

# Build a Personal Spacecraft Amapi Designer 7

Carl E. Schou

June 31, 2003



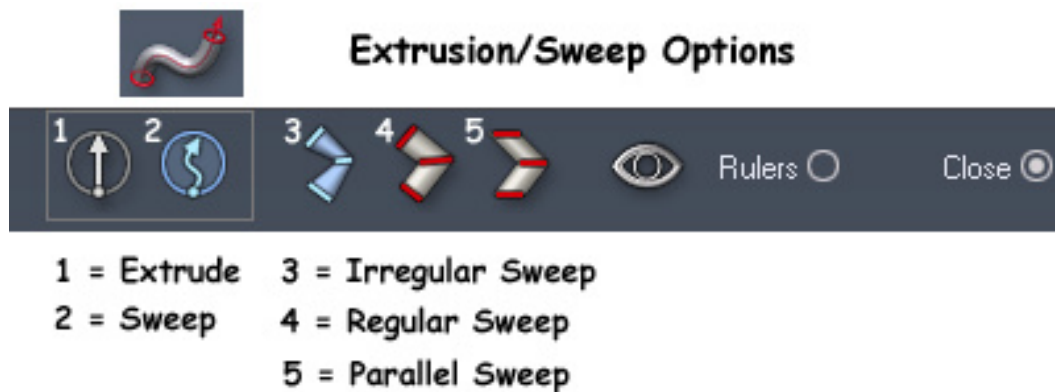
The Teeth of Dawn

Have you ever had the urge to take an early morning flight, skimming over the clouds of a distant world in your own custom built, personal spacecraft? Well, getting to the distant world is up to you, but you can create the craft in Amapi, and that's the subject of this month's foray into the digital domain.

We will start with a brief overview of Amapi, followed by a summary of the modeling strategy for this project before we begin the actual construction.

## An Overview of Amapi

For anyone not familiar with Amapi, the workspace is split into three rooms for Modeling, Rendering, and Cataloging your work. All of our work for this tutorial will be done in the Modeling room. The tools in the Modeling room are arranged into a Basic Toolkit and into three Tools Palettes. The Basic Toolkit includes functions like Move, Rotate, Scale, and Stretch. The Construction Palette includes Surface and Volume Primitives, Sweep, Double Sweep, and various surfaces. The Modeling Palette includes tools such as Smooth, Chamfer, Thickness, Cut, and Tessellate. The Assembly Palette includes tools such as Duplicate, Symmetry, Weld, Snap, and Decimate. This is just a partial listing of the tools available in Amapi. Most of these tools are outside the scope of this tutorial and are well covered in the Amapi PDF manual.



The Extrude/Sweep tool is found in the Construction palette. The definition and operation of these functions vary enough between different 3D applications that it is worth covering Amapi's implementation here. The Sweep is accessed by clicking on the symbol of a curved pipe in the Construction palette. This will open the pop-up options menu shown above. Clicking Extrude allows you to extrude a facet straight out (perpendicular) from the original facet's position, in the direction of that facet's normal. Clicking Sweep allows you to change the orientation of the facet as you go. In addition, you can select three different types of sweep and use the space, shift and CTRL keys to control the amount and direction of scaling and growth. If you haven't used these functions before, the explanation probably sounds a lot more complicated than it really is. The tools are very intuitive to use.

## Modeling Strategy

- (1) Build a simplified low polygon model using Box Modeling techniques. Start with a box and extrude, sweep, and stretch it to get the overall desired shape.
- (2) Apply smoothing to the model.
- (3) Adjust vertex positions to get the final desired shape in the smoothed mesh.
- (4) Split the model into groups for ease in texturing later on.

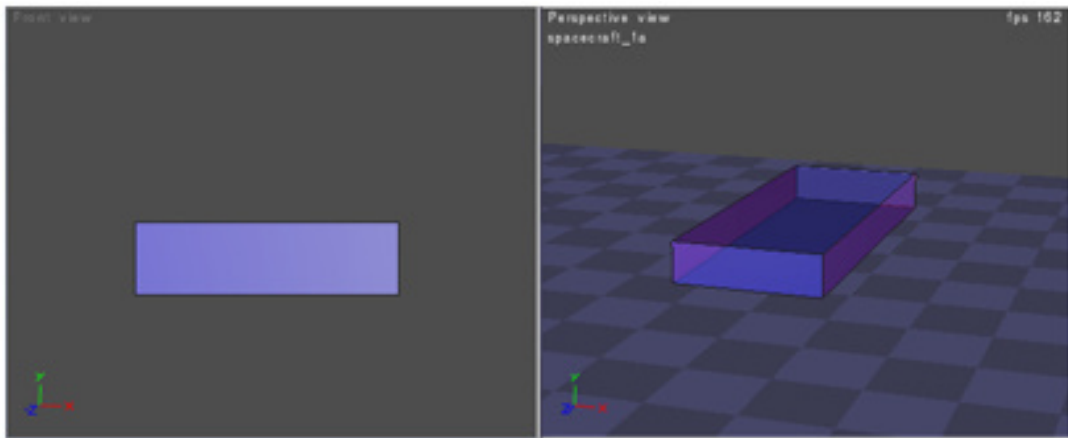
### Create the Low Poly Model with Box Modeling

Box modeling is simply the technique of taking a box, extruding and sweeping the faces, then scaling and moving the parts to roughly approximate the object you want to model. This simplified model is then smoothed through subdivision to produce the final high resolution mesh.

