



Altair

HyperWorks

HM-3510: Freehand Morphing

Model Files

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

Exercise: Translating Nodes to Increase the Length of a Propeller Blade

In this tutorial, you will increase the length of a propeller blade by 100 units, using freehand morphing.

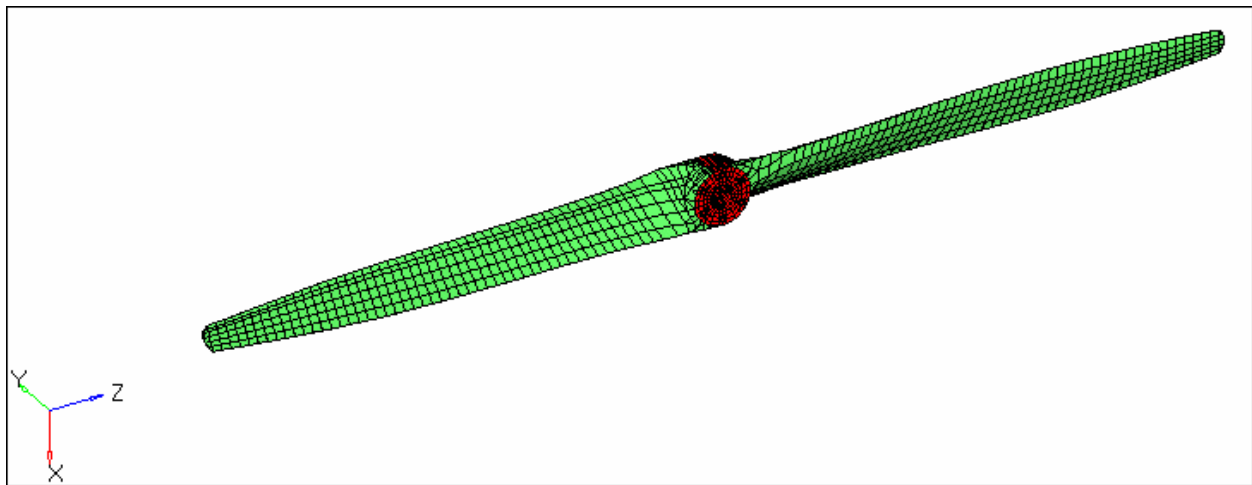


Figure 1: Original blade

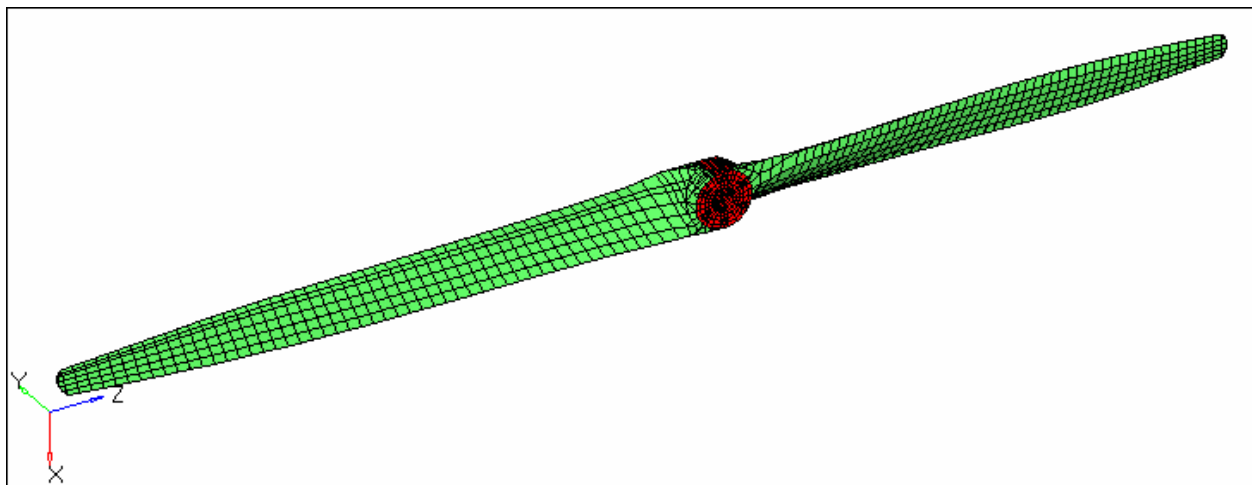



Figure 2: Blade after morphing

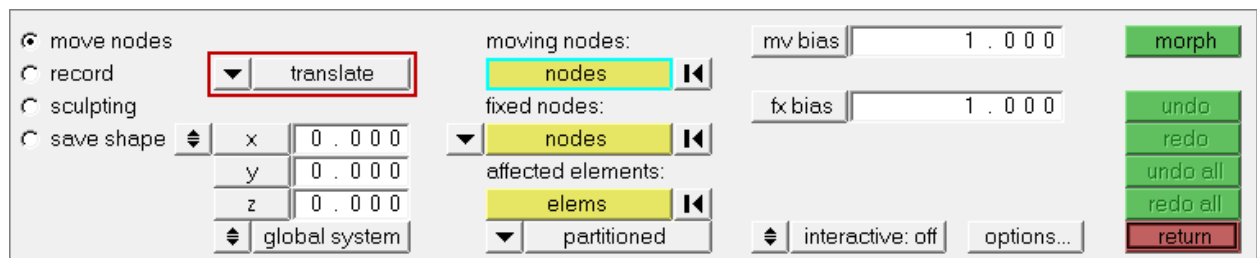
Step 1: Load the model.

1. Start HyperMesh Desktop.
2. Open a model file by clicking **File > Open > Model** from the menu bar, or clicking  on the **Standard** toolbar.
3. In the **Open Model** dialog, open the `propeller.hm` file. A model appears in the graphics area.

Step 2: Morph the blade.

Method 1: Fixed value based

1. Open the **move nodes** subpanel by clicking **Morphing > Free Hand** from the menu bar.
2. Set the morphing method to **translate**.



3. In the **z=** field, enter **-100**.
4. In the **Model** browser, **View** folder, right-click on **View1** and select **Show** from the context menu.
5. Use the **moving nodes** and **fixed nodes** selectors to select the nodes indicated in the following image.

