

Modeling a Dinosaur in Organica

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For this month's foray into the 3D domain, we're going to model a dinosaur: a Dilophosaurus, to be exact. The techniques covered here can be applied to a wide variety of creatures, still living or extinct, as well as all sorts of other objects. The model produced will be used as the basis for future tutorials on painting and posing. The bulk of the modeling work was done in Organica, with a little help from Amorphium, Decimator, and UVMapper. The components were assembled into a single model in Poser, and the finished wireframe model is shown above.

Dilophosaurus - Who?

The first fossilized Dilophosaurus remains were found in the Navaho Nation in Arizona, in 1940, by a man named Jesse Williams. The investigating paleontologist, Sam Welles from the University of California Museum of Paleontology, realized he was looking at something new. A few more specimens were found and some facts came to light.

Dilophosaurus lived about 180 million years ago, in the early Jurassic. This was about 115 million years before the time of Tyrannosaurus Rex. Dilophosaurus was the biggest predator of its day, about 20 feet long and 1000 pounds in weight. It belonged to an early class of dinosaurs, the ceratosaurs. Like other ceratosaurs, it had a clawless vestigial fourth outer finger on each hand and a cleft in its upper jaw. Unique to Dilophosaurus were the two crests adorning the top of its head. You can find more information and some illustrations by clicking on the links at the end of this tutorial.

Dilophosaurus achieved some fame as the frilled, poisonous "spitter" in the first Jurassic Park movie. However, the real animal was much larger. There is no evidence it was poisonous. Being so big, it wouldn't have needed to be. There is also no evidence for the existence of any kind of a neck frill, which would have shown up in the structure of the neck vertebrae. Personally, I prefer the real beast anyway.

Modeling Requirements

Before beginning the modeling process, it's a good idea to examine all of the tools you'll be using to determine the best strategy. The model will be built in Organica, a package that works with Metashapes. The nice thing about Metashapes is that you can generate complex organic forms when the Metashapes glom together. The down side is that body parts you'd want to keep separate (like fingers) will glom together unless they're kept spread apart. Another caveat is that, when you generate a mesh with a lot of detail in some areas like teeth, you're can wind up with a humongous polygon count.

After construction, this model is going to have texture mapping added in Deep Paint 3D. If this is done while all of the moving parts of the model are in their middle, neutral positions, there will be fewer texture map problems to fix later on.

The model will also have a skeleton added in Poser Pro Pack. For best results, the limbs should be aligned with one of the coordinate axes to keep the rotation orders of the bones from getting too confusing. This is the reason that a lot of Poser models are initially set up in a position that looks like they're getting ready to do calisthenics for gym class.

Modeling Strategy

1. Construct model in Organica with the arms and tail in the neutral position, fingers spread and legs spread to minimize unwanted glomming of the mesh. Eyes will be added later.
2. Export body from Organica as a medium-density mesh DXF file.
3. Export teeth from Organica as a high-density mesh DXF file.
4. Import body mesh into Amorphium to correct normals. Export as OBJ.
5. Import teeth mesh into Amorphium and correct normals. Export as OBJ.
6. Cut body mesh down to size using stand-alone Decimator program. You can also use the Optimize function in ZBrush. Export as OBJ.
7. Import body mesh into Amorphium for normal correction, as well as smoothing and touch-up. Export as OBJ.
8. Import body and teeth into Poser. Add eyes using ball props. Adjust relative sizes and positions of parts. Assign hierarchies and create figure. Export as OBJ.
9. Apply UV coordinates to finished OBJ file using UVMapper. This completes the modeling portion of this project.

Note: If you don't have Amorphium, then Zbrush or 3D Explorer or Crossroads (free!) can do the file conversions and Zbrush can do the touch up work.

Painting and Posing Strategy

Painting the model will be covered in the coming tutorial, "Painting a Dinosaur in Deep Paint 3D". VAMP mapping will be used to allow distortion-free projection painting.

Posing the model will be covered in the coming tutorial, "Posing a Dinosaur in Poser Pro Pack". A temporary skeleton will be used to bring the limbs into the proper orientation for posing. A permanent skeleton will then be built for the model.