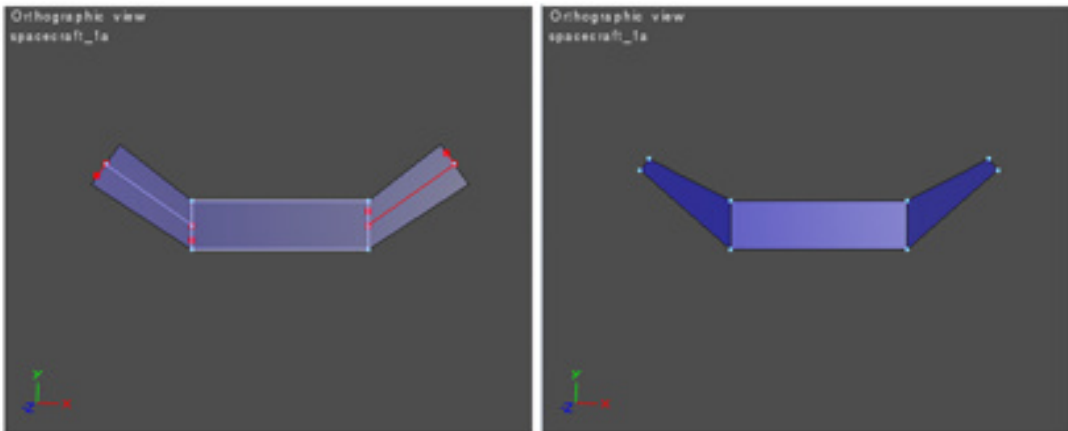
To simplify things, you can turn off the Dynamic Geometry feature for this project. If you prefer to work with Dynamic Geometry turned on, you will need to turn it off or collapse it when you start using the Stretch tool on the individual vertices of the model.

To begin, click on the Surface and Volume Primitives icon in the Construction Palette and select the cube. Make sure you are in Poly mode. Click in the Top view window and drag to create the cube that everything else is going to grow from.

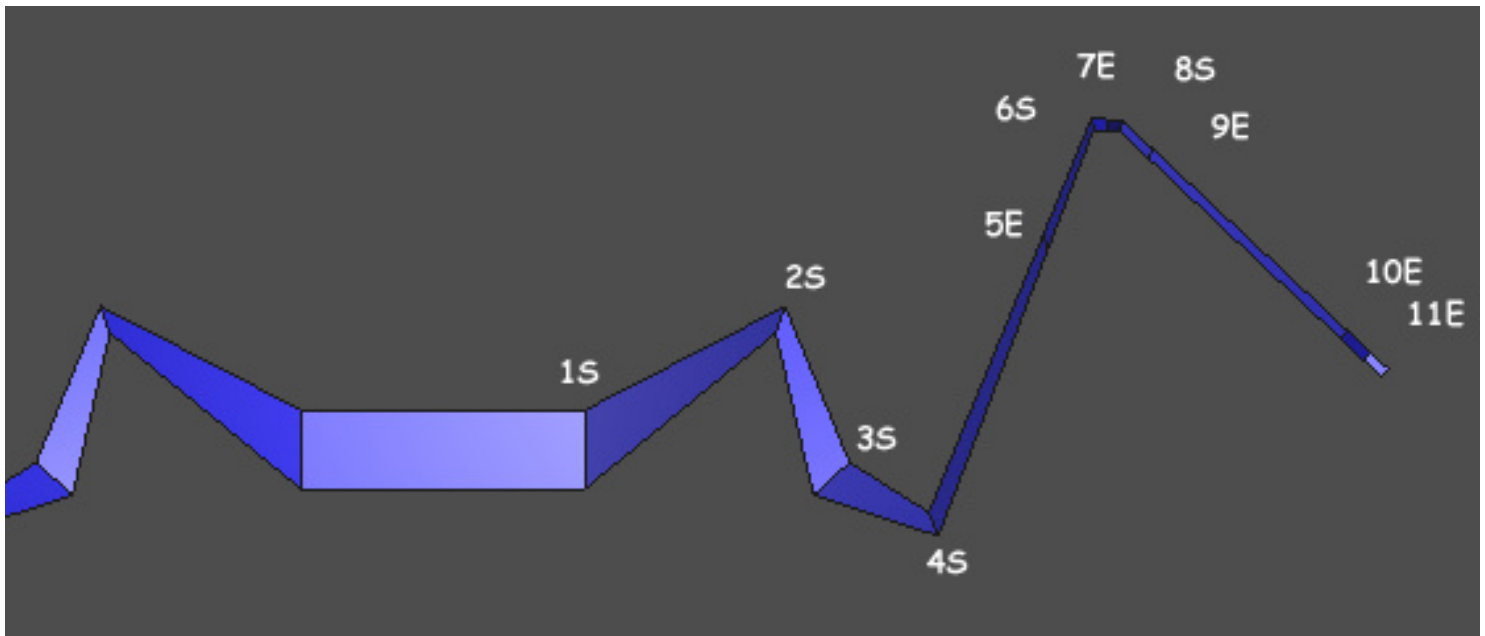
Click on the size icon. In the pop-up window that appears, uncheck the prop size button, then set  $X = 12.2$ ,  $Y = 3.4$ , and  $Z = 20.2$ . The resulting Front and Perspective views are shown below.



