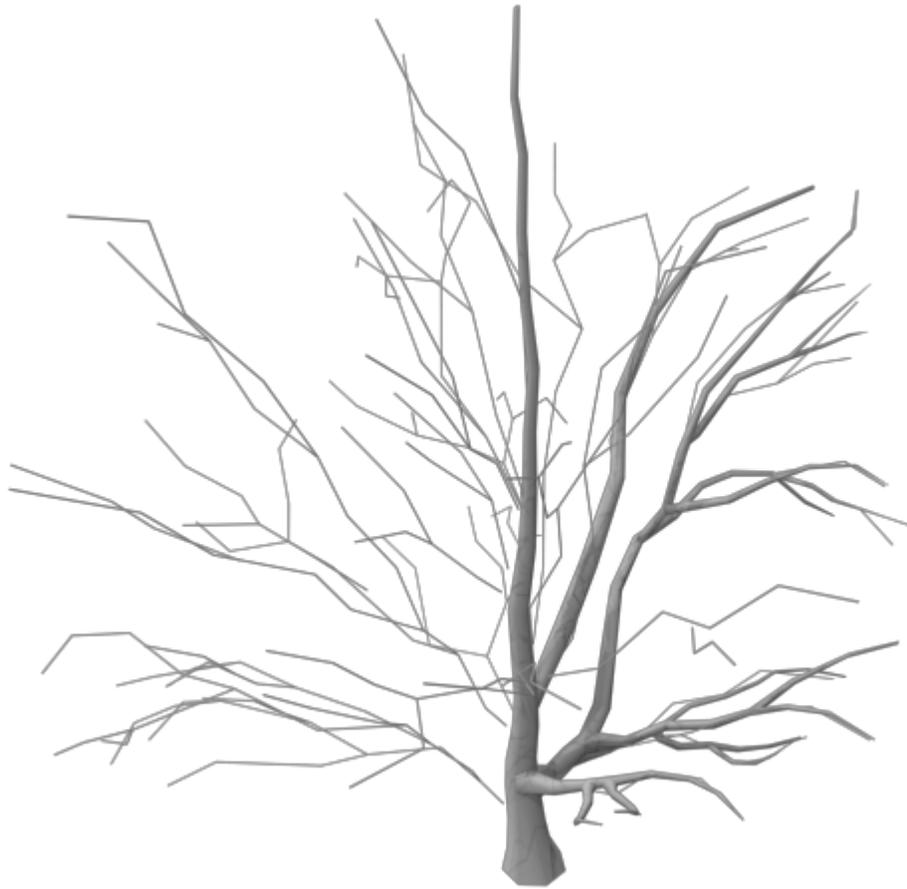


3d studio max

Intermediate Tutorials

Tree Modeling Techniques and Principles



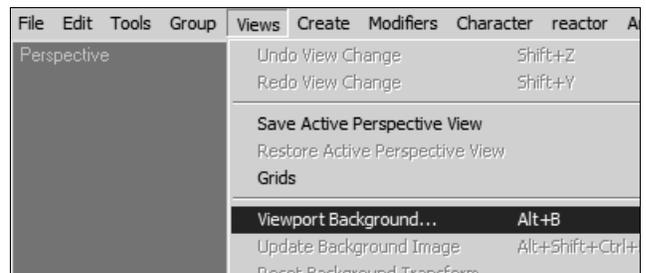
Modeling – Trees

Tree Modeling Techniques and Principles

The era of sprites and cylinders-for-trunks has passed and the need for realistic trees is has become a necessity. Graphics technology has reached fruition and it's time for the artist to take center stage. This tutorial is here to bring you, the artist, up to speed by providing a simplified process from start to finish.

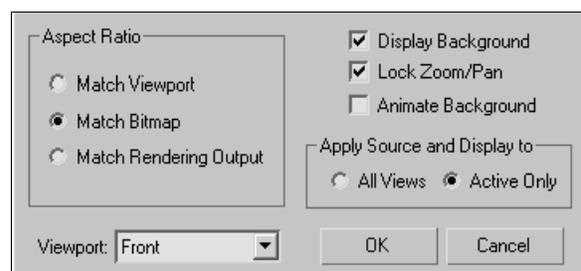
Setting up the scene

To place a background bitmap, start by selecting the front viewport. Using the the main tool bar navigate to **Views >> Viewport Background...**



The **Viewport Background** dialog should appear. At the bottom of the window check the boxes for **Match Bitmap**, **Display Background**, and **Lock Zoom/Pan**. Click [**Files...**] and navigate to your reference image, if you have one. Select the image file and click [**Open**]. Click [**OK**] to close the window.

