



3D Modelling Report

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Section 1. Conceptualisation

Whenever I need inspiration to create something, I always look to my favourite media. So after watching the Lord of the Rings trilogy for about the 50th time recently, I instantly thought of making a steampunk gauntlet inspired by the Witch King of Angmar.



Figure 1.

<https://pinshape.com/items/47219-3d-printed-nazgul-gauntlets-the-lord-of-the-rings-for-cosplay>

After getting this idea, I decided to only use the finger plating from the gauntlet to add variety to the model and went about finding more concept images/ideas. I settled on a gauntlet that would inject the wearer when they put it on. Wheel handles would open up vials of drugs which would travel through small pipes into the wearer to power them up. Pureref was useful to look at concepts while modelling/texturing. I also added a colour palette to reference when texturing.

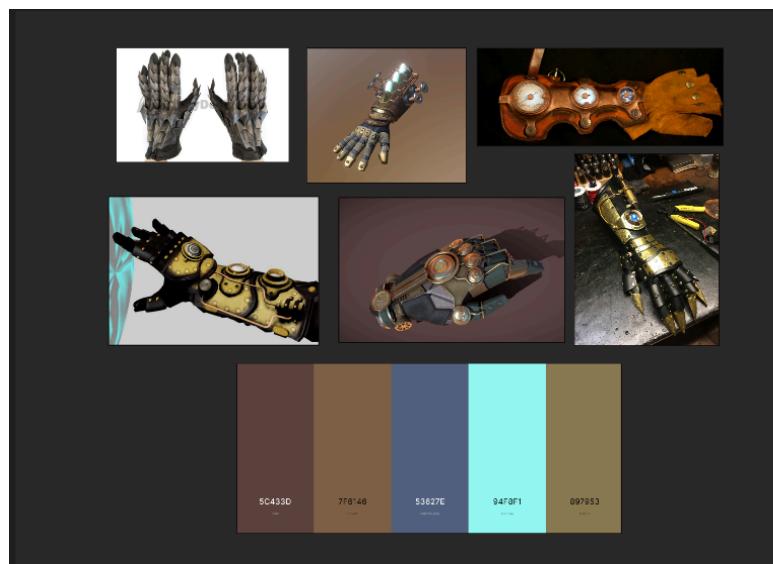


Figure 2. Pureref references and palette

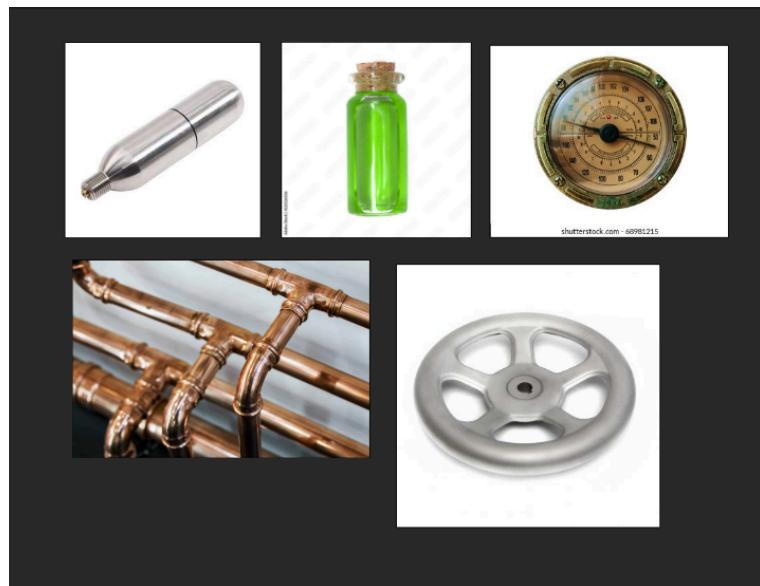


Figure 3. Pureref material/texturing references



Figure 4. <https://free3d.com/3d-model/steampunk-glove-5889.html>



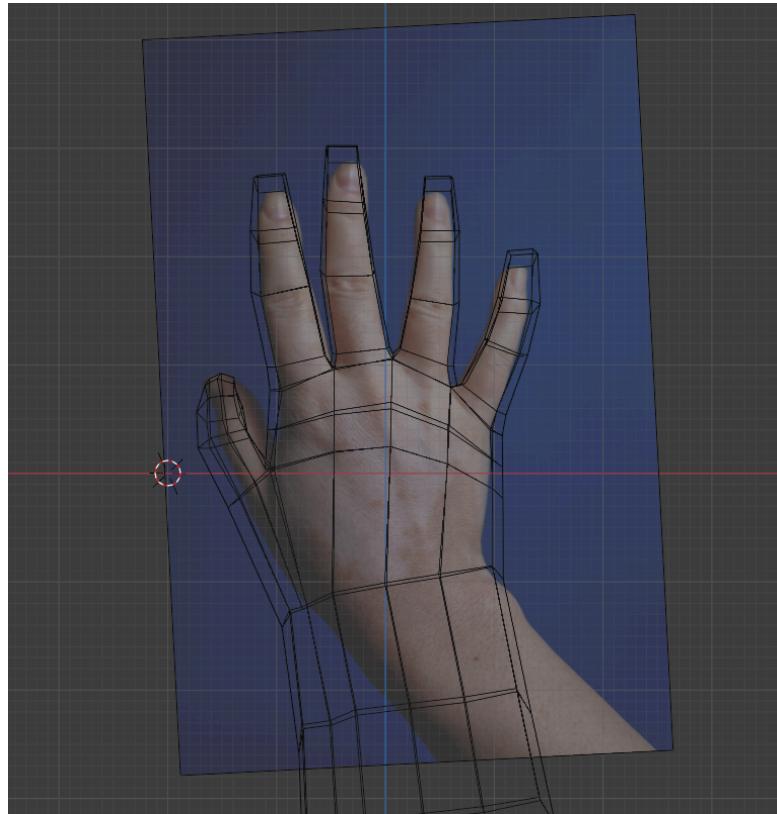
Figure 5. <https://sketchfab.com/3d-models/steampunk-gauntlet-851ccf579d07423fa5ff9a03694e4709>



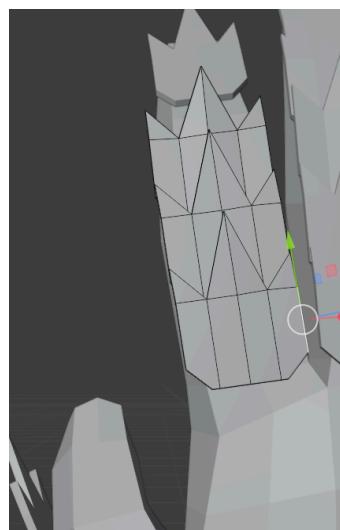
Figure 6. <https://sketchfab.com/3d-models/steampunk-glove-1890ba9b1bb040bb864641d81a662495>