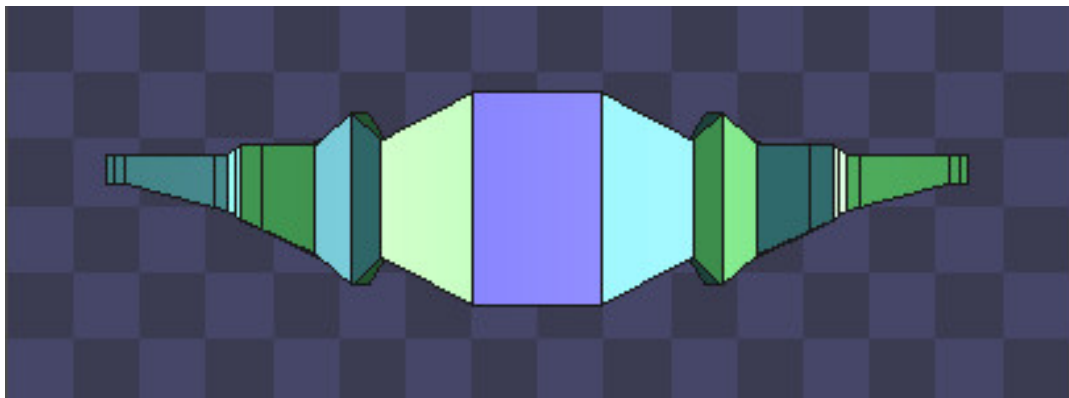
Select the two side panels of the box, click on the Extrude tool and press Enter. Choose Sweep mode and raise the extrusions as shown below left. You may need to press the space bar a few times to get the desired type of sweep. Then hold down the CTRL key and adjust the extrusion size as shown below right.



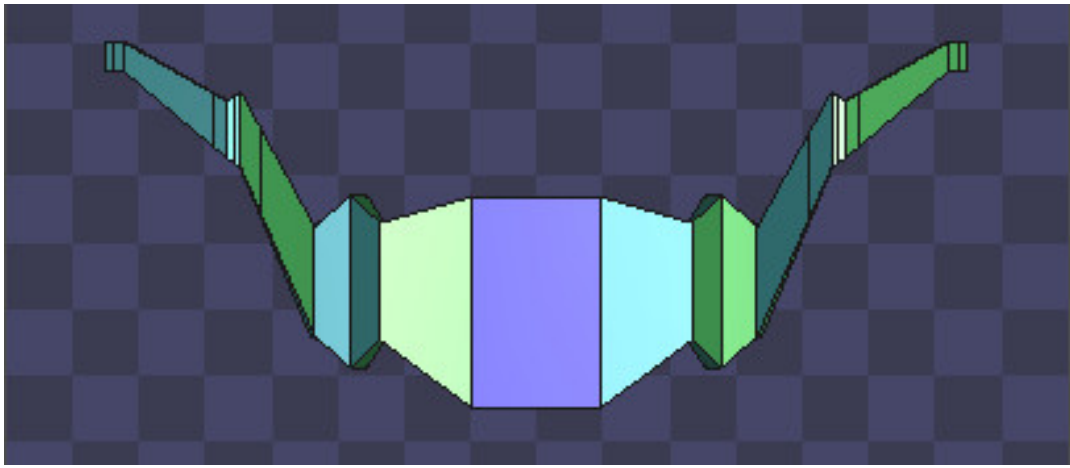
Continue the extrusion process to build the wings as shown in the Front view in the image below. There were eleven steps of Sweeping (indicated by an "S") or Extruding (indicated by an "E").