You should now be able to see the reference image as the background in the front viewport.



By default 3dsmax displays background bitmaps at a very low resolution. This makes it very difficult to see the background bitmap clearly

when zooming in.

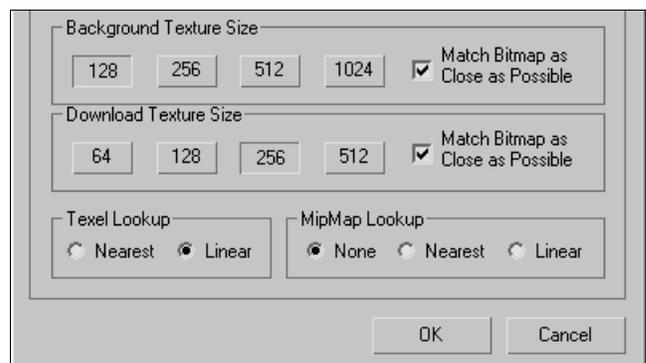
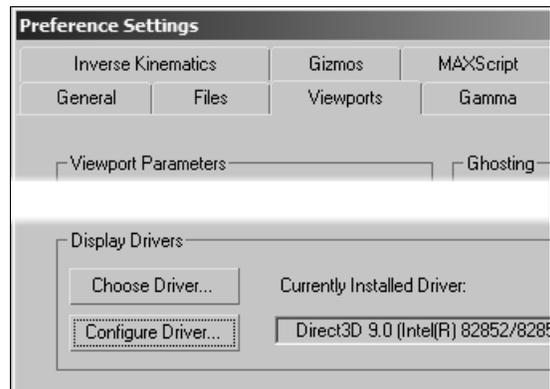
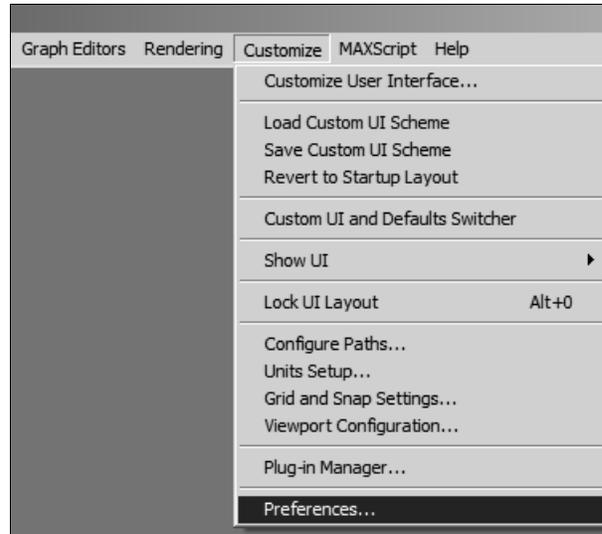
To fix this first navigate to **Customize >> Preferences** from the main tool bar.

In the **Preference Settings** dialog select the **Viewports** tab and click on **[Configure Driver...]** in the **Display Drivers** dialog.

A slightly different dialog will appear depending on whether 3dsmax is using OpenGL or DirectX as the primary display driver. If you see a different window than the one in this tutorial, don't worry. The instructions work the same for both drivers.

In the **Configure** Dialog under **Background Texture Size** check the box next to **Match Bitmap as Close as Possible**. And under **Texel Lookup** check the box for **Linear**. Click **[OK]** to close the dialog box once you have done this.

The reference image placed as a background bitmap should now appear much smoother. This makes it easier to distinguish detail when zooming in closely in the viewport.

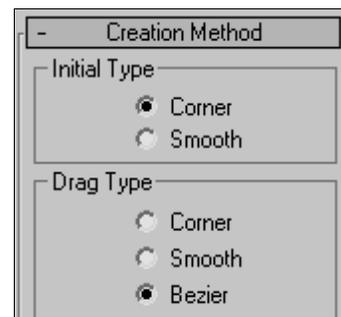
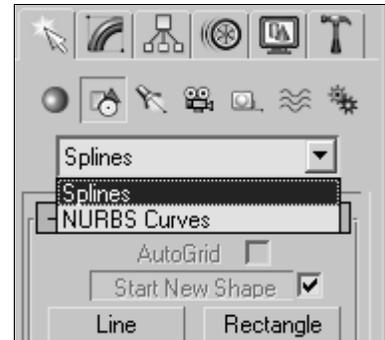


Introduction to splines

Select the **create** tab in the command panel. Click on the **shapes** button and choose **Splines** from the drop down menu.