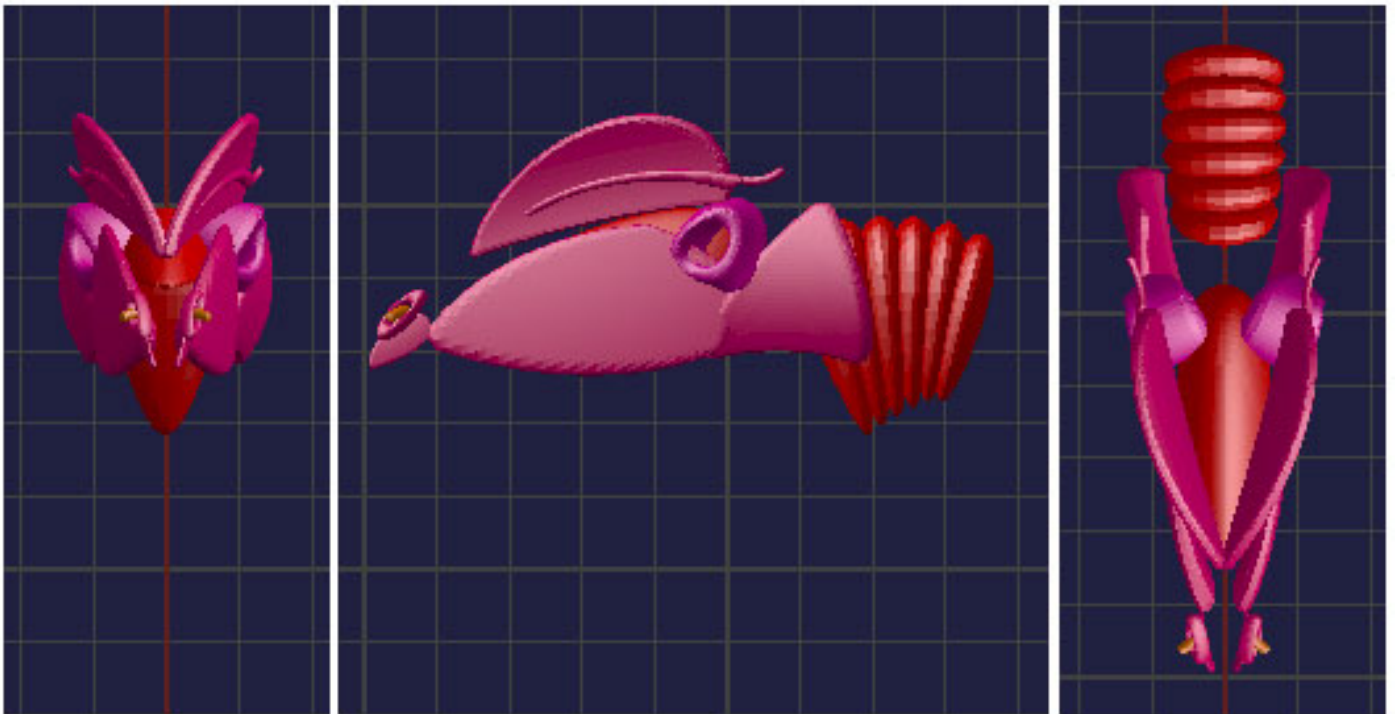
Model in Organica

We are going to model all the parts of our Dilophosaurus, except for the eyes, using the basic Metashapes in Organica. You'll want to read through this section and have a good overview of what you're going to do before you start Organica. You can do all of your work in a single file by refining it as you go, but with this many parts, I'd recommend saving each section into its own OGC file. This will speed things up when you want to see the given part's mesh. When you have all the sections roughed out and saved, combine them into a total model by opening Organica and importing each section, adjusting that section's size and position as you go. When you've got it all together, save your total model and see what parts still need work. Select the section that needs work and export it to a new file, then delete that section from the total model and save the total model as a new version. After you've modified and saved the section that needed work, open the new version of the total model and import the changed section and see how it all fits. This modular modeling approach adds some extra planning to your work, but it can save your sanity if you need to restore one part of a model to an earlier version but don't want to lose all the work you've done on the other parts.

