

# Part one of a series of tutorials for the Blender game engine by Smoking\_mirror.



## *Document Description:*

This is part one of a set of tutorials, it covers modelling, texturing and preparing a game engine model for use in the BGE\*.

\* Blender Game engine

## *Document Aim:*

The aim of the tutorials is to introduce new users of the BGE to some of the concepts needed to produce a moderately complex game. The aim of this first tutorial is to show users how to model, texture and prepare a object mesh for the game engine.

## *Document Goals:*

- Describe how to model a low poly game object.
- Show how to use real world textures to texture a game object.
- Show how to unwrap a game object mesh on to a UV sheet.
- Show how to bake textures.
- Show optional techniques for further development of the game object.

## *Introduction:*

I'm going to go through the steps needed to make a game ready model for the BGE. I'll go quite slowly and try to include lots of pictures. Future tutorials will pick up the pace as the reader will be improving their skills and will hopefully be able to re-use the knowledge they gain here in future instalments. For example, next time when I'm telling you how to add enemies to the game I will just instruct you to make a new game model, I won't go through the steps already outlined here.

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## Part One – Planning:



First you need to decide what you are going to make. In our case we are making a game which is similar to the old Megadrive (Genesis) game "Desert Strike". We need a helicopter. In the original game you fly an Apache, But I've always been rather fond of the Bell AH1 Cobra. Whichever design you choose make sure it's one with lots of pictures available. Use Google images to trawl for images to use for blueprints and texture samples. You will find it useful to gather images that show the object from many different directions, but try to find images that come from the same source i.e. pictures of the same helicopter taken at an air show or in a museum. Another source you may find useful is plastic scale model websites or forums. These give very well detailed images, but from a view which is hard to find on a real life object.

Some examples:

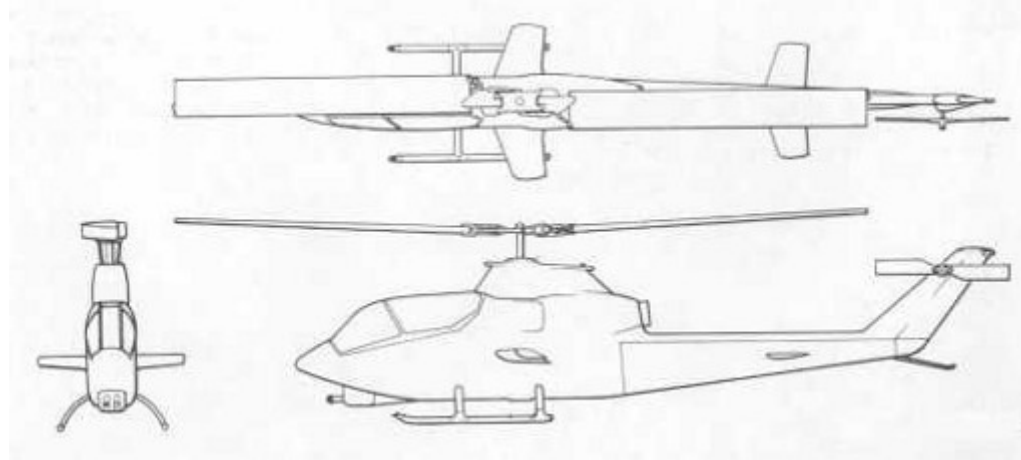


*A simple montage of images from different views. Not ideal as I'd prefer some more shots at 90 degree angles but it will do for our purpose.*



*An old cold war tank from a modelling forum. I will be using this for one of the enemy models. There are lots of good details and quite nice lighting. In this case you want flat, even lighting of the model, no flash photography.*

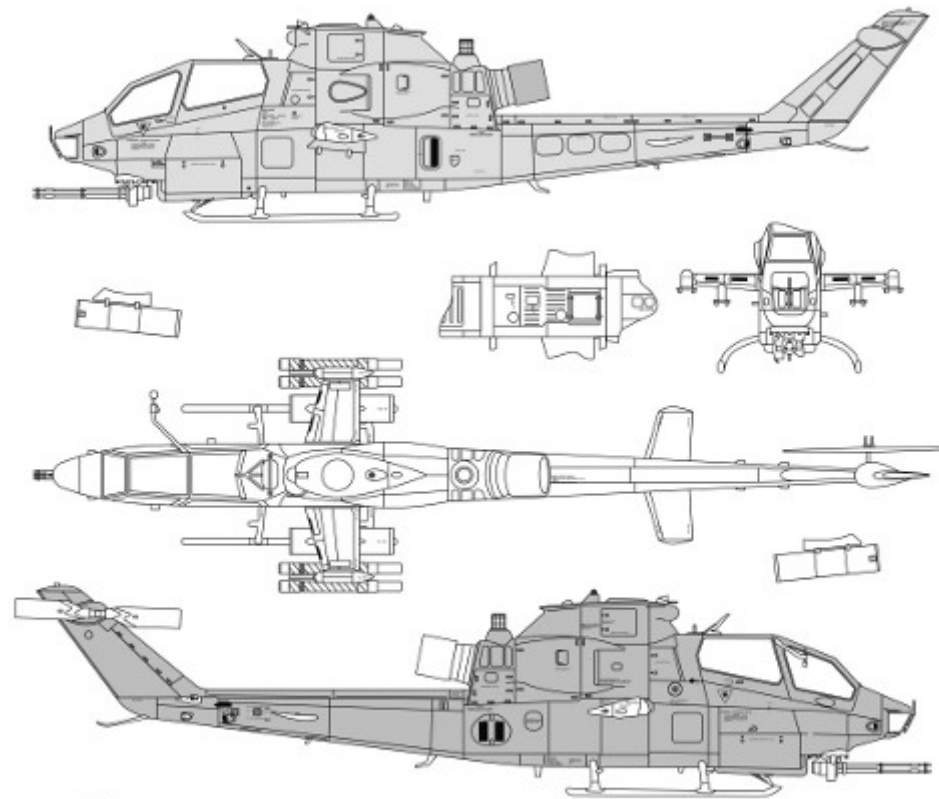
## Blueprints:



When looking for blue prints try searching for “orthographic views” they are easy to find and even something simple like this can be useful if you can't find anything else.

