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# **BOXER Tutorial**:

### Transforms

BOXER version 3.10.0

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### Transforms

In this example we will actuate a mannequin by moving the arms, legs and trunk. We will also use the parametric function to collect all of the separate transformations under a single, controllable parameter.

This tutorial assumes that the user is familiar with the general method of the BOXERmesh GUI, and the operation of the various specifier panels. If this is not the case then please review beginner tutorial.

#### Import the project from the \*.bxr file mannequin\_01.bxr

- File > Open from the menu bar, OR
- Click the Open Project toolbar button, OR
- Use the keyboard shortcut Ctrl-O

The project is loaded into session and the mannequin can be seen.



Note that in the feature tree list we have created a point to be the centre of rotation and a polyline to be the axis





#### Insert a new Transform Specifier

Select Insert > Transform > Rotation from the menu bar, or click on the 'Create new rotation transform' button in the toolbar, the Rotation Editor appears

- Select the 'Custom' radio button
- Drag the 'l\_shoulder\_centre' point to the 'Centre' field
- Drag the 'left\_shoulder\_axis' polyline to the 'Axis' field
- Change the name of the specifier to 'left\_arm\_swing'





Now add patches to the patch list

- Use the feature tree filter to list only entities that begin with 'I\_'
- Select I\_shoulder, I\_u\_arm, I\_elbow, I\_I\_arm, I\_wrist and I\_hand
- Drag and drop these patches into the patch list subset
- Enter a rotation angle e.g. 33 degrees

Press OK and observe that the mannequin's left arm has moved.



#### Import the project from the \*.bxr file mannequin\_02.bxr

- File > Open from the menu bar, OR
- Click the Open Project toolbar button, OR
- Use the keyboard shortcut Ctrl-O
- This project has 3 additional transforms. Note that they use the extra axes and rotation centres
- Double click and edit the rotation and scale values in each transform specifier and note the effects





#### **Create a Parametric Transform**

Select Insert > Transform > Parametric from the menu bar, or click on the 'Create new parametric transform' button in the toolbar, the Parametric Editor appears

Click OK, the parametric transform called "Parametric" appears in the Feature Tree

Now drag each individual transform (left\_arm\_swing, l\_leg\_swing, upper\_body\_sway, breathing) into a sub-branch below the parametric transform "Parametric" in the Feature Tree. Use the menu expanding 'twist handle' to see the items below 'Parametric' in the feature tree as you add them. This makes all 4 transforms parametric.





Double Click the transform "Parametric" in the feature tree to bring back the Parametric Editor for this transform

Change the parametric value with the slide (click OK to confirm) and observe that all 4 transforms work together. The slide value is a multiplication factor for each individual transform value.



## Tip:

The order in which the transforms are carried out can be changed by drag-dropping the transform items to a different position in the Feature Tree. This method can also be used to remove individual transforms from a Parametric transform list and place them back in the 'independent' transforms list.