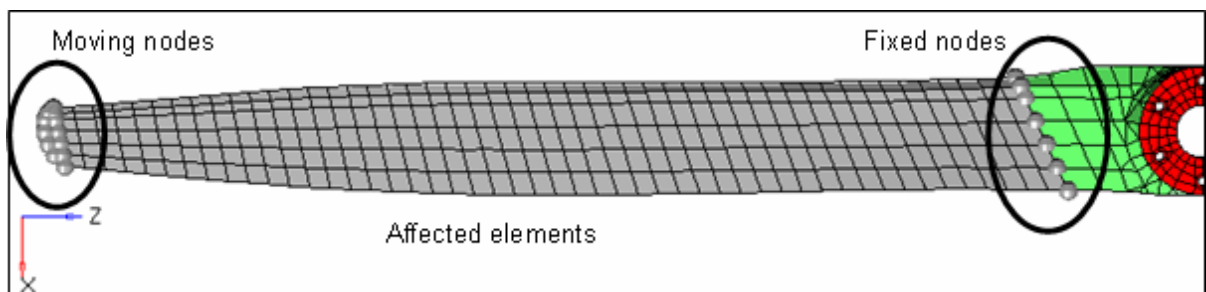


Figure 3: Node and element selections.

6. Use the **affected elements** selector to select the elements between the **fixed nodes** and **moving nodes**.
7. In the **mv bias** and **fx bias** fields, keep the default values (1.00).

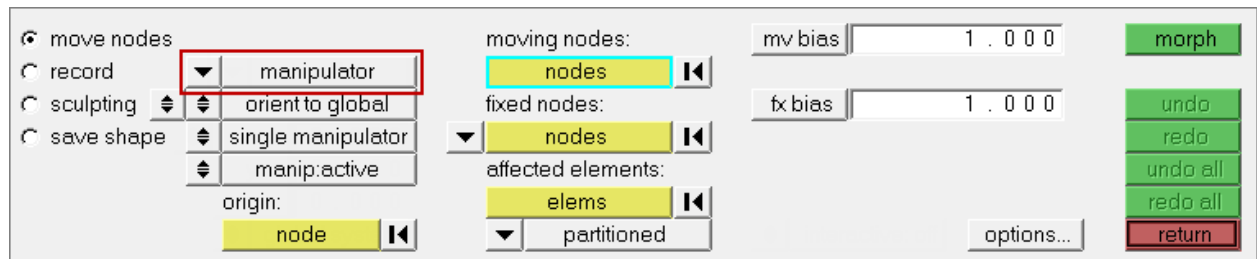
- Click **morph**. HyperMesh alters the blade of the propeller.

Note: The length of the propeller blade increased by 100. The **fixed nodes** did not move. HyperMesh stretched the **affected elements** evenly to maintain element quality. The stretching of the elements took place between the **moving nodes** and the **fixed nodes**.

- Restore the propeller back to its original shape by clicking **undo**.

Method 2: Interactive graphic manipulator base

- In the **move nodes** subpanel, set the morphing method to **manipulator**.



- Leave the other parameters and options set to their default values.
- In the **Model** browser, **View** folder, right-click on **View1** and select **Show** from the context menu.
- Use the **moving nodes** and **fixed nodes** selectors to select the nodes indicated in the following image.