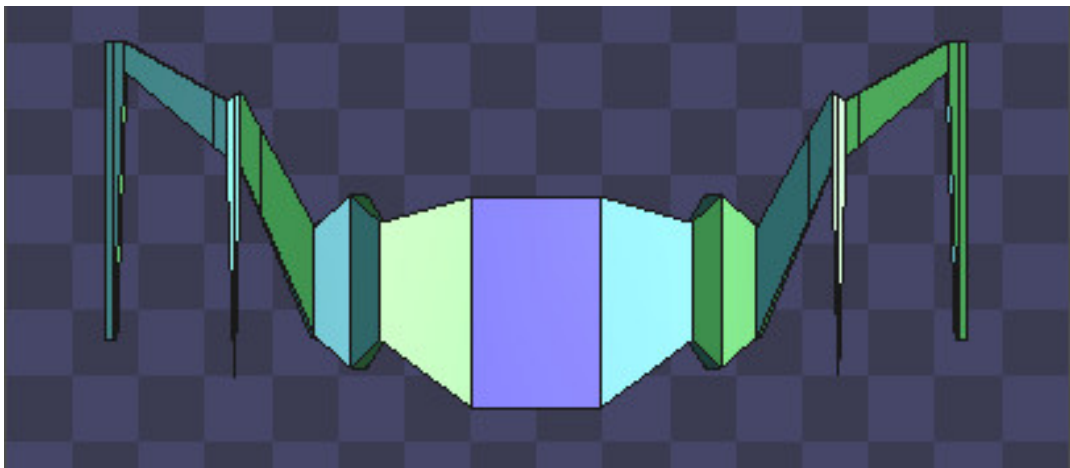
Switch to a Top view as shown below. Determine which points need to be moved to give the wings the shape you want. Select these points and click on the Stretch tool from the Basic Toolkit. Tap the space bar several times to constrain motion to the axis you want to move the vertices in, then start shaping the wings. To keep things symmetrical, select and move vertices on both wings at once.



In the image below, the wings have been swept back a bit.



Finally, a few vertices were selected and pulled far forward.



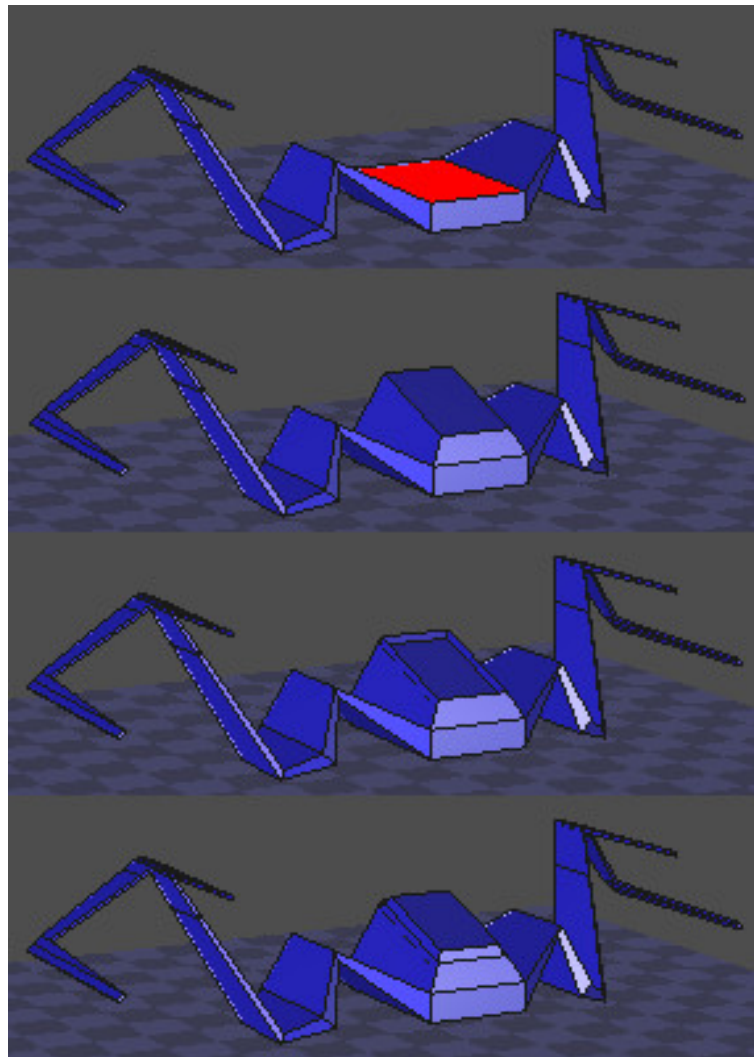
The image below illustrates the four steps in the construction of the cockpit.

The top center facet was selected.

