Rigging a Flag:

The following tutorial will help familiarize yourself with how you can combine different deformers to create a simple flag rig. This will also go some way to help you get used to the accurate organization of your assets.

This may be viewed as a somewhat complicated approach to rigging a flag, and in some ways you would be correct but the aim here is to provide you with knowledge of techniques that have the ability to be applied to almost anything.

We created a very simple flag and pole model for you to start with.

Because we want a few different types of flag deformations to be mutually exclusive, we are going to create blend shapes to drive the flag.

Step 1:

Duplicate the flag a couple times and move the duplicates out into their own space. We also want to group these into a *blendShapes group*, and name them appropriately (*Ctrl-d* to duplicate, *Ctrl-g* to group and *MMB click and drag* to move *the blendShapesGrp* to the *extrasGrp*).
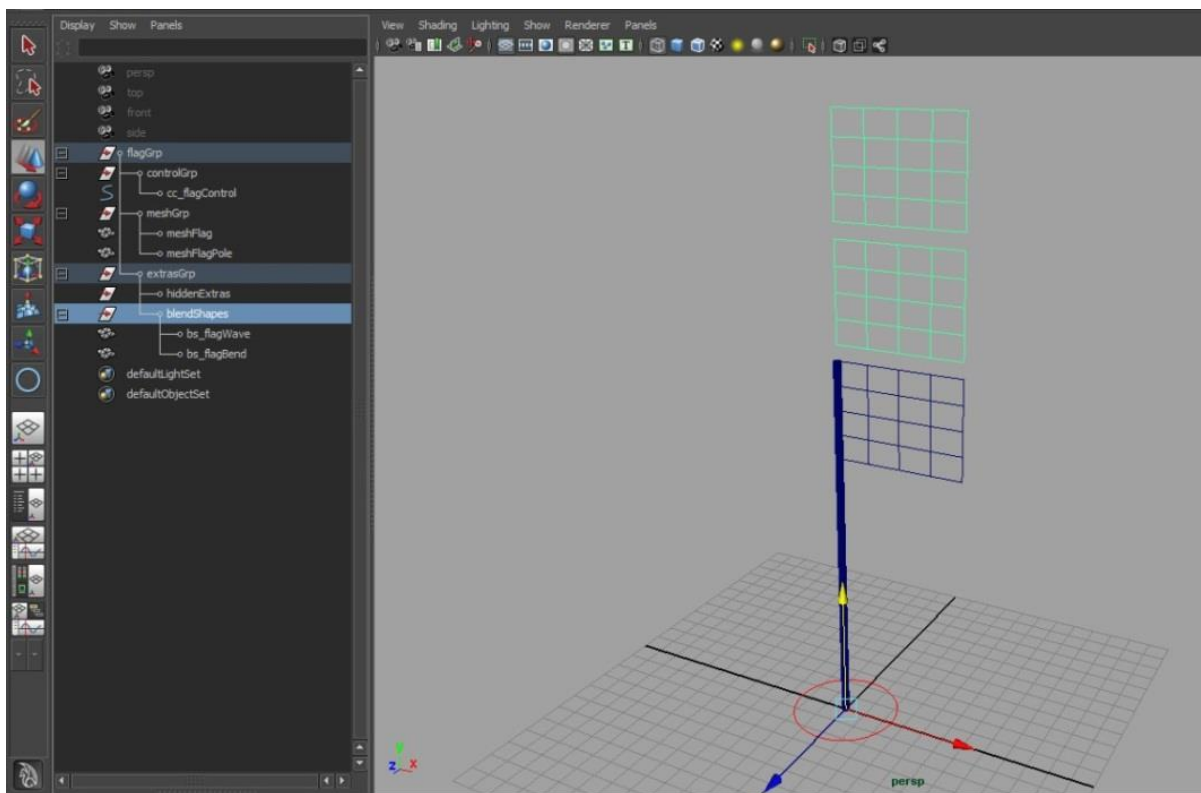
First we will add the wave effect for the flag. With the *Wave* shape selected, apply a Sine deformer to it.
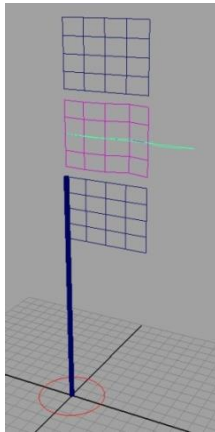
To give the correct kind of effect, first we need to move and rotate the deformer into place. Set the Rotate *Y* and *Z* to *90*, and then move the deformer out so that the centre of it is nearing the flag tip. We also need to extend the length of the sine curve, so increase the *high bound* to *2*. We want less movement at the pole end, so increase the *drop-off* to *1* and so that we can see the effect we will be getting, increase the *amplitude*.
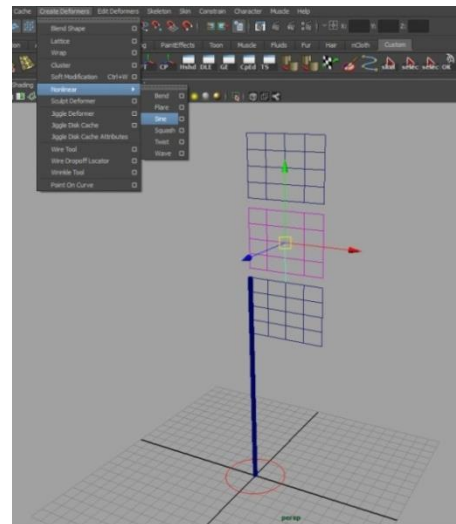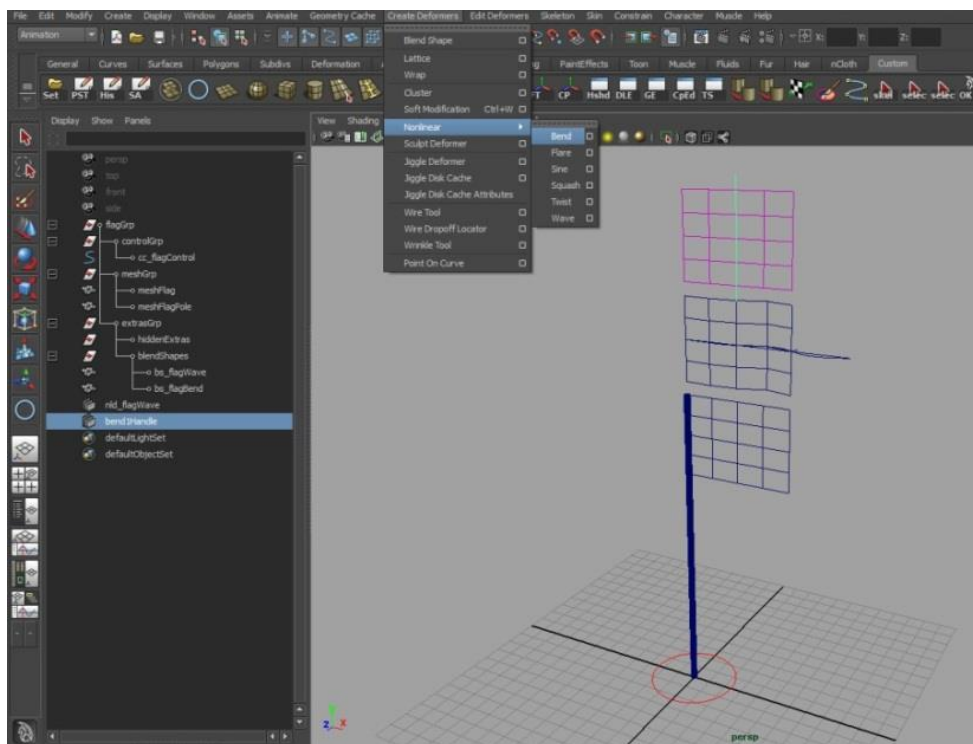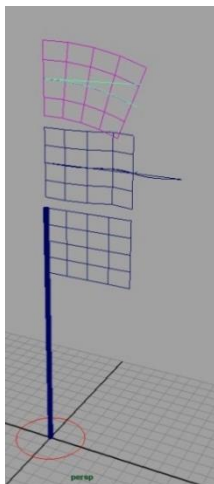
The second blend shape is going to give the flag a drooping effect. With the bend mesh selected, apply a *bend modifier*.