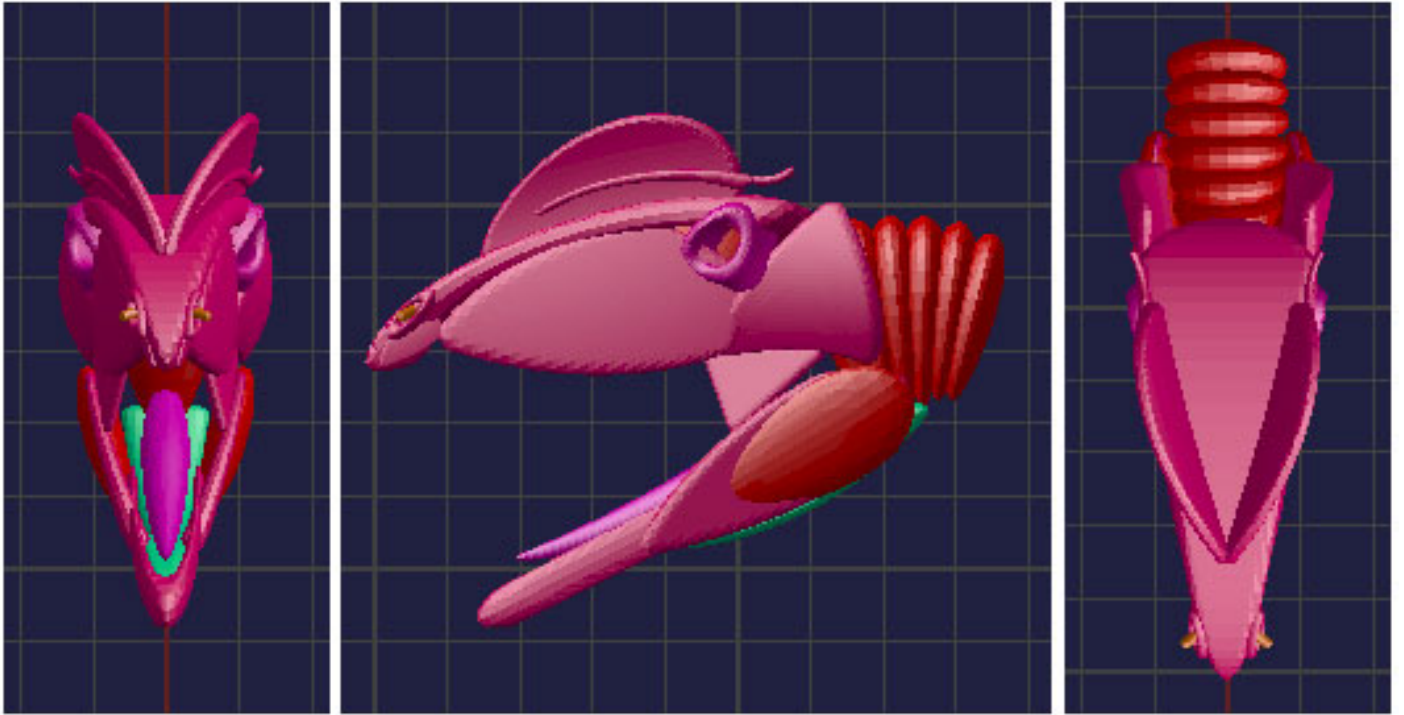
We'll also take advantage of the mirroring capabilities of Organica to cut down the modeling work of any symmetrical parts like arms, legs, and parts of the head. To do this, make sure that the head, body, and tail are centered down the Y-axis where X equals zero. Select the part to be mirrored, click the mirror button and mirror the part

around the X-axis. Press enter to pull up the properties window, select the position tab, and change the sign of the position value in X. Presto, your part is mirrored.