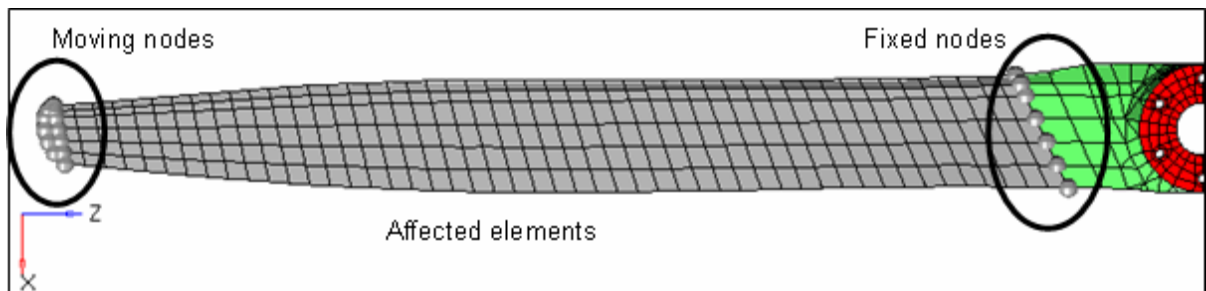
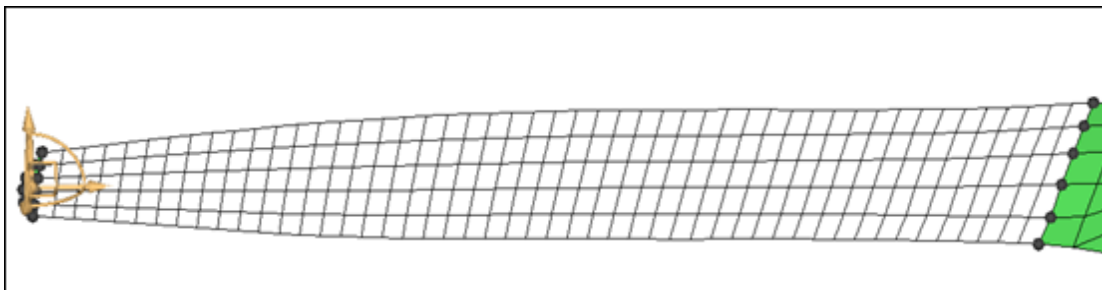
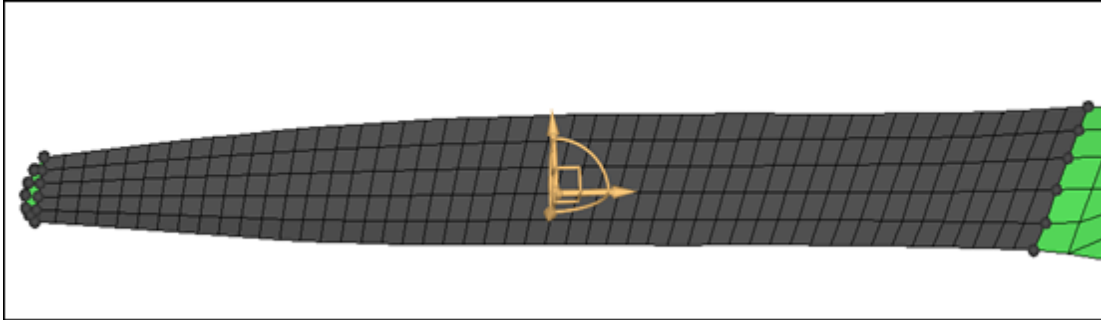


Figure 3: Node and element selections.

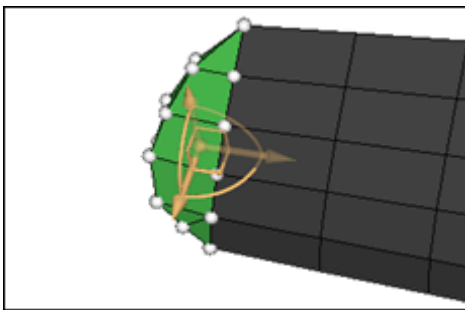
- Use the **affected elements** selector to select the elements between the **fixed nodes** and **moving nodes**. A manipulator appears.



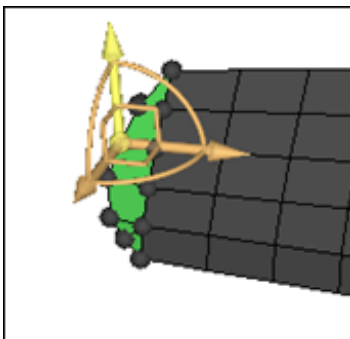
- Optional: Move the manipulator to a different location by activating the **origin: nodes** selector and selecting another node as the origin.