Again, we need to move and rotate the deformer into the correct position, and adjust the high and low bounds. We can also increase the curvature to give an impression of the effect we will be getting.

Step 6:

The next step is to create the blend shape node that will drive the main flag mesh. Select the two blend shapes and then shift select the original flag mesh. In the options box, be sure to give the node a sensible name. When you have created it, set the two blendshape nodes to '1' to activate them (you should see the flag mesh deform).
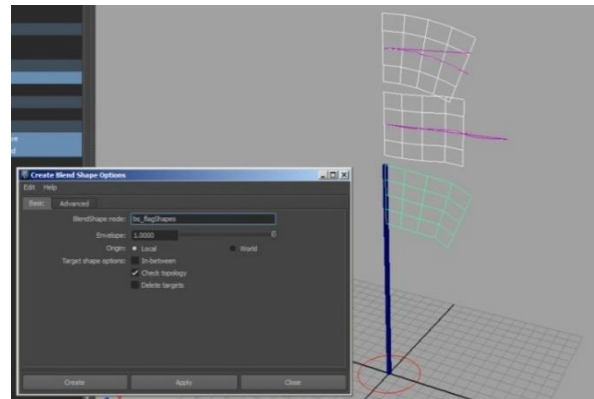

Step 7:
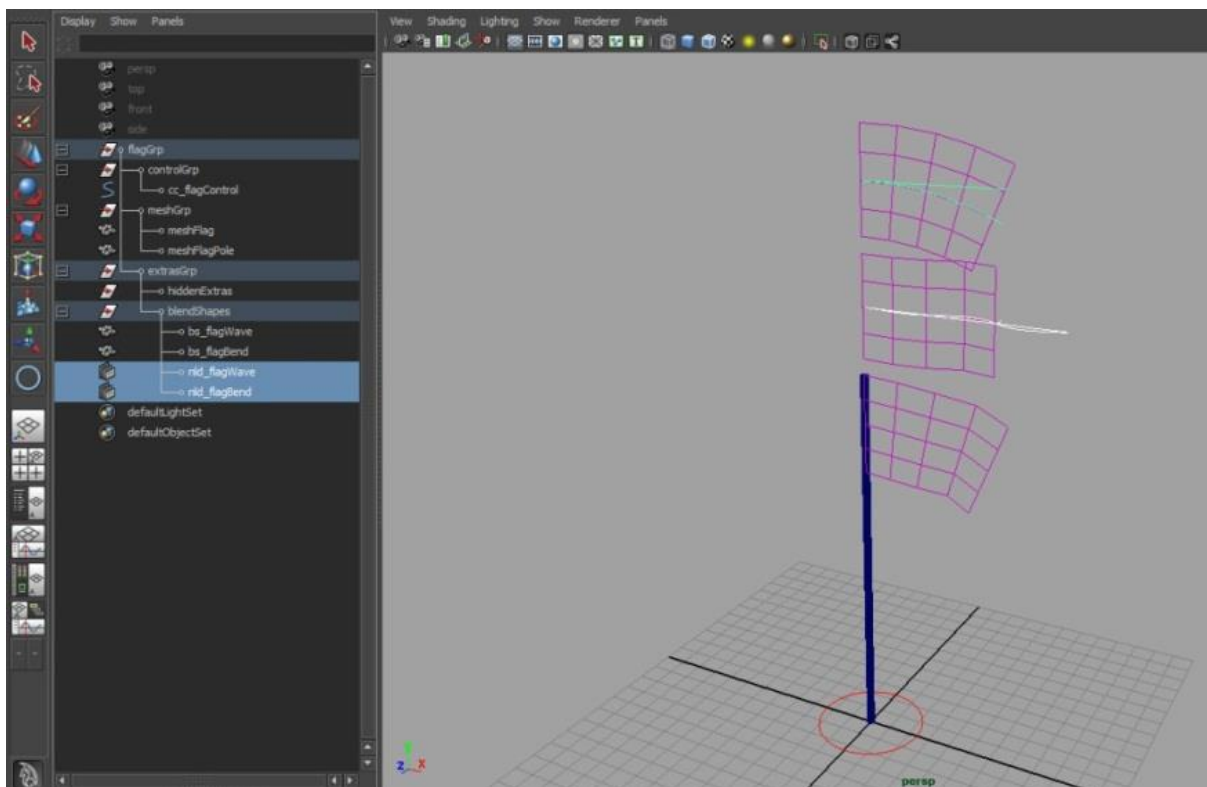
Now we can get around to creating the controls to move the flag, and a little bit of cleaning up. First, Move the two deformers into the blendShapes Group.