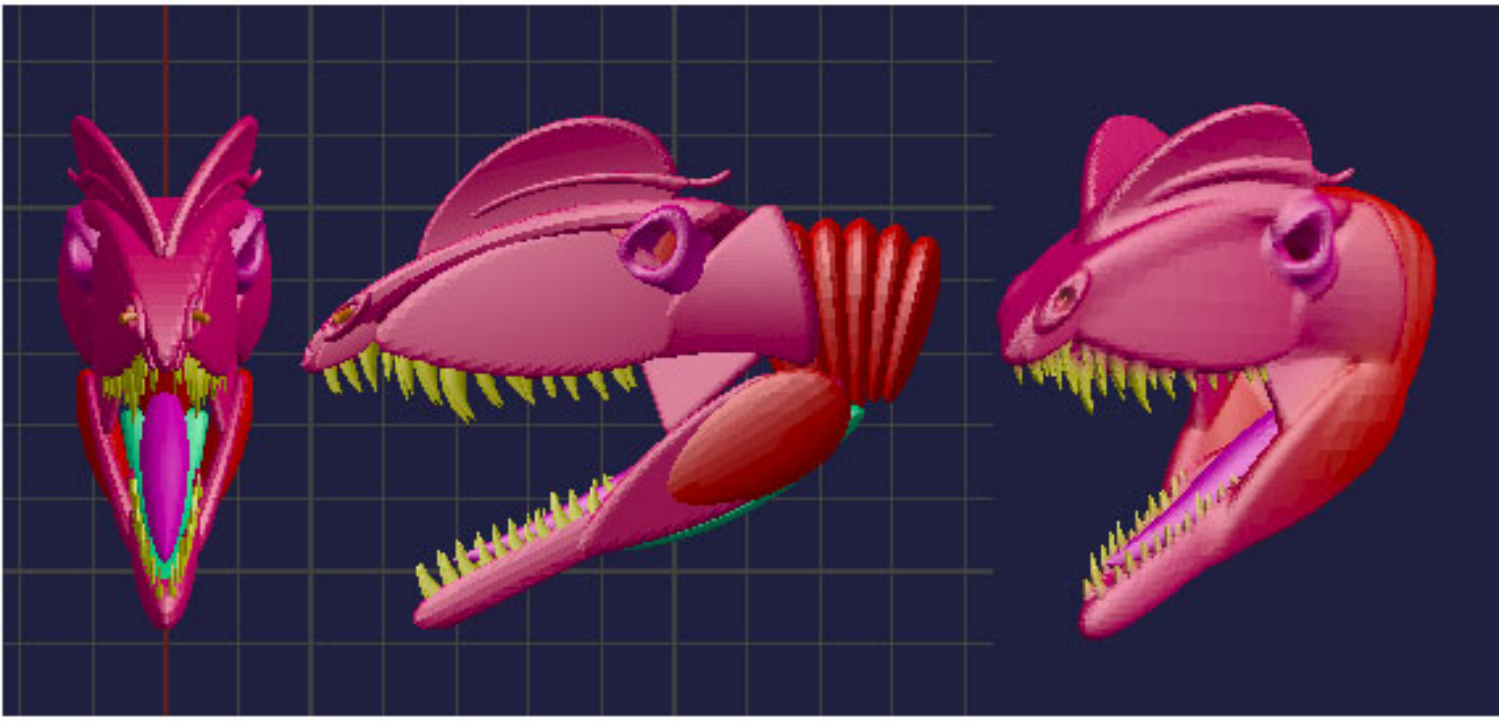
The composite images below show the construction of the head. They also include the first six segments of the neck, which is covered later. The colors are the defaults for the various Metashapes. The first three images are the front, side, and top views of the head halfway through construction. The Eye sockets and nostrils were built with Tube Metashapes. The sides of the head and the crests were built with Disk Slices. Subtractive Cylinders were inserted into the nostrils to keep them from getting glommed over by the mesh. The internal roof of the mouth was built using a Bowl.