However, this image lacks detail and doesn't match that well with the montage I produced above. It may be better to wait to produce your texture montage until after you've found a good set of blueprints.

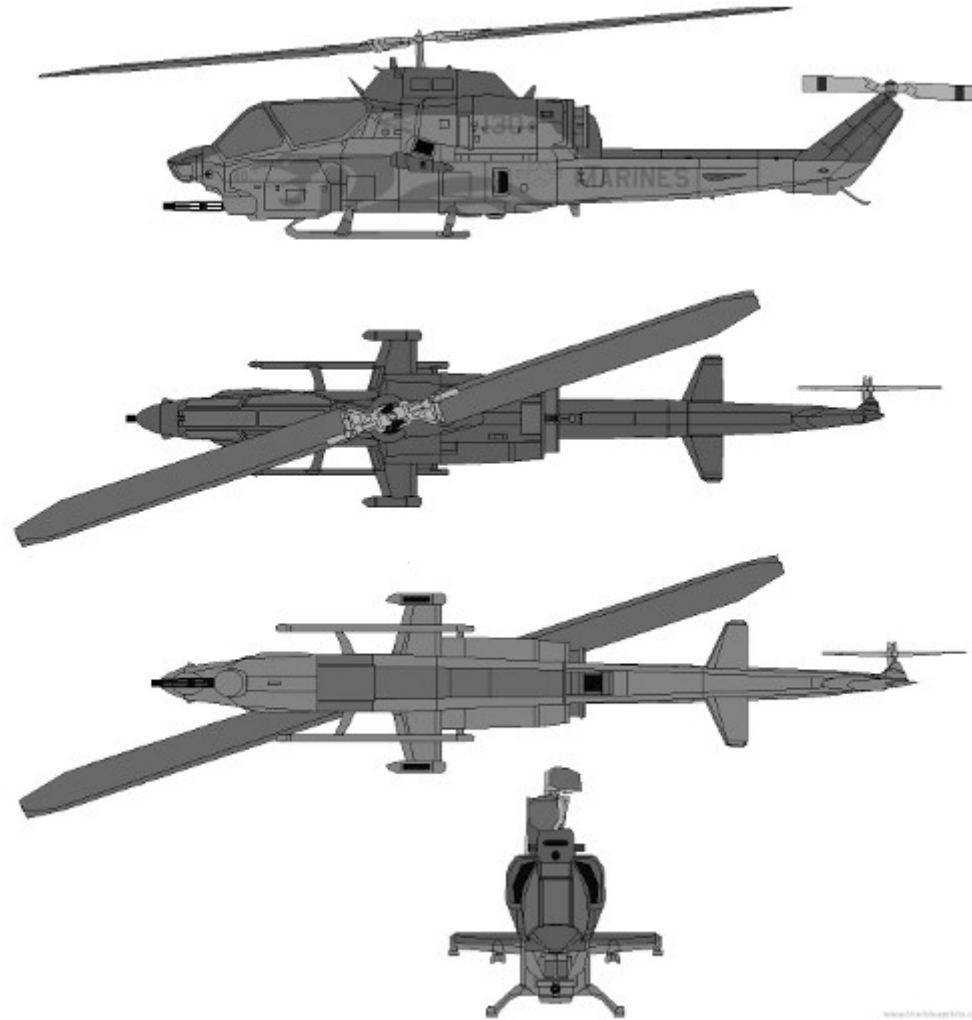
## Bell AH-1F Cobra



[www.MartWorkshop.com](http://www.MartWorkshop.com)

*This is a little better, it shows the chopper in more detail and shows exactly where the weapons go, but it doesn't show the front view that well.*



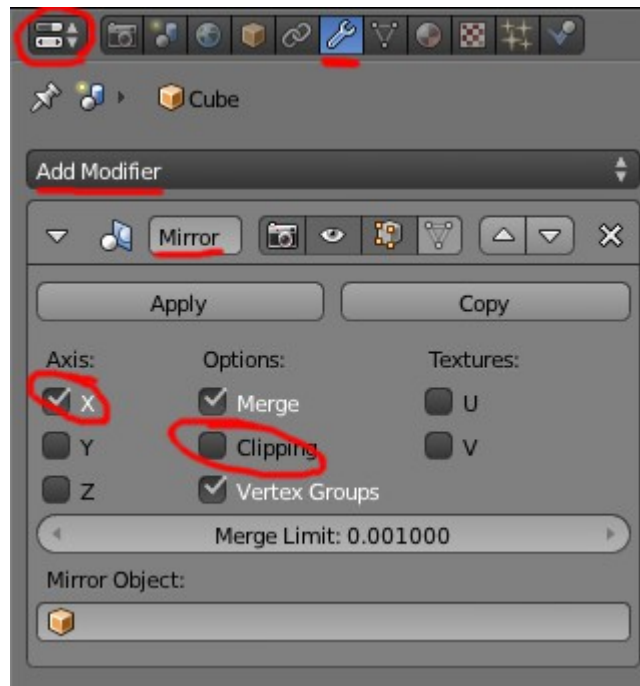


*Here's the one I chose, however, I was later to find that although it is well drawn, the views don't match exactly, so some guess work was required. Choosing your blueprint carefully will save you a lot of time and result in a better model.*

## Part 2 modelling:

So now we have our montage and blueprints, we know what we are going to make should we should move on to making the model.

The first thing to do is add a cube, then subdivide it and remove the vertices from one side. Next add a mirror modifier.

