

Creating realistic human hair

I think hair can still be most realistically achieved by using complex realistic textures and transparency maps on very simple geometry, like bent rectangles, maybe about half a dozen to a dozen on a head. I don't recommend using only particles for realistic hair, because in my view the software isn't quite developed enough yet. Having said that, I haven't tried Maya Fur yet, despite hearing great things about it, so who can say what the future holds. Another approach might be to try a hybrid method, again, I haven't had the chance to experiment with that yet myself but in theory it seems sound.

To get those complex maps I've just mentioned you'll want to find or shoot some hair images.

To create my maps, I found two low resolution images of the same girl. (It doesn't have to be the same person, but it certainly helps.) I cropped out the areas marked in red, and retouched them, increasing the resolution, and painted alpha channels - or transparency masks - to fit them.

I can't give these texture images to you, since if you all used them for your own 3d face...

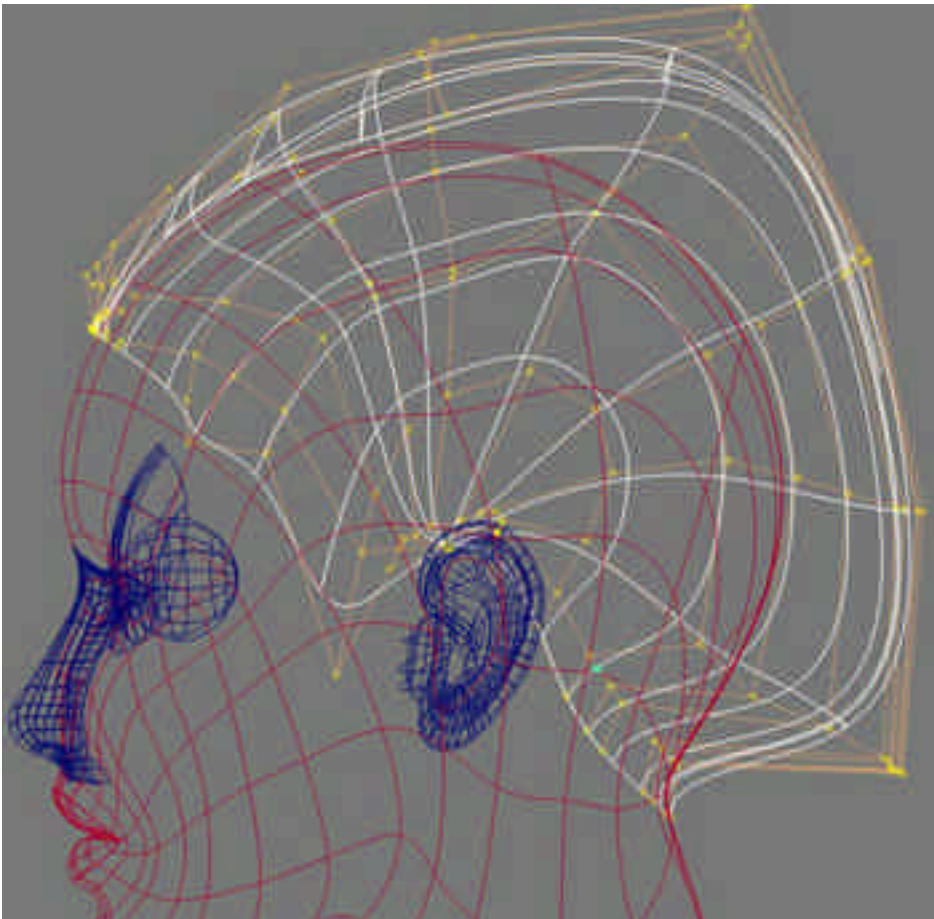
- it would be shortcutting an important part of the learning process
- I have sold the copyright of my 3d face, and I could theoretically find myself with legal difficulties
- it wouldn't be good to see lots of virtual characters all over the place all with the same hairdo!



You can photograph people yourself, or put a wig in a scanner. I once photographed a girl with long hair letting it hang in front of a backlit white curtain, and used that as a transparency mask in many different projects - it looked very realistic and something you may wish to try.

Now it's time to create the geometry. I won't go into as much detail on this, suffice it to say that if you've managed to achieve a head that looks similar to the one that we have shown how to create in this document don't need precise tuition for creation of these simple surfaces.

Basically I've created a 'helmet' shape from skinning a few curves, starting at the front going back (you can create a simple Curve on Surface for a guide to where the hairline is), rotating the curves around a pivot point near the ear and editing their shape, like we did with the nose etc. This surface is not that important, it will not be seen that much later. I know the shape seems a bit funny in the side view, but the other surfaces to be added will fill it out.