Select the flag control curve, and then in the Channel Box go to the add attribute options. We want to add four main controls, a way to change the value of the *droop* and the *wavelength*, *amplitude* and *offset* of the *wave deformer*. I usually add a *Boolean* (*on/off*) attribute to begin with, and then lock it (right click on the attribute, lock selected).

We will start with the wave deformer, select the control curve and *shift-select* the *wave deformer*, then bring up the *connection editor*.
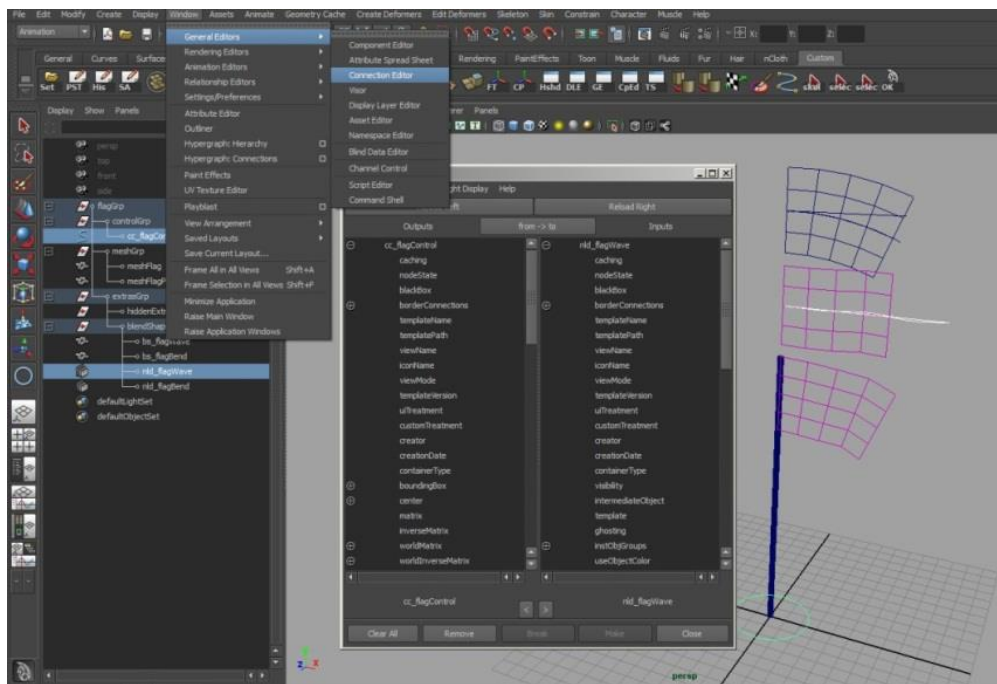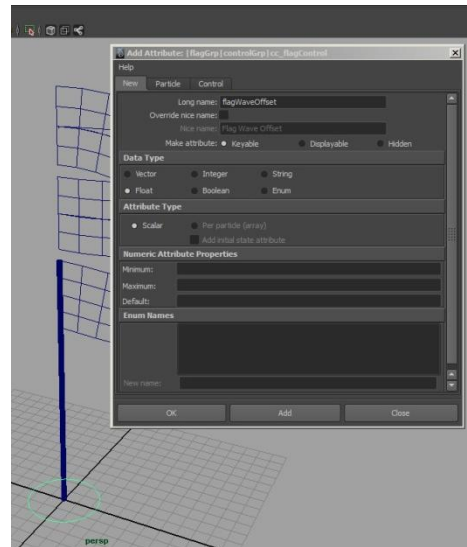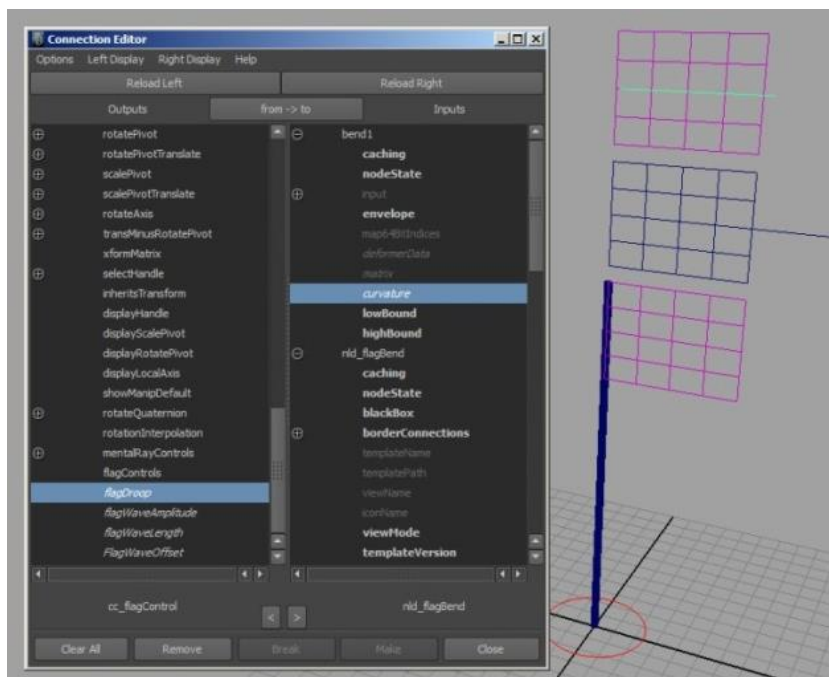
Step 10:

