



Rigging a Spine with an IK Spline/FK switch

Epona Schweer, 2009

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What on earth is an IK/FK switch?

While an IK system is a great way to quickly animate a lot of functional movement (waving, walking, etc), it can be a nightmare when you want a very specific or precise movement for your animation. That's why you build in a switch that lets you go from working with the limited IK (Inverse Kinematics) setup to a manual FK (Forward Kinematics) setup.

Before you start:

Make sure you've built in the trio of bones that make up the end of your spine (last Vertebrae bone, the Ilium and the Main root bone) see the **Hip Functionality Setup** on how to do that.

Step 1: Duplicating the spine and setting up the Spline IK Curve:

- a) Select the end of your vertebrae chain (the end at the hips) and duplicate it. Delete all the NEW bones that are NOT your vertebrae chain.
- b) Immediately rename with the prefix **mbv** (for Move Back Vert).
- c) Prepare to set up your Spline IK by expanding the ORIGINAL vertebrae group in your outliner. Using the Spline IK Handle tool, in the Outliner, first click the end of your original vertebrae chain (the hips end) and then hold down CTRL and click on the top of your vertebrae chain.
- d) Immediately name the new IK Handle and Curve that's been created to `ikspline_spine_01` and `crv_spine_01`.

Step 2: Clustering the IK Spline Curve and Parent Constraining Clusters to Vertebrae

- a) Select the renamed curve and go to Surfaces>Edit Curves>Cluster Curve
- b) Immediately rename the clusters after the vertebrae they're nearest to (ex: `cls_vertebrae5_01`) and parent all the clusters under the Main Bone (part of the Hip Setup). Each cluster will be automatically assigned a group. Immediately rename those groups after their cluster (ex: `grp_cls_vertebrae5_01`)
- c) starting from the second to last bone in your spine (**ignore the last hip bone and the last two clusters right next to it for now**), parent constrain the clusters to the **MBV** vertebrae they're sitting closest to (example: `cls_vertebrae4_01` needs to be parent constrained to `mbv_vertebrae4_01`, so I would select the `mbv_vertebrae4_01` then CTRL select the `cls_vertebrae4_01` in the outliner and click Parent Constrain with Maintain Offset turned on).

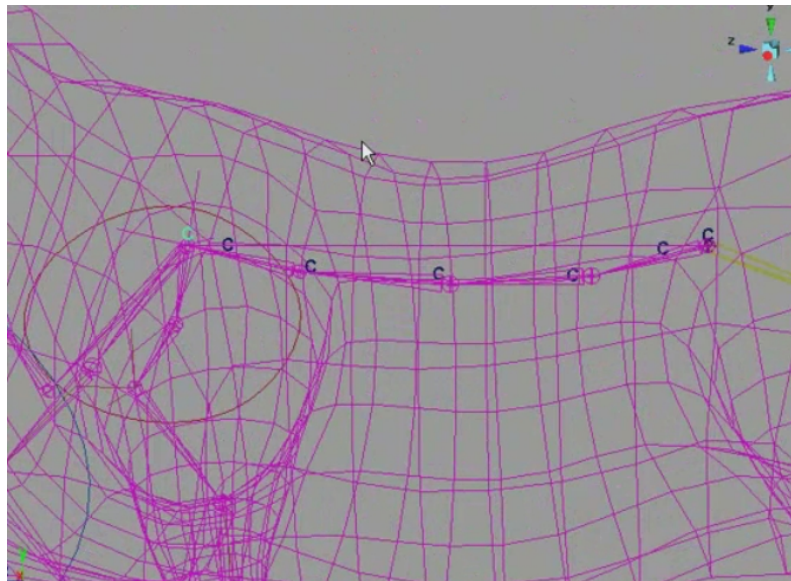
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d) Finish up by parent constraining the final two clusters at the top of your spline curve to the joint at the top (head end) of your MBV vertebrae chain which is mbv_vertebrae1_01 in my case (again, select the joint first, then CTRL select the cluster in the outliner, and hit Parent Constrain).

NOTE: Maintain offset MUST be on in the Parent Constrain options!!

If you have Controls for your shoulders, parent them under the joint at the top of your original joint chain now (head end). In my case that's jt_vertebrae1_01. This is so we can test out the functionality of our new spine IK without the front of the body getting stuck on those Controls.

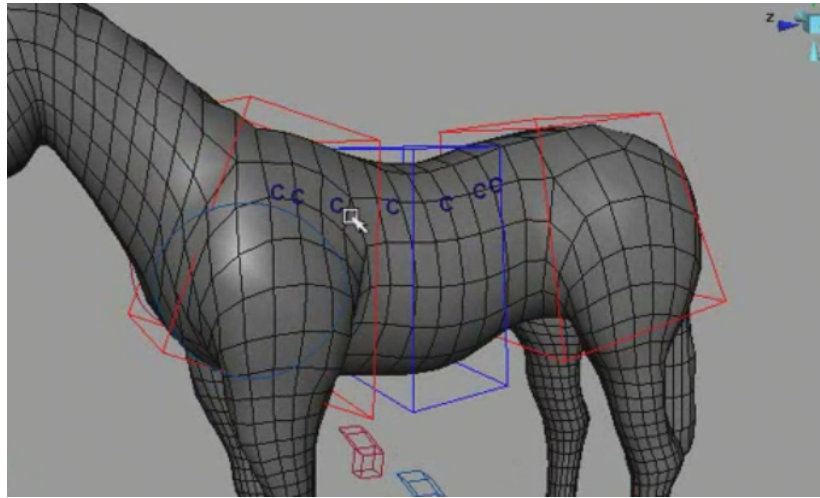


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Step 3: Creating Controls for the Spine

a) Create three Control boxes, one for the End, Middle and Top of the spine



b) Parent constrain the Main joint (part of your Hip Setup) to the End Spine Control (select End Spine Control first, then the Main joint, then hit parent constrain)

c) Parent constrain the middle vertebrae of your MBV chain to the Mid Spine Control (in my case it's mbv_vertebrae3_01 and mbv_vertebrae4_01).

d) Parent constrain the second to the top mbv vertebrae (right before the top of the MBV chain) to the Top Spine Control (in my case that's mbv_vertebrae2_01)

e) If you have Shoulder Controls, now is a good time to parent them to the Top Spine Control

f) Select the Top Spine Control and group it. Name it appropriately with the “grp” prefix. Change the pivot of that GROUP to the top of the spine. Parent Constrain that group to the Mid Spine Control

e) Parent the Mid Spine Control to the End Spine Control

f) Parent the GROUP of the Top Spine Control to the End Spine Control

Test it out and let me know if you're having any trouble!!