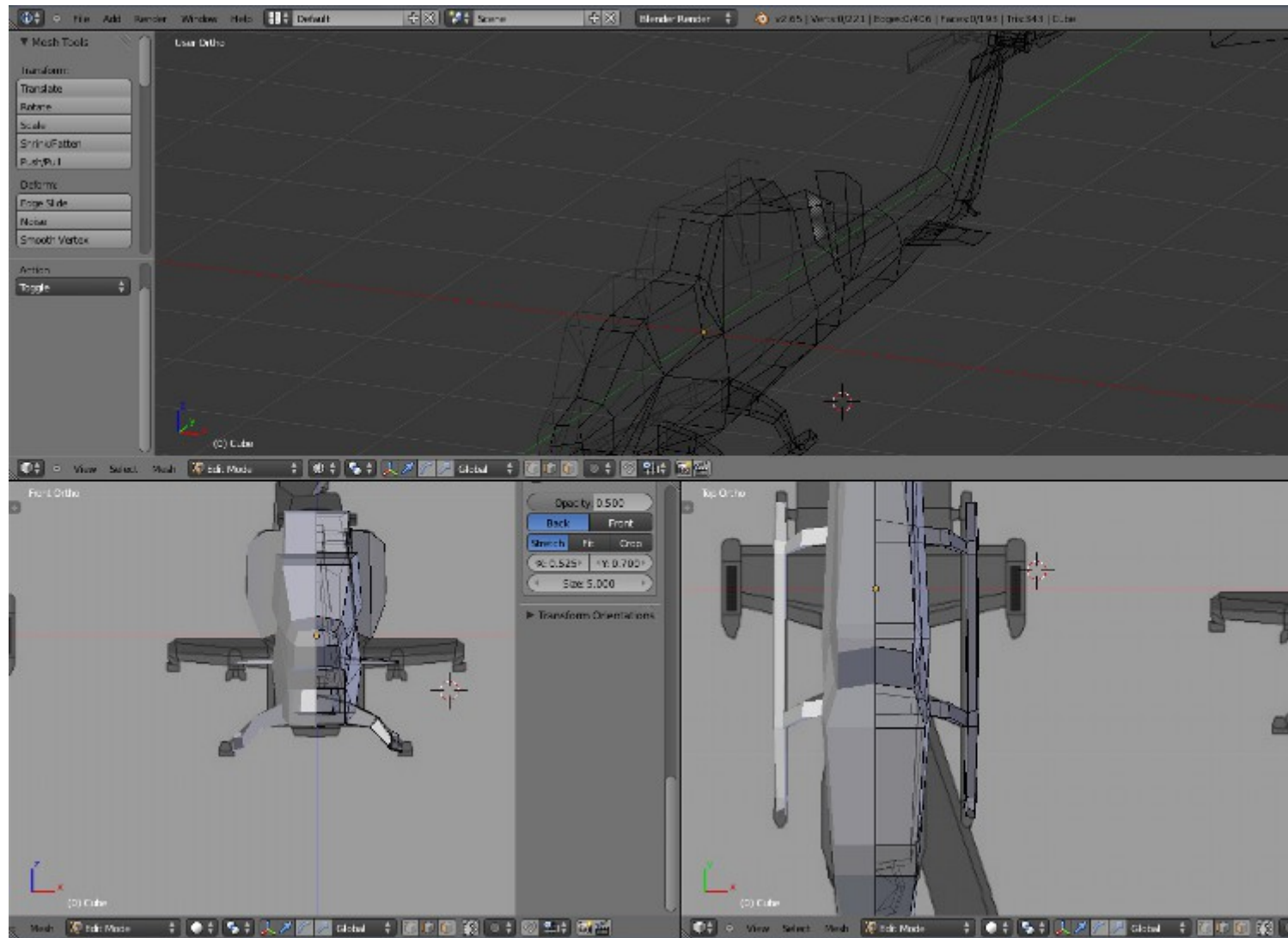


You can find it in the properties tab, you should check clipping, except you may want to turn it off sometimes when modelling. The mirror modifier means you only have to model one side of the object. The other side will follow your edits.

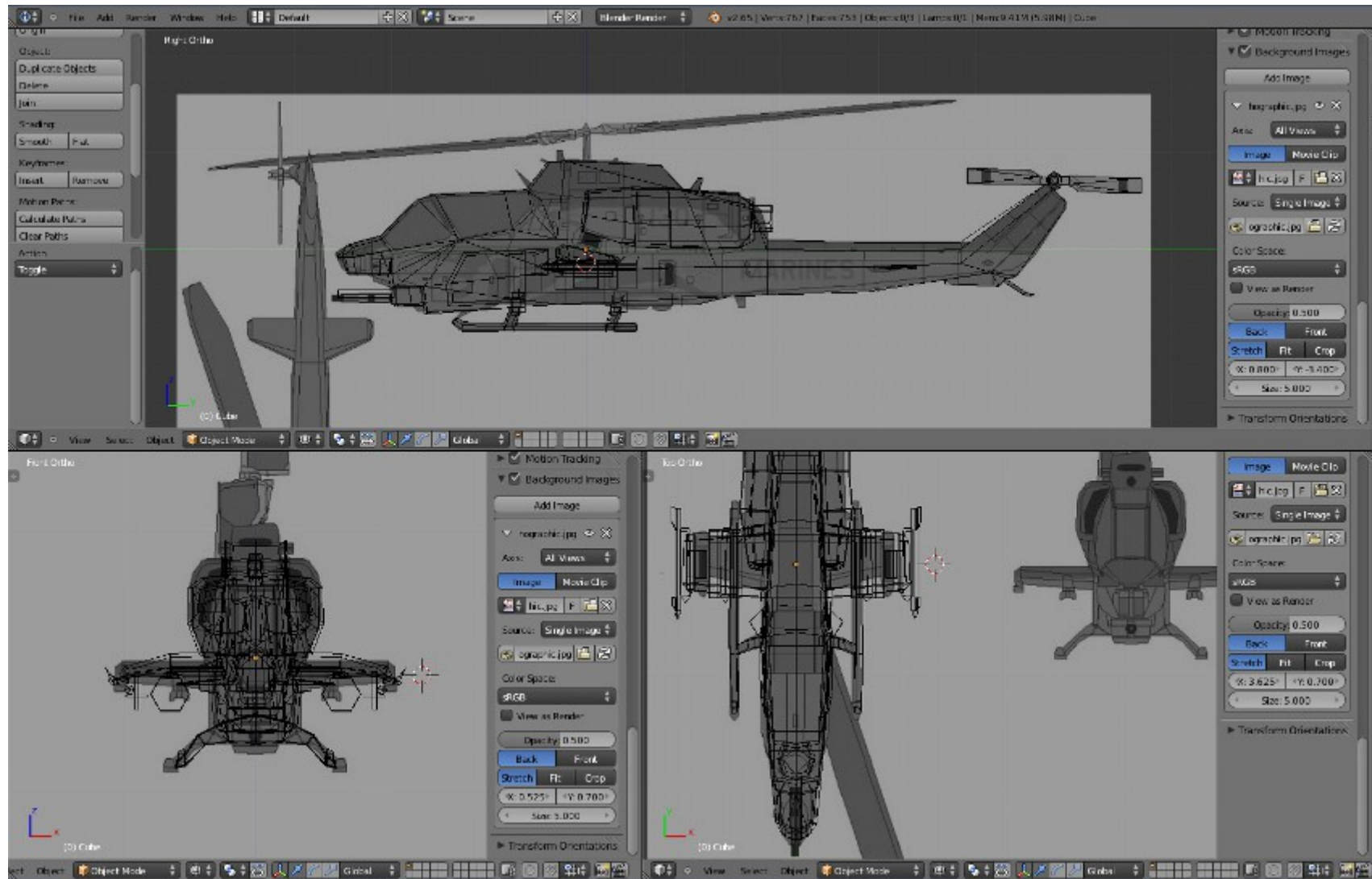
Next we are going to add background images, the tab for these is in the main 3d view, press "n" to bring it up if it is hidden.



