Rigging: IKSpline for the Neck and Tail

By Epona Schweer, 2009

Table of Contents

Why use an IKSpline?

You have three choices when you're deciding on how to set up your neck and tail. You can use a Forward Kinematic rig setup which will give you manual control over the joint orients. You can use the Inverse Kinematic Setup which will give you the ability to twist and move your joint chain uniformly. You can also choose to set up a system that lets you switch between both.

The benefit of using the Inverse Kinematic Setup (or IK for short) is that you can affect the whole joint chain with just one or two controls. Great for fast animation, though not so great if you want a really precise and specific movement.

Before you Start: Build your Spine Controls!!

We'll be connecting the neck controls into the spine, so go have a look at **Rigging a Spine with an IK Spline/FK switch** on Elearn. Or you can create a more basic spine control system by orient constraining the joints of the spine to your back controllers.

Step 1: Preparing the Neck Joints for an IK Spline

a) Name all your joints appropriately

b) Ensure that your joint orientations are clean (the red line should be going down the bone, and the blue line should be going in the same direction as all the joints in THAT LIMB)

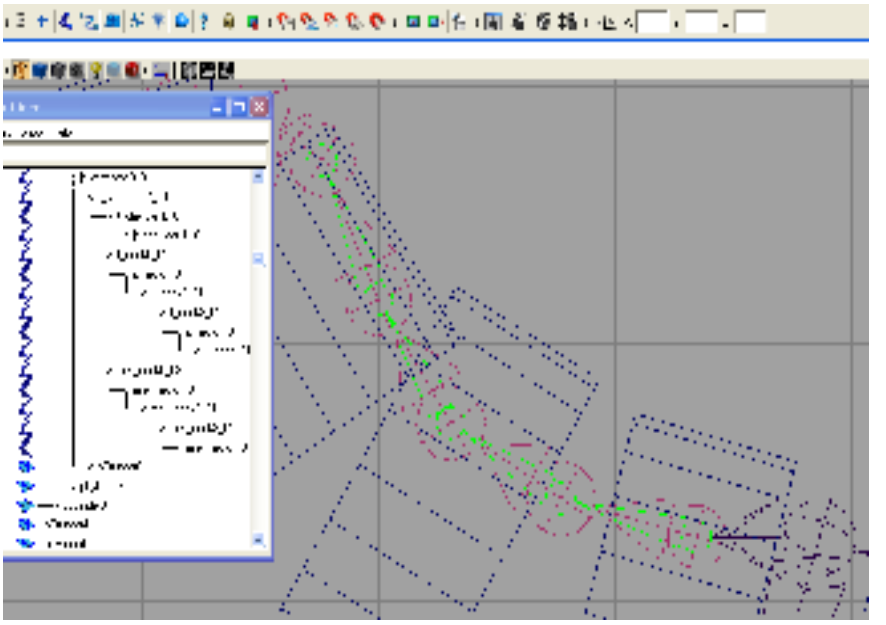
Step 2: Duplicating the Neck Joints

a) Select the root of your neck joints (in my case that's jt_neck5_01) and Duplicate

b) Go into the outliner and delete any extra duplicated joints (like the head)

c) You should end up with an additional neck joint chain which you should now
rename with the prefix "mnv" for Move Neck Vert

d) use the Joint Orient tool to ensure that your new mnv joints have the same orientations as the original spine