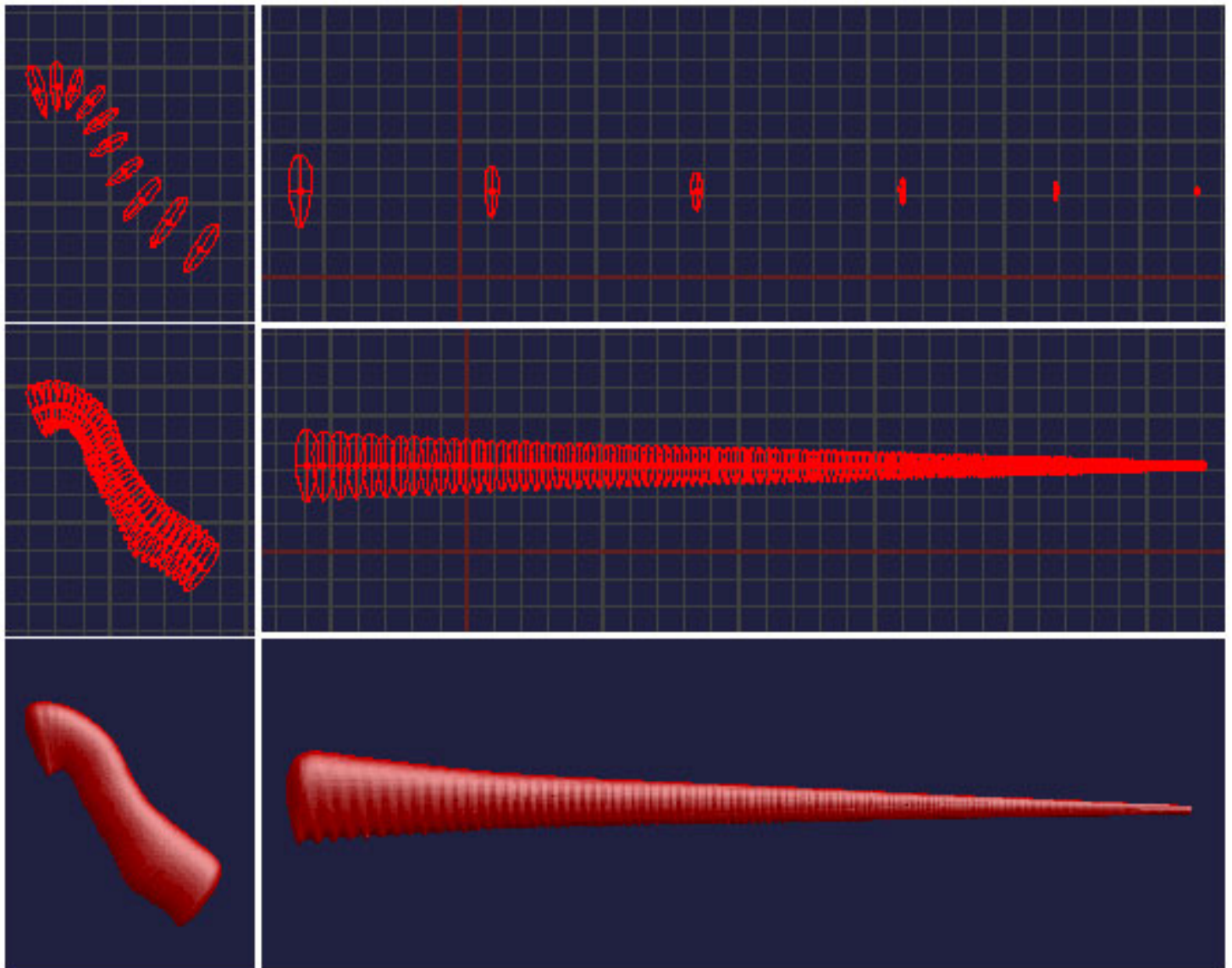
The three images below are the same views of the head with everything but the teeth. The tongue was built with the Football Metashape. The floor of the mouth was built using a Pie Slice. The muscles at the hinge of the jaw used Spheres. The sides of the jaw and the top of the head were built using Disk Slices. The U-shaped tip of the jaw was built from a Bent Cylinder.