We want to connect our custom attributes to the corresponding deformer attributes. First we need to bring the deformer's shape node into the right side of the connection editor, select the deformer, and then the 'sine1' input node, and then click *'Reload Right'*. You will then be able to see the *amplitude/wavelength/offset attributes* and can link them to the global control.
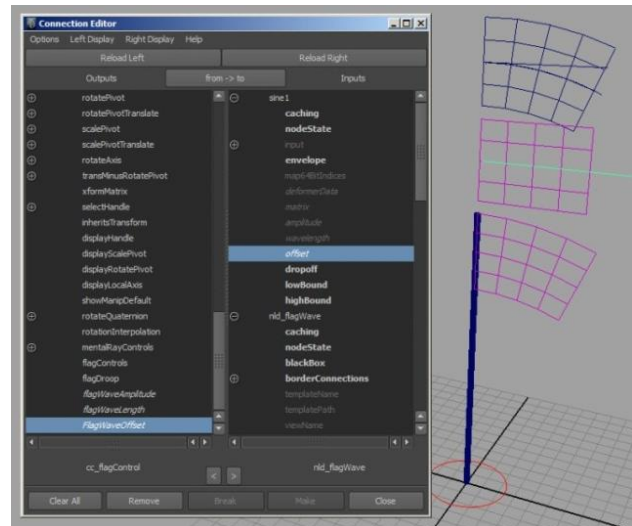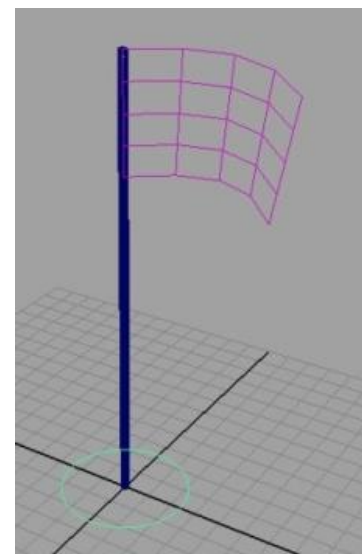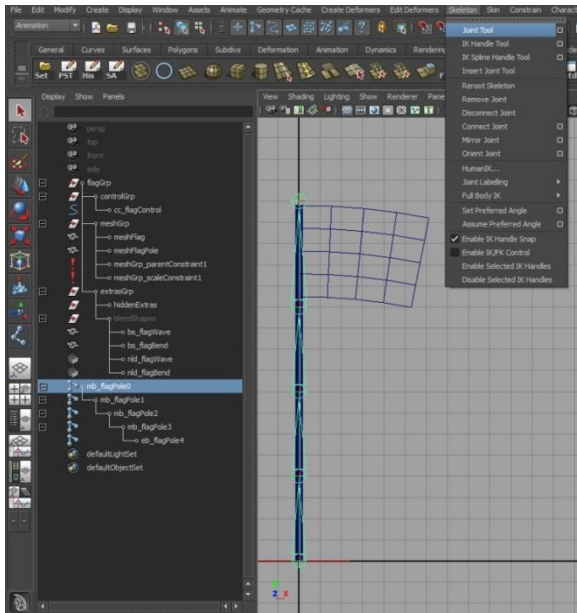

Step 11:

Now we can do the same with our bend deformer and the droop control.