Click the [**Line**] button in the **Object Type** roll-out. There are two sections that can be seen in the **Creation Method** roll-out: **Initial Type** and **Drag Type**.

The function of a spline is determined by its **Initial Type** and **Drag Type** setting. The first vertex used when creating a new spline will always draw a line. Each consecutive vertex 'dropped' by clicking once with the left mouse button will result in the **Initial Type**. If the the **Initial Type** is **Corner** it will draw a straight line; if the type is **Smooth** then it will draw a smooth line. **Drag Type** takes effect when you left click and drag while placing a new vertex. A **Drag Type** of **Corner** will draw a straight line; a type of **Smooth** will draw a smooth line, similar to a NURBS CV Curve; a type of **Bezier** will draw a bezier line with a visible manipulator. This manipulator can be altered from the the spline's vertex sub-object.



Roughing out the limbs

For modeling trees I recommend using either **Corner/Corner** or **Corner/Bezier**. For the gangly looking tree seen here I used a combination of both.

Begin by building the trunk. If the tree is exceptionally tall or has an odd shape try using



two or more splines to make up its length and give variation to the complete extrusion. Create each branch as a new spline offset from the trunk or parent branch.

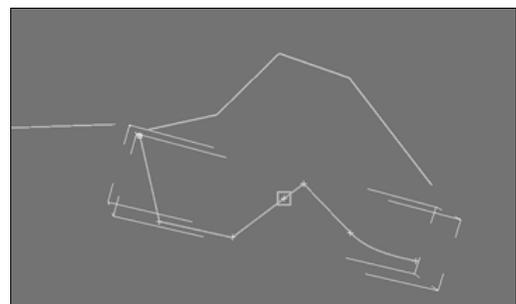
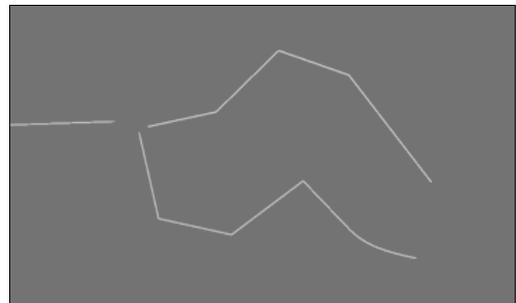
Once you have finished building the rough skeleton of the tree begin shifting the branches and moving vertices in the perspective viewport. It is important to reposition the vertices of your branches so they flow realistically and have depth.

Refining and redefining the limbs

Use this technique to smooth out limbs and branches if they appear to be too jagged.

Select a spline and navigate to its **vertex sub-object** in the modifier stack. In the Geometry roll-out click the [**Refine**] button. Click anywhere on the spline between two vertices to add a new vertex that can be moved and repositioned better continuity.

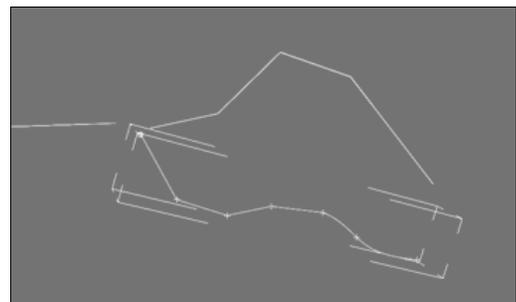
Detail can be removed in a similar manner by selecting a vertex and clicking the [**Delete**] button.