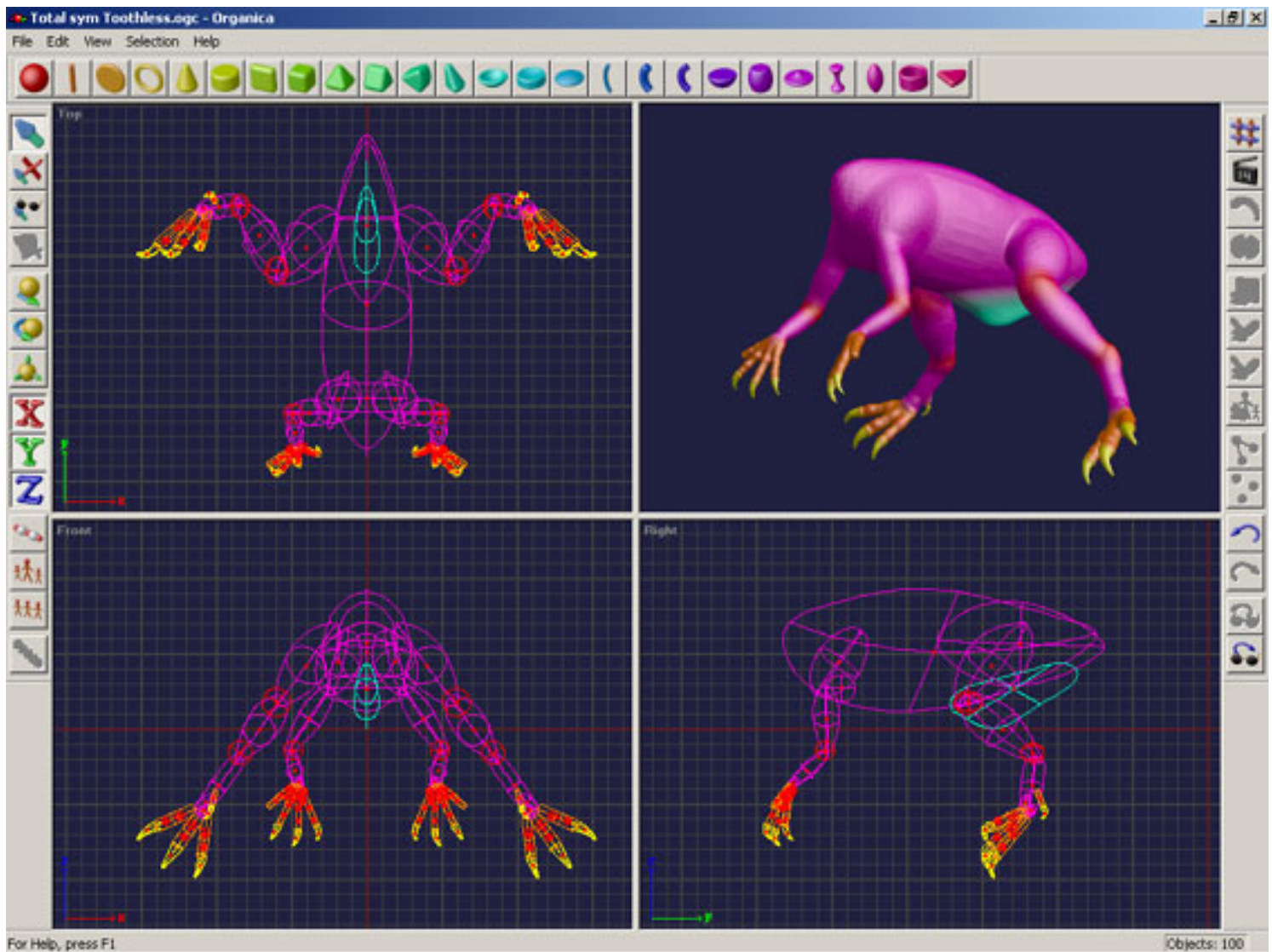
The teeth were added to the three images below. The top view at the right has been replaced with a quarter view of the mesh. The teeth were made from cones with the roundness reduced and bent in the Z-X plane.



The composite image below shows the construction of the neck on the left and the tail on the right. Both of these body parts were produced by cloning a few sample Metashapes. The upper left image shows the pieces of the neck before cloning. The middle left shows the neck after cloning, and the bottom left shows the mesh. The three pictures on the right show the same sequence for the tail. The pieces making up the neck and tail were squashed Spheres, tapered at the bottom ends to produce the desired cross-sectional shape. It's worth noting that cloning works best when done in steps. Select the first few pieces and clone, select the next few pieces and clone, repeat as needed.