Step 12:

When everything is connected, test your new controls out. We can also go ahead and hide the blendShapes group.
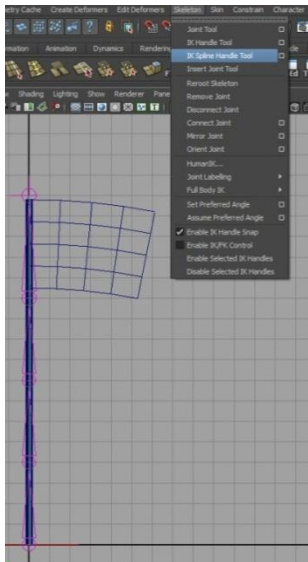
We would like to also bend the flag in any direction, and maintain the rest of the setup we have created. We are going to create a Spline IK driven by a control at the tip of the flag. In the front view, using the Joint tool, create about 5 joints along the spine of the flag. Name the joints appropriately.
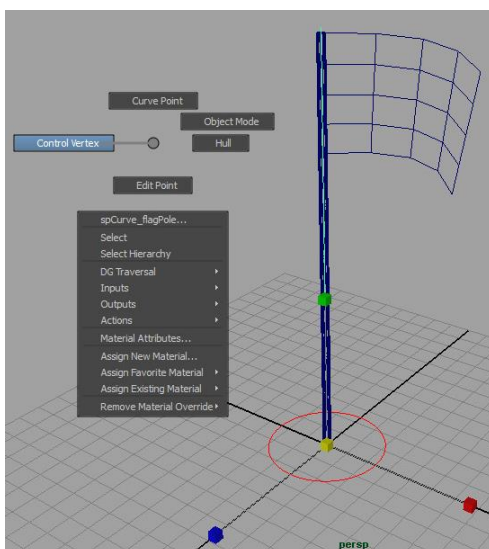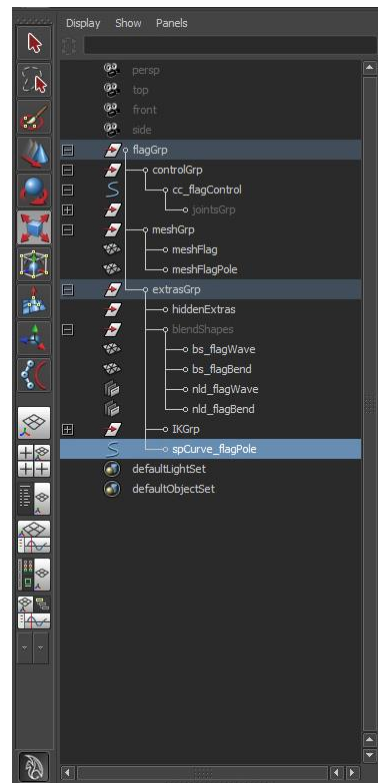
Step 14:

Using the IK Spline Tool, select the first and last joints in the sequence.

Step 15:

You can also group and hide the IK node and the joints and organize them into the hierarchy. The spline curve should also be moved into the extras group.

Step 16:

Select the spline curve, and *marquee-select* the top control vertex, with this selected we're going to assign a cluster to this point.
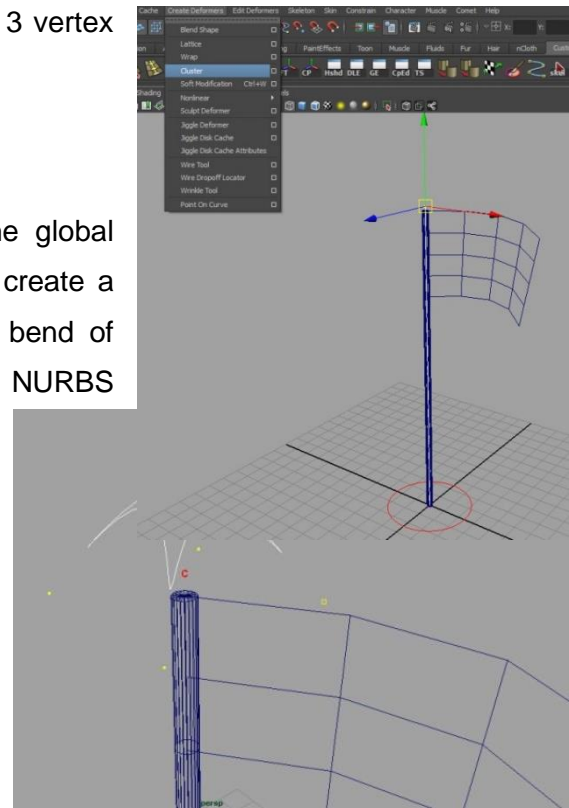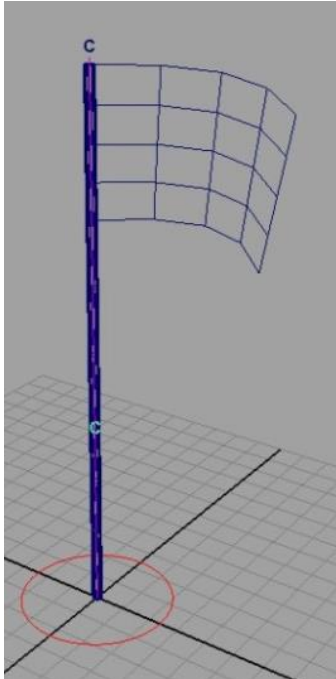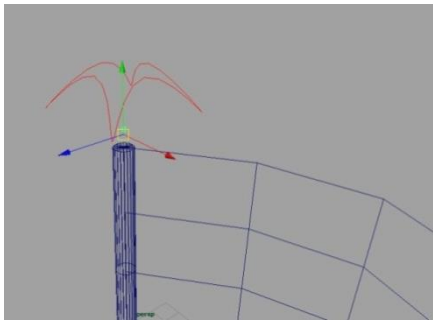
We want to do the same again with the bottom 3 vertex points of the curve.