Preparing the geometry

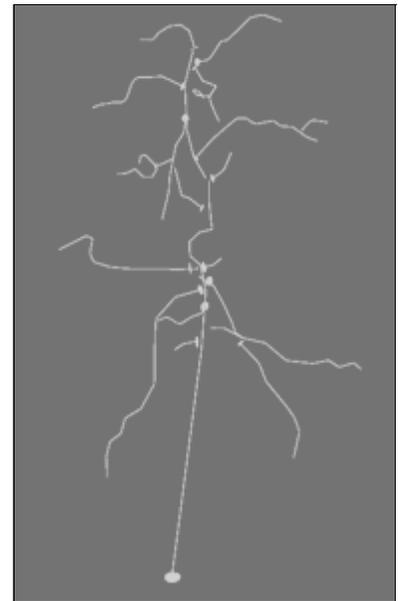
To create the surface we will need to first create the outline of the shape. This outline will be extruded along the path marked by the previously drawn splines.

Make the outline by creating a cylinder and deleting all the polygons beneath the cap.



To correct the pivot select the cap object and open the [**Hierarchy**] tab in the **Command Panel**. Realign the pivot by first clicking [**Affect Pivot Only**] and then [**Center to Object**]. Do this for three cylinder caps with segments of 4, 6, and 7.

Begin cloning the cylinder caps and aligning them at their starting vertex at the base of each spline. I used caps of seven segments for the trunk, six for the limbs, and four for the branches.



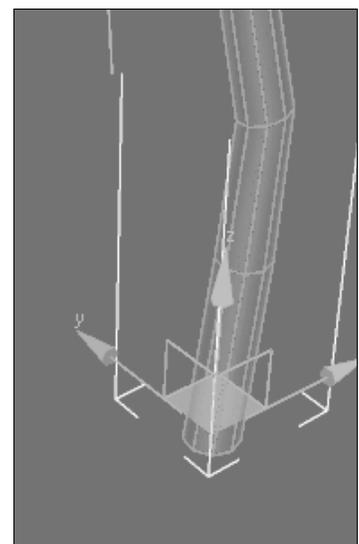
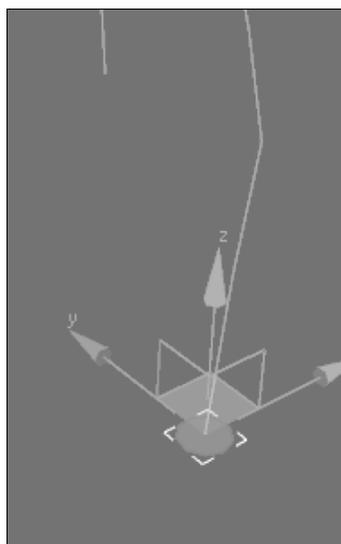
Extruding the geometry

Select a polygon at the base of a spline. To demonstrate, I will use the trunk spline.

If you haven't done so already, collapse the cap into an **Editable Poly**. To do so, right click on the cap object in the viewport and navigate to **Convert To: >> Convert to Editable Poly**.

Now that the cap is an **Editable Poly**, navigate to its polygon sub-object. Select all the the polygons of the cap and, in the **Edit Polygons** roll-out, activate the **Extrude Along Spline dialog** (). Click on the [**Pick Spline**] button and select the spline that is base of the trunk. Apply values to your extrusion that create a convincing average for its shape.

Continue by cloning caps and making extrusions for each of the remaining splines until the whole tree has a surface.



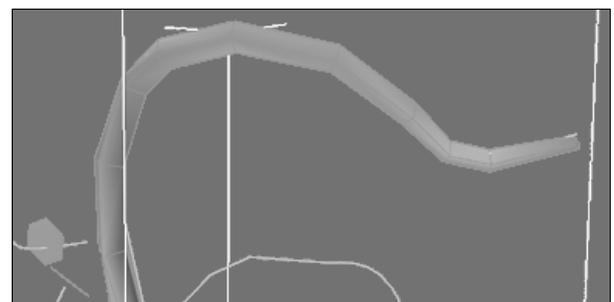
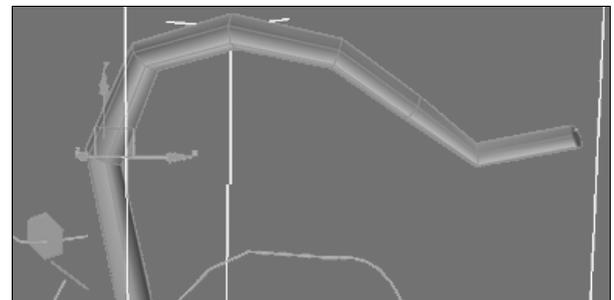
Multi-part extrusions

For this tree I split the length of the trunk into three splines. One major spline that spanned the thickest portion of the trunk, a second where it begins to taper off, and a third completing the length to the tip. The reason for this is because the taper of most trees is not uniform. In this case, the settings in the extrusion dialog could not accurately define the shape of the entire trunk.