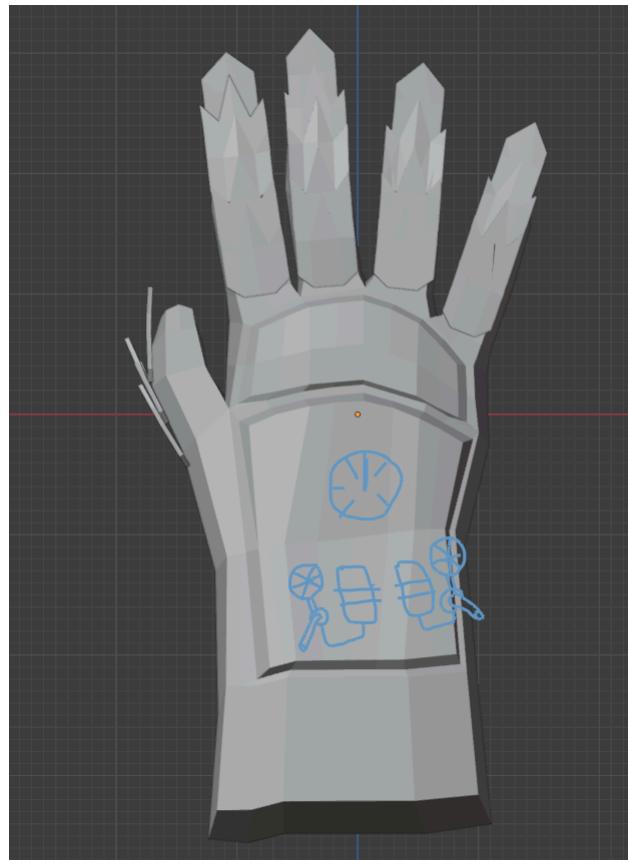
Section 2. Modelling

After acquiring references, I started modelling the base gauntlet shape. I used a reference image to base the general shape off of. As a gauntlet/glove fits around a hand it doesn't have the finer/thinner details of a hand so I used techniques like extrude, bevel, scale, loop cut and manually adjusting vertices/faces.

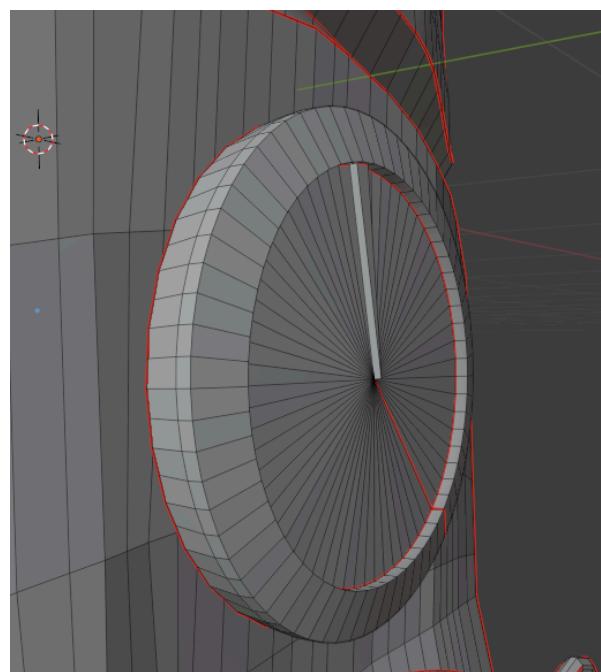


After getting the general shape, I added the finger plating and metal layers/guards on top of the glove. I modelled a single plate and used arrays with manual fine adjustments to get the desired look.