Step 3: Create your IK Spline on the Original neck joints

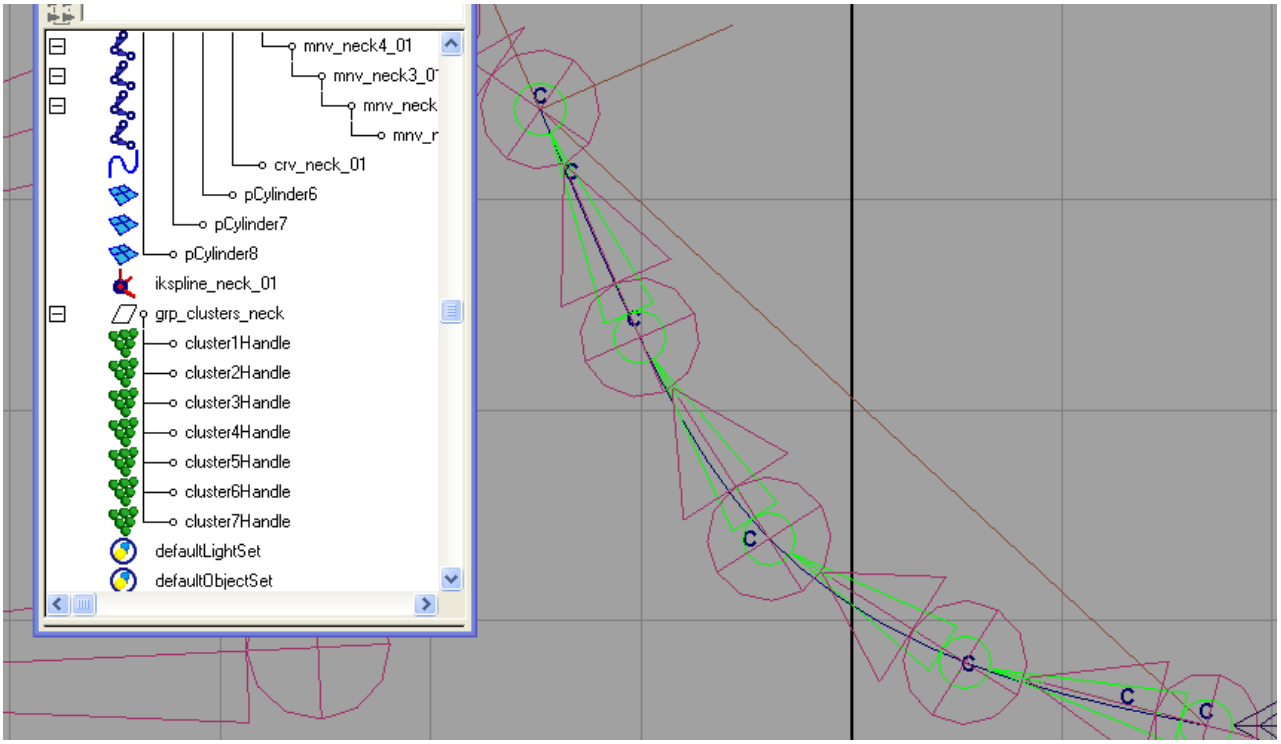
a) In the Outliner, use the IK Spline Handle Tool under Skeleton (all options turn on and Spans set to 4) to click on the **original** neck joint closest to the shoulder and then CTRL Click the original neck joint closest to the head).

b) Rename the IK Handle and the Curve that this has automatically created to ikspline_neck_01 and crv_neck_01

Step 4: Cluster the neck curve

a) Select the new curve in your outliner and go to Surfaces > Edit Curves > Selection > Cluster Curve to create a series of clusters that will let you control the CV's of that curve.

b) In the outliner, select all your clusters and hit CTRL + G to group them. Rename that group to grp_clusters_neck



Step 5: Connect each cluster to its appropriate mnv joint

a) Starting from the mnv root joint of the neck (closest to the shoulders) Parent constrain each cluster to the mnv joint it's nearest to (ex: Select **the mnv joint** and CTRL Click **the cluster handle** then go to Constrain > Parent Constrain). Make sure Maintain Offset is turned on.

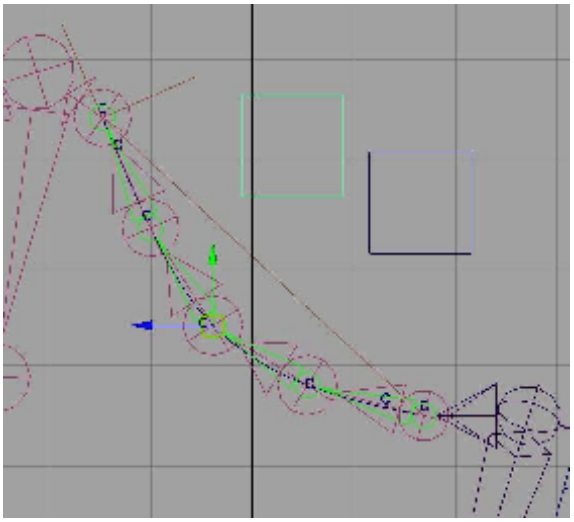
b) Repeat this step for all clusters. In my case I had an extra cluster at either end of the curve. I just parent constrained that to the end joint as well (so mnv_neck1_01 has two clusters parent constrained to it, as does mnv_neck5_01)

c) Test your connections by rotating each of the mnv joints. If your neck rotates with it at the same point then you're on the right track

Step 6: Create and connect two Controllers for the neck

a) Create two controllers for the neck, any shape that you'd like and position them above the neck (easiest to work in the side view for this) with enough space that you can easily select them again

b) Rename them ctrl_lowerneck_01 and ctrl_upperneck_01. Snap the pivot of ctrl_lowerneck_01 to the lowest of the middle bones of your neck (in my case that's mbv_neck4_01). Snap the pivot of ctrl_upperneck_01 to the next joint up. Freeze Transformations on those controllers.

