

# Morphing



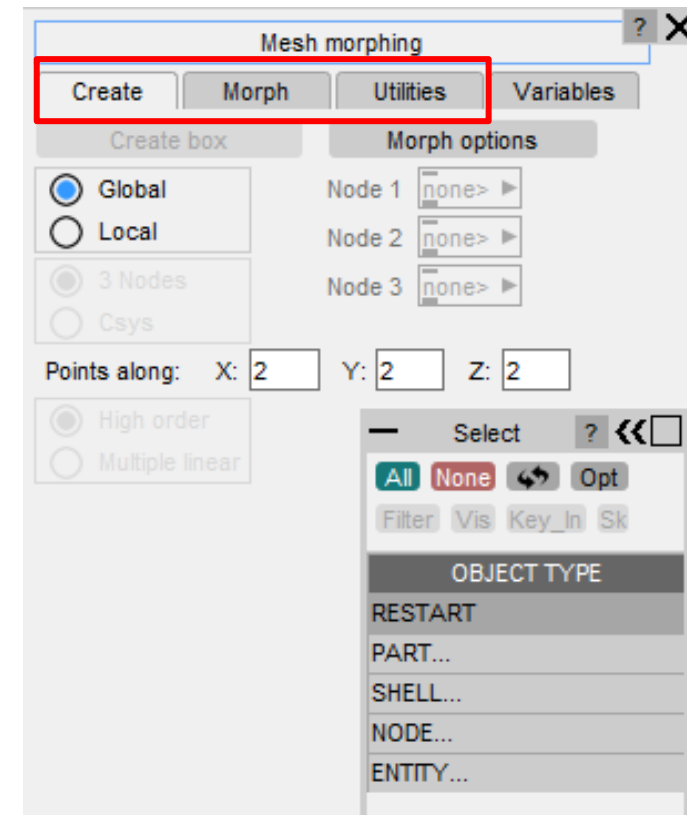
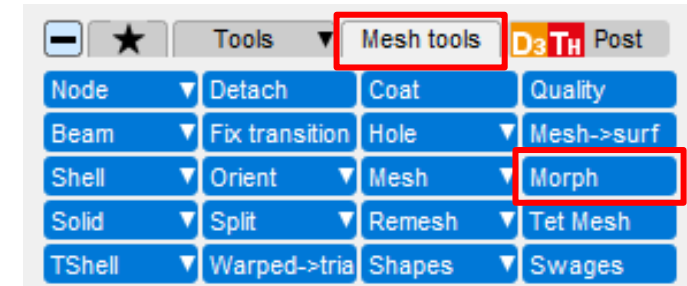
# What is morphing?

- This function allows the user to interactively morph a mesh that is present in a model.
- Morph means to modify the original position of all nodes in selected mesh. You do this by modifying the position of a few special items called “handles”.
- The final position of morphed nodes will be a combination of the final position of the handles.