Group the clusters and parent them under the global

control. We need to create a curve to control the bend of the flag, so using a NURBS circle, create a shape and move it to the top of the flag. Ideally, the centre pivot of the curve wants to be the same as the cluster.
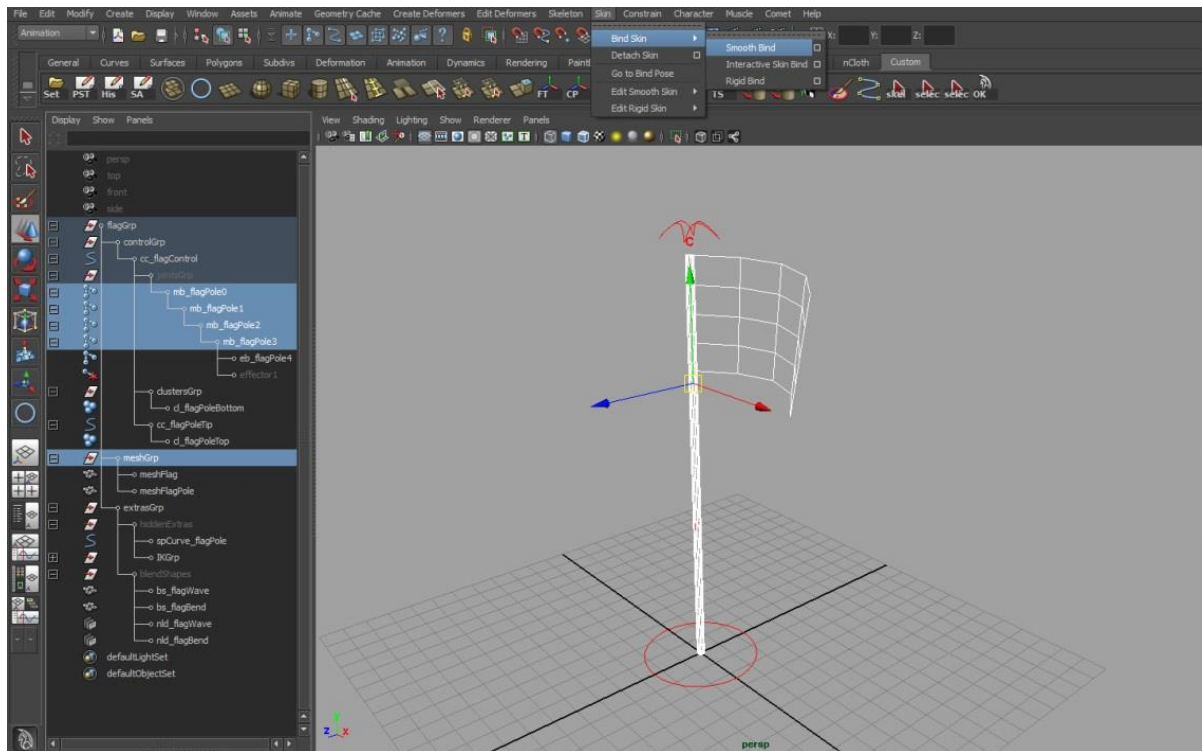
You can then parent the top cluster to the new curve (which in turn wants to be parented under the *global control*).

Step 20:

In order for the flag mesh to be driven by the spline IK, we are going to bind it to the joints. Select the meshGrp and then Ctrl-select the first 4 joints and create a smooth bind.

That concludes the rig of our flag. We can now easily create a continuous flag wave by keying the flag Offset Attribute with a post-infinity curve set to linear, and at the same time, dynamically change the amplitude, wave length and flag droop during your animation.