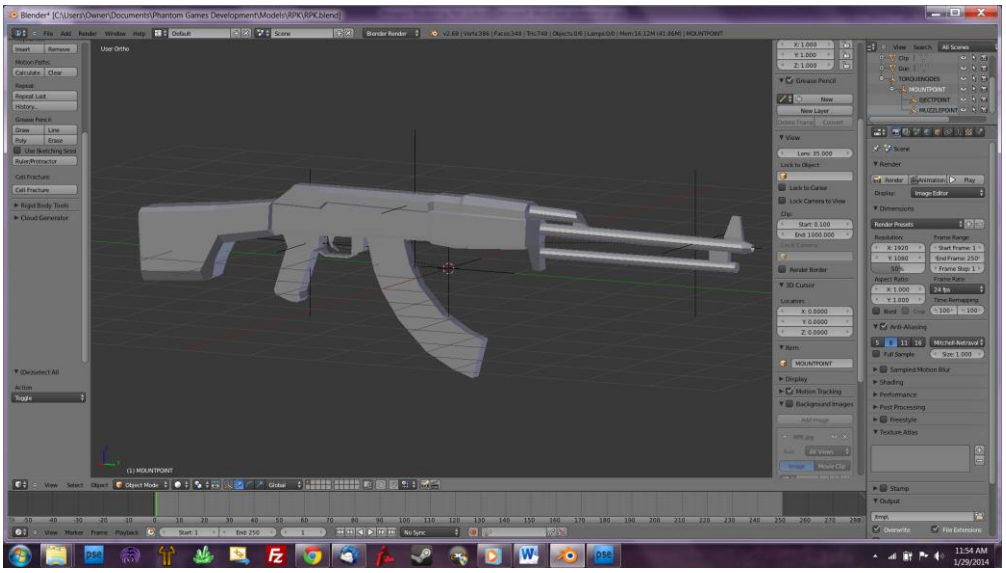
Advanced FPS Kit
Tutorials
Weapon Modelling (Part 4)

Welcome to part 4, and the last part of this modelling tutorial series. Last time around, we completed the modelling part of this tutorial, now we're ready to get this bad boy into our game. At the moment however, we've got a big white cube. Now unless your game involves guns that look like big white cubes, you're going to need some color in there to give your gun some "definition". That's where UV-Unwrapping comes into play. So as a little reminder from last time, our gun looks like this:

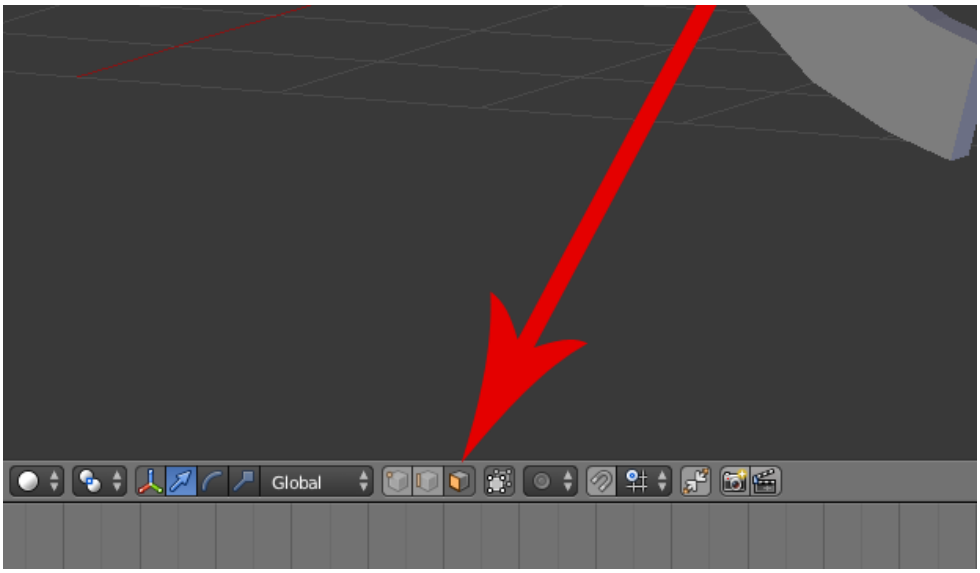


So, the process I'm going to teach you now involves two separate sets of programs. The first, obviously, is Blender itself. The other is a texture editing program. If you have Photoshop, you can follow right along with me, however GIMP is another great option for those who don't have the money to fork out for Photoshop, and it will work just as well. At this point in time, you should know pretty much every Blender hotkey you'll need with the exception of two you will learn in this tutorial. If you've forgotten them, simply go back in the tutorials to find them, or use the included Blender Cheat Sheet and look it up. This tutorial is going to be split into two "Sub-Parts" involving the individual steps of the tutorial.

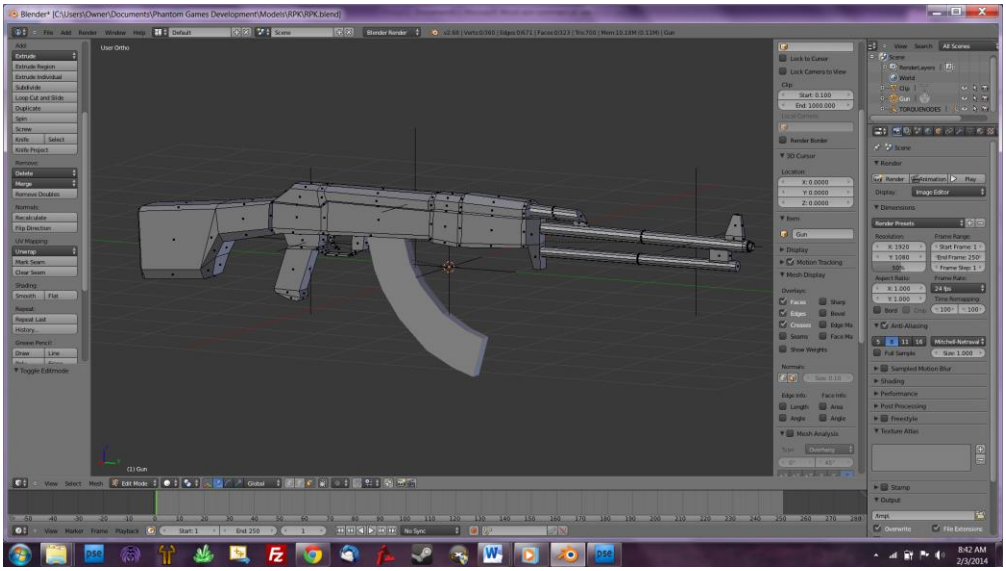
Sub-Part 1: UV-Unwrapping

The first step is to select your 'Gun' object from last time, and then you need to get into edit mode if you're not already there. Up to this point, we've only been dealing with something called Vertex Edit Mode. This is great when you're modelling, but it's not the optimal choice for unwrapping. We're going to switch over to something called Face Edit

Mode, where instead of editing individual vertices, we'll edit faces (or directly editing the cubes or triangles), to enter this mode, left click (yes it's fine) the button I've shown in this picture:

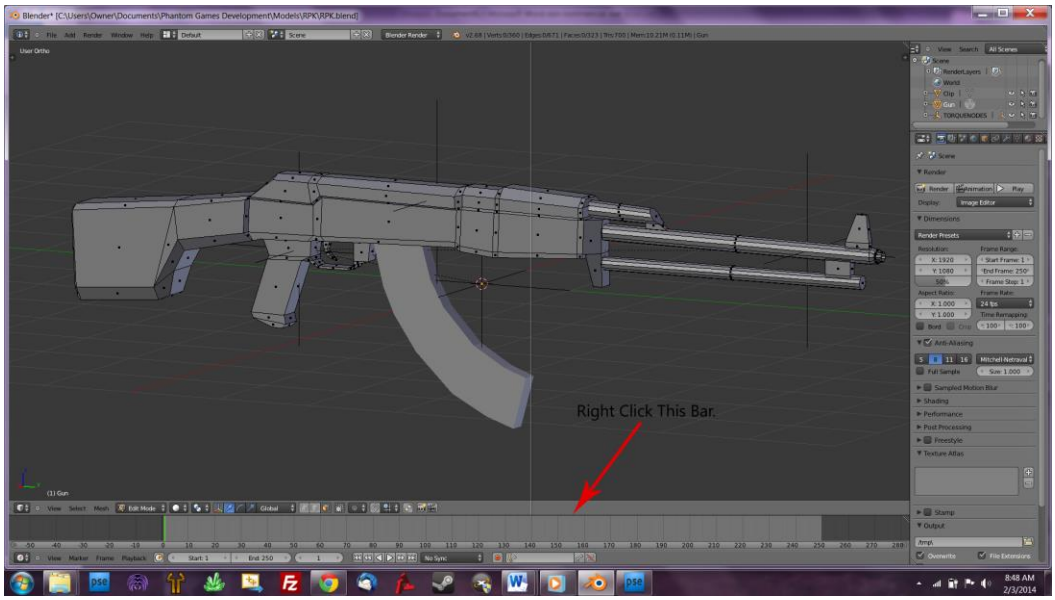


And voila, now instead of seeing dots on vertices in your edit mode, you'll see dots on faces:

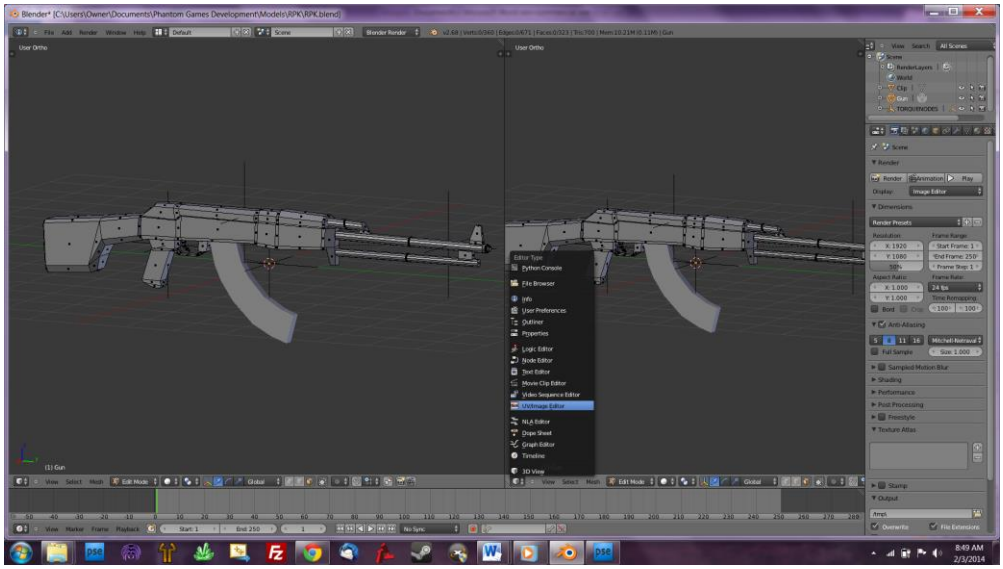


Now, while we're unwrapping, you're going to want to exploit as much screen space as possible, so we don't need the preferences and we don't need our edit shelf. I haven't shown you how to close the edit shelf, but you know the hotkey for the preferences. I'll make it easy this time though (T [edit], N [preferences]). Now, we're going to want to do what is called "Splitting" the screen into two segments. If you own or have at least used 3DS Max, you know that the editing pane already has 4 views. Blender can do this as

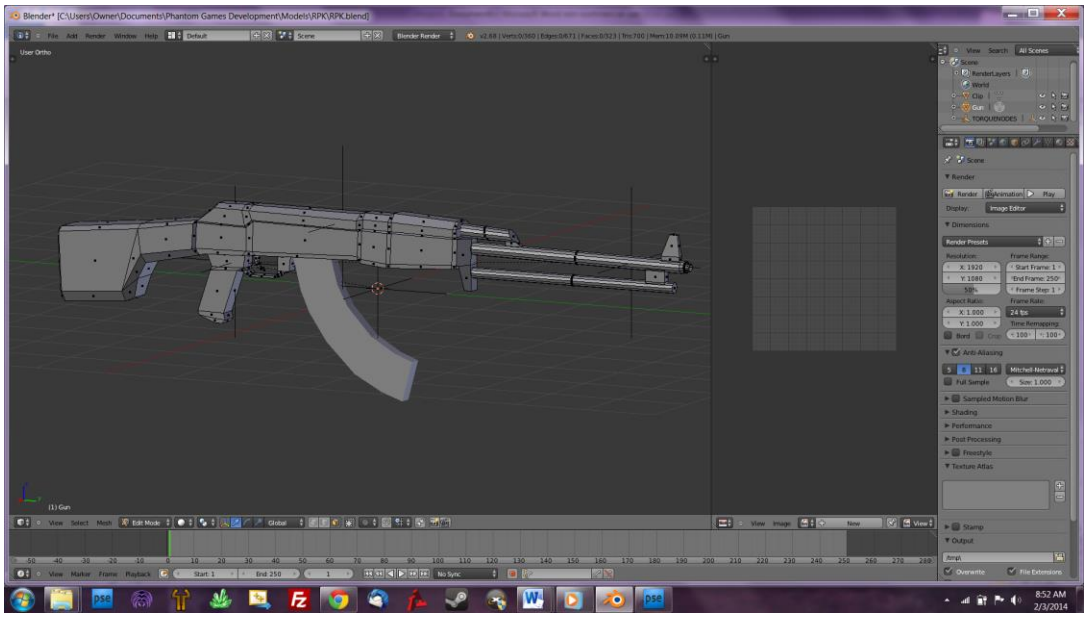
well, you just need to make the splits yourself. To make a split, move your mouse over the little grey bar separating the animation timeline and the tool shelf with the button you clicked to go into face edit mode. Right click it, and select the “Split Area” option, and then make a split by left clicking in the viewport:



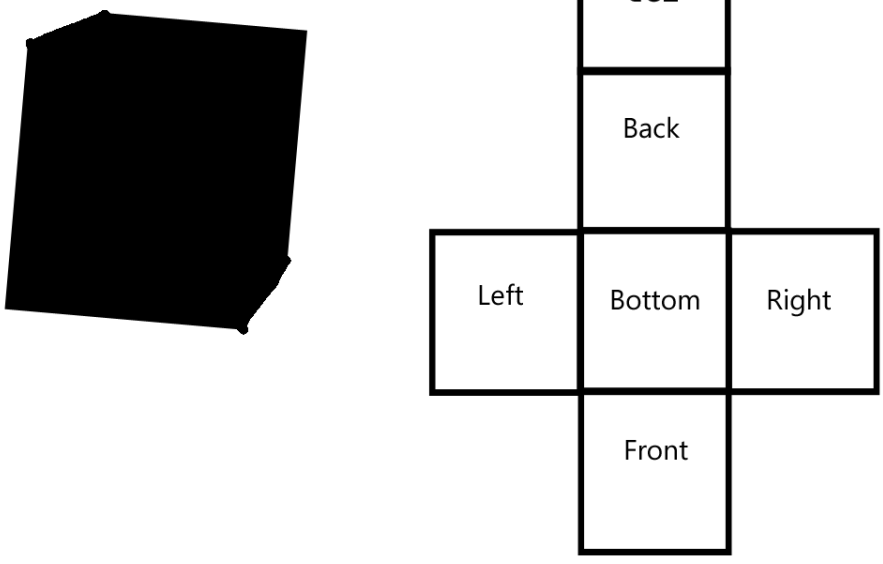
And now we have two smaller views of the same image. Now, we want a special editor for our right screen, the UV Image Editor. On the bottom left corner of the tool shelf, you’ll see a cube icon with a dropdown box, select it to open a list of editors. Select the UV Image editor and you’ll get a grid on the right screen.