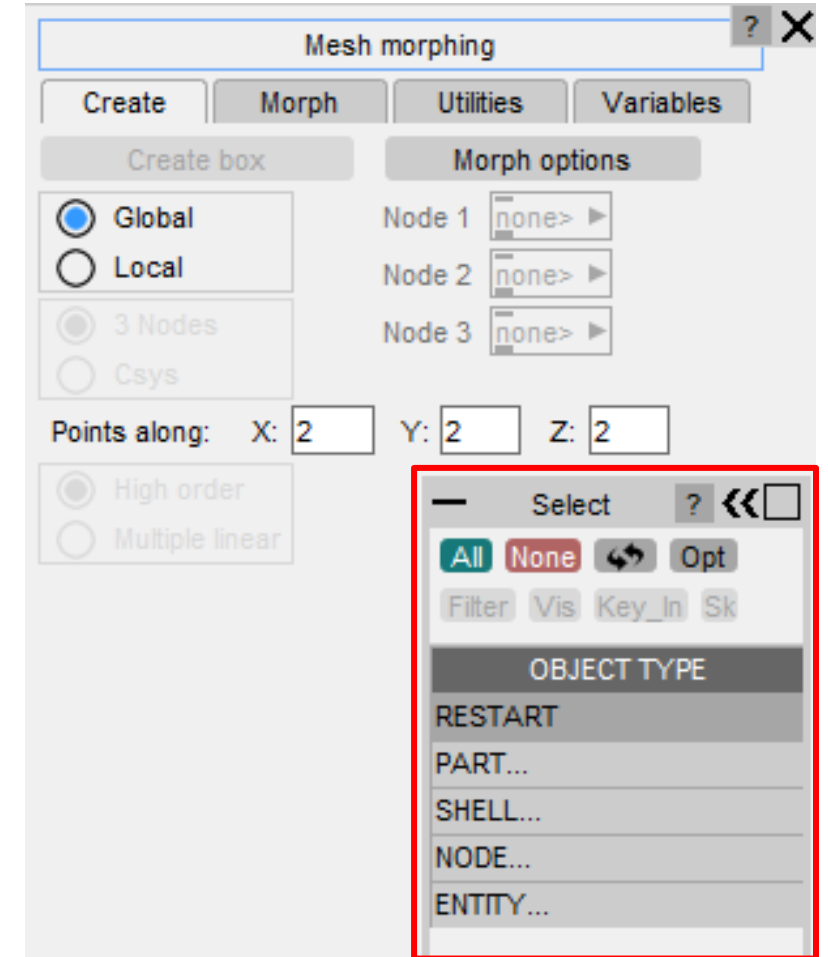
# Morphing: starting the panel

- The **Morph** feature is available from the **Mesh** tools button
- In this tutorial we will see the following three tabs of the **Morph** feature:
  - **Create**
  - **Morph**
  - **Utilities**
- The **Variables** tab is explained in the Morphing Optimisation tutorial.



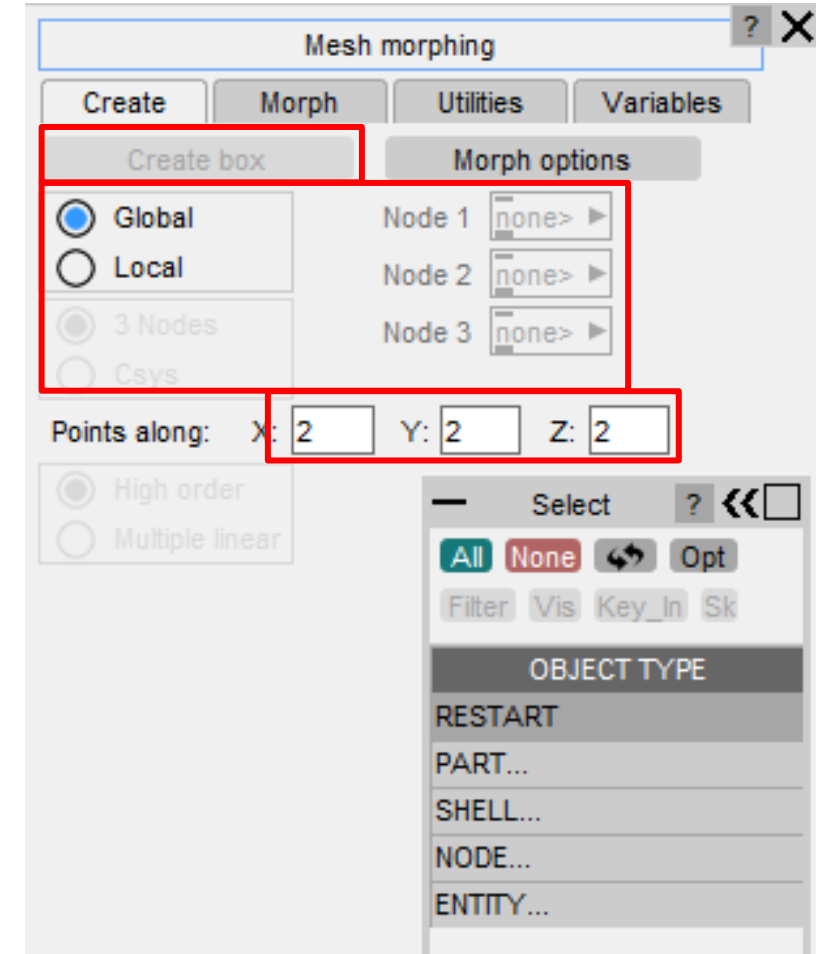
# Morphing: Create tab

- The **Create** panel is used to define the mesh that you want to morph. This is done by selecting parts, elements, nodes or any other entity type. The actual morphing will only depend on the underlying nodes in all cases.