Use this method to complete an extrusion if part of the tree is composed of more than one spline.

To add to an extrusion select the cap of the already extruded surface and extrude it again along a new spline by activating the **Extrude Along Spline dialog** and picking the next spline in the sequence.

The final portion of the trunk was extruded from the cap of the previous spline and optimized by hand at the wider length to four segments and tapered to three at the tip.



Smoothing and reducing

With the rough geometry in place the next step is to remove any unnecessary detail and smooth out the mesh.

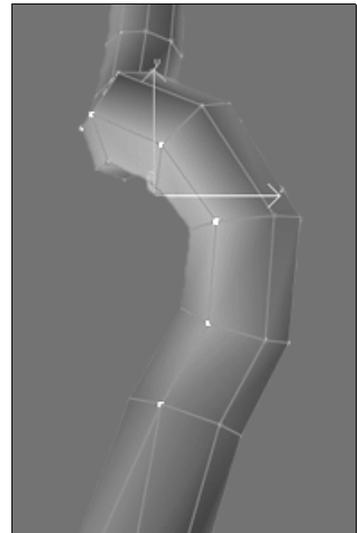
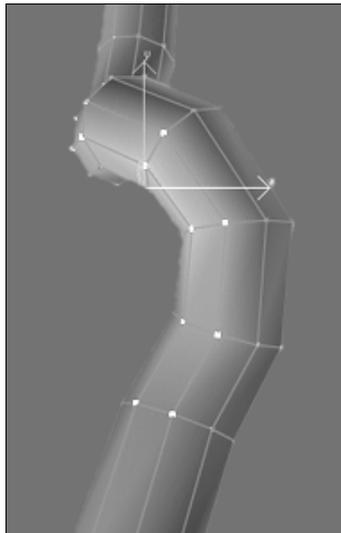
In this image to the right I extruded a very ugly looking trunk. Regardless of what settings I chose in the dialog the the cap simply would not extrude smoothly. When this occurs choose values that bring the extrusion as close as possible to the desired shape in mind. Once the area is blocked out begin to manually repositioned the vertices and edges until the shape flows realistically.



There will undoubtedly be some areas where unnecessary detail will crop up. This occurs most commonly around locations where the mesh twists, contorts, or tapers.

The quickest way to optimize the excess detail is to grab vertices in rings and collapse them by increasing the weld threshold. If this welds non-uniformly then it is still

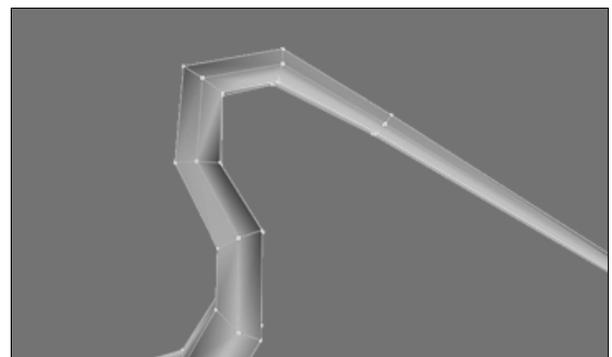
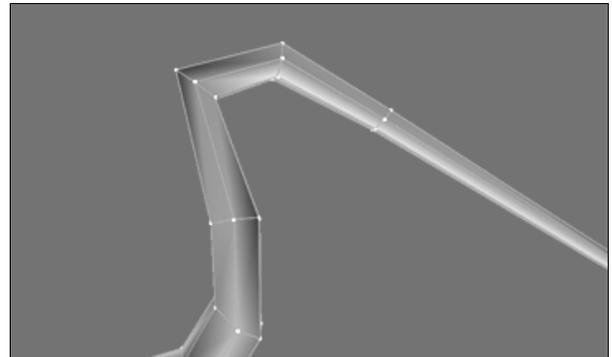
possible to collapse by hand by selecting two adjacent vertices and clicking the [**Collapse**] button in the **Edit Geometry** roll-out.



