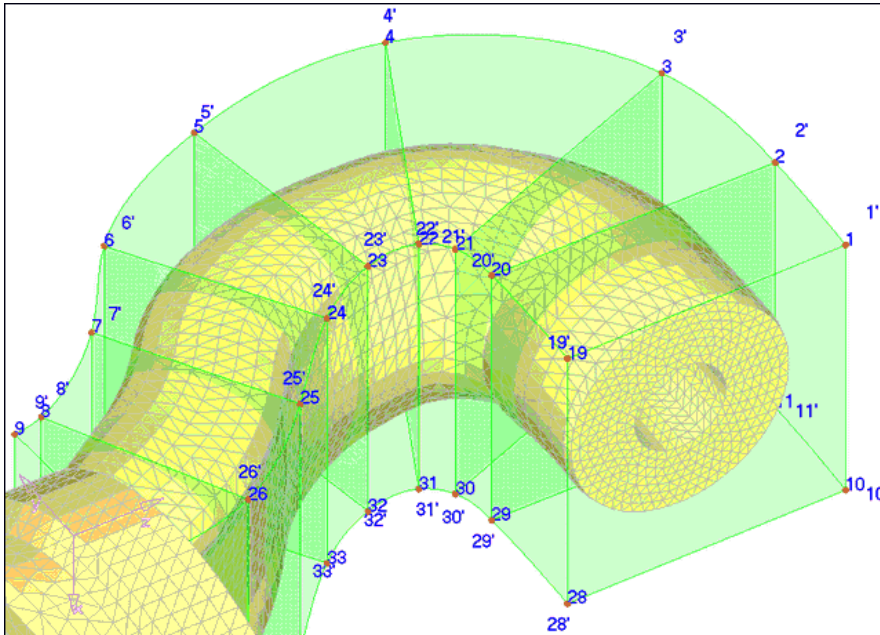


Figure 3: Using tags to change the morph volumes

Step 4: Save the morphed shape.

- From the menu bar, select **Morphing > Create > Shapes**.
- Go to the **save as shape** subpanel.
- For **name=**, enter `Prong1`.
- Toggle **as handle perturbations** to **as node perturbations**.
- Click **create** and select **Yes** to the message which appears.
- Click **undo all** to bring the model to its original position before morphing.

Step 5: Create coordinate system.

You need to reference a coordinate system in order to create symmetry.

- In the **Model Browser**, right-click and select **Hide** for **Shape** and **Morphing Volume**. Right click on `yoke_1` and select **Show**.
- From the menu bar, select **Geometry > Create > Systems > Axis Direction** to open the **Systems** panel, **create by axis direction** subpanel.
- Click **origin** and select the **node** labeled "origin."
- For **X-axis**, select the **node** labeled "X."
- For **XY plane**, select the **node** labeled "Y."
- Click **create**.

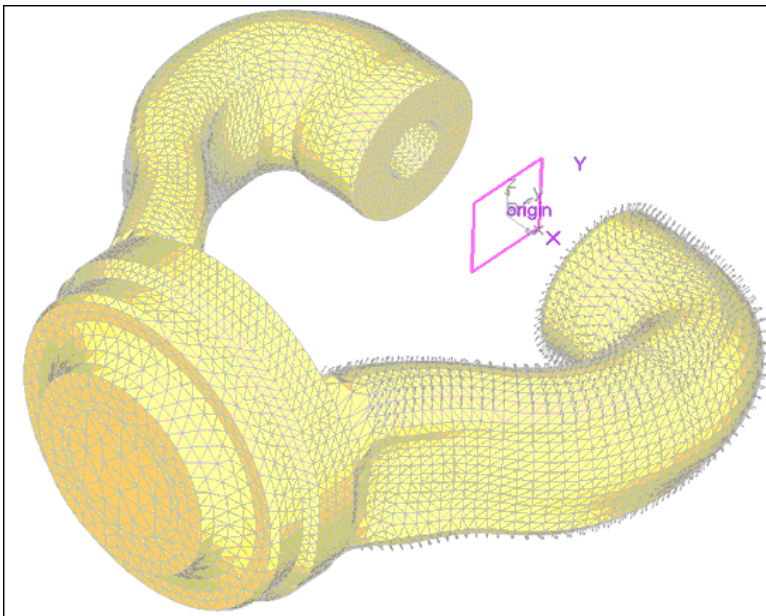
7. Click **return**.