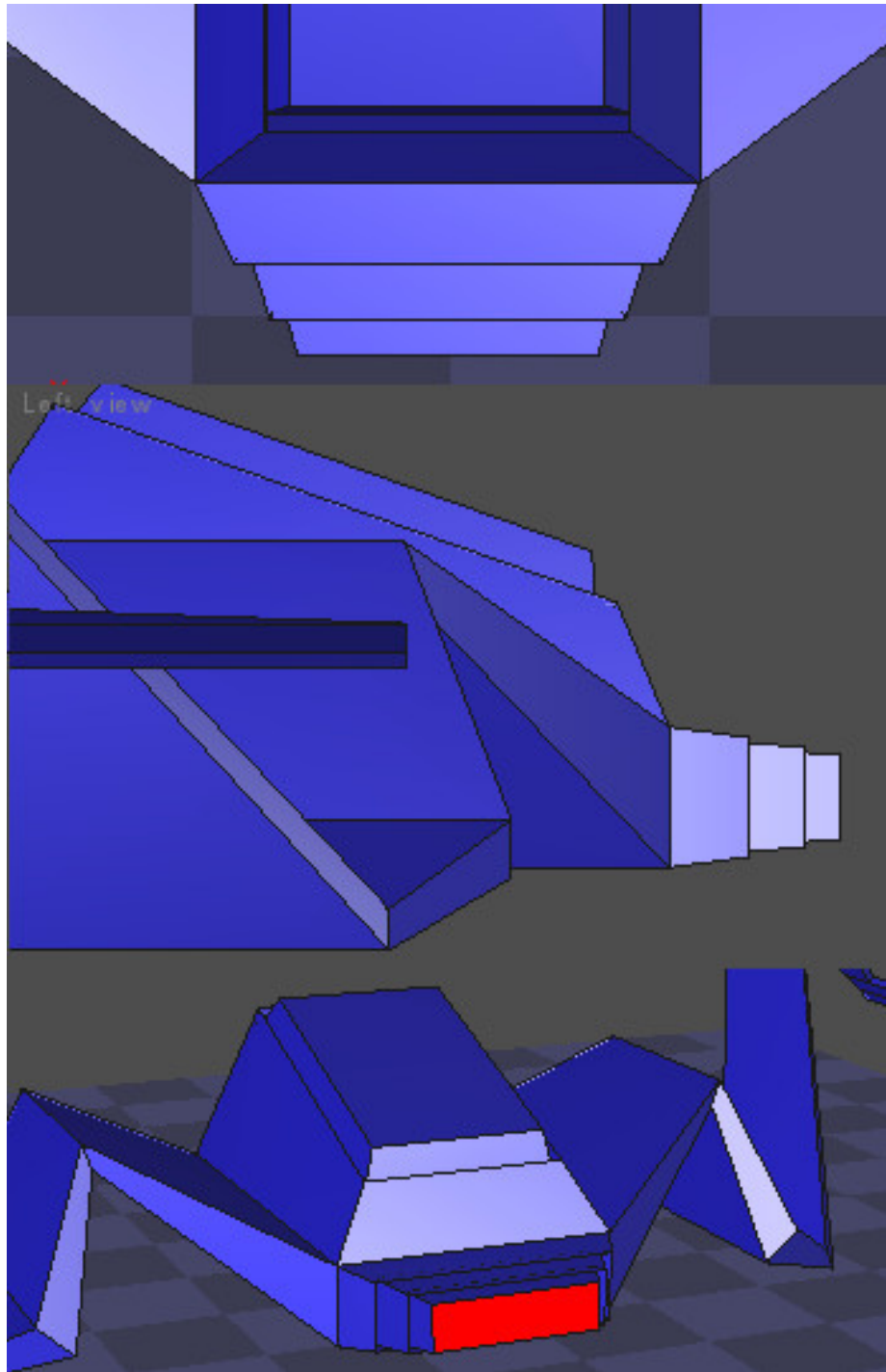
This facet was Swept out and forward, and shrunk a bit

The facet was then Extruded inward and shrunk a bit more.

The facet was Extruded outward and shrunk still further.