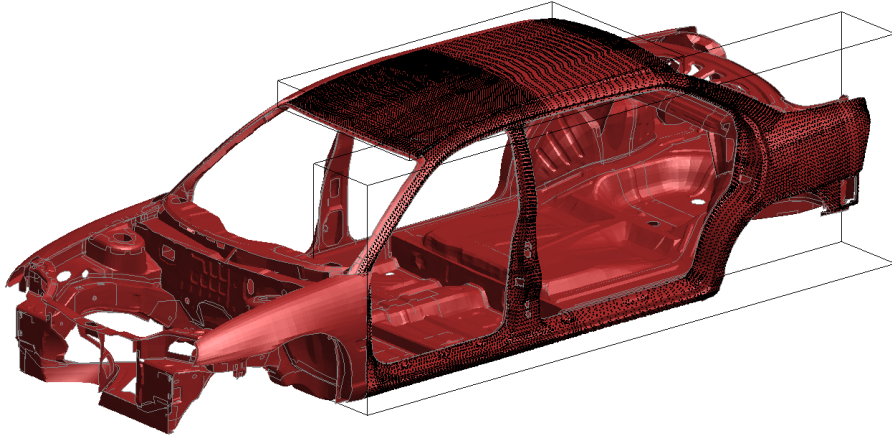


# Morphing: Create tab

- After selecting the nodes of the mesh to morph, you can create a **Morph Box** surrounding the selected nodes by using the button **Create box**.
- **Global** and **Local** options allow you to create the MORPHING BOX in the global or in a local coordinate system respectively.
- For the option **Local** you have two further options:
  - **3 Nodes**: it is possible to specify a local coordinate system by selecting three nodes.
  - **Csys**: it is possible to pick/select/create a **DEFINE\_COORDINATE\_SYSTEM**.
- The numbers of points along **X, Y, Z** can be left as the default 2 here. More detail about this can be found in the tutorial about morph boxes with high order.