You can change the X: and Y: values to move the image around so that it matches up with the object in your view. You can open multiple views and change the background image's X and Y position in each. You want to line up your cube in each view so that it sits in the middle of the orthographic image that you will be using for that view.



Here you can see the different views, and you can see that I've already started modelling the mesh.



Here I've almost finished the modelling. I can't really instruct you on how to do this part, low poly modelling takes practice. Just try to use simple shapes where ever you can.

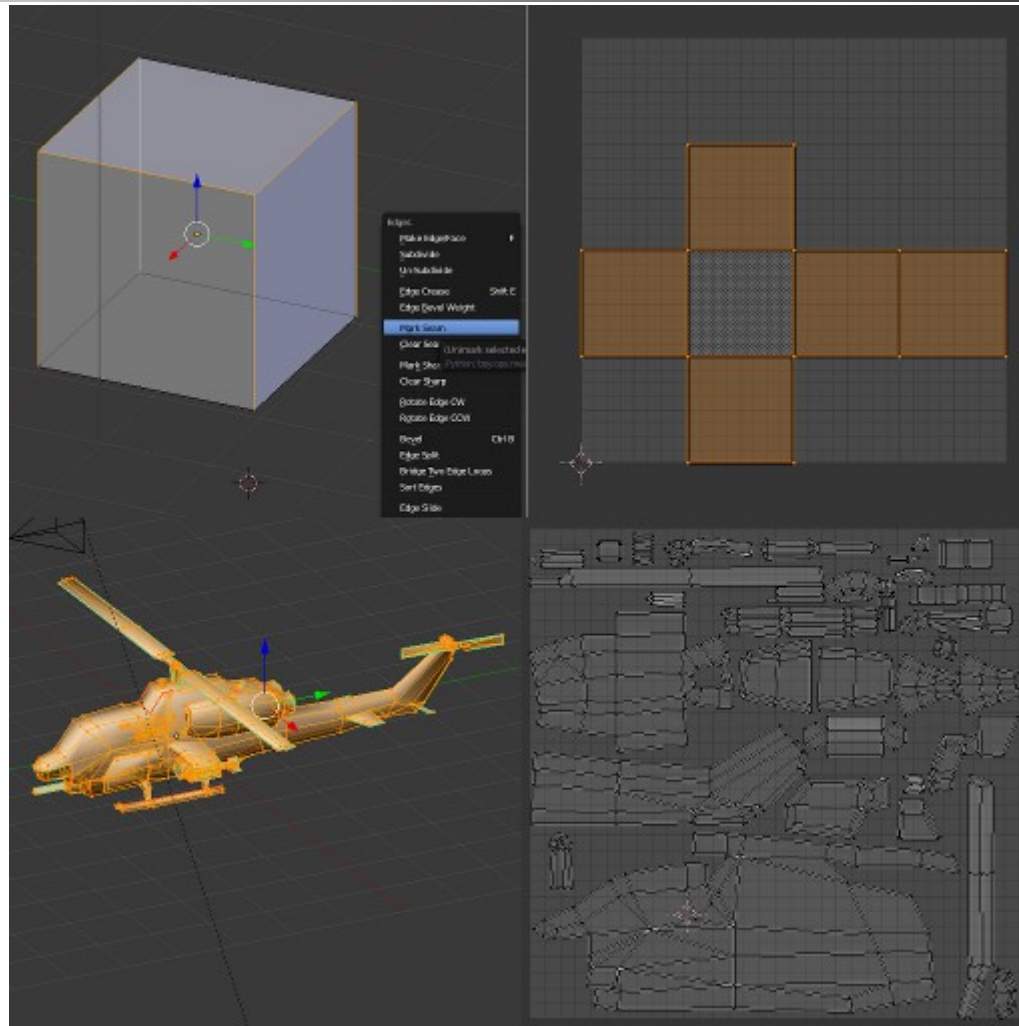


When you've finished modelling you should have something like this. Notice I've only modelled one blade for each of the rotors and likewise only half the missile is detailed. This is because I am going to UV unwrap the model soon and I want to save space on the texture sheet. I can duplicate the rotors later. The Mirror modifier is still applied, and it will remain in place until after I've finished texturing.

Blender Game v2.65 | Verts:973/973 | Edges:2458/2458 | Faces:1542/1542 | Tris:1542 | Cube

You should be aiming for less than 2000 triangles for a main game character, less than 1000 for an enemy, and less than 500 for a simple prop such as a RTS (Real Time Strategy) style building.