You can then place your mouse over the split, and drag it over to give the model view some more space:

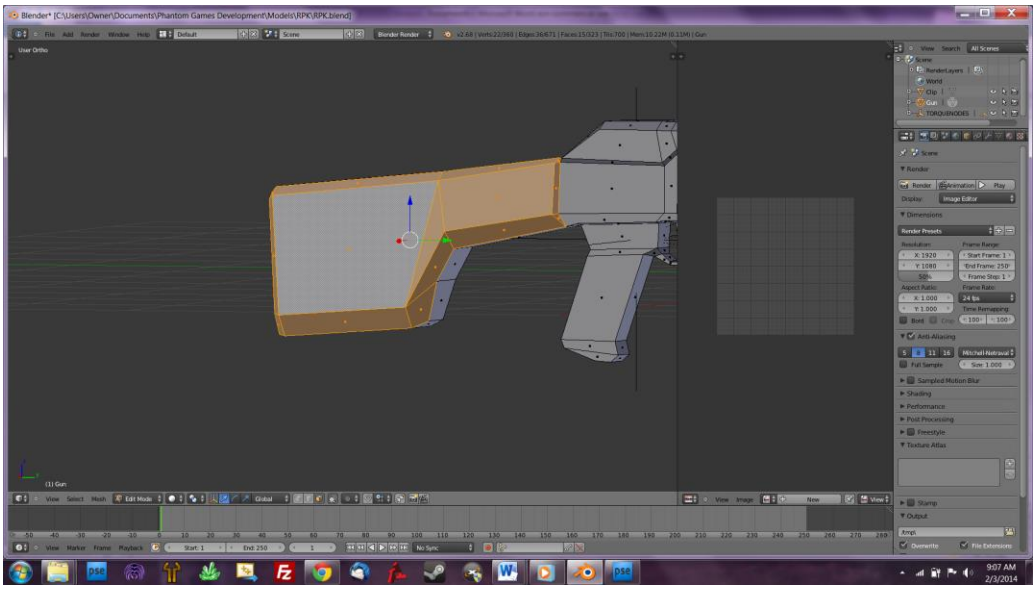


Now, a little segment on the Unwrap process. Imagine for a second you have a box, it could be a plain old cardboard box. This is a 3D image, now, in the image world, we don't have 3D images, only 2D images. So now imaging your cardboard box opened from the top view, looking down, you'd have something that looks like this:

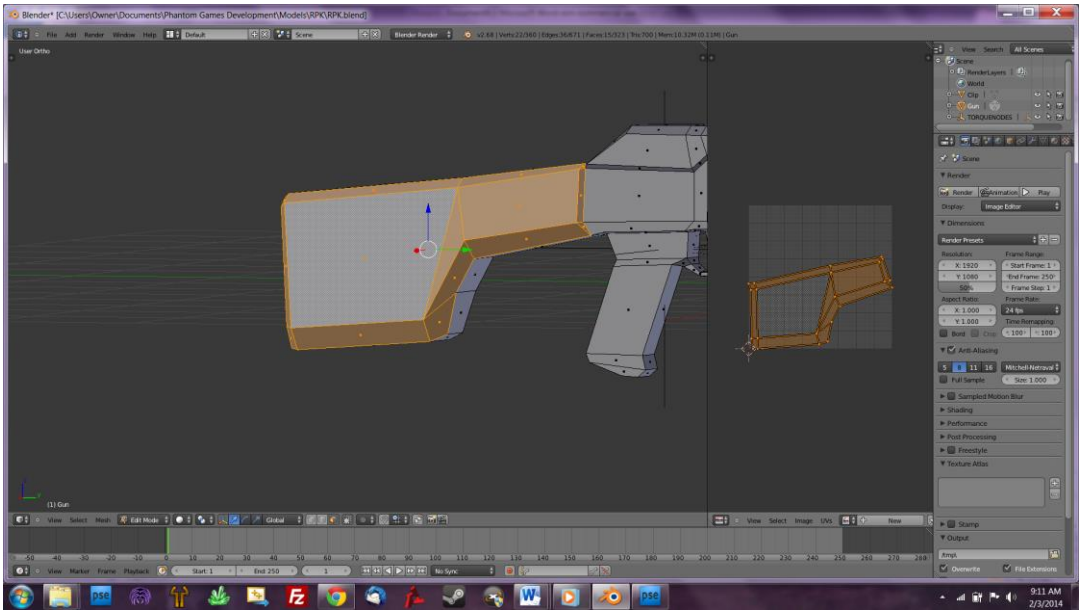


Notice how the top is upside down? This is something we're going to need to consider while unwrapping. But after numerous trials and errors, you'll get this down in no time at all. I'm also going to mention right now that this process can be quite lengthy and it requires a ton, and I do mean a ton of patience.

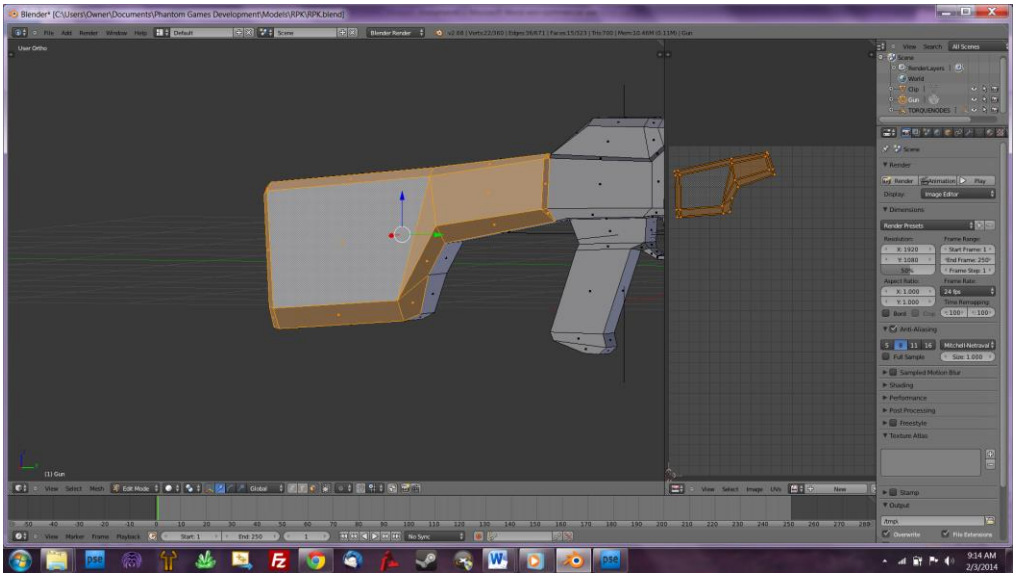
Also, you're only going to unwrap what you need to unwrap (Why unwrap the inside?), so there will be no "z" mode usage in this tutorial except right near the end when we unwrap the cylinders, because you'll find out how evil those can be soon enough. So, instead of me rambling on and on, let's just get right into it. We'll do our favorite wooden handle we modelled in part one first. I'll also be using custom angles aplenty, so make sure you know how to rotate your view. I'll start by moving into a nice angle that shows from the front-down, and select the right side of the gun stopping where it changes to metal:



Now, here comes new hotkey #1, which is your new friend, the unwrap tool (U). Now, there's a few options here. But I'm just interested in a standard 'Unwrap', so select that (should be the first option). (If you want to put yourself through texturing hell, you are free to select everything, bypass the full unwrap process by hand and use Smart Unwrap, but you'll quickly find out why this is bad, bad, bad!!!) And now, the right side of our screen will light up for the first time (yay!):

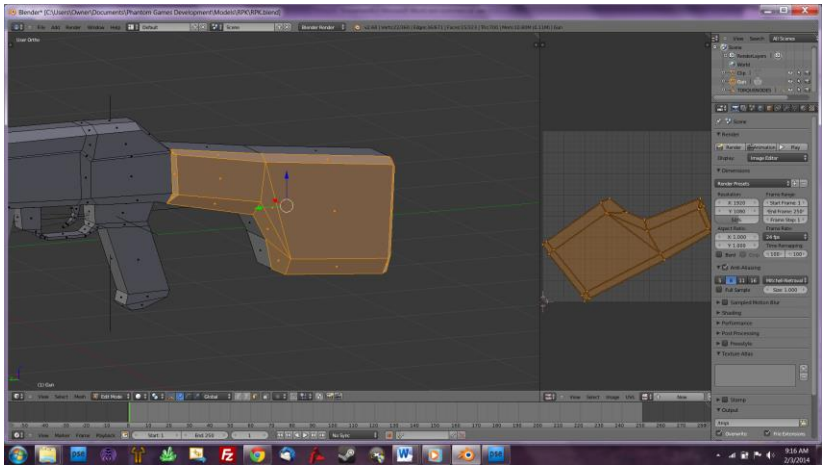


So, now, the art of unwrapping is exploiting as much space as you possibly can using the grid. And you can use any tool you want to accomplish this, you can move (G), Scale (S), and Rotate (R) to accomplish these needs. I'm going to move this to the top, and scale it way down, since we've got a lot of work to do. (And feel free to zoom in on the piece you're editing, I find that it helps a lot)

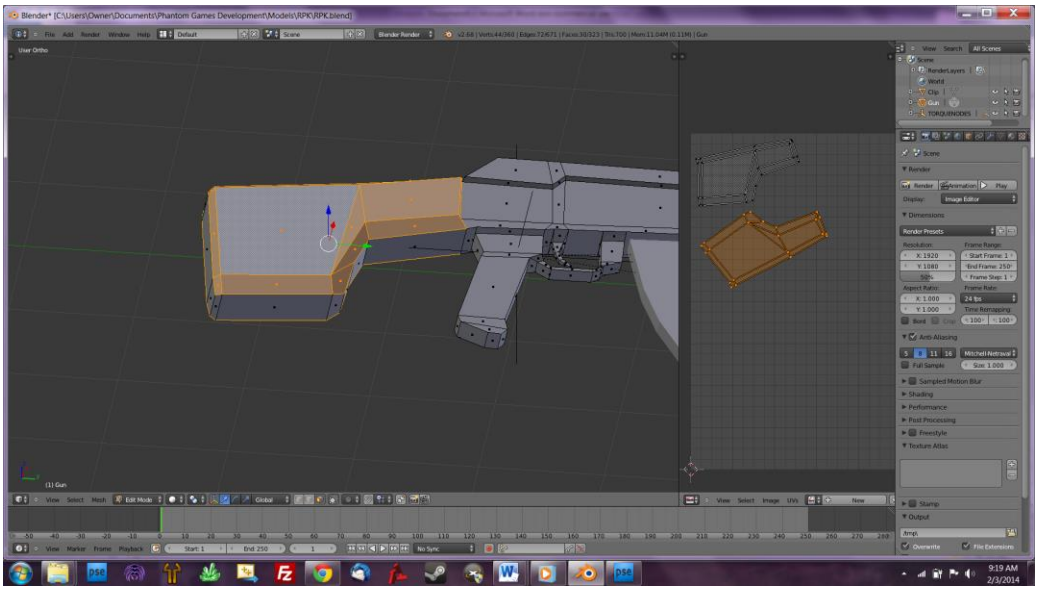


Now, something you should notice from the past few pictures, is I haven't de-selected the mesh. Reason being is once you de-select it, the map will "appear" to vanish and be

gone, but fear not, it's still there. So, next up, we'll want to grab the other side of the wood (ignore the top and bottom for now, that's next) and unwrap it.

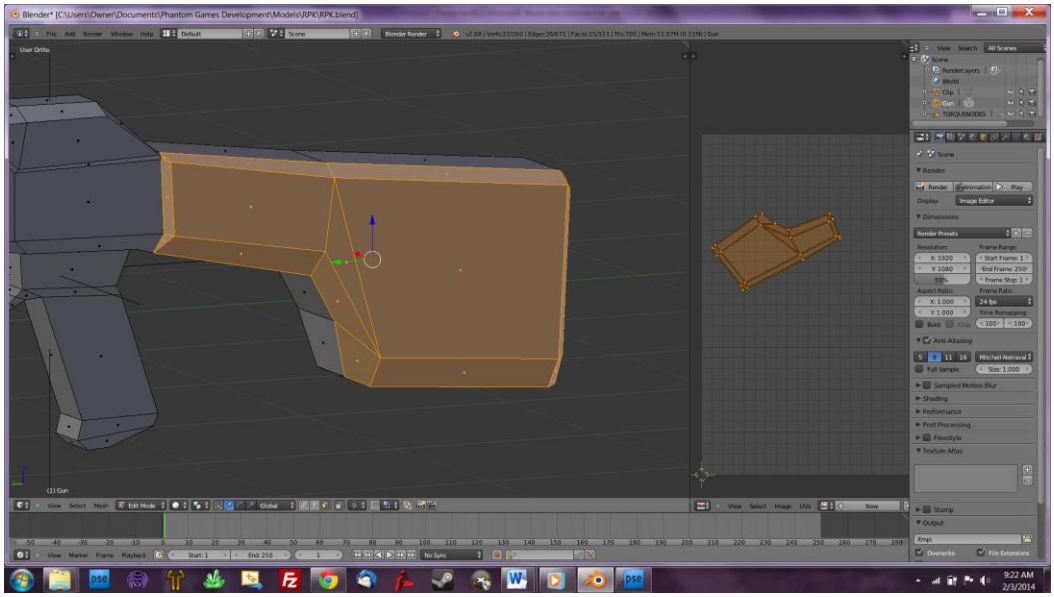


Now, let's go back to the cube diagram. Remember how the top is "upside" down. Well, now picture your gun as the cube. It can be hard to see this, but if you unwrapped just the wooden handle, the other side as we have unwrapped it is upside down. I can easily demonstrate this by selecting the other side (the one we did):