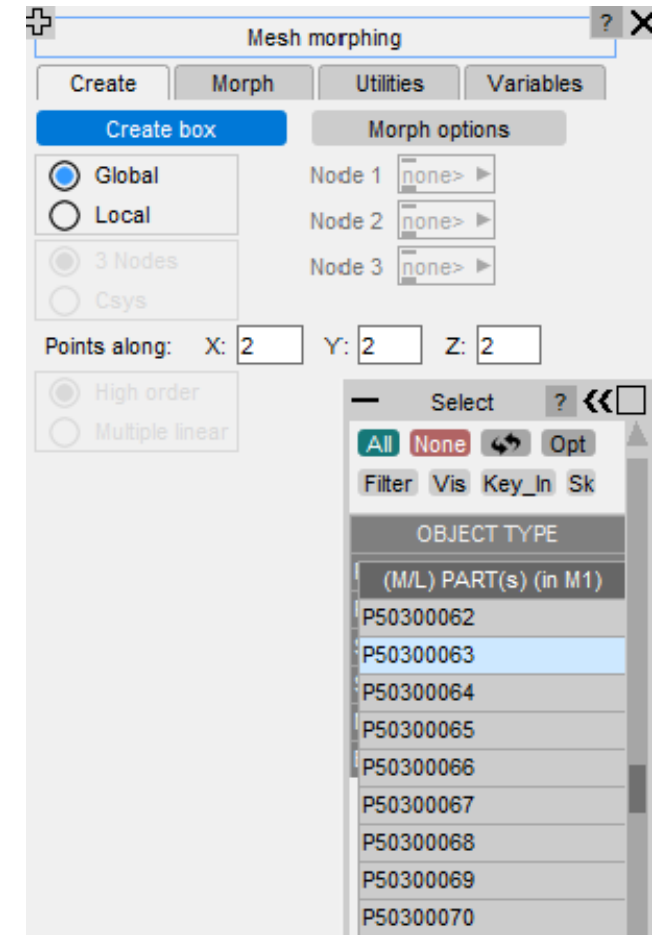
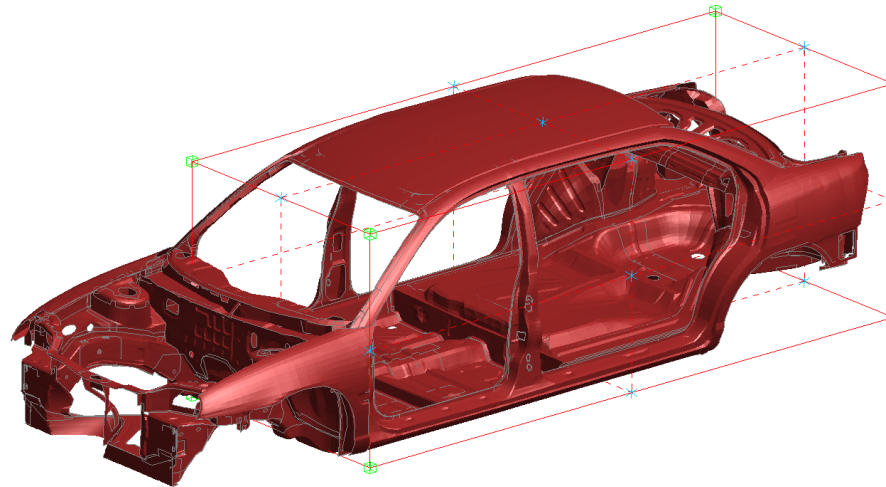


# Morphing: Create tab



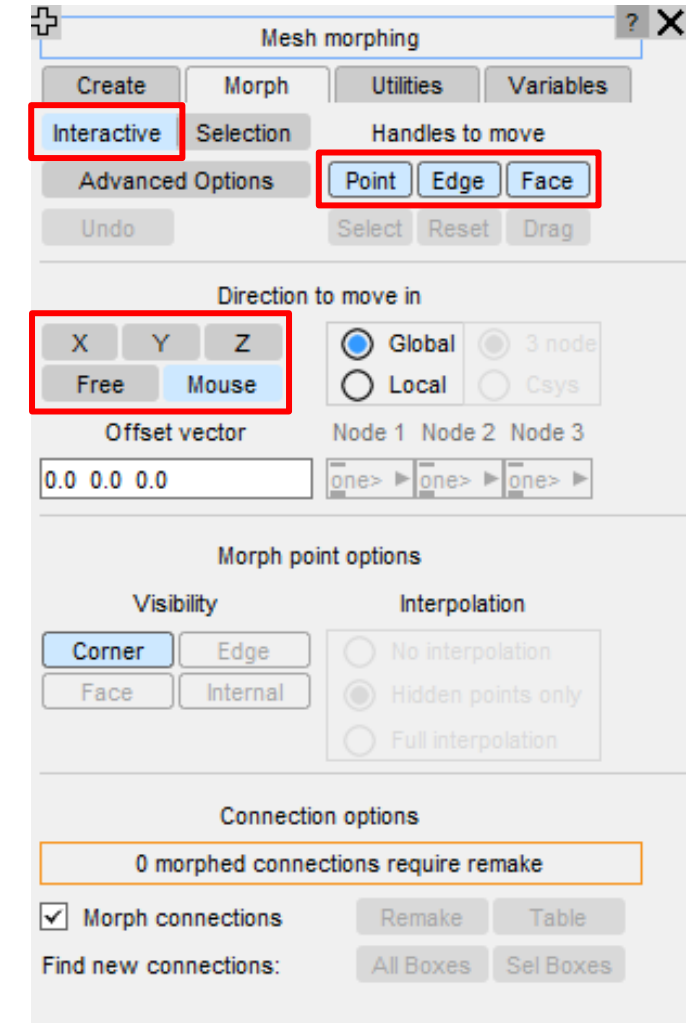
After selecting mesh to morph, click on **Create box**

On the **Morph Box** created, **Handles** are present as the morph points at the corners as well as at midpoints of edges and faces.