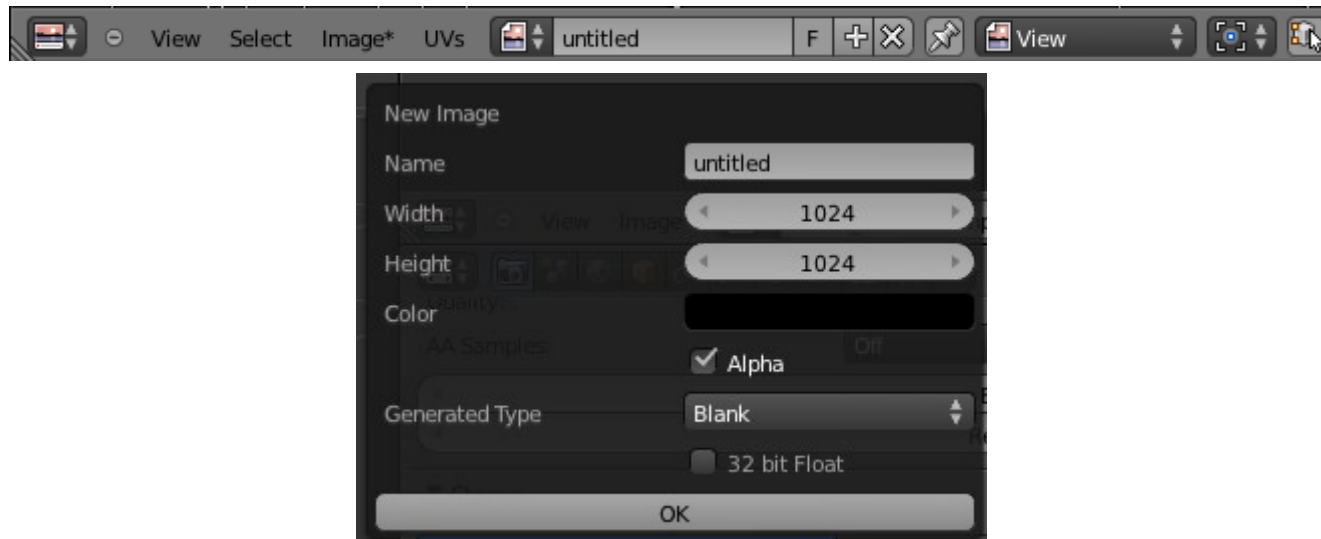
## Part 3 UV Unwrapping:



Mark seams by first selecting an edge, pressing Ctrl "e" and selecting "mark seam". Press "u" to unwrap the finished mesh in edit mode. You will need to mark enough seams so that the model can be cut up by Blender and then flattened.

UV unwrapping can be difficult for new users, just remember that everything is basically like a cube. It needs to be unfolded so that the top, sides, back, front and bottom are not overlapping. Try not to leave too many corners connected, but on the other hand the more polys that can remain connected in a single island the better as this will reduce the number of visible seams on your finished object. Try to pack all the polys close together manually, don't just rely on Blender's simple unwrapping. The more space you save here the better the finished product.

You will need to give your UV layer a blank texture for baking to later, you can do this in the UV editor window.



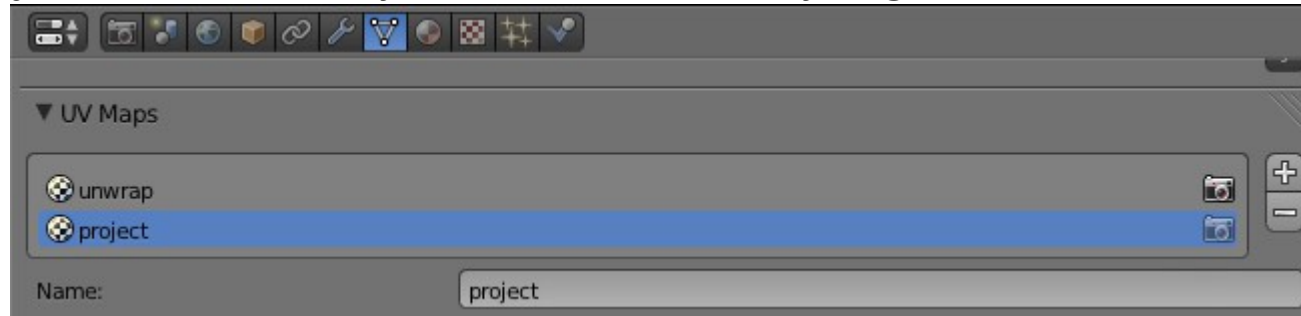


## Part 4 Projection Painting Textures:

By now you should have your main UV map. But how do you make a texture?

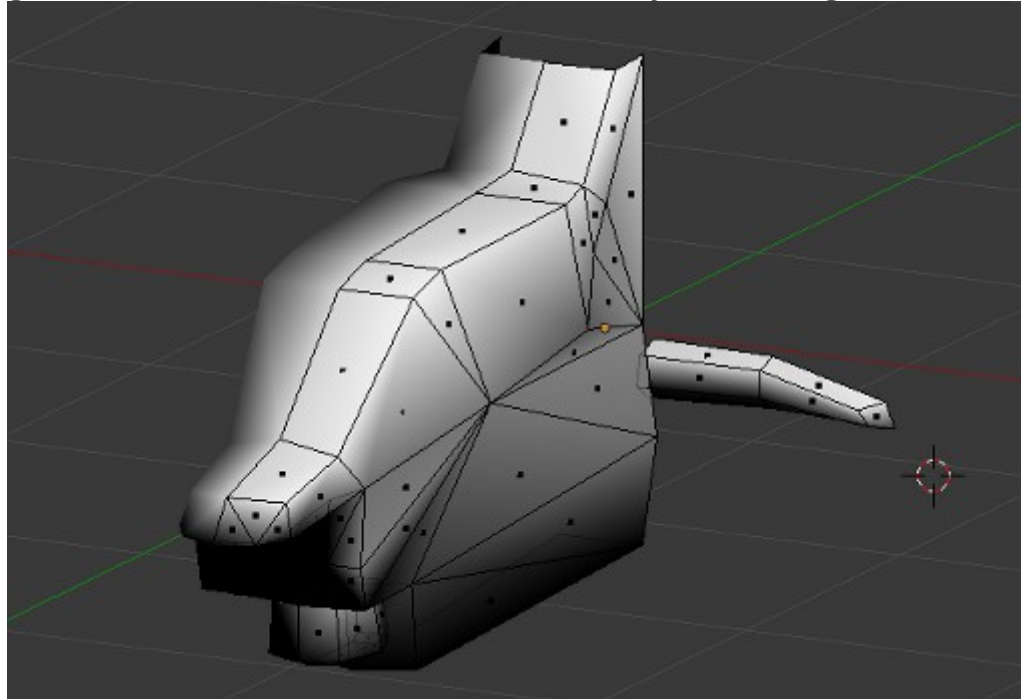
I'm going to use a technique which for lack of a better description I will call Projection Painting.