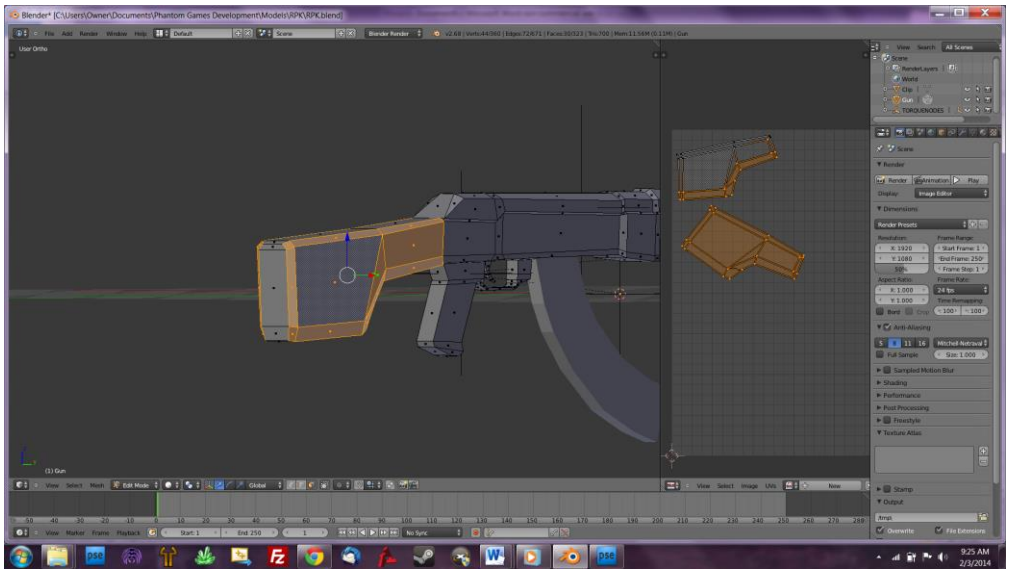


I'll show you how to de-select the edited side in a bit, but you can see here that the piece you're unwrapping is upside down along the Y axis. No matter how many times or which way you attempt to use the rotate tool, you cannot and I repeat, Can Not match this. But there exists another tool that can help you here. And that is the Mirror Tool,

and enter Hotkey #2 (Ctrl+M). So, let me get back to your current selection here before we proceed:

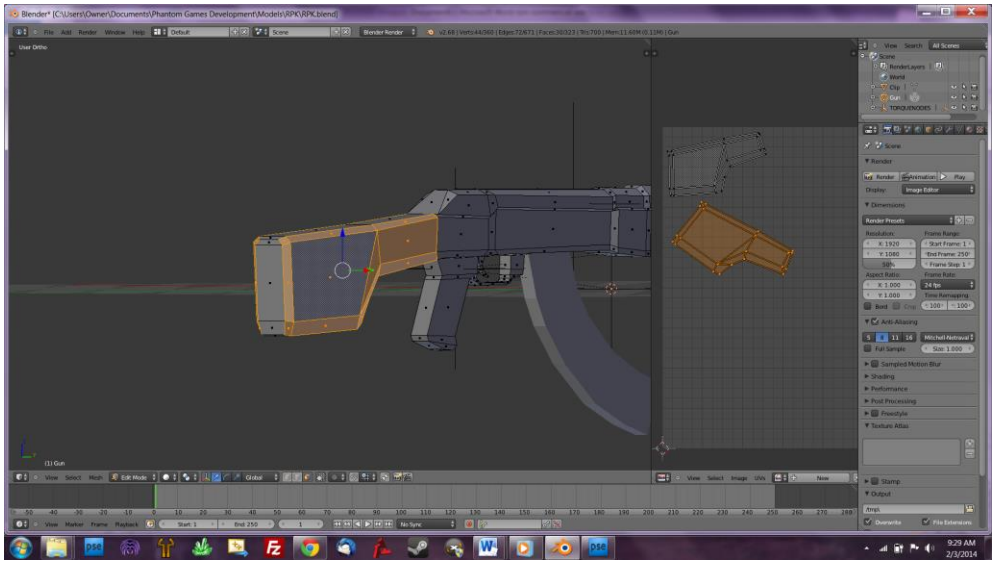


Go ahead and press your new Mirror Tool hotkey now (Ctrl+M). You'll see some text on the bottom of the right pane (Make sure you've got the UV edit window selected, you can right click it if you don't). It's asking you which axis to mirror along; we want Y so press that, and then press ENTER to apply the mirror. And now, our UV has flipped along Y and can now be matched to our prior unwrap. So, pan your mesh view back to the other side and re-select the unwrap we did earlier.

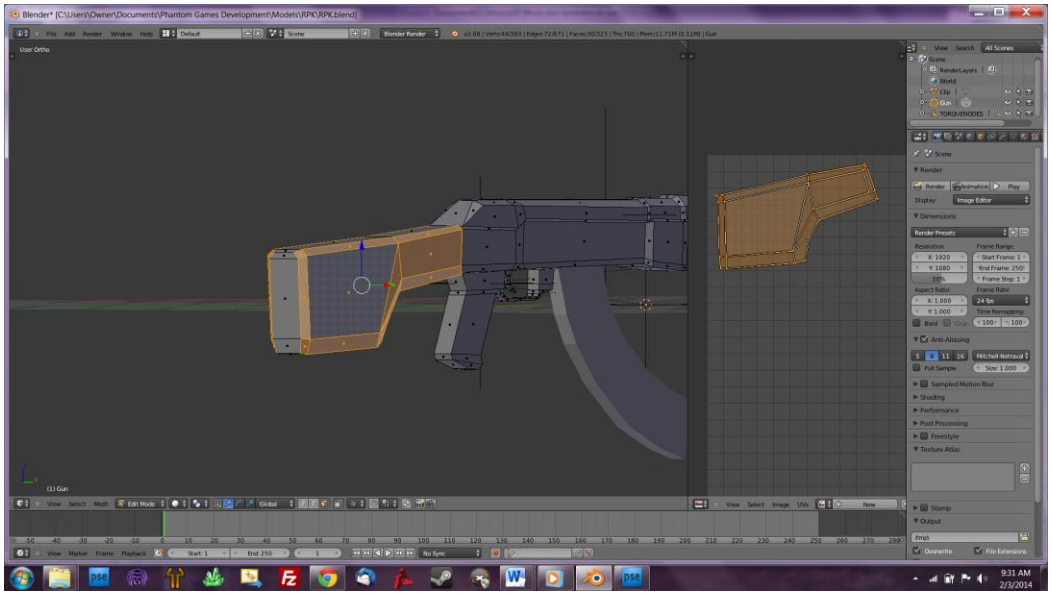


As you can see here, we've got a little problem. If we try to edit our new unwrap, the existing one will follow. I don't recall teaching you how to deselect individual

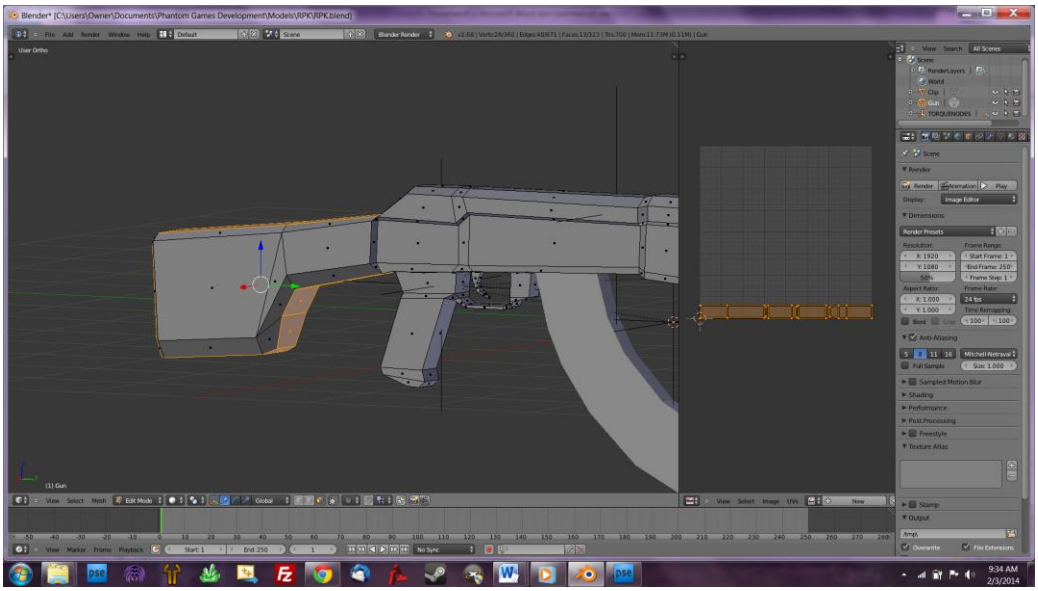
objects/vertices in the prior parts, but let me tell you, it can be done. Whip out your circle select tool in the UV Editor, and mouse over all of the vertices on the top image, then press your middle mouse button while over them to de-select the individual pieces. Since you're de-selecting in the UV menu, they won't deselect in the mesh, and therefore, won't deselect in the UV menu either:



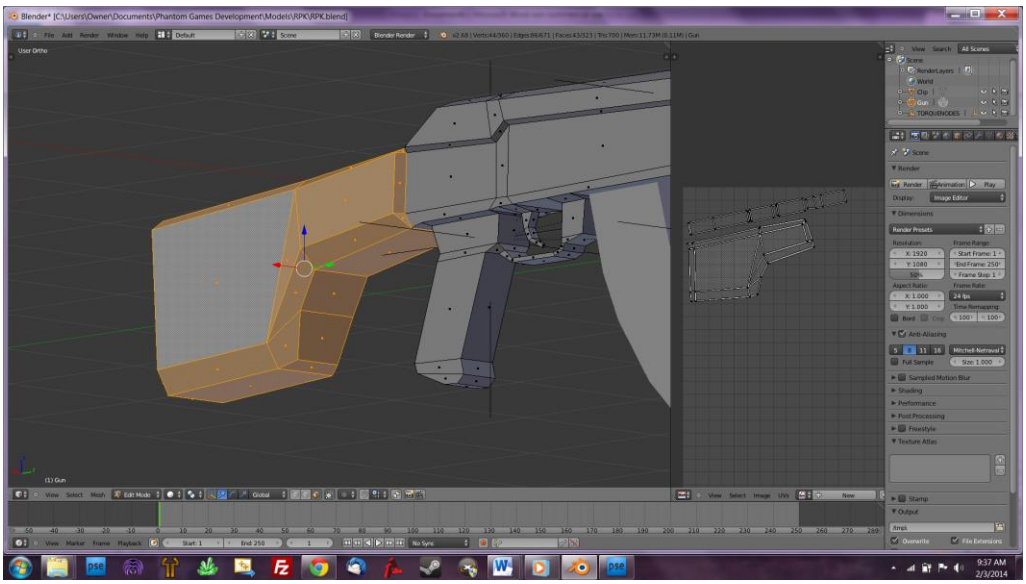
Now with the selected piece, align the vertices to match exactly with our unwrap from earlier. We're doing this because the wood is constant on both sides, and as I said before, UV-Unwrapping is the art of exploiting as much space as possible, even occupied space. After you spend about the next three minutes trying to do this, you'll see why I said this takes time and patience. We're going to be doing the same thing for the entire gun. Imagine those lovely High Poly models right about now. ;)



Now, the top and bottom is a little easier to accomplish. You can imagine it as one great big strip of wood bent around the two sides. So select everything on the top and bottom and unwrap it to get one nice horizontal strip:

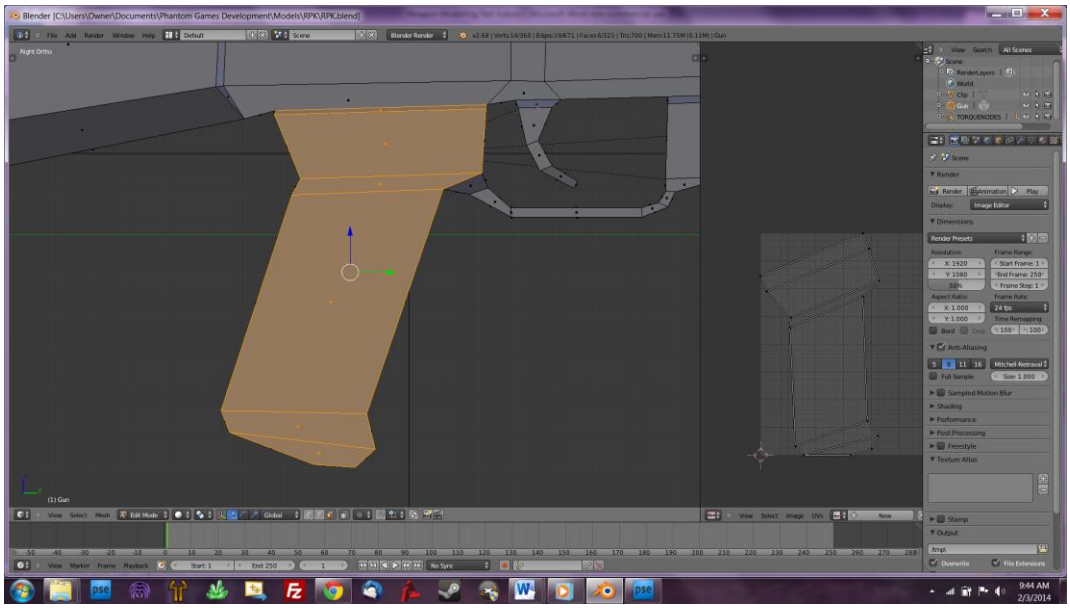


Scale it way down and move it up by the other wooden unwraps. Feel free to re-select prior pieces to see where you've unwrapped, and where you have not, the select all tool will come in great use throughout this process. This is what my wooden handle unwrap looks like:

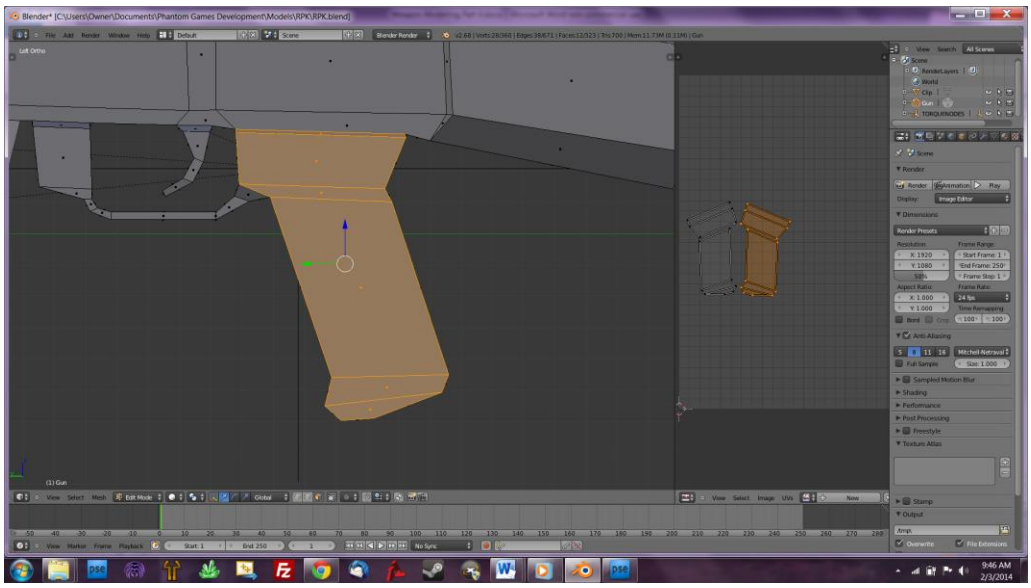


And now we're done with the wooden handle! Next up, I'll do the grip and trigger of the gun to show you how to navigate around more complex surfaces. First off we'll do the grip of the gun, and essentially, it's going to be the exact same process as the wooden