The image below shows a screen shot of the finished body and limbs. The top, front, and side views are in wireframe mode, with the mesh shown in the upper right window. The body and limb sections were built with deformed football shapes. The fingers and toes are cylinders with small spheres added for the joints. The claws were built the same way as the teeth. It should be noted that the hind legs are spread out for modeling purposes only. They will be rotated along the Z-axis to give them a vertical orientation later using Poser Pro Pack.



For Help, press F1

Objects: 100

Putting all the pieces together should result in something like the image shown below. It may take several passes to get the model to this point.

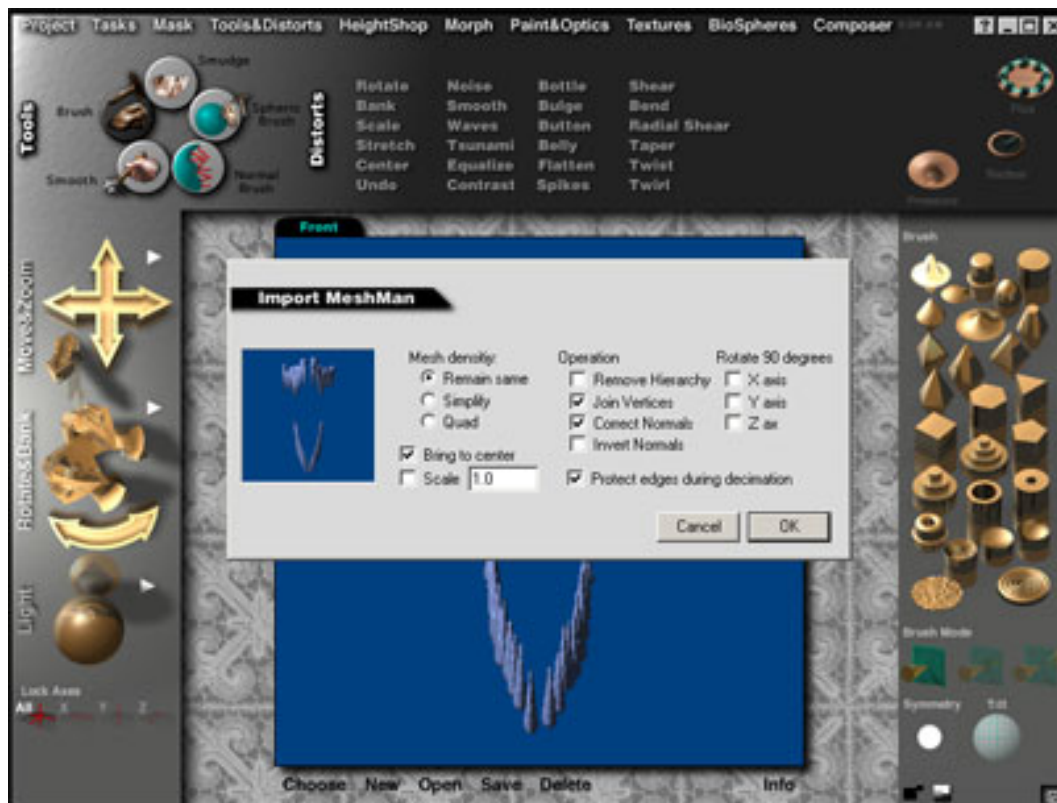


Now we're going to generate one mesh file for the teeth and another mesh for everything but the teeth. Select the teeth and export them to a new file called Teeth.ogc by clicking File>Export. Delete the selected teeth and save the remainder of the model as Skin.ogc. Start by setting the Mesh as follows (size = 2, face reduction = 1.0, precision = 10). Press Apply on the mesh drop down menu and it will start building the mesh. Experiment with these settings until you find a good compromise between mesh quality and polygon (face) count. When you're satisfied, save the mesh as a DXF file called Skin.dxf by selecting File>Save Mesh Object>DXF Format.

To get the mesh of the teeth, clear the work area and open Teeth.ogc. Set the Mesh for a finer grade as follows (size = 0.75, face reduction = 1.0, precision = 10). Experiment until you're satisfied with the mesh quality and polygon count. Save the mesh as a DXF file called Teeth.dxf.