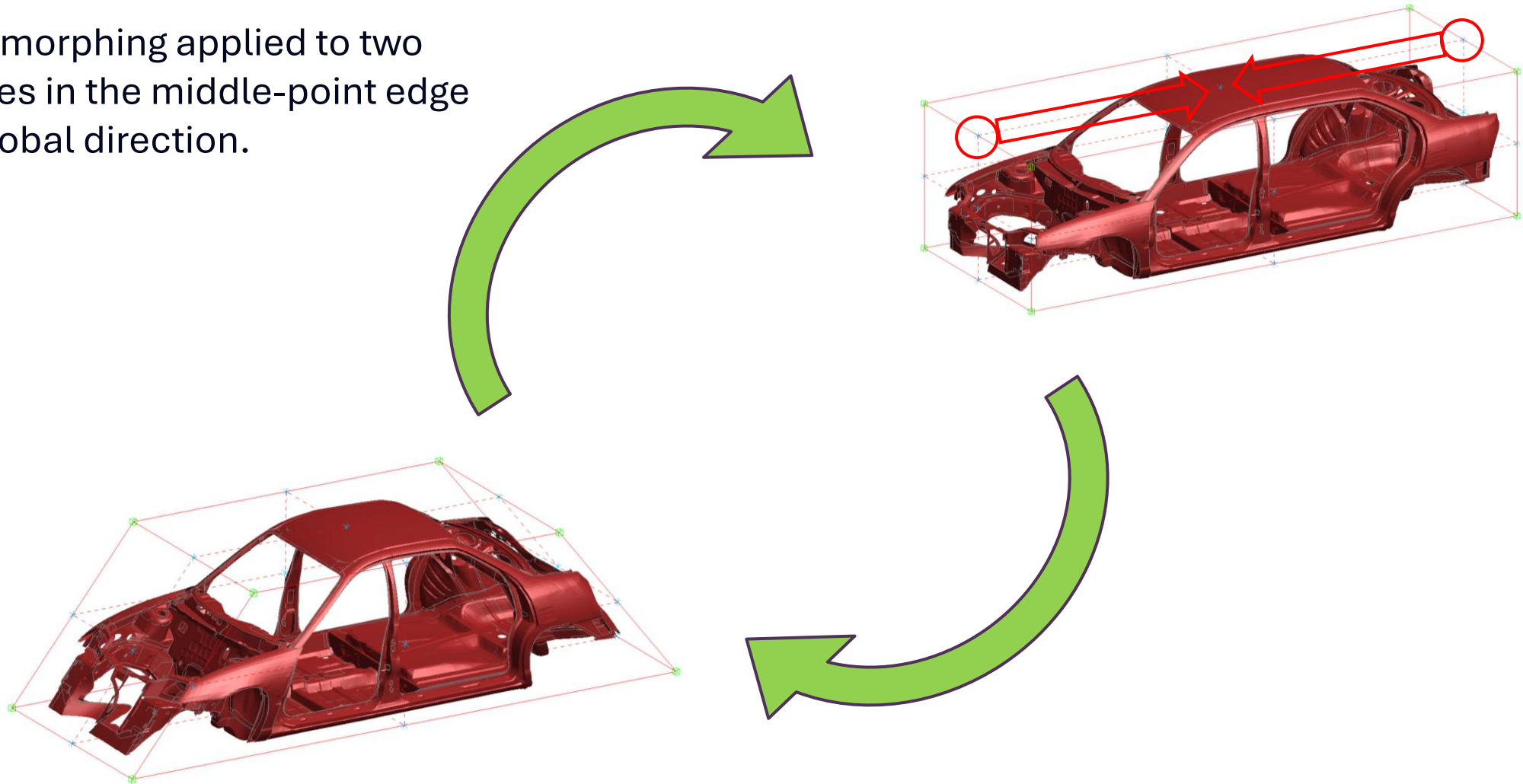
# Morphing: Morph tab

- After creating the **Morph Box**, it is possible to morph the selected mesh, using the Morph tab.
- The **Interactive** option allows you to interactively move **Handles**, that are present on the Morph Box, one at time using the mouse pointer.
- It is possible to switch on/off Handles on corners, edges or central-point faces using the buttons **Point**, **Edge** or **Face** respectively.
- Regarding the direction of morphing, there are several options:
  - **X**: morphing in x direction using any mouse button.
  - **Y**: morphing in y direction using any mouse button
  - **Z**: morphing in z direction using any mouse button.
  - **Free**: morphing in the screen plane using any mouse button.
  - **Mouse**: morphing in x direction using the left mouse button, in y direction using the middle mouse button and in z direction using the right mouse button.



# Morphing: Morph tab

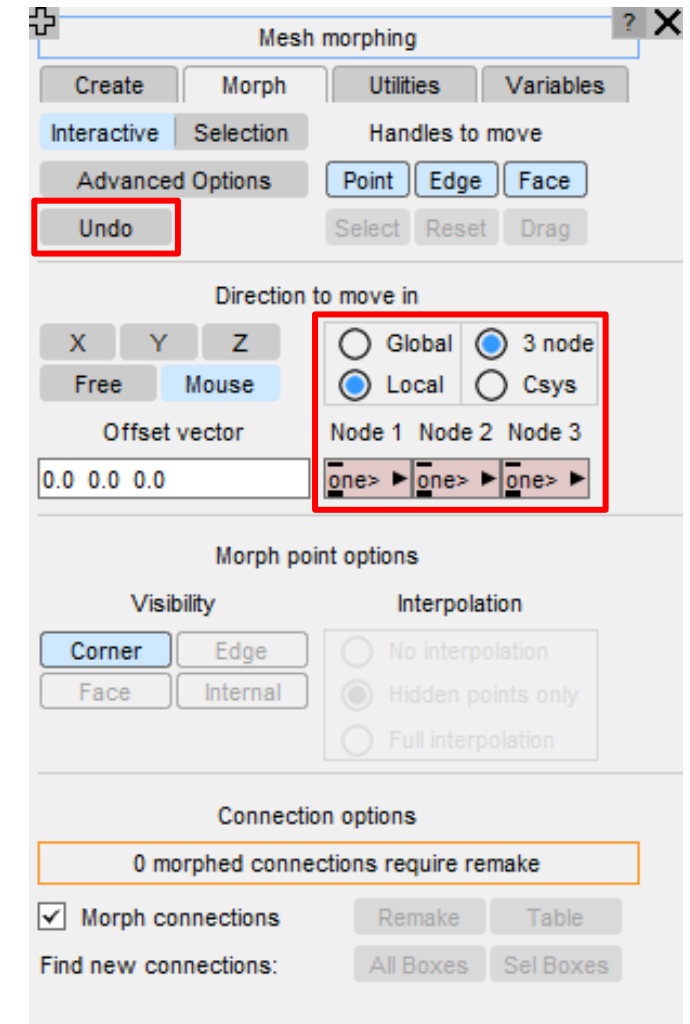
- Mesh morphing applied to two handles in the middle-point edge in X global direction.