Increasing detail as needed

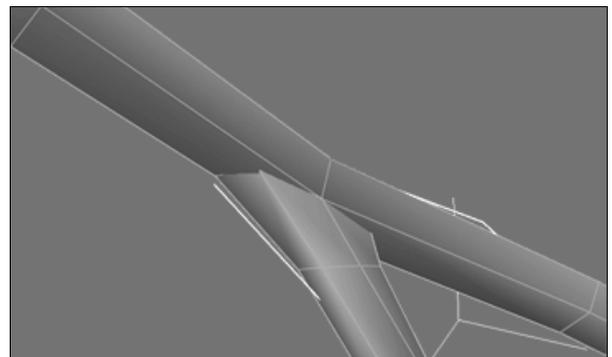
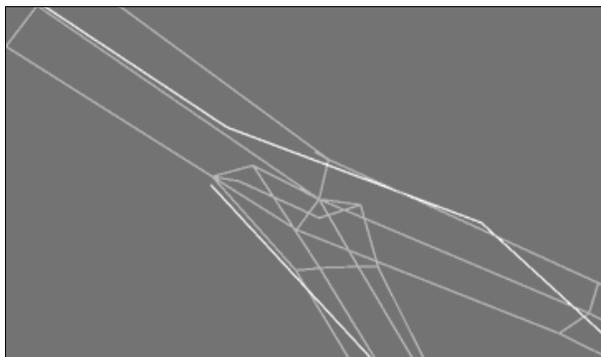
In some instances the resulting mesh may have less detail than desired. The following technique can be used to counter this problem.

In this branch the shape of the extrusion around the bend could use some improvement. To do so, first select the edge you wish to add detail to. In the **Edit Geometry** roll-out click the [**Connect**] button to add a new edge loop to the selection. Once created, the new edges can easily be moved to add a smoother bend to the branch.



Intersecting branches

When modeling low-poly trees generally it's a good idea not to model the intersecting joints of branches. This in turn reduces polygon count and effectively boosts moral among tree



modelers suffering from sore hands. Keeping the branches as separate elements also makes mapping and repositioning them much easier.

Intersecting branches can be modeled either by physically intersecting the polygons or snapping the edges to the geometry of the parent limb.

Working with divided branches

The best way to create seamless intersections for divided branches is by using snap tools.

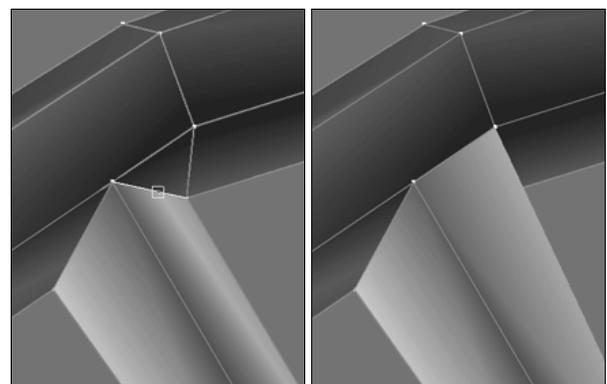
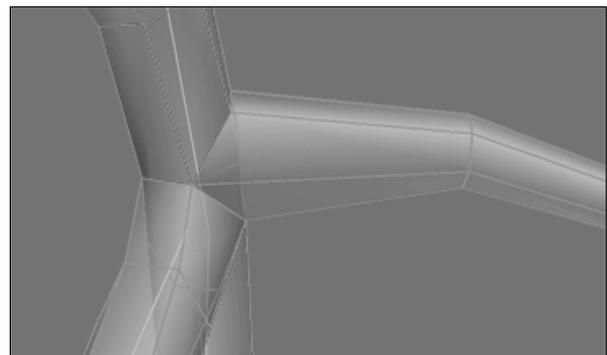
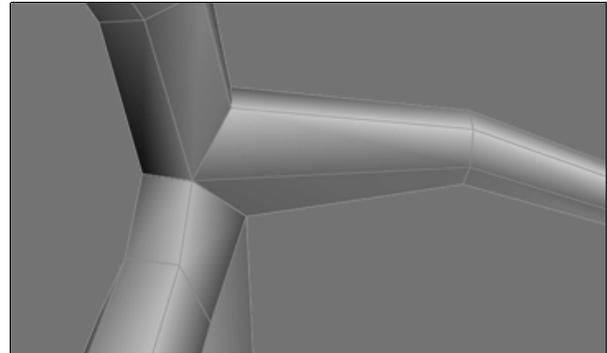
To do so, use vertex and edge snap to snap the vertices of the child branch to the edges of the parent trunk.