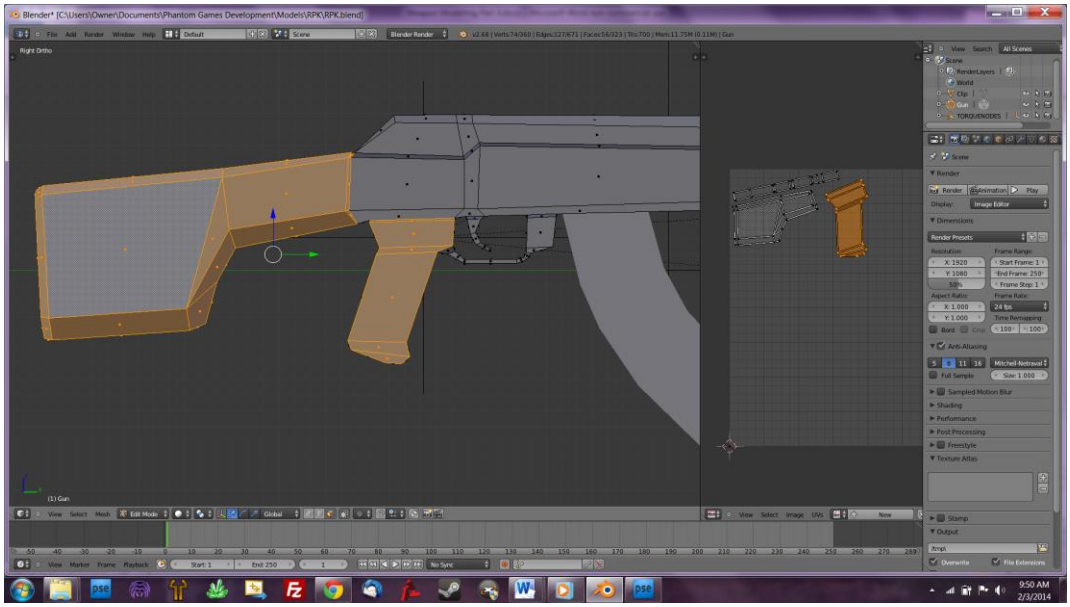
handle, Unwrap one side, Unwrap the other, then unwrap the top/bottom, only the top/bottom has been replaced with the left/right views. In fact, you can use the side perspective here to make your life easy.



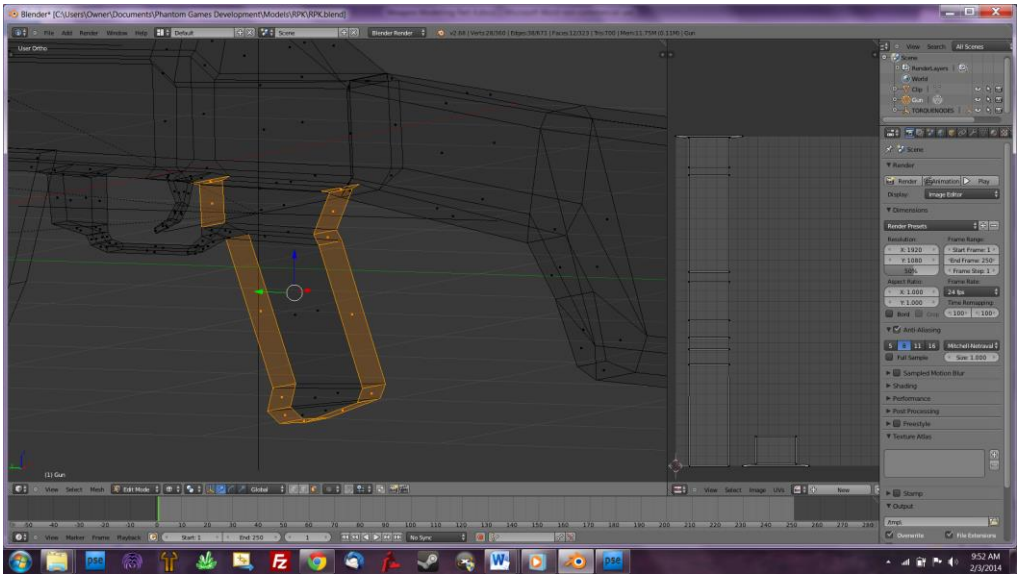
And you know the drill. Scale down the unwrap, and then proceed to the other side and repeat the process (I selected both sides in the picture below to show what a good result here is).



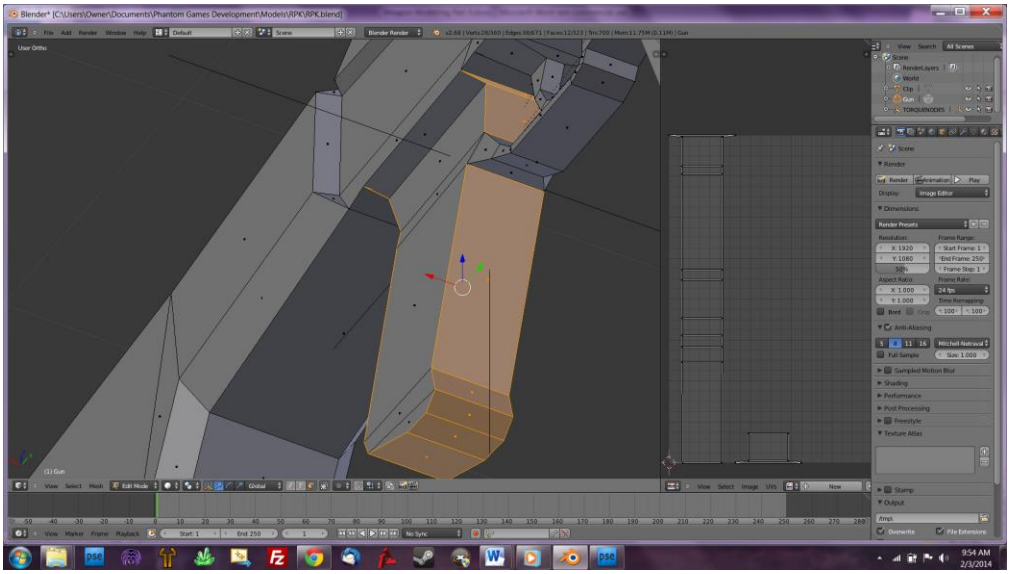
This time around however, we've got a flip along the 'x' axis that needs to be accomplished, so whip out your lovely mirror tool again and mirror it along the X axis this time (Ctrl+M >> X >> ENTER). Then repeat the process by moving the vertices to occupy the same space.



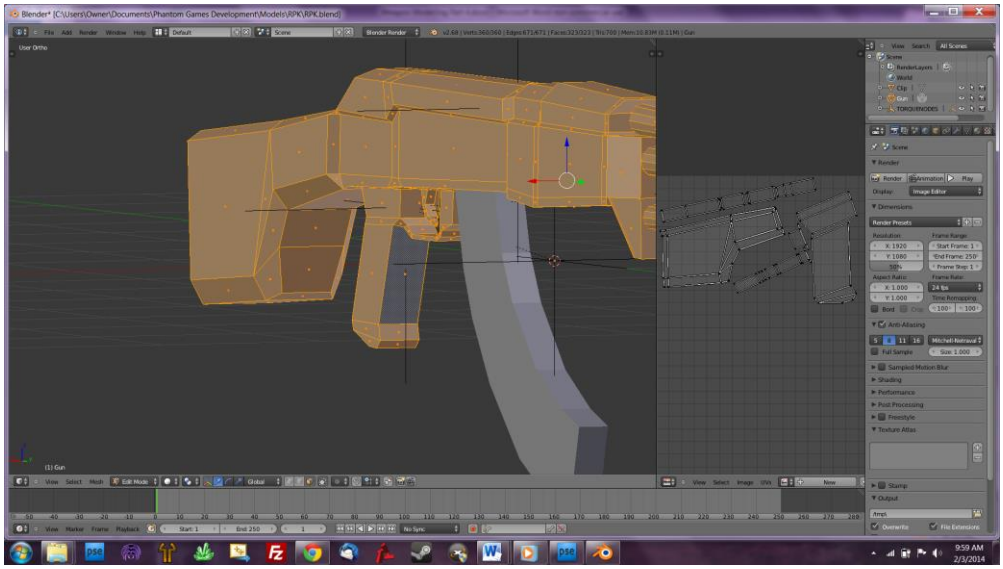
This is what my full unwrap looks like now. Now, let's use a custom angle to unwrap the side pieces of our weapon grip:



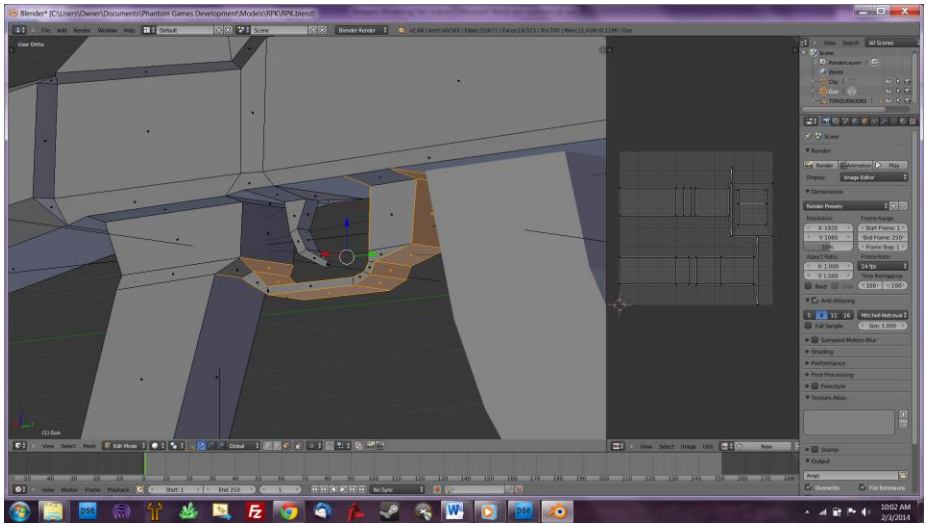
I used mesh transparency here to show you which pieces need to be selected (make sure you get those tiny little sliver pieces along the edge of the grip and where the gun metal will be, also we skip the face where the trigger grip metal is), but seeing as this one is tricky, here's a view from the trigger side:



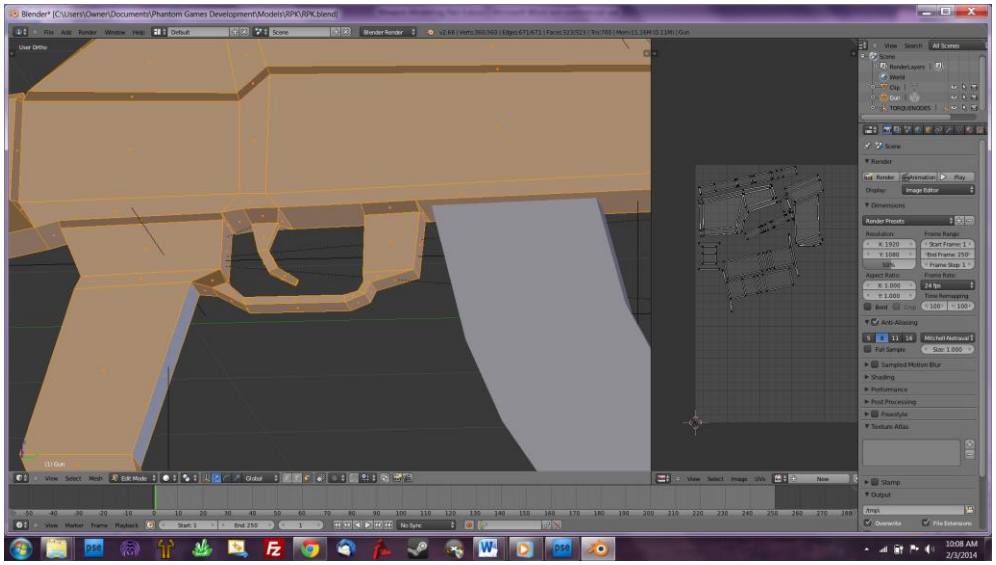
Now, with that unwrapped, scale it down and move it into a good position (and yes, as you can see, separate pieces may be unwrapped together).



Now, the grip is done, so let’s do the trigger. I’ll start with the outside of the trigger first. And since I showed you that you can do multiple pieces, there’s no reason not to do it. ☺

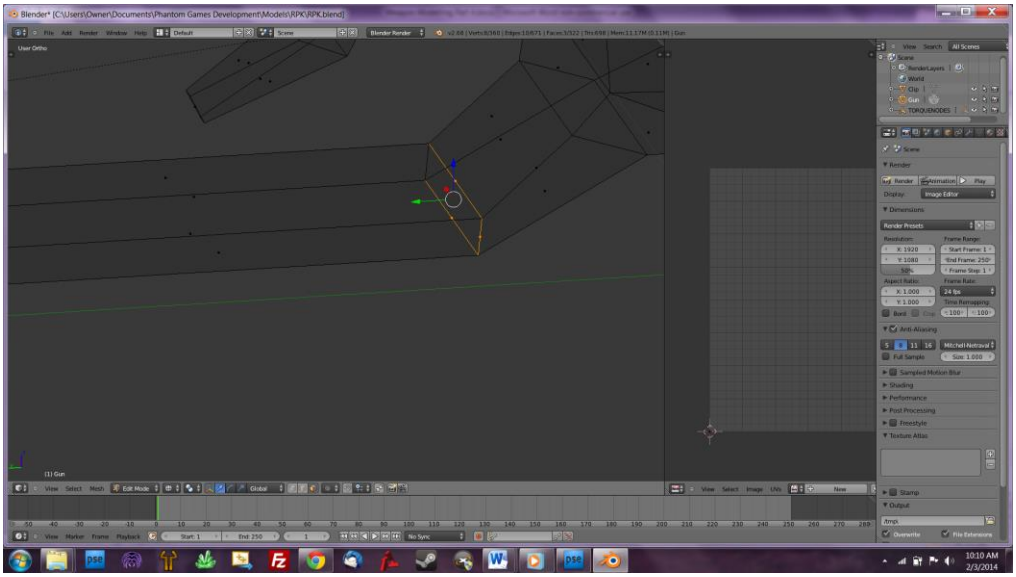


But, doing more at once introduces two potential problems, so I'll only use it where applicable. First problem is that you're going to have to do some more in the UV image editor to actually get it the way you want it. And the second problem is that certain shapes don't unwrap properly when done together (Evil Cylinders, for example) you'll usually be able to see this pretty quickly as it will appear as either a jumbled mess or some kind of odd shape that doesn't even resemble your unwrapped shape, but for this time around, two at once is fine. Select the individual shapes, and use the prior steps to get it in a good position.

