



Altair

HyperWorks

HM-3625: Morph a Symmetric Part onto a New Geometry

Objective

Update the mesh to a new geometry quickly using symmetry.

Model Files

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

Tools

3-D domains, symmetry, interactive morphing.

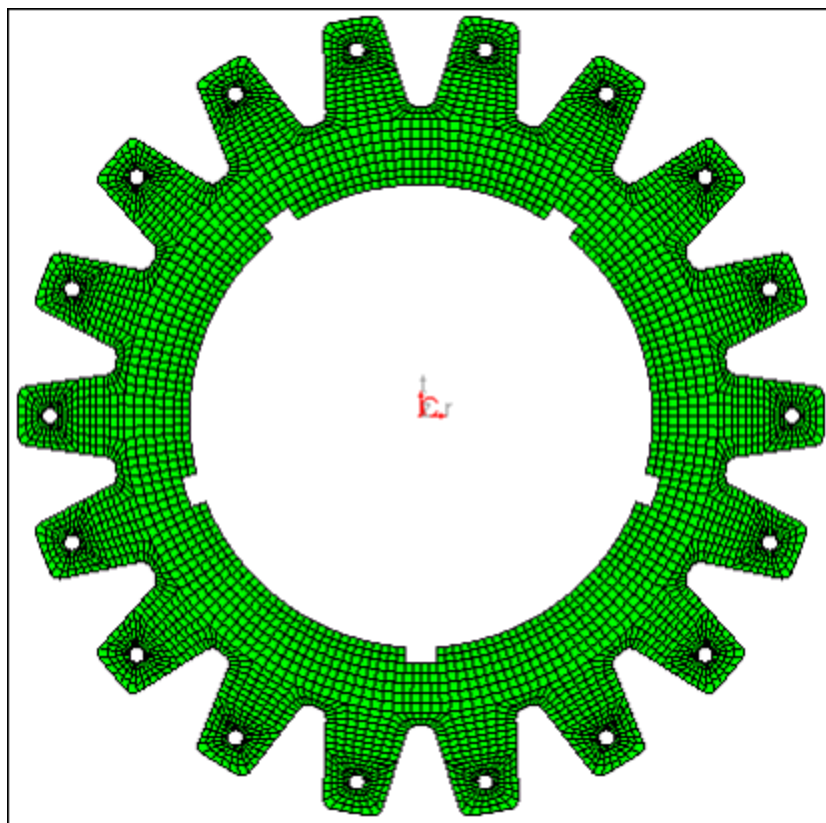


Figure 1: Mesh to morph

Step 1: Load the model.

1. From the menu bar, select **File > Open > Model** and load the file `fe_only.hm`.
2. From the menu bar, select **File > Import > Geometry** and load the file `new_design.igs`.

Step 2: Create domains and handles.

1. From the menu bar, select **Morphing > Create > Domains**.
2. Switch the domain type from **global domains** to **3D domains**.
3. Toggle the element selector to **all elements**.
4. Activate the **partition 2D domains** option.
5. Click **create** to create the domains.
6. Select **return** to exit the panel.

Step 3: Create symmetries.

1. From the menu bar, select **Morphing > Create > Symmetries** to enter the **Symmetry** panel.
2. Switch the symmetry type to **cyclical**.
3. Switch the symmetry angle from **180 degrees** to **set freq**.
4. Set the **# of cycles** to 18.
5. Click **syst**.
6. Select the center point of the gear.
7. Click **domains >> all**.
8. Click **create**.
9. Click **return**.

Step 4: Morph the mesh to the new geometry.

1. From the menu bar, select **Morphing > Morph**, then select the **move handles** subpanel.
2. Zoom in to one of the cogs of the gear as in the following image:

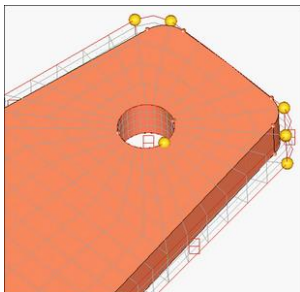


Figure 2: Mesh, domains handles and the new geometry

3. Switch the morphing method to **move to point**.
4. With **from: handle** active, select the node depicted in the following image.
5. With **to: point** active, select the point on the geometry you want to move the handle to, as depicted in the following image:

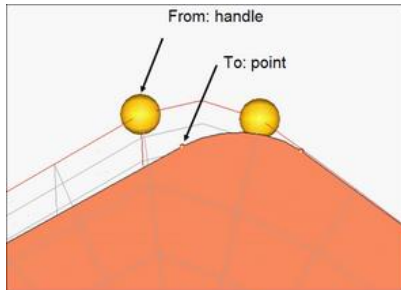


Figure 3: Morphing handle to point

As the handles are moved, you will see that the mesh starts conforming to the new geometry.

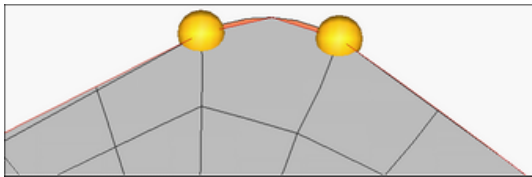


Figure 4: Mesh mapped onto the new geometry

6. In the same manner, move the following handles:

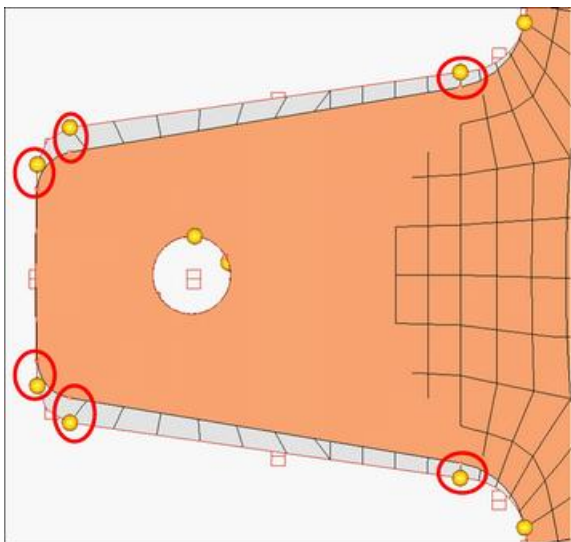


Figure 5: Handles to map

- Return to the main menu.

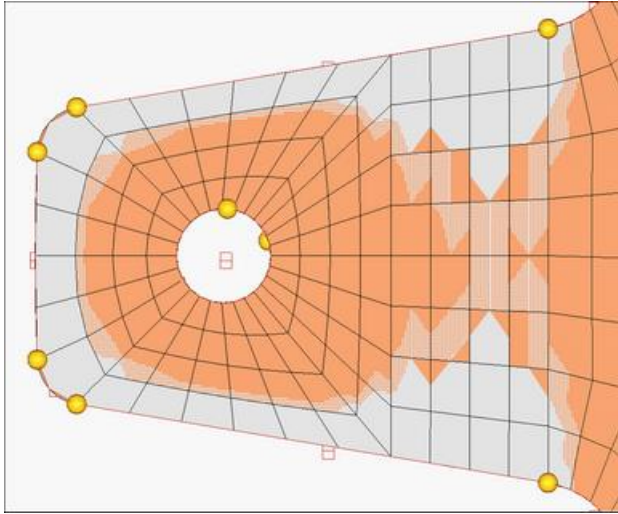


Figure 6: Updated (morphed) mesh

Summary

Notice how each cog on the gear is updated. Taking advantage of the symmetry in this part, you are able to morph it much quicker.