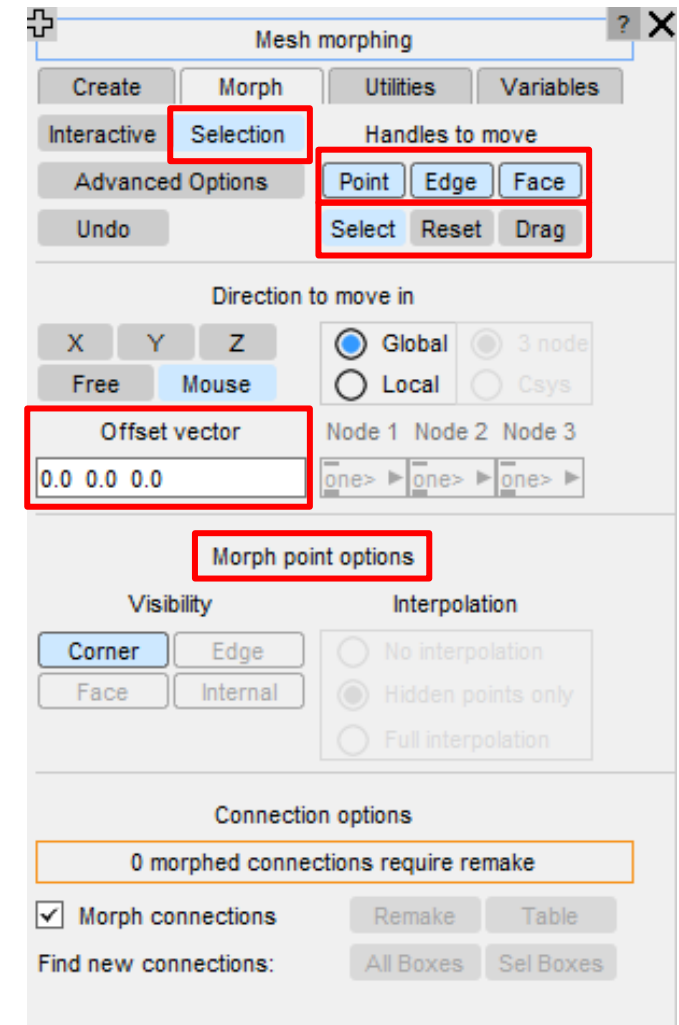
# Morphing: Morph tab

- For the direction of morphing, there is the possibility for you to use the global or a local coordinate system.
- For the option **Local** you have two further options:
  - 3 Nodes:** it is possible to specify a local coordinate system by selecting three nodes.
  - Csys:** it is possible to pick/select/create a DEFINE\_COORDINATE\_SYSTEM
- It is possible for you to undo the latest morphing operation, by using the button **Undo**.