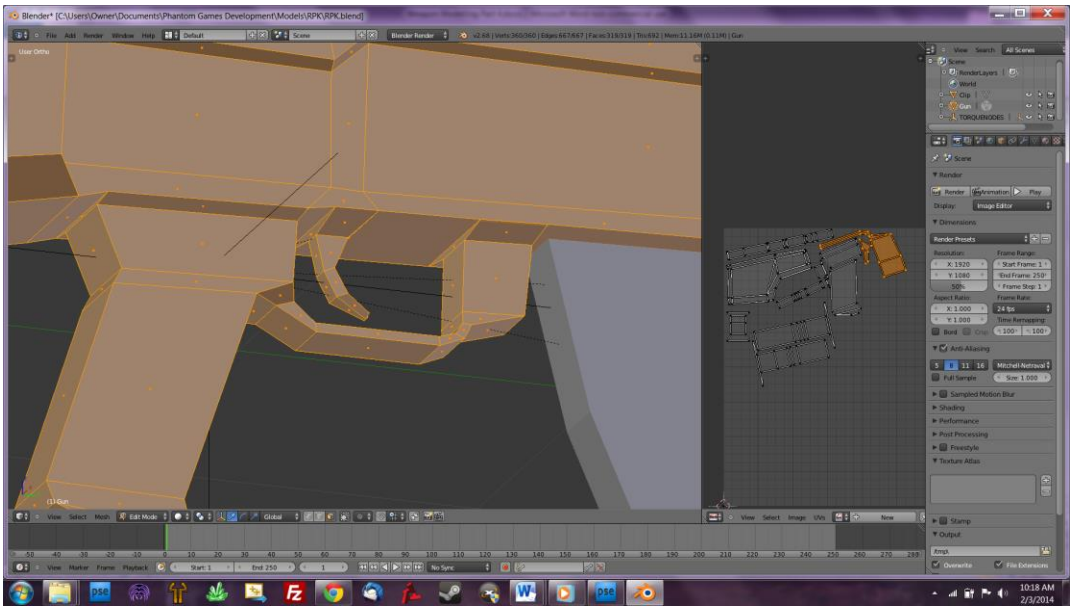


Before you do the side however, I want to show you something. Notice those weird dots just sitting along one of those edges on the face. That my friends, is an extra face that

we don’t need, or want. So go to the mesh side of things, turn on Mesh Transparency, and select them, and delete them (X >> Delete Faces), and that’s much better.

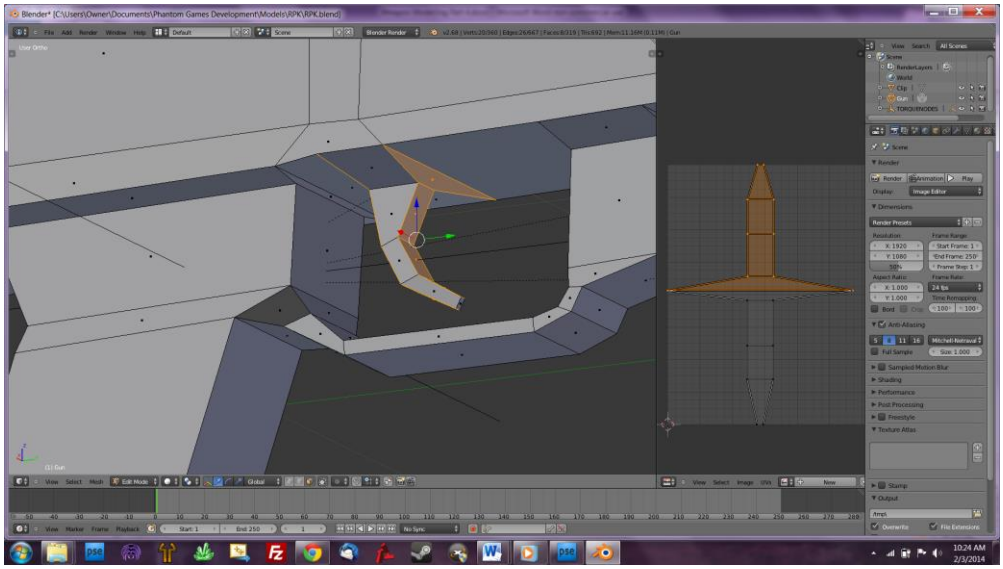


Now that we’ve taken care of that, let’s resume the unwrap process by selecting the sides of the trigger grip, and unwrapping it. If you haven’t noticed by now, you should note that the sides are of the exact same shape and therefore it would do us well to mirror and use the same space for it. And I did so and came out with this:

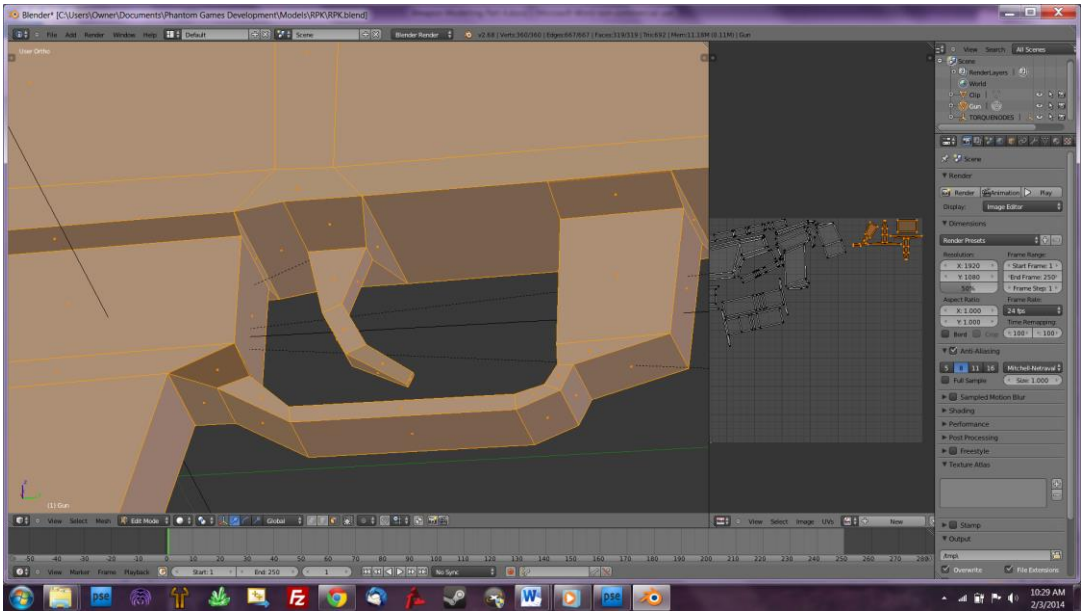


As this should clearly show, don’t be afraid to use mirror and any of the other tools I have shown to exploit this open space. You’ll want to use it to the best you can as the more space you occupy, the better the end result will look. Now we’ll go ahead and do the trigger itself. And this will pretty much follow the identical process as the grip. Start

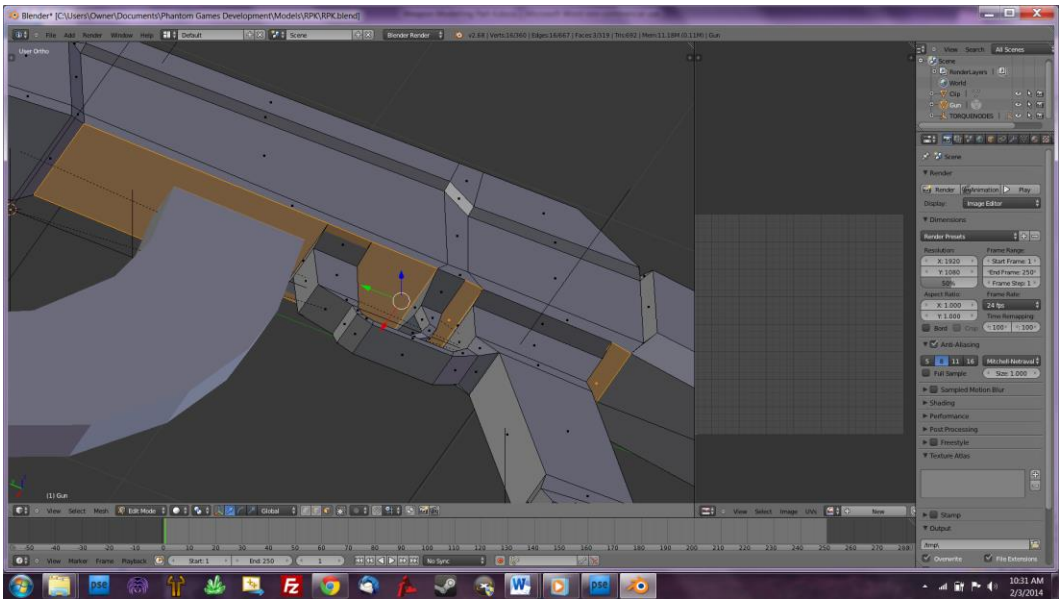
with the sides, and use the mirror tool to get the same space occupied. Then to the left and right (Don't select the bottom piece, just the left/right):



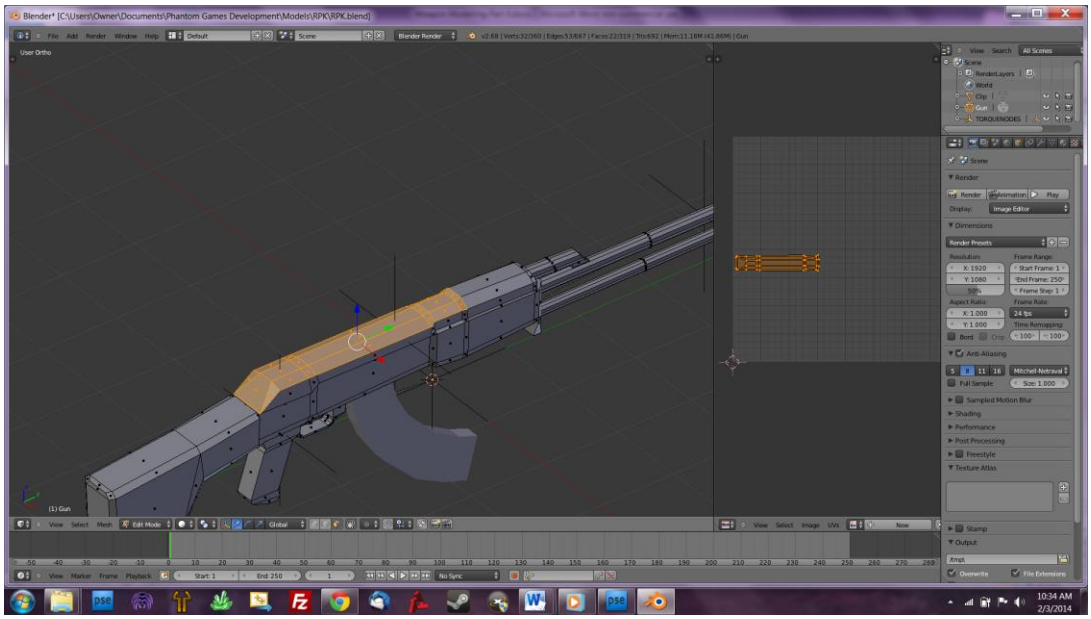
You might need to zoom way in on the UV-Unwrap to select the individual vertices of interest so be mindful of that. You can also just right click to select a single vertex and hold Shift while right clicking to select additional vertices. So, complete that unwrap process, and then unwrap the bottom as a single piece.



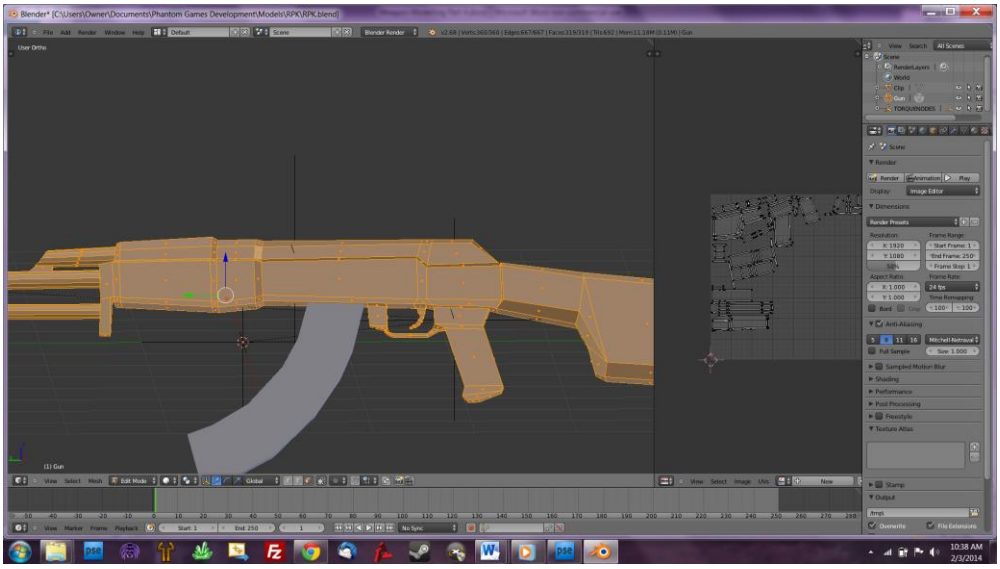
Now, we're going to unwrap the metal part of the gun. Make sure you check the unwrapped side to make sure you're not re-doing pieces you've already unwrapped. I'll start with the pieces on the bottom.



And then unwrap the top:

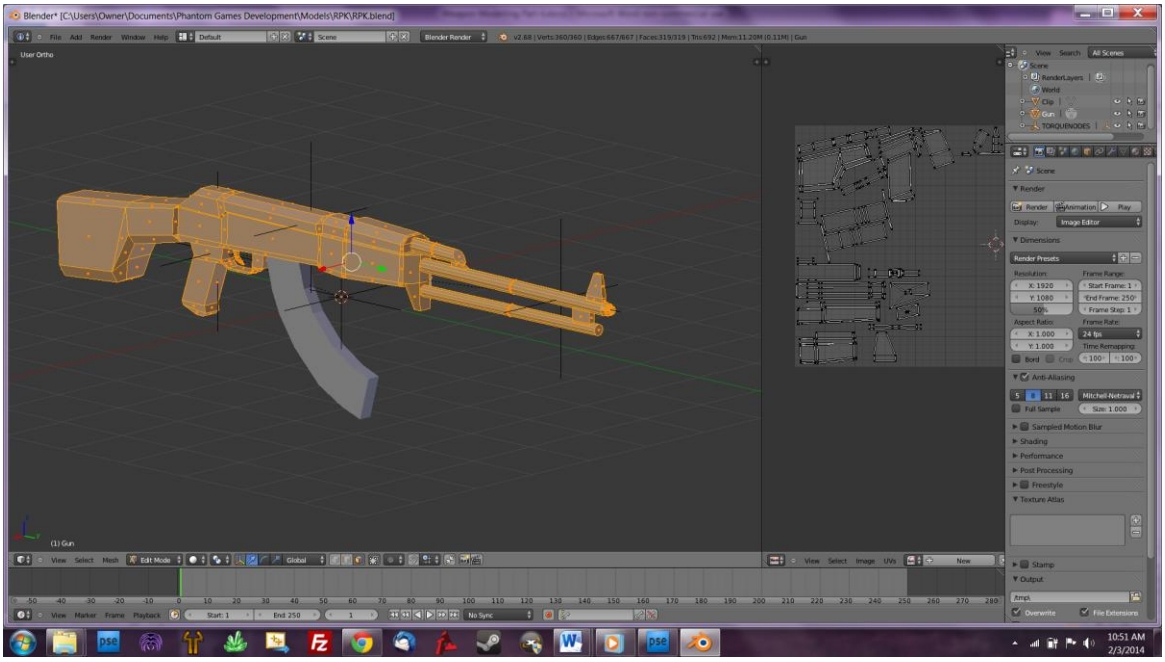


And lastly, unwrap the sides, making use of the mirror tool to exploit the space used by the same sided mesh.