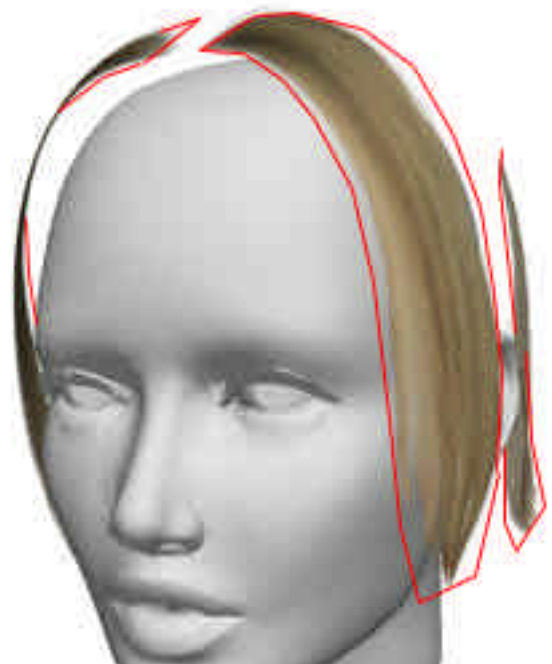
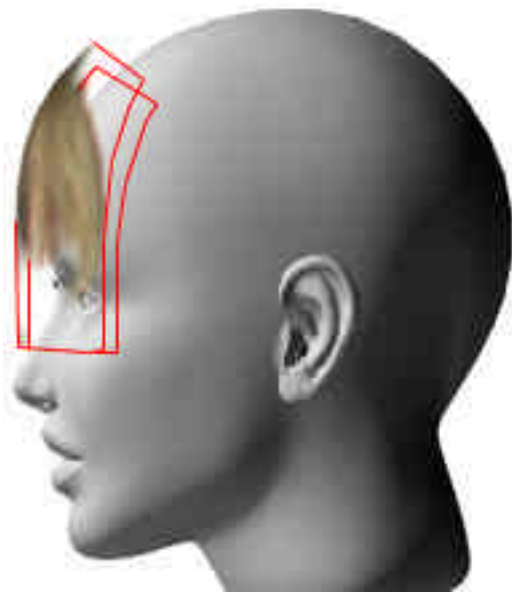
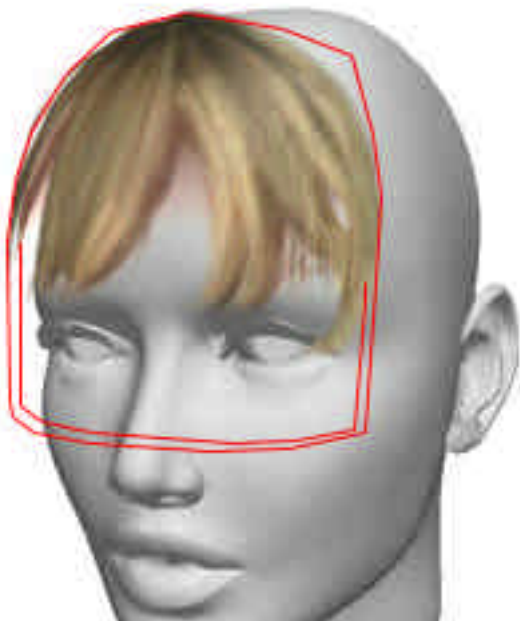


The shader I'm using is a Blinn with Diffuse at 0.45, Rolloff at 0 (1 in Maya), Eccentricity at 0.3 (default), Reflectivity, Incandescence and Translucence at 0.

The image map I'm using was a Ramp texture at first, which I converted to a bitmap and then edited in Photoshop® - there is much room for improvement there. The same image is used in the spec channel, the color channel and the bump channel. The spec version is darkened a lot, and blued (see the Shading section on why I like to make the spec channel the opposite Hue in some shaders).

This would be a really good place to use the anisotropic shader available in Maya® (giving the highlights a directionality like in real hair, or brushed metal), look for it at **Highend3D.com** (a great resource -- well worth checking out).

The transparency channel is mapped with 2 layered ramps to make all the edges of this surface softer.



The most important surface are the 'bangs', covering the forehead. This consists of two surfaces, simple 4x4 cv rectangles bent and shaped to follow the head. The top one are the actual bangs, and the bottom one is used to create an illusion of a drop shadow. The shader for the top one is basically the same as the one for the 'helmet', the bottom one is shaded with a simple Lambert and a reddish transparency channel to get a warm shadow. A more advanced method would be to split the bangs up into two or more rectangles.

The same principle is followed for the long "Jennifer Aniston" like tresses on each side of the bangs, except they have no drop shadows, this means you must remember to switch shadows off for the bangs but keep them on for the tresses. The smaller one at the back is the same surface and shader copied with its shape changed - this can be done as many times as you wish, the more the better, but be careful if you want to animate this later - too many will make it difficult and time consuming, since this technique for making hair has to be largely keyframed by hand in PA (in Maya you should be able to use soft-body dynamics).

Below is the finished result, with 3 bluish spots (with reddish shadows) middle, left and right, and 2 reddish ambient lights to left and right, with the Ambient Shade at 1. I've added a simple ponytail at the back, using a simple stretched sphere mapped with a streaky Ramp in the color, and with sCloud in the transparency to give it soft edges. A better way would be to use the same method I used for the bangs, on a few layered surfaces.