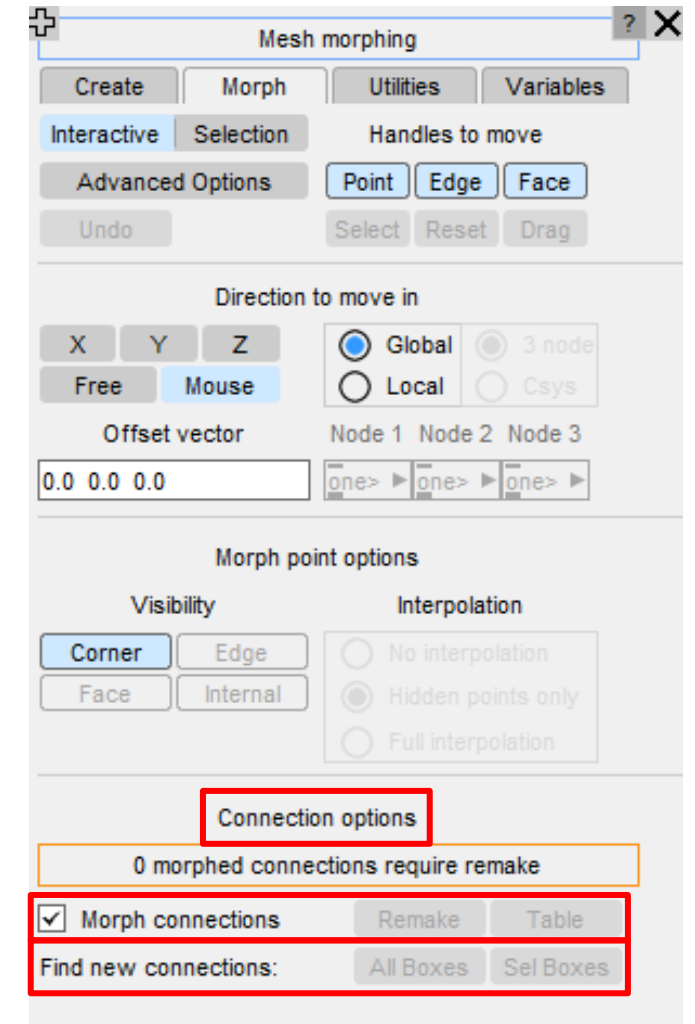
# Morphing: Morph tab

- The **Selection** option allows to select multiple Handles on morph boxes and to move them at the same time.
- It is possible to switch on/off Handles laying on corners, edges or central-point faces using the buttons Point, Edge or Face respectively. The “Selection” option works a bit differently to the interactive option; it is necessary to use the **Select**, **Reset** and **Drag** buttons as follows:
  - Select**: enables the capability to select several Handles.
  - Reset**: deselects all the Handles previously selected.
  - Drag**: enables the capability to drag all the Handles selected. It is possible to move all the selected Handles by a specific **Offset vector**, which can be given either in global or in local coordinates.
- The Morph point options are only relevant for high order morph boxes explained in their tutorial.



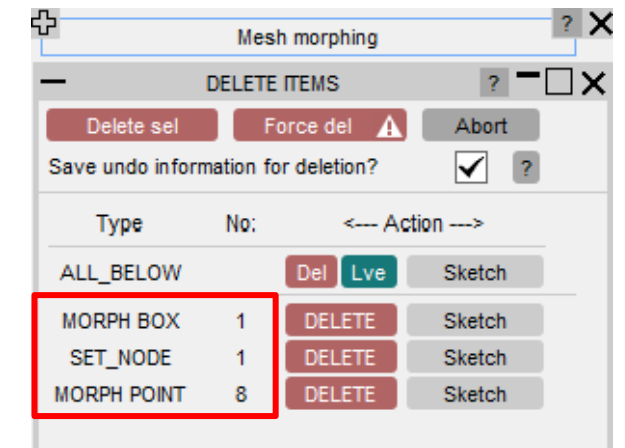
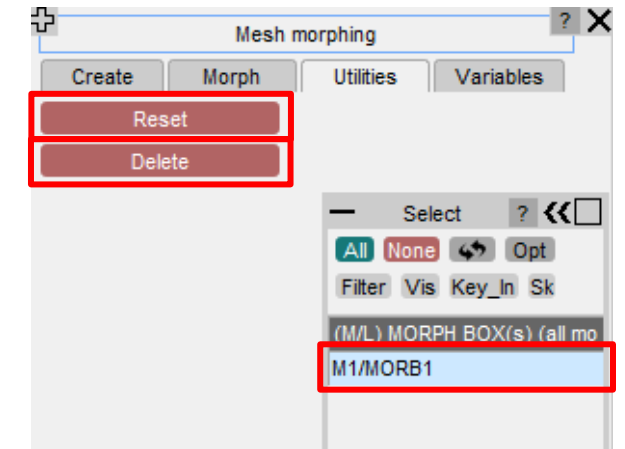
# Morphing: Morph tab

- With **Morph connections** selected PRIMER will attempt to find any connections on the panel being morphed. These connections will then be morphed along with the panel.
  - **Remake** is used to attempt a remake on any morphed connections in the current session.
  - **Table** will present any morphed connections in the current session in the Connections Table (where you can edit connections)
- With **Find New Connections**, discovery and update of connections can be manually triggered within Morph Boxes
- The value in the feedback box (above **Remake** and **Table**) is the number of morphed connections that have not had a successful remake since the last morphing operation. These connections may not be realized, or their FE may be warped.
- The status of **Morph connections** can also be controlled via the preference: *morph\_connections* (TRUE/FALSE)



# Morphing: Utilities tab

- Using the **Reset** button on the **Utilities** tab, it is possible to get back the initial shape for a selected morph box.
- The **Delete** button allows to delete the morph box together with its eight morph points and the underlying node set, which are implicitly created in the **Create** tab.



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