Aligning the edges in this way by hand will yield a smoother transition than if the branches were to simply intersect. This also eliminates the need to perform messy boolean operations.

Smoothing branch transitions

Making a branch actually look like it's growing out of another isn't as obvious as it may seem. Some branches just look like they're sticking out no matter how much you move them around.

If this is the case then there probably isn't enough vertex detail at the base of the child branch to make it flow smoothly with its parent. Take this



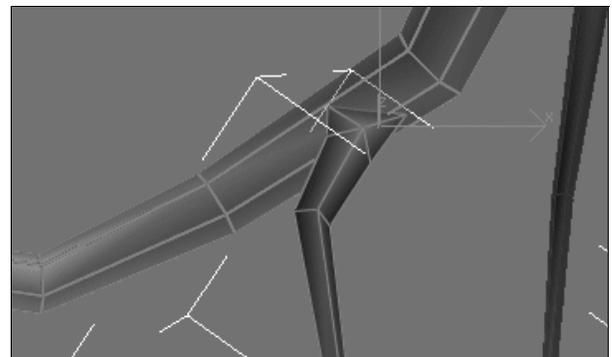
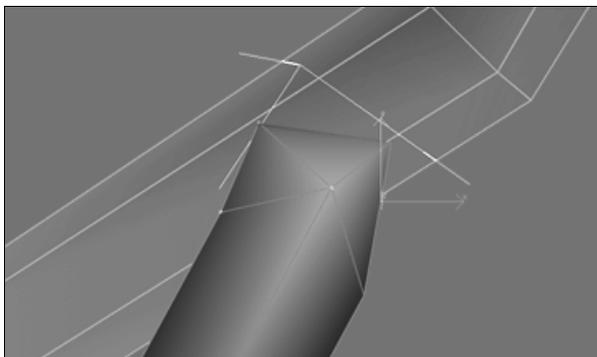
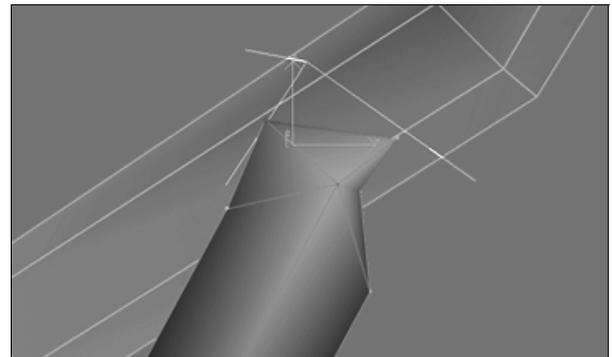
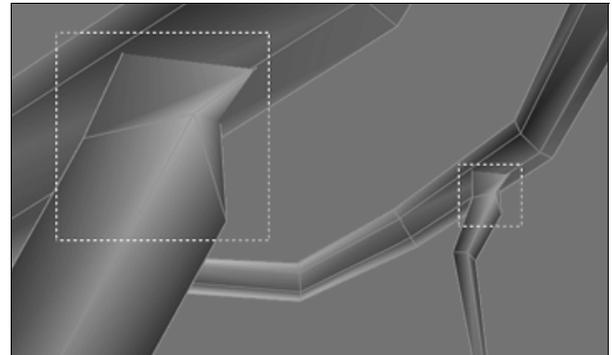
limb for example. Simply by adding a vertex to the problem edge and snapping it to the vertex above smooths out the branch transition perfectly.

Correcting edges

Sometimes 3dsmax's handling of hidden edges results in a problematic edge. Although the connection of the vertex is fine, the edge is flipped the wrong way around. This can make a really nasty looking polygon that doesn't flow with the shape of its parent.

To fix this error first select the two vertices to connect as the new edge. In the [**Edit Geometry**] roll-out, click the [**Connect**] button to connect the two vertices and create the new edge.

Once the edge is in place a small bit of tweaking to smooth out the area will give the branch a much more organic look



Conclusion

With all of the techniques demonstrated in this tutorial you should now be able to easily construct most any tree regardless of shape or curvature. I purposefully chose an odd and decrepit tree for instruction to illustrate this very point. Even with all its twists and turns it was hardly a challenge.

With that said, good luck and happy tree modeling!