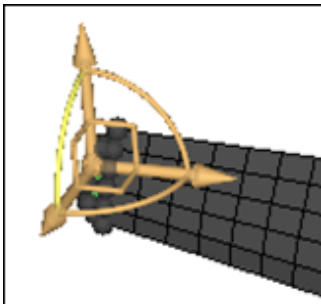
- Zoom in and rotate close the manipulator area.



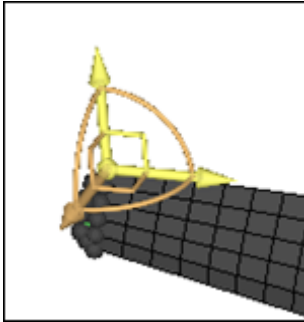
- Translate the nodes by clicking and dragging one of the three yellow arrows of the manipulator.



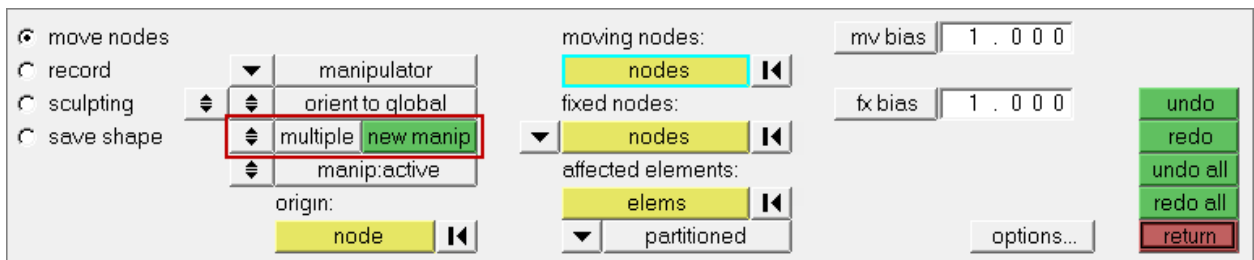
- Rotate the nodes about the center of the manipulator by clicking and dragging one of the three yellow arcs of the manipulator.



19. Click **undo**.
20. Move the nodes in a plane by clicking and dragging one of the three yellow right angles of the manipulator.

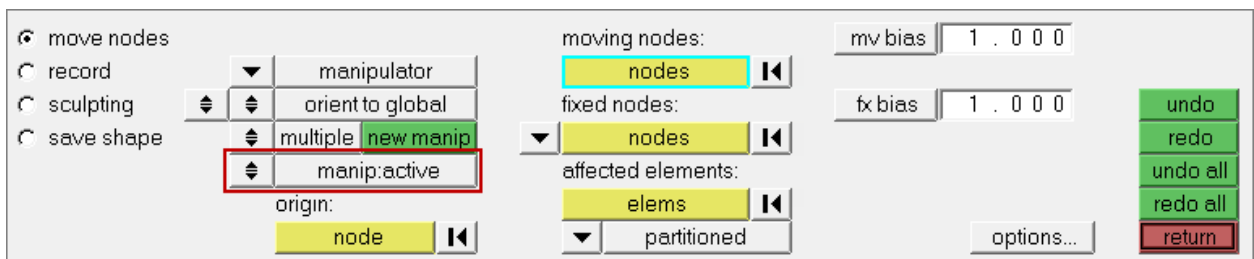


21. Create more than one manipulator at a time by setting the **single manipulator/multiple** toggle to **multiple**.



22. Create a new manipulator by clicking **new manip** and selecting one or more moving nodes.

Note: The different manipulators may have different selected entities and different parameters, and can be moved independently of one another.
23. Move a manipulator by clicking a manipulator or simply moving your mouse over a manipulator. HyperMesh updates the panel to the parameters associated to that manipulator. You can change the parameters or the entities associated with them if you desire.
24. Make manipulators active or inactive by switching the **manip:active/manip:inactive** toggle. When active, the manipulators morph the model when you move them. When inactive, the manipulators will only change their own position and orientation when you move them.



Summary

Method 1: The length of the propeller blade increased by 100. The **fixed nodes** did not move. The **affected elements** were stretched evenly to maintain element quality. The stretching of the elements took place between the **moving nodes** and the **fixed nodes**.

Method 2: The length of the propeller blade increased depending on how you dragged the handles along the three arrows, arcs, or right angles of the manipulator to respectively translate, rotate, or move the nodes. The **fixed nodes** did not move. The **affected elements** were stretched evenly to maintain element quality. The stretching of the elements took place between the **moving nodes** and the **fixed nodes**.