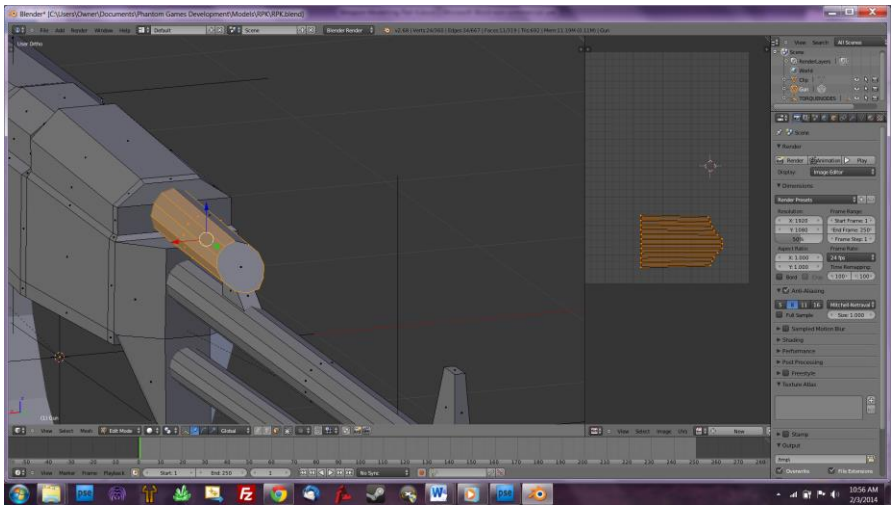
At this point in time, you should see what we're doing. We're unwrapping pieces that will have the same texture and placing them in the same spot if possible (same sided mesh), and close to each other if they aren't. Continue unwrapping your gun until you've unwrapped everything but the cylinder and the ammo clip (I'll get to those next).

This is my result (I've also included my .blend file [RPK_AtImage33.blend] at this current point in time in the tutorial files folder for a learning tool)

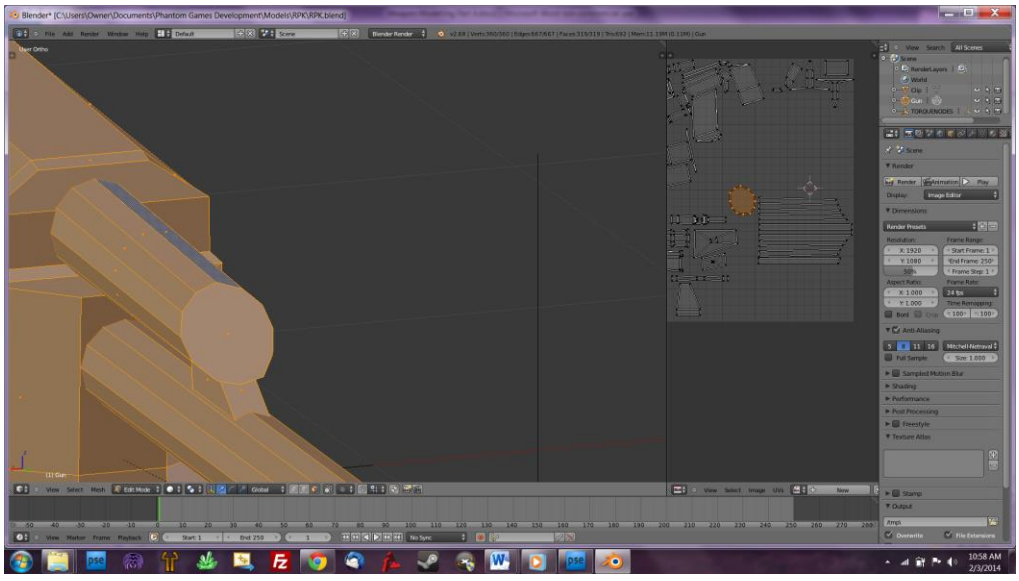


Now, let's get those little demonic cylinders done. Cylinders are honestly one of the most annoying things to unwrap (Behind Satan's Spheres (As I like to call them)). If you try to unwrap the whole cylinder, you will get a failure that involves just a mess of wtf is

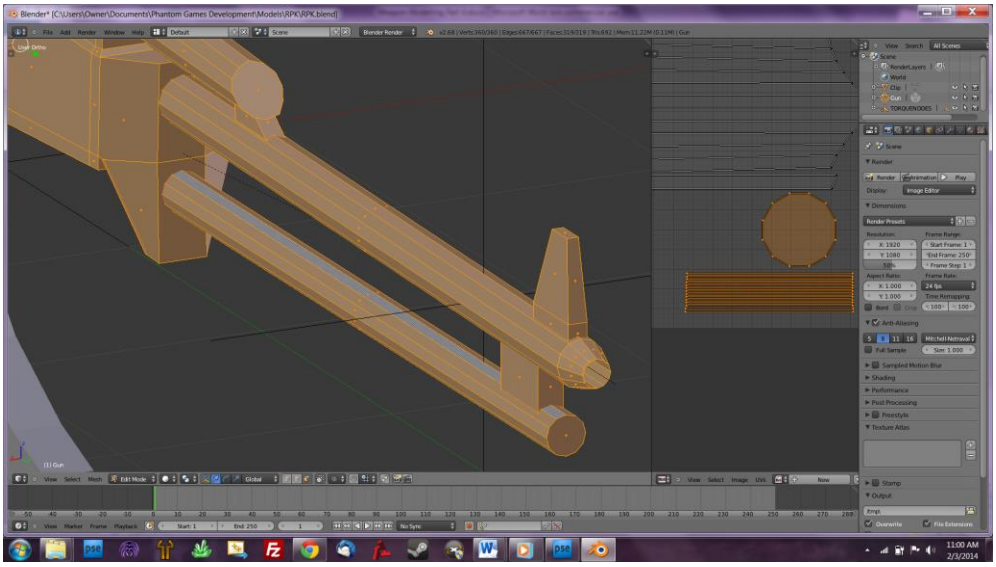
this? But I've got these nightmares down to a little trick now that will save you time, hair pulling, and more! Start with the top cylinder, and select every face BUT the top one. Then unwrap it:



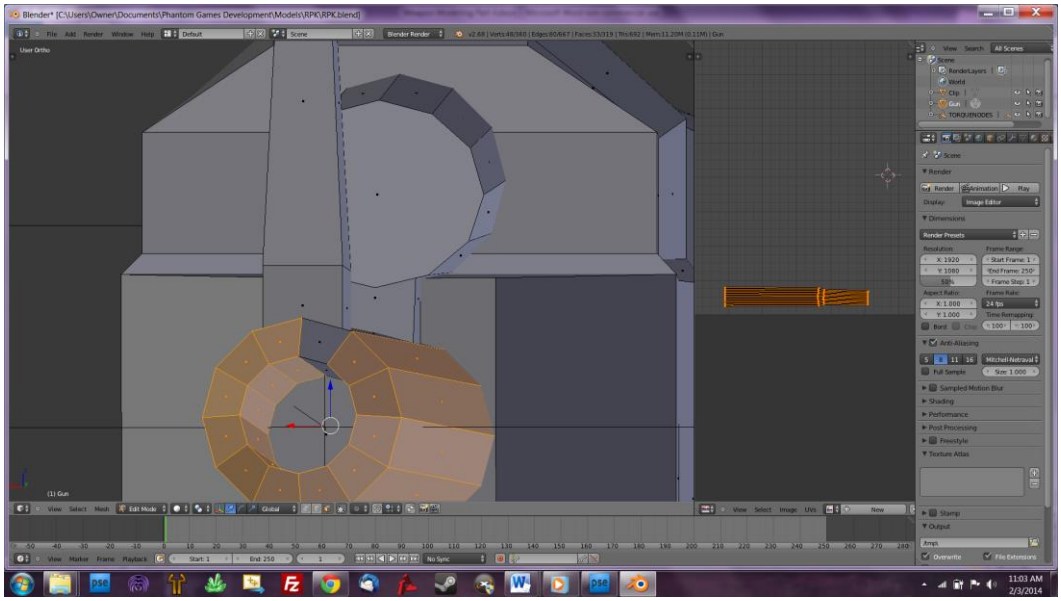
Now that's better! Unwrap the top piece and the circular end piece as separate entities, and place them in a proper position on the UV Image:



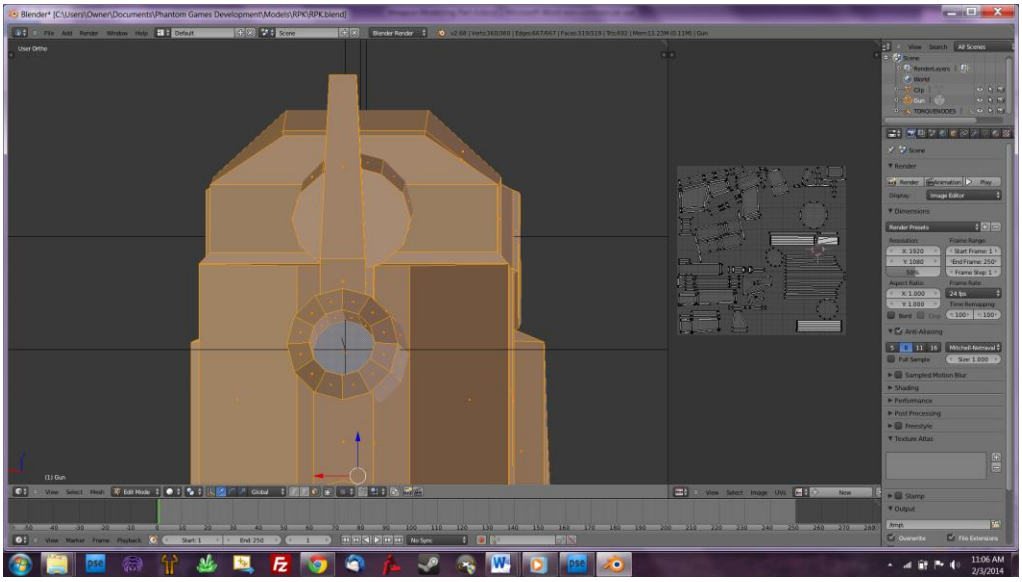
Repeat this process for the bottom cylinder:



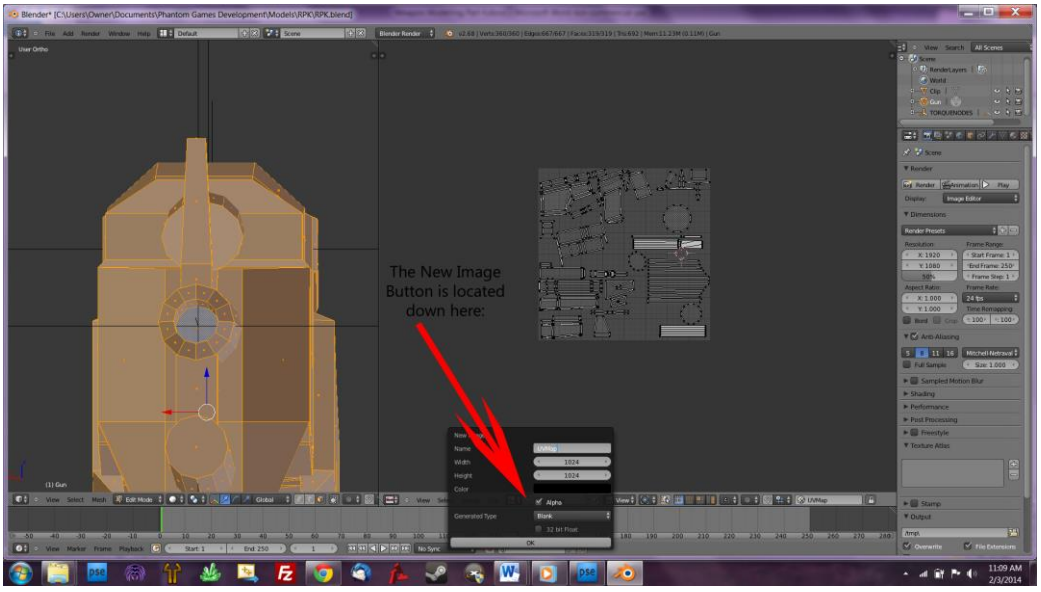
As for the gun barrel, start selecting the outside of the barrel in the same fashion, leaving one portion unwrapped, then move the camera angle and select all of the inside but leave the same parallel unselected:



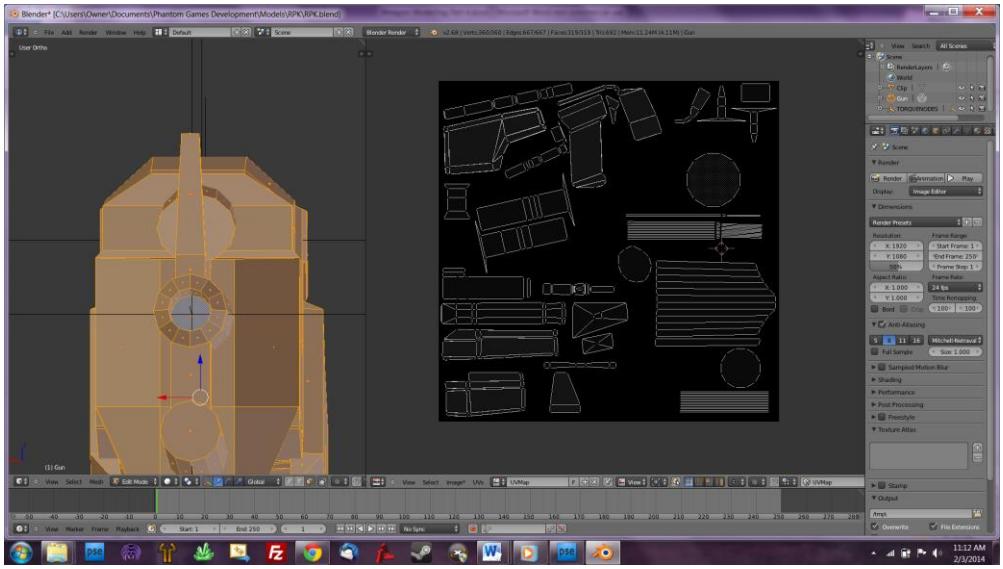
From there, you can unwrap the remaining parallel and the last piece inside the cylinder, go ahead and use the tools to get everything in a nice and orderly fashion and you'll end up with something along the lines of this:



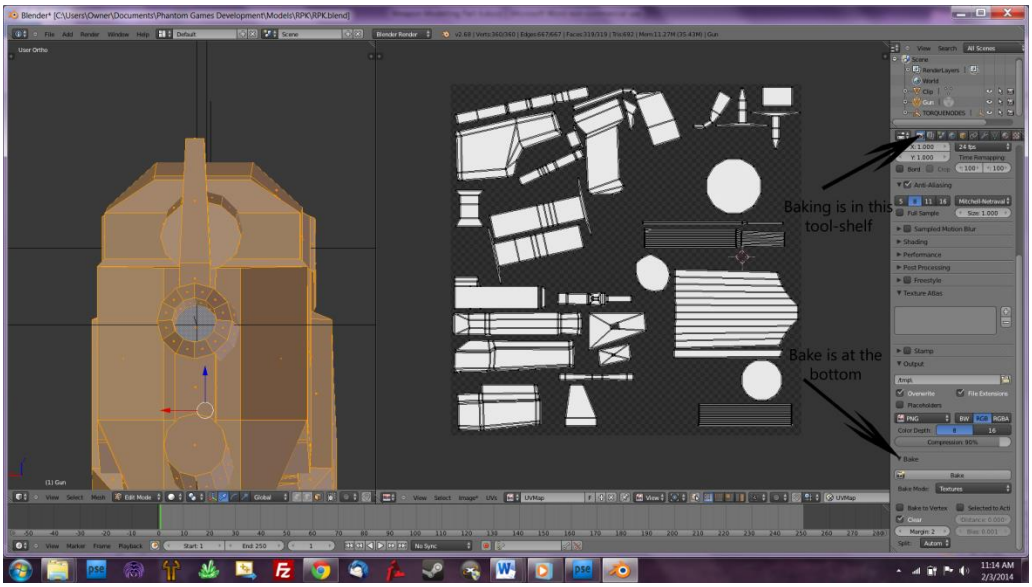
And congratulations, you've completed your first unwrap. Now before you stop me and say, what about that ammo clip, I'll explain. There's many advantages to using multiple objects in your model, one of them happens to be that different objects, can and often do use different UV Maps to accomplish the same thing. And today, I'll teach you how to do that. But for now, we need to generate the actual image we're going to edit. So drag your UV window over a bit, then select the New image button:



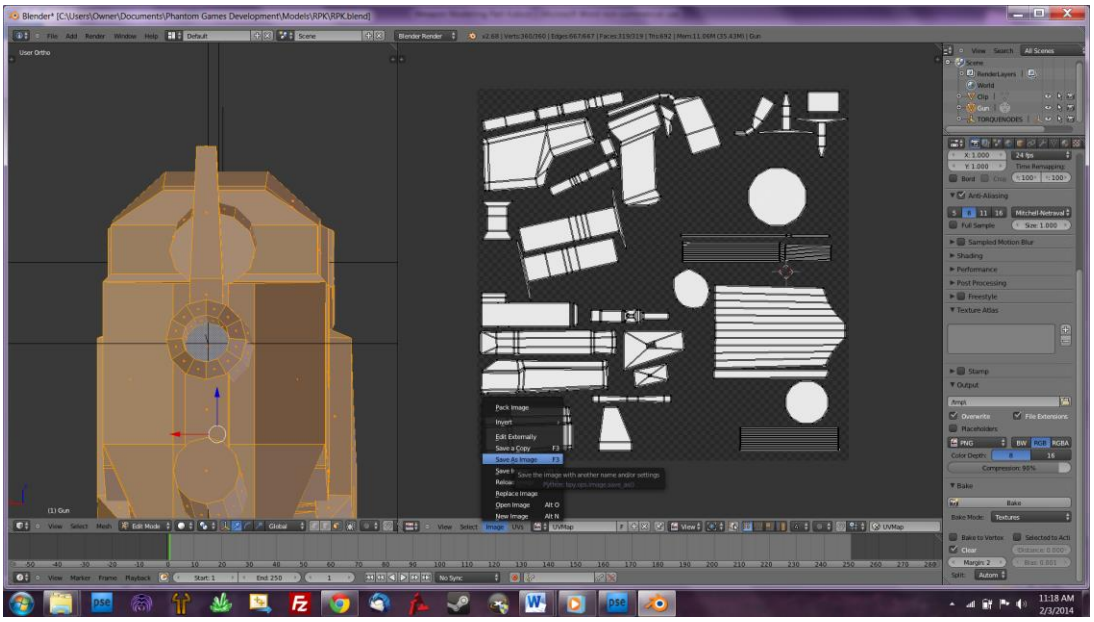
We're just going to use a standard 1024x1024 map as that's the general size that Torque accepts. Name it UVMap or something of the sorts and leave the other options alone. Your image side will now turn black with your UV's shown as white sections like the following:



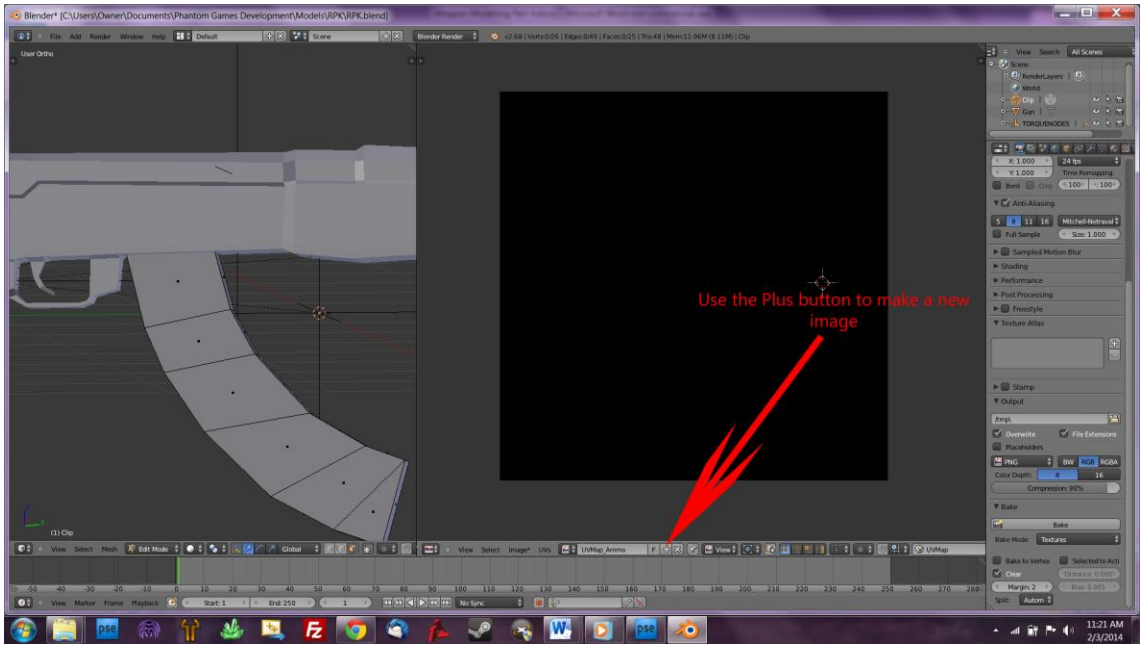
The next thing we need to do is called “baking” the textures. On the tool shelf on your left, make sure you have the scene options selected (I’ve had it open the whole time), and scroll down to the bottom where the Bake tools are located. Open it up, then select “Textures” from the dropdown list, and drop the Margin down to 2. Then click the bake button to get the following:



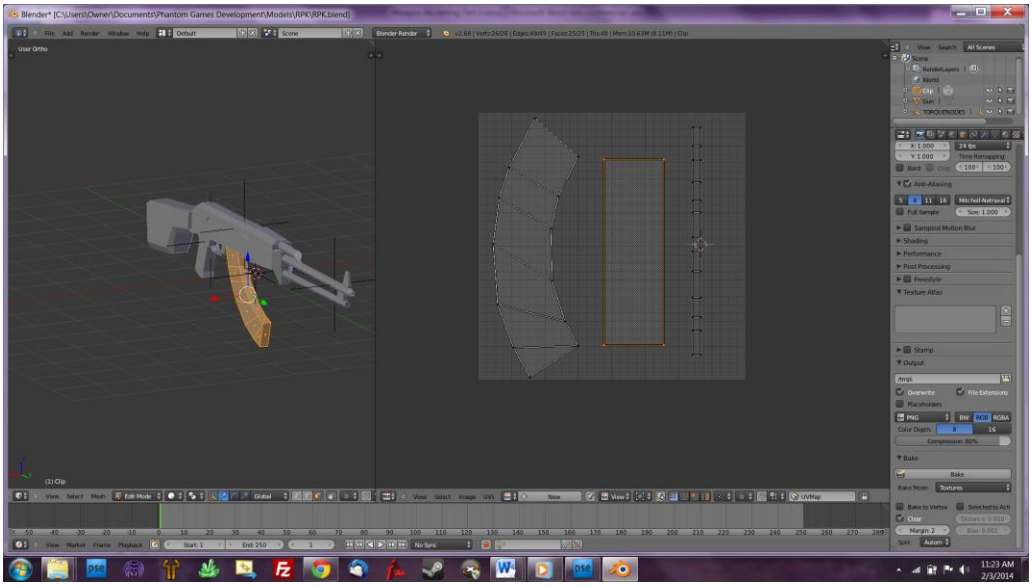
And the last thing to do is save the image so we can edit it in our texturing program. Click the image button on the bottom shelf and select Save-As Image, then name it DiffuseMap.png and save it.



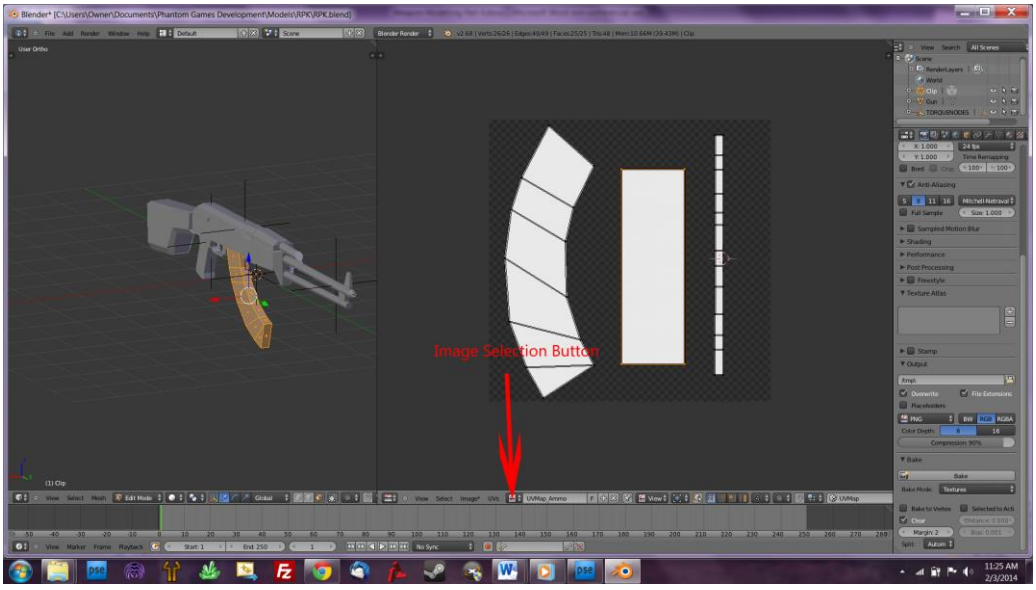
Now, we can do the Ammo Clip for the gun. On the mesh side, flip over to object mode and select the ammo clip, then go back into edit mode. Now, we have two options here, we could either continue on our current map, or use a new one. For tutorial purposes, we'll make a new map, so create a New Image, and name it UVMap_Ammo.



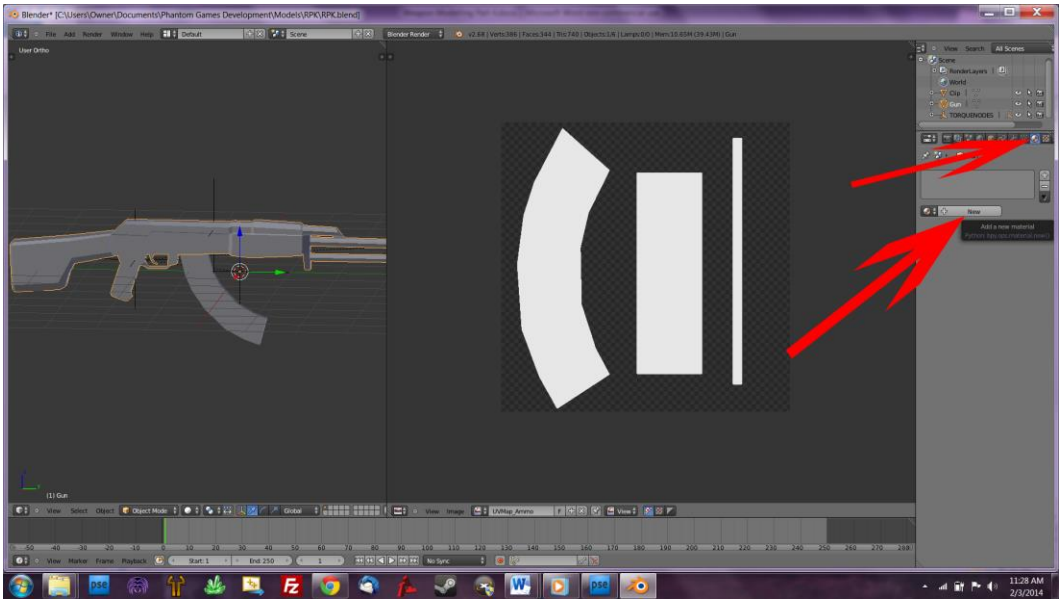
You can then unwrap the ammo clip using the exact same processes as you did earlier for the weapon itself:

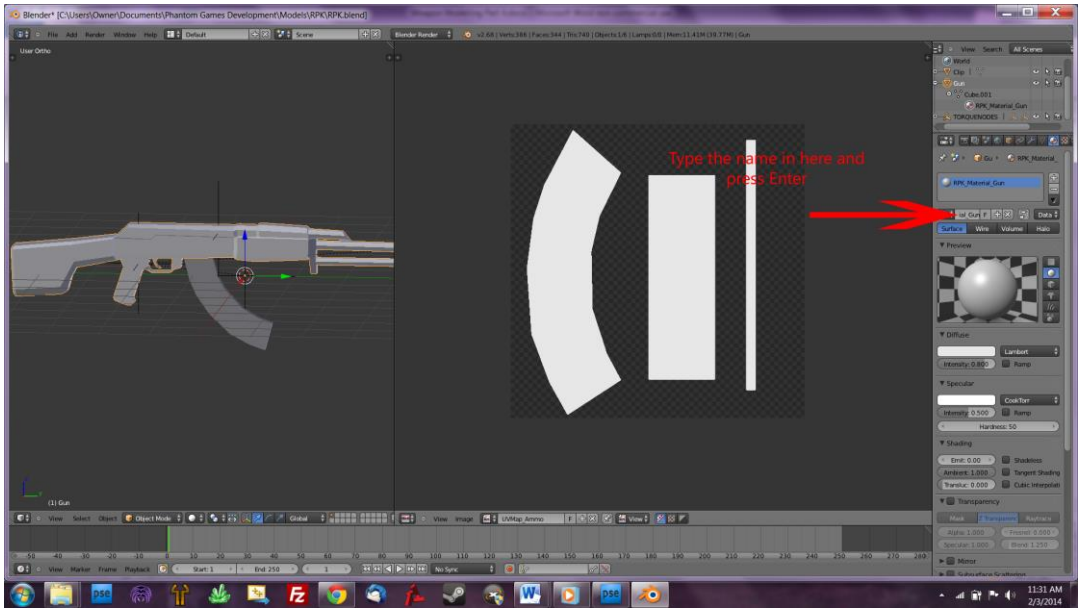


Bake your textures, and save it as DiffuseMap_Ammo.png. (In the event you don't have your UVMap_Ammo image selected, see the above picture indicated by New showing on the image button, select the drop down arrow just to the left and re-select the image)



The last thing we need to do will have importance later on when we're adding the model to Torque. Torque uses Materials to indicate which textures go on what surfaces. So, in our case we will need two materials for our gun, one for the gun itself, and one for the ammo clip. Go back into object mode and select the gun, then select the materials tab in the scene editor and add a new material, name it RPK_Material_Gun.