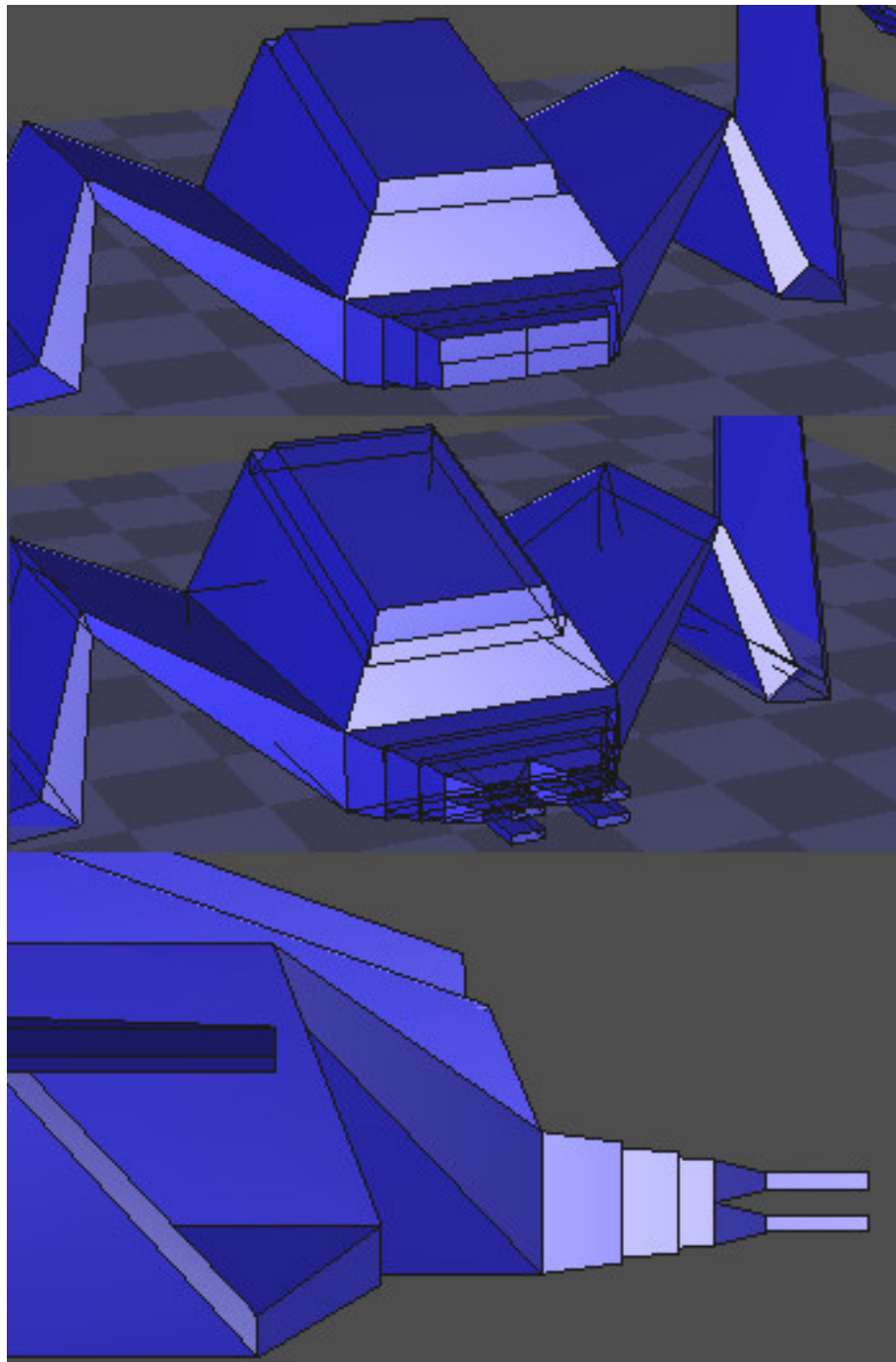


The same Extrusion process was used to build up the nose of the craft as is shown in the Top and Side views in the image below. The front facet of the box was selected and Extruded out, then in, then out, then in, then out. Each extrusion was shrunk a bit to taper the nose.