The idea is to project textures on to your model from every angle, and then bake them.

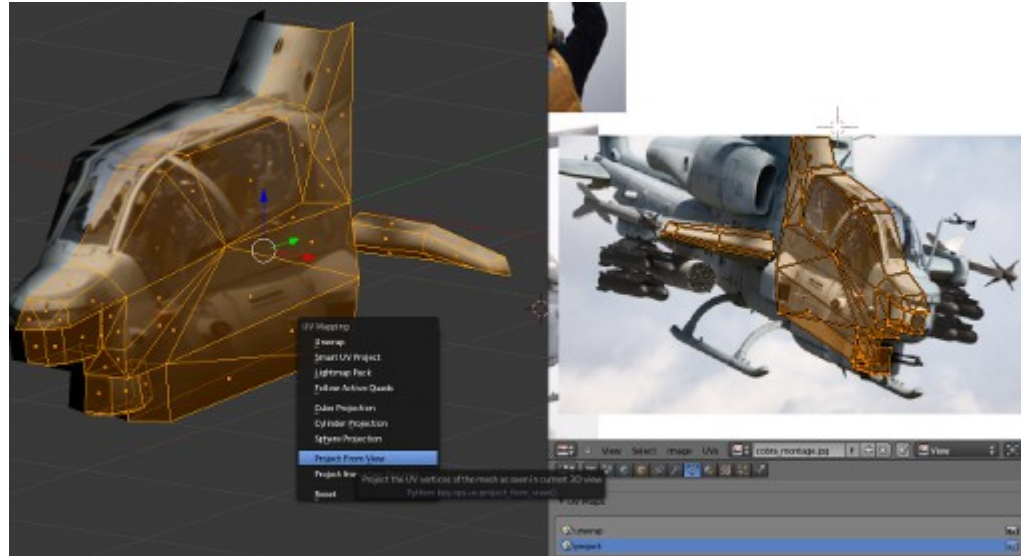


First you should add a second UV layer in the object's mesh panel. You can call it whatever you like, Here I've called it "Project" (the verb, not the noun). You have to keep your unwrapped UV texture though, don't delete it and make sure you select your "project" UV layer before editing it.

Next you should choose some faces on your model that would match up with one of the images in your montage. You can go ahead and hide all the other by pressing "h".



You'll get something like this. Now rotate the view until your mesh matches your montage picture then press "u" to unwrap and select "project from view". You then need to move the polygons around in the UV map window to match the Montage picture view. You can mirror the polygons by scaling by "x" and "-1". Just remember that if you do then letters or writing will be mirrored too. It doesn't matter too much as you're probably going to remove the lettering later anyway, you don't want it to be mirrored on the other half of your model. Ideally you should only select the faces which are facing the camera, any back faces or faces which are at more than 45 degrees to the camera will look strange.

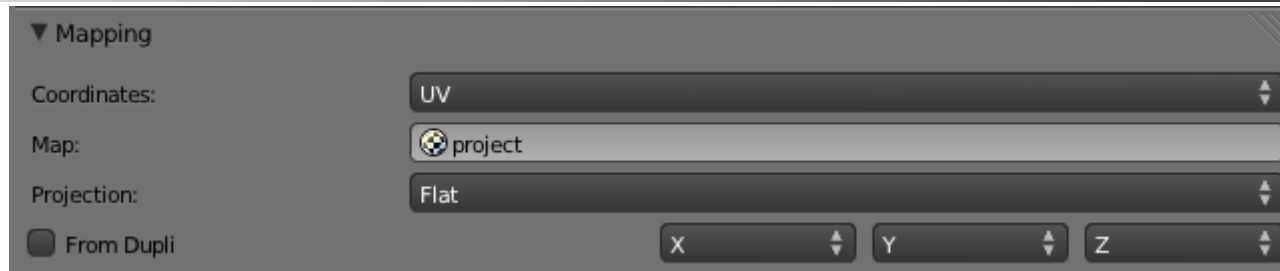


This is what the effect will look like (above) and when finished (below).

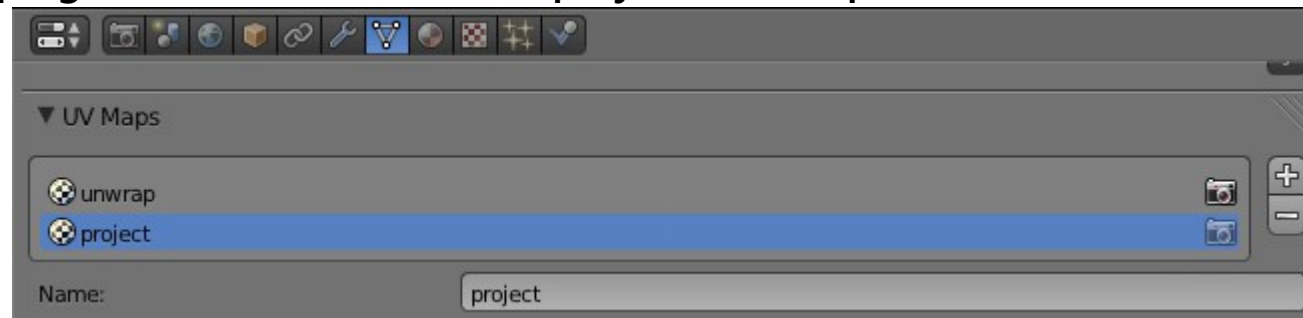


Keep going until you have projected a texture on to every surface of the mesh. Don't worry if some parts look strange as you'll be editing them later.