Step 6: Create symmetry.

1. From the menu bar, select **Morphing > Create > Symmetries**.
2. For **name =**, enter symm1.
3. Under **domains**, click the check-box for **morph volumes**. (make sure it is active).
4. Set **1 plane** and keep the rest of the default settings.
5. Click **syst** and select the newly created coordinate system.
6. Click **create**.
7. Click **return**.

Step 7: Reflect shape.

1. From the menu bar, select **Morphing > Create > Shapes**.
2. Change the subpanel to **apply shapes**.
3. Under **shapes**, change **apply shapes** to **reflect shapes**.
4. Change **apply only** to **apply & create**.
5. Keep the default **auto-envelope**.
6. Click **shapes** and select the newly created shape from the previous section.
7. Under **reflect using:** click **symmetries** and select the newly created symmetry.
8. Click **reflect**.



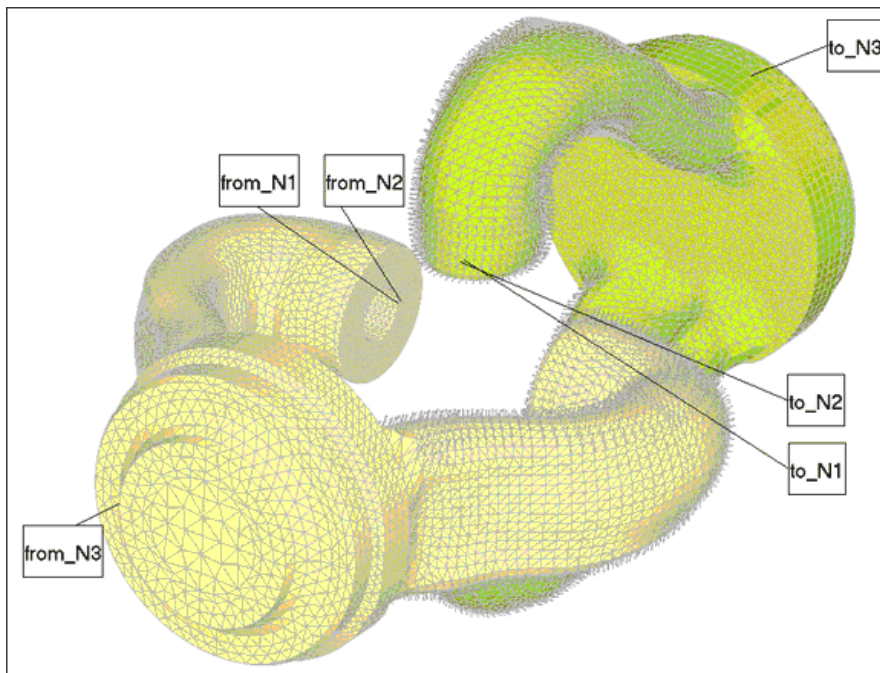
Note: A reflected shape has been created and applied on the other prong.

The name of the shape, created by reflecting, has the same name as the original shape with a suffix "1."

Step 8: Position the shapes onto the other yoke.

In this step, you will **position** the shapes of the two prongs of the yoke onto the opposite yoke.

1. In the **Model Browser**, right-click **Title** and select **Show**.
2. In the **Model Browser** right-click **yoke_2** and click **Show**.
3. In the **apply shapes** subpanel, under **shapes**, change **reflect shapes** to **position shapes**.
4. Change the selector from **scale** to **no scale**.
5. Click **shapes** and select the two shapes present in the model.
6. Under **from:** select the three nodes named **from_N1**, **from_N2** and **from_N3** for **N1**, **N2** and **N3**.
7. Under **to:** select the three nodes named **to_N1**, **to_N2** and **to_N3** for **N1**, **N2** and **N3**.
8. Click **position**.
9. Click **return**.



Note: The two or more shapes have been created and applied to the other yoke. The name of the first new shape (on the other yoke) will have a suffix "2" because it is the second copy of the first shape and the second shape will have a suffix of "11" as it is the first copy of the reflected shape.