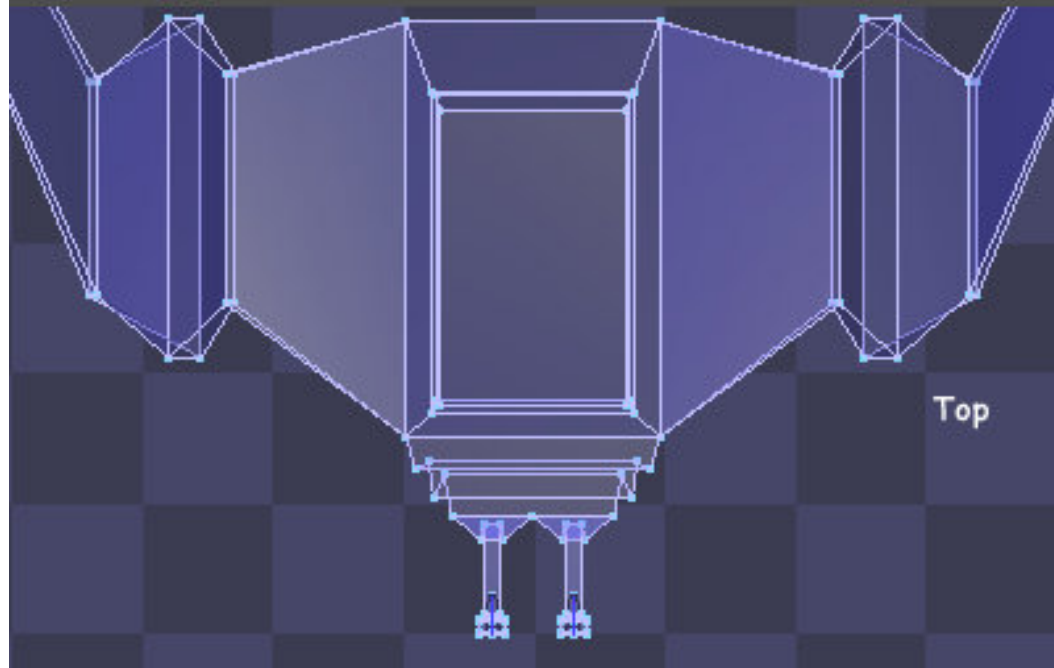
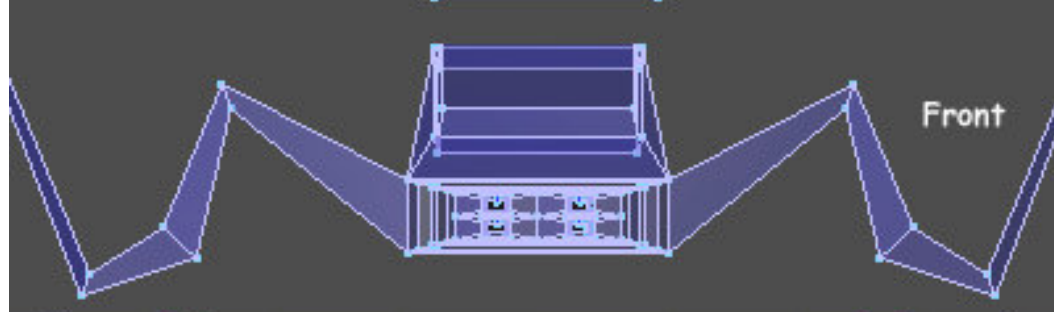
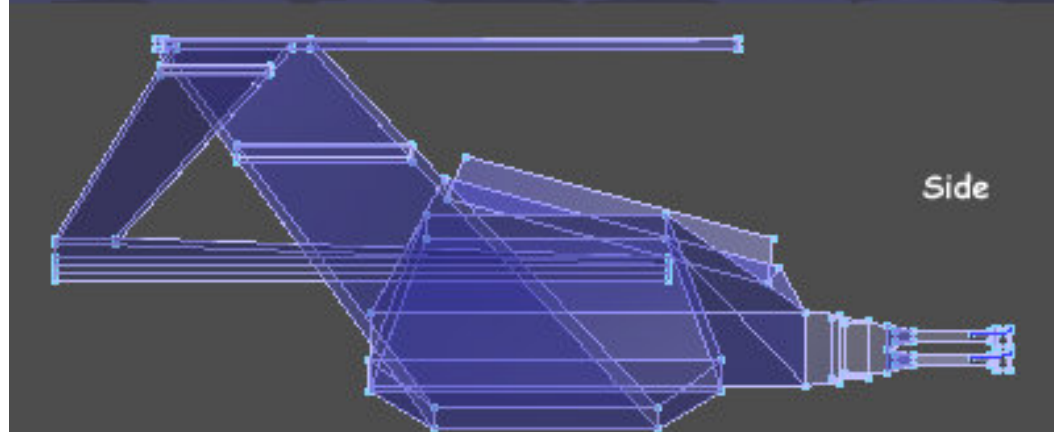
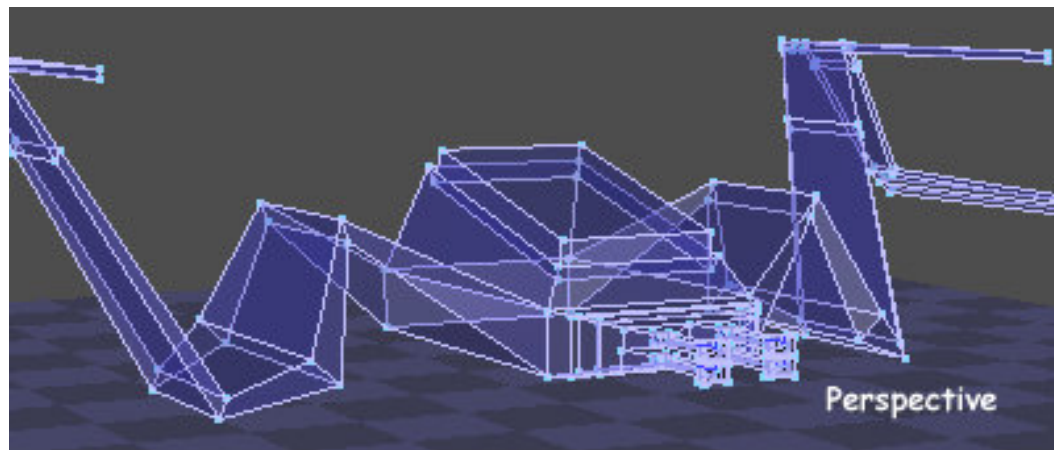


The front-most facet of the nose was selected (as shown above), and then Tessellation was applied to produce four facets (as shown below). These facets were Extruded to start the modeling of the guns.