Fix Normals in Amorphium

Once we have the two main DXF files, we're going to bring them into Amorphium to correct the normals and to convert the files to the Wavefront OBJ format. After starting up Amorphium, import the Skin.dxf file by clicking Projects>Import and selecting your DXF file. When the Mesh Man (stands for Mesh Manipulation) window opens up, add a check mark to "Correct Normals". Once the import process is complete, export the file as an OBJ file called Skin.obj. Repeat this process with Teeth.dxf to produce Teeth.obj. This is illustrated in the screen shot below.



Cut it Down to Size in Decimator or ZBrush

The Skin.obj file probably has a lot more polygons than you really need. You can cut the model down to size using a standalone program like Decimator, or the optimize function in ZBrush. Either program allows you to drastically reduce polygon count in selected areas or over the whole model. The main places you need high density mesh are around the flexing areas like joints and the detail areas like claws. Whatever you do with polygon reduction, I'd recommend that you save the reduced file with a new name so you can backtrack, and that you test out the reduction by looking at a smoothed rendering. When you're satisfied with the compromise between mesh density and quality, save the file as SkinReduced.obj.

Remove Ugly Cellulite in Amorphium

Now we're going to bring the reduced mesh of the skin into Amorphium to reduce the ribbing effect produced by glomming together a series of Metashapes. Import the SkinReduced.obj into Amorphium and correct the normals. Select a point of view where an area that needs smoothing is facing you. Select the Smooth Brush (at 1 in the screen shot below), set the pressure to zero (at 2), turn down the flux (at 3), and set the radius (at 4) to just cover the area you want to smooth. Now click and drag to smooth out and remove the ugly cellulite. When you're through, export the file as SkinReducedSmooth.obj.



Putting it all Together in Poser

Next, we're going to assemble the pieces of the model in Poser. To do this, start up Poser and select Figure>Delete Figure to clear the Pose Room. Now bring in the skin OBJ file by clicking File>Import and selecting the file SkinReducedSmooth.obj. Import the file Teeth.obj the same way. Add two Ball Props for the eyes. Use the menu to select each part and adjust its size and position. Select Window>Hierarchy Editor and rename the body parts by double clicking on the present names (ball1 to leye, ball2 to reye, etc.). Make the eyes and teeth children to the body object by clicking and dragging them over the body object. Click the Create Hierarchy button, then close the Hierarchy Editor. Save your work as Dilophosaurus.pz3. Export it as Dilophosaurus.obj. In the export dialog, you'll want to check the boxes for "Include body part names in polygon groups" and "Include existing groups in polygon groups". The other export settings can be left as they are.

Wrapping Up With UV Mapping

To prepare the model for painting, we need to apply UV mapping coordinates to our OBJ file using the program UVMapper by Steve Cox. If you don't already have it, you can download the beta version of the program using the link at the end of this tutorial. Start the program and select File>Load Model>Dilophosaurus.obj. You'll get a report on items like the number of vertices and facets. Click on OK, then select Edit>New UV Map>Planar (or other mapping type). You can adjust the alignment, orientation, and splits in the map. For my model, I just used Planar mapping and accepted the defaults since I'm going to texture the model later on in Deep Paint 3D. After mapping, click on Edit>Select>All, then click on Edit>Assign>Material. You will be prompted for a name for the material and to create the material. Once this is done, save out the complete UV mapped model as DilophosaurusUV.obj.

Are We There Yet?

Yep, we're there. That's it for the modeling part of this project. Next comes the painting and the posing. After that you'll have a fully textured, posable model suitable for animation. Of course, there may be a few bumps along the way, but your best protection is to save your work as you go and keep track of all the changes you make. That way, if you get the whole thing put together and it comes out looking like your dog, you can always backtrack and fix it. Plus, you'll also have a nice model of your dog.

Until next time, Happy Modeling.

Links for Organica and UVMapper

<http://www.coolfun.com/INFO/info.html>

<http://www.uvmapper.com/>

Links for Info on Dilophosaurus

<http://www.ucmp.berkeley.edu/dilophosaur/intro.html>

<http://dinosauricon.com/genera/dilophosaurus.html>

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