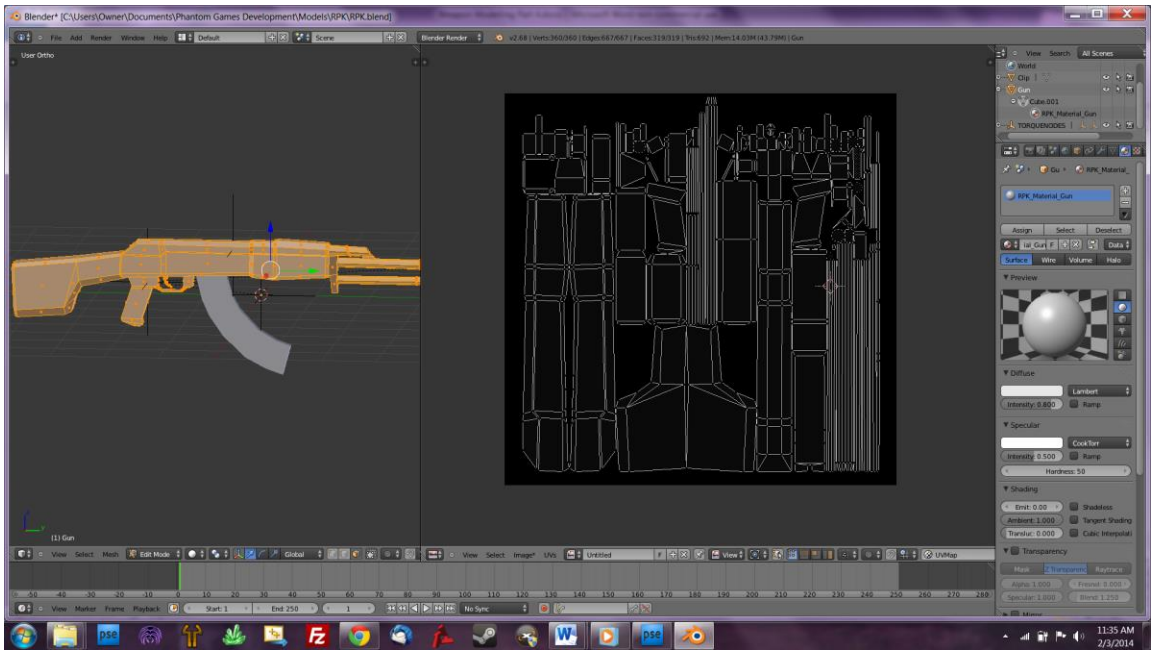




Do the same for the ammo clip of the gun but name it RPK_Material_Clip. Finally save everything and sound your cheer, you're now 100% done with your weapon model! At this point in time, you can export the model to the DAE format (which Torque uses) through the file menu. I'll get to loading the model in another tutorial after this one, but that's pretty much all you need to do in blender.

Sub-Part 2: Texturing

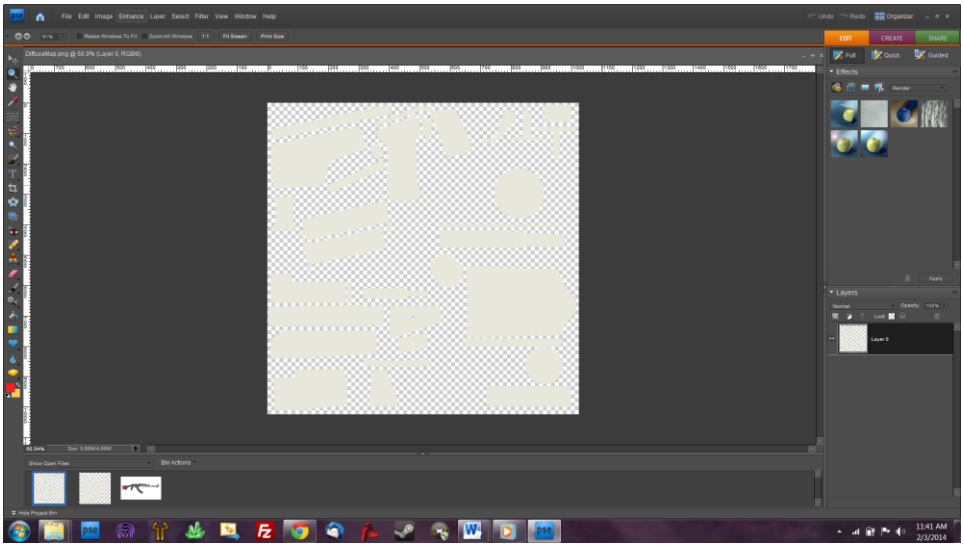
So, congrats! With the model itself done, we can now step into the very last thing you need to do for your model, which is texturing the model. Now, assuming you didn't commit the unpardonable sin of using Smart UV-Unwrap, which by the way, does this:



DO NOT USE SMART UV-UNWRAP EVER! EVERY TIME SOMEONE DOES, A PUPPY IS KILLED.

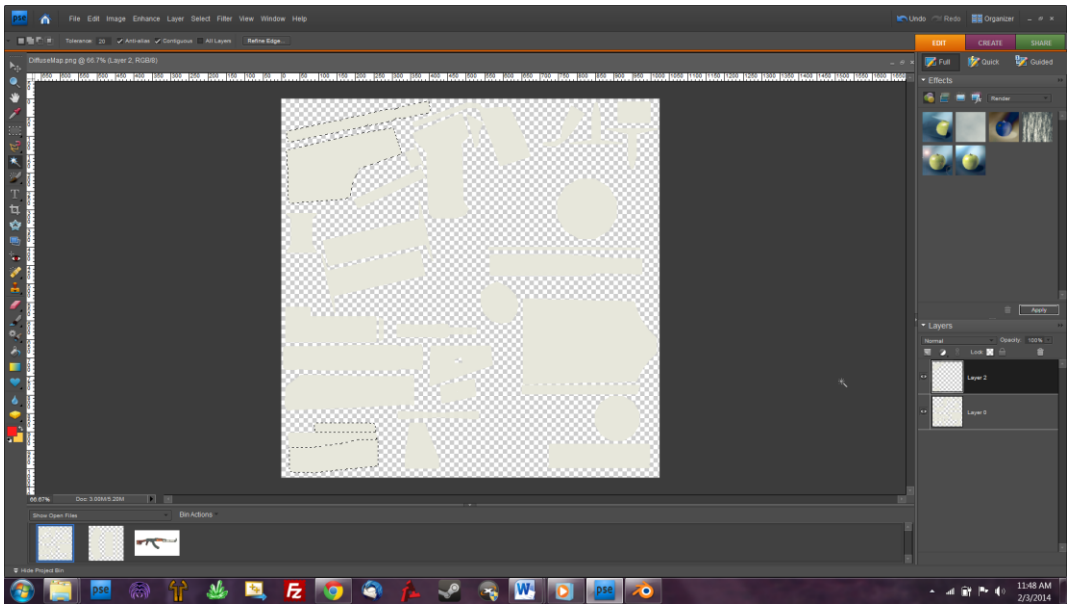
Dark comedy aside, You now have yourself a very nice unwrap diffuse map to texture. Since I have Photoshop, I'll just use that to texture my gun. You can also use GIMP, although the functionality of it will be a little different compared to what I do. I also find it extremely helpful to have my reference image opened up so I can pull textured directly from the gun to my model texture.

I'll start with the texture for my gun itself. When I open it up I have the following to work with:

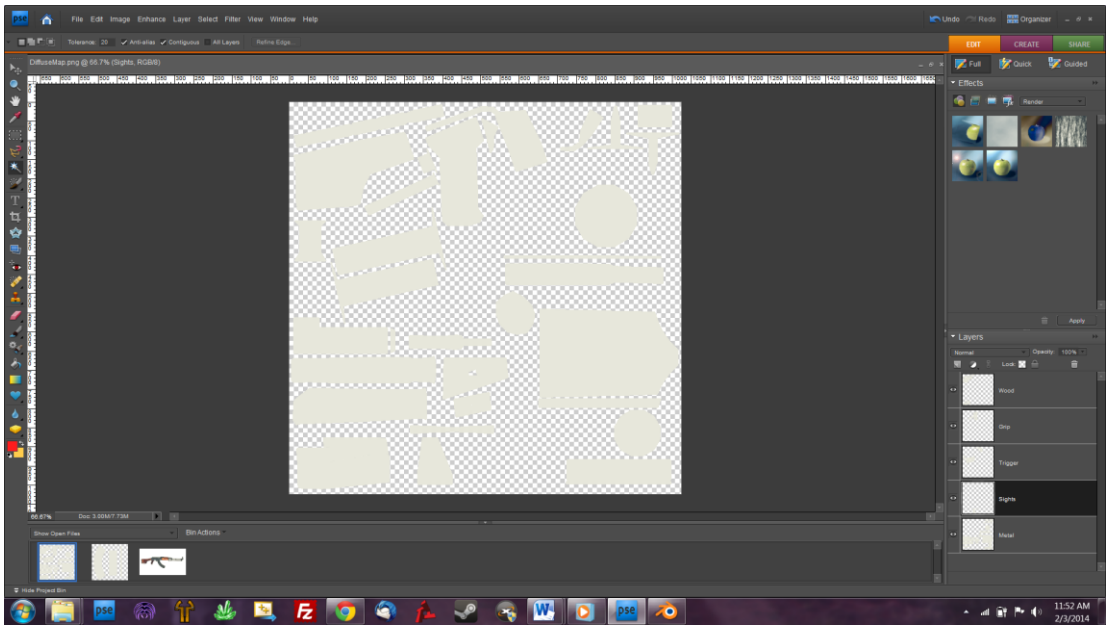


First, I'm going to separate everything into layers depending on which texture it has. Select the Smart Wand Tool (or the similar on GIMP, it's the tool that selects objects

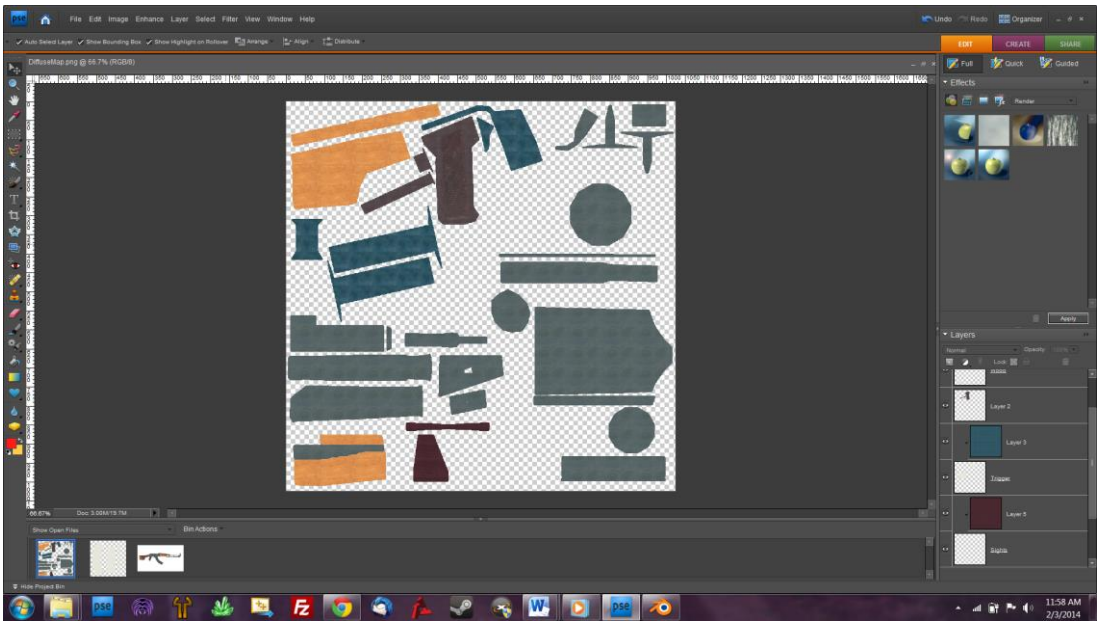
until the color changes, or in our case, it will select the individual objects), Also, don't be afraid to re-open blender as a reference to which pieces you set as which unwraps. I have the lovely advantage of being the tutorial writer, and therefore I'm just going to look at my own writing. ☺



Once you select all the pieces that share the same texture, split it into its own layer. Repeat this process for all of the remaining different parts of the gun you want to have its own texture. Once you've broken everything into nice layers, you can use the reference image to fill in the gaps, or use any web reference to find texture samples:



How I do this in Photoshop, is I pull a sample from the reference image, and create a new “pattern” with it, I can then use the fill tool to fill in that region of the layer with the texture. Doing so gets me the following:



I can now save over my existing image. And then I’ll follow the exact same process for the ammo clip and save it. Once you’re done texturing, you’ve completed everything you need to do for your model prior to loading it into your game! Congratulations!

Feel free to tweak the UV map or do anything else you’d like at this point! You’ve completed this tutorial and are now ready to model guns like no tomorrow!