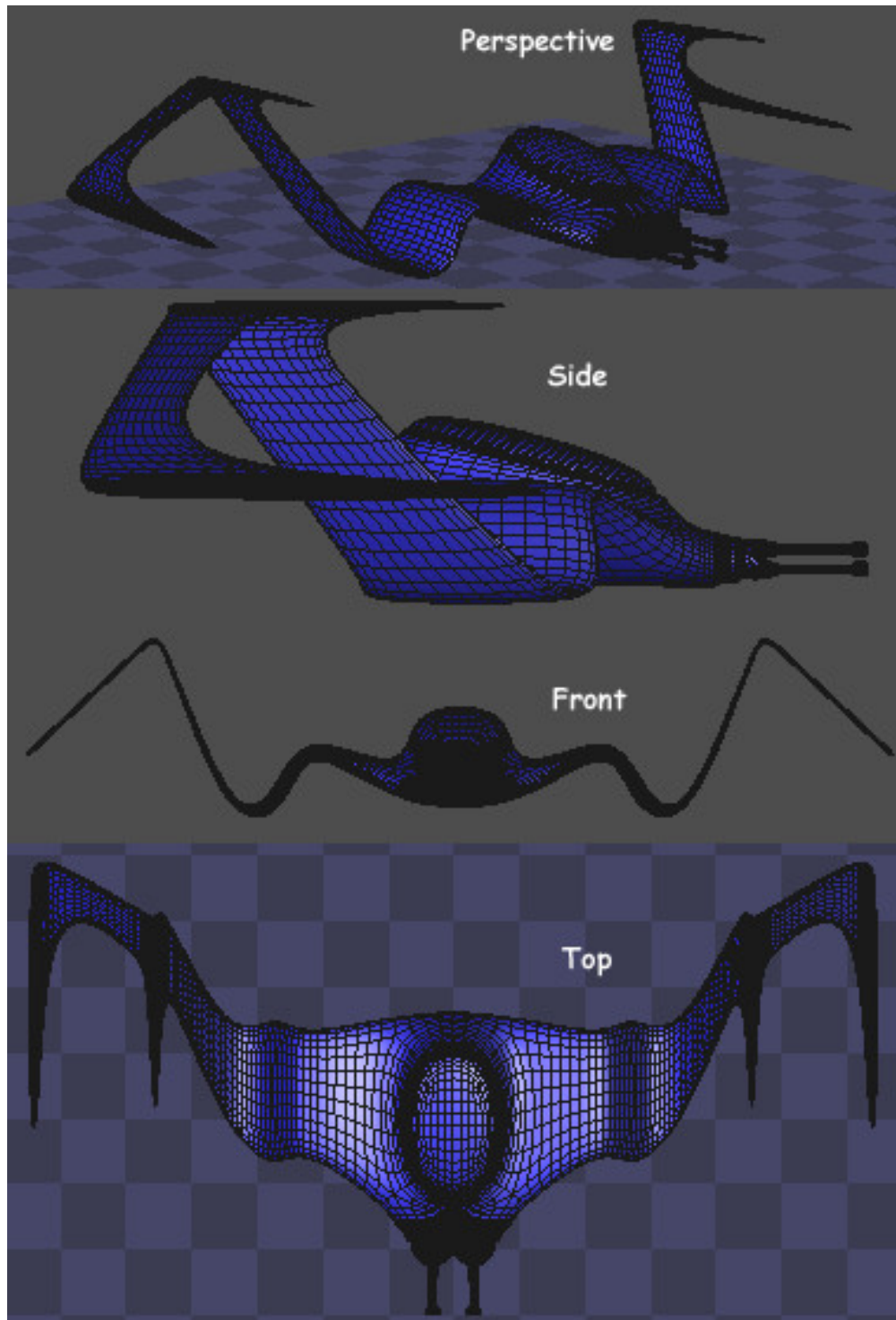


The last extrusions of the guns may be seen in the images of the almost finished model below.



## Apply Smoothing

Click on the Smoothing icon from the Modeling palette and accept the default Catmull-Clark subdivision algorithm. In the Parameters window, set Range to 3. Swipe the cursor to the right to validate the changes.



## Group the Model

To make life a lot easier later on, it is a good idea to split the model into groups. This will let you apply different textures to the various parts of the model, using either image maps or procedural textures. The model may be grouped using the UVMapper utility or the Grouping tool in Poser, but you can also do this work right inside Amapi.

To do the grouping inside Amapi, select the facets to be included for a given group. In the Modeling Palette, click on the Cut tool, and choose the Extract option. Double click the selected area to extract it, then double click it again to open the Information pop-up to rename the group. Repeat this process for each group. Click on the Group tool, then click "A" to lock all of the parts together.

For this project, the model was split into separate groups for the hull, the canopy, the sections of the nose, and the parts of the guns. The model was then exported in the WaveFront OBJ format, ready for texturing and rendering.

## The Rest of the Picture

The grouped model was imported into Bryce where procedural textures were applied to each group. The rocky crags jutting through the clouds are terrains with height dependent transparency mapping applied, so that the bottoms of the terrains fade away into nothing. The cloud cover was made of a volume cloud slab and a cloud plane. Torus shaped volume clouds were also added around the peaks. The sky was made by starting with one of the defaults and tweaking it a bit in the Atmosphere Editor of Bryce's Sky Lab.

Well, that's it until the next time. I hope you enjoyed his project as much as I did.

Oh yeah, don't forget to buckle up.

## Related Links

[Eovia, home of Amapi](#)

[Amapi Designer 7 Feature List](#)

[UVMapper](#)

**[RETURN TO TUTORIALS]**

Copyright © 2003, Carl E Schou, All Rights Reserved