### Part 5 Texture baking:



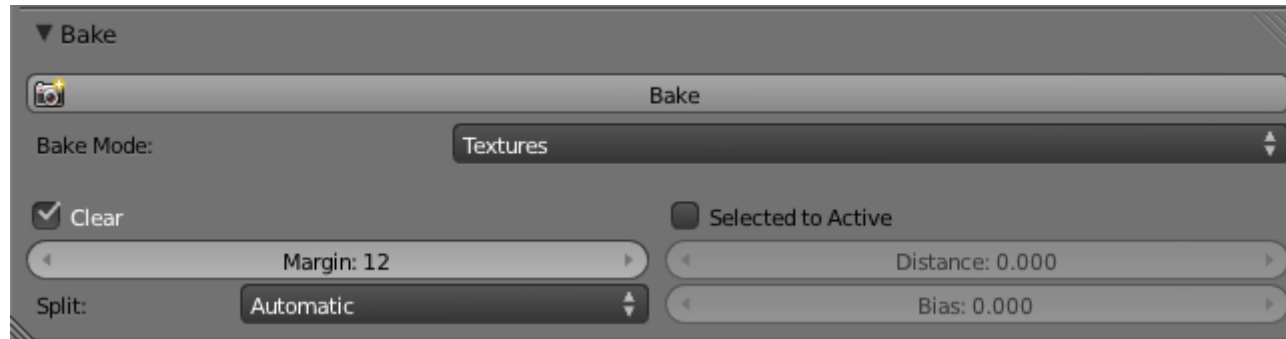
Next you will have to create a material and add a texture, give it your montage image as a source and set the mapping to "UV" and select the "project" UV map.



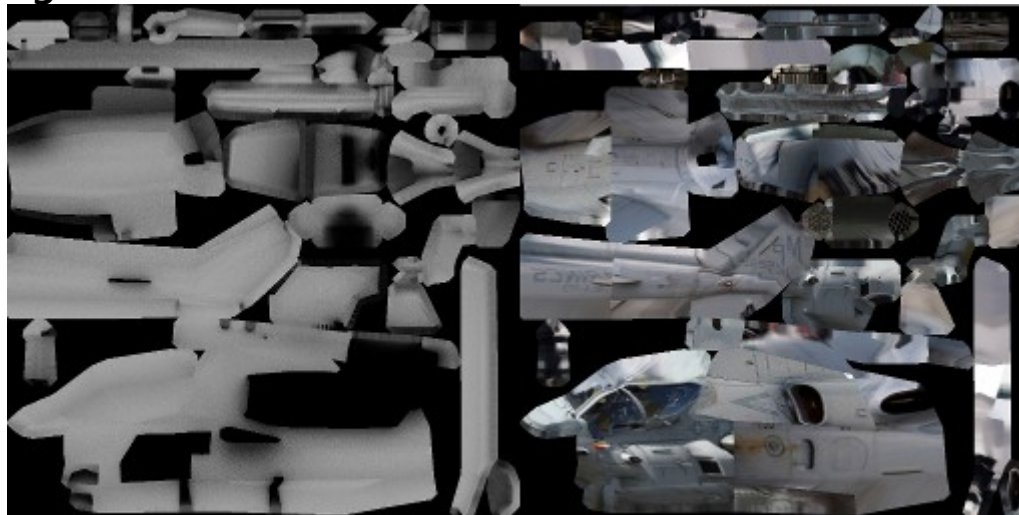
Make sure your mesh panel looks like this, "unwrap" should be the active map. (the camera image should not be greyed out. Now go to the render panel:



And scroll down to “bake”:



Select bake mode “Textures” only and set the margin to a quite high number like 12. Now hit bake. It may take a few times to get the setting right, make sure your texture is set in the materials tab, and your UV map is set to “unwrap” in the mesh tab. If you have any problems go back and reload any textures you are using.



You can also bake the ambient occlusion data to use for giving more depth and realism when editing your texture.

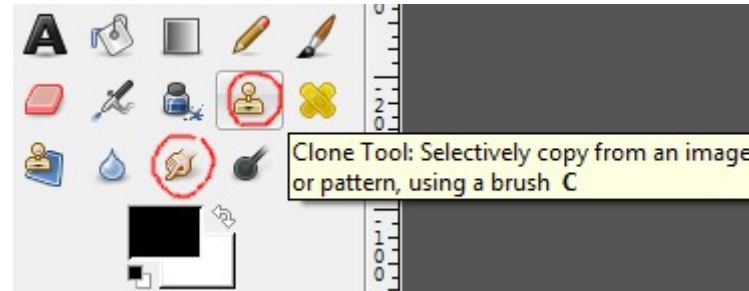
Something you may want to do here is to export the UV layout as an image. You can do it like this:



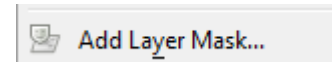
You can use it as an overlay image when editing your textures.

## Part 6 Image editing:

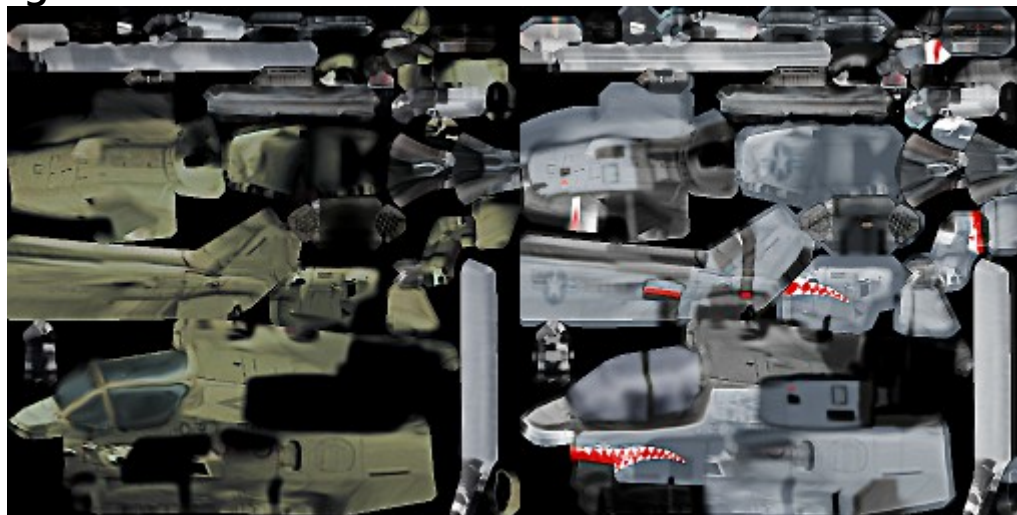
Now you should use an editing program, I suggest the GIMP, if so you can use the clone tool and the smudge tool to merge any seams or mismatches between the different projected texture angles.