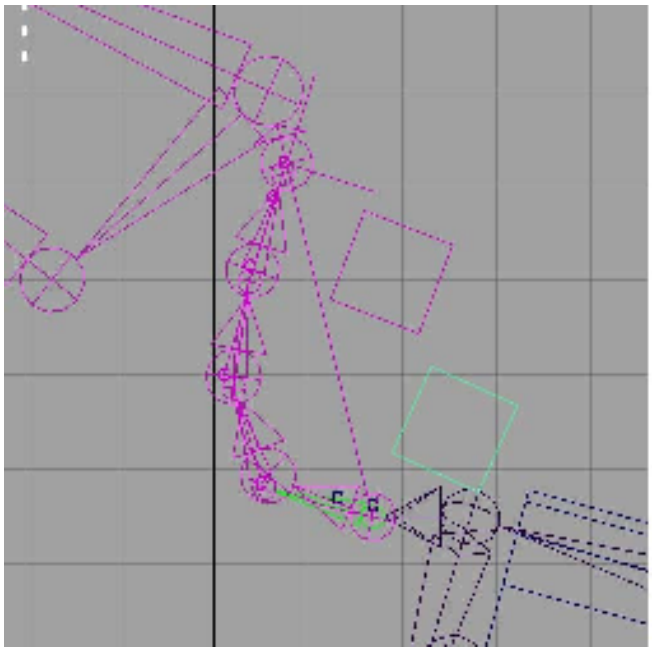


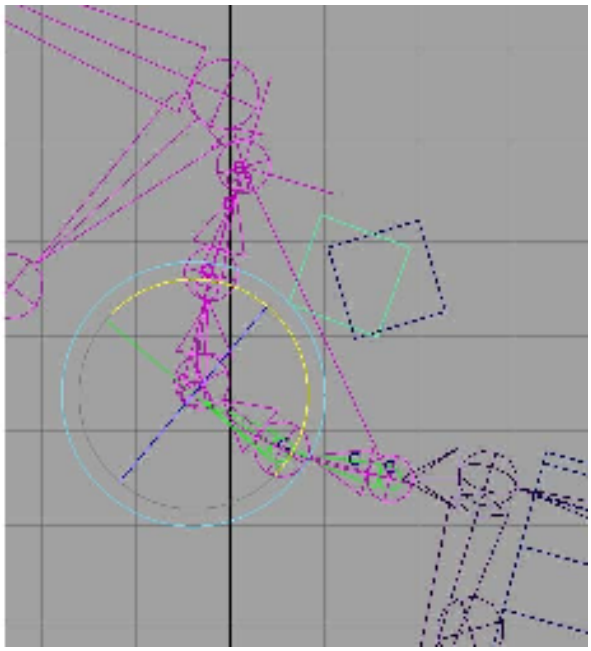
c) Parent constrain those joints to their respective controllers (ex: select ctrl_lowerneck_01 and CTRL Click mbv_neck4_01 in the outliner, then hit Parent Constrain).

d) select ctrl_upperneck_01 in the Outliner and group it to itself (hit CTRL + G) and rename that group grp_upperneck_01.

e) select ctrl_lowerneck_01 and CTRL Click grp_upperneck_01 in the Outliner and hit Parent Constrain.

f) Select each of your controllers in the viewport and test them out.





Step 7: Add Attributes to your Chest Controller and Connect

a) Select your Chest Controller (or your Top Spine Controller) and go to Modify > Add Attributes and add the following – Neck Curl, Neck Sway, Neck Twist

b) Open up the Connection Editor (Window > General Editors > Connection Editor) and load your Chest Controller in the Left Display. Load the base of your mnv joint chain into the Right Display (in my case that's mnv_joint5_01).

c) Connect Neck Curl to Rotate X

d) Connect Neck Sway to Rotate Z

e) Connect Neck Twist to Rotate Y

f) Select your Lower Neck Controller (ctrl_lowerneck_01 in my case) and group it to itself by hitting CTRL + G. Rename this grp_lowerneck_01.

g) Parent constrain grp_lowerneck_01 to the base of your mnv neck joints (ex: select mnv_joint5_01 and CTRL click grp_lowerneck_01 in the Outliner and go to Constrain > Parent Constrain)

That should be it!! Test it and go!

Taking it Further: Repeat all of the above for the tail!

You can repeat all of the above for the tail using exactly the same principles