You can edit your textures until you are happy with the result. You can overlay the AO textures and set the layer to "overlay", "darken only", "multiply" or add a layer mask:

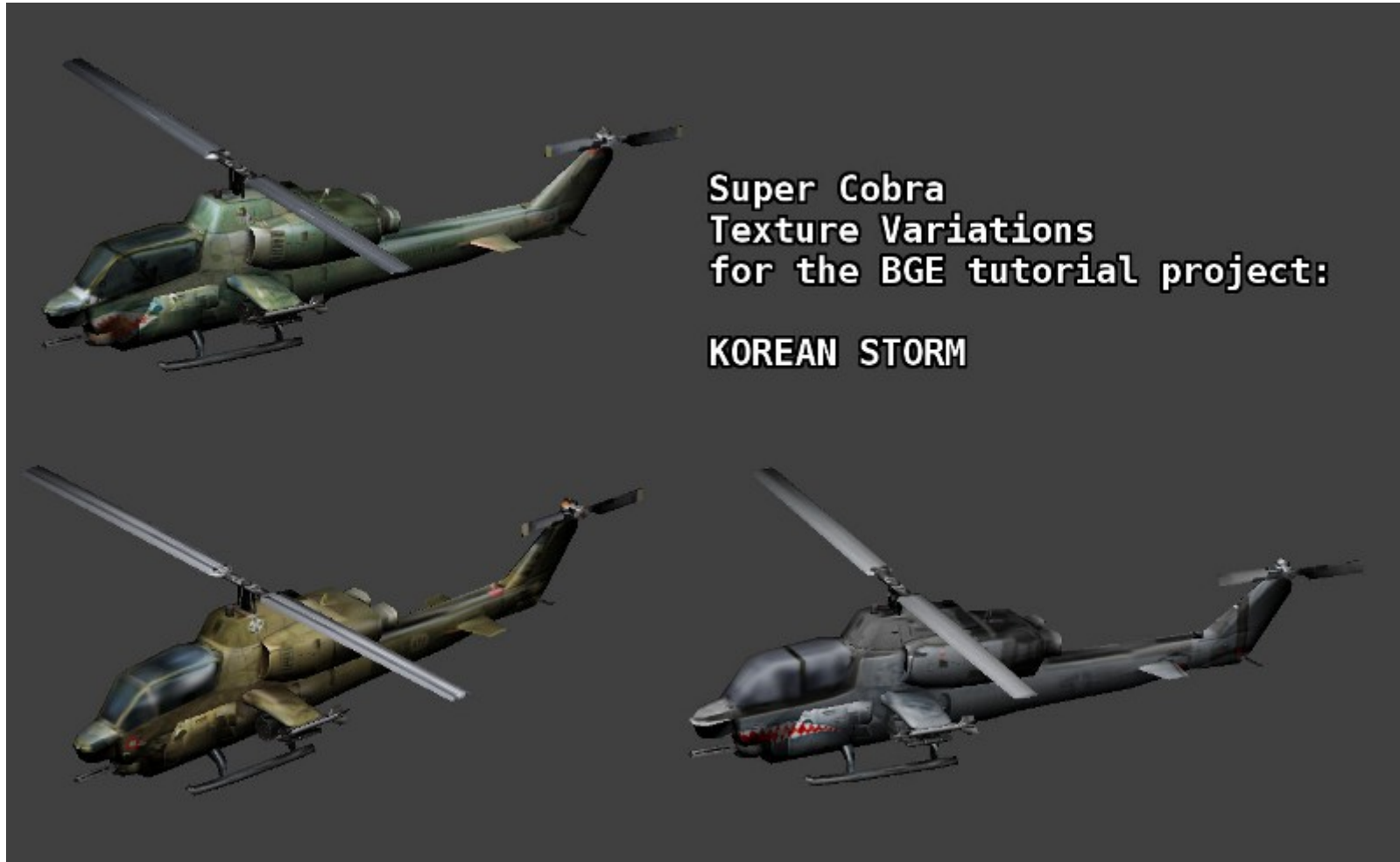


to get more control over how the AO textures are mixed.



Keep checking how your edits look on the real model, you can also go back and project and bake more textures, in this case I projected the teeth to get the right look to the image.

Finally:



Don't forget to apply the mirror modifier, and to add any finishing touches to the model. If you are going to rig the model with a skeleton, do that before applying the mirror modifier. You can also make multiple skins for your model. The edge split modifier can also make your model look better.





*Here's what the model looks like in game.*

*In the next tutorial we will look at preparing your model for the game engine and giving your player object some movement logic and scripts. Thanks for reading.*

*Smoking Mirror AKA Pickledtezcatt AKA John Topple.*

*15<sup>th</sup> June 2013*

If you want to write your own tutorials to be included in the series you should use the following formatting conventions:

Main Title: Segoe Print 26 point, Centered.

Subtitles: Segoe Print 16 point, left aligned.

Main text: Segoe UI Semibold 16 point, left aligned.

Image captions: Segoe Print 16 point, Centered.

The document should be landscape, not portrait for better viewing on wide screen monitors without splitting pages, and images included should be of a maximum width of 512 pixels and should be centered. There should be a roughly 50/50 mix of text and images

You can use the following image for title text background:



It's a simple gradient from pure white to "404040" gray on the right.