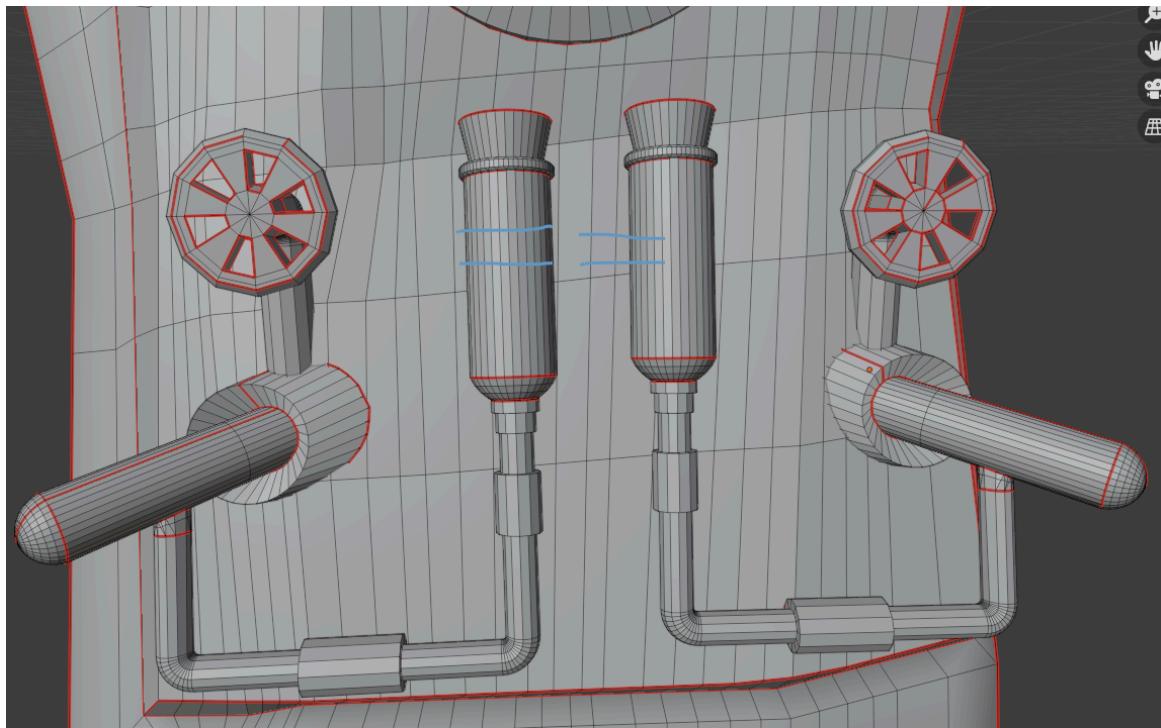


As seen in the above image, I drew what I wanted the rest of the model to look like to get a sense of the space needed for the missing components.



I wanted a dial to show the pressure of the drugs in the pipes so I used a cylinder with extrudes and scaling. A useful technique was clicking a vertex, moving it with G and then pressing B. After this I click on the vertex and click on another one to snap them together. I used this to attach the dial to the main glove.

After this I modelled the pipes, wheel handles and vials with stoppers as well as the ports in the glove the pipes would go into.



I modelled the right set of objects and duplicated and flipped them to the left. The vials were made with spheres with their top half deleted and the top edge extruded. I wanted to fill up the vials with bright green liquid drugs so I duplicated the vials, cut off their tops and scaled them down to texture them to look like liquid later.

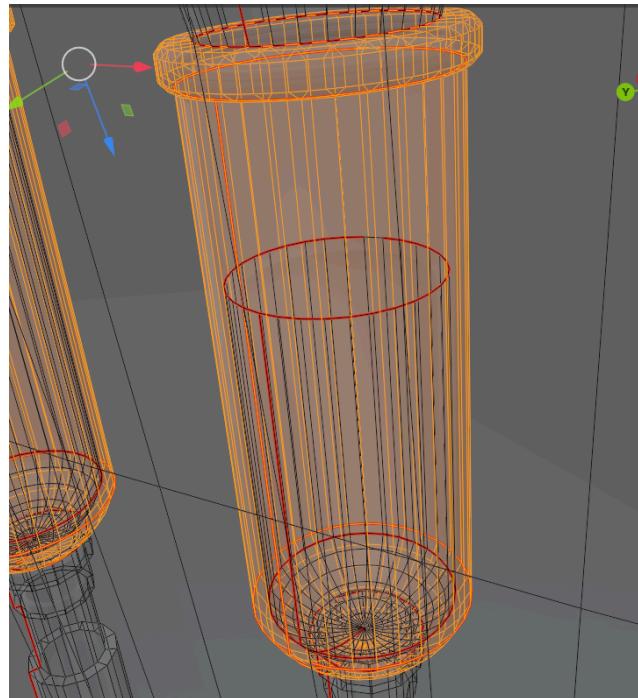


Figure 7. Duplicated vial inside vial for liquid

The way I made the pipes was by first making a cube, merging all the vertices and extruding the single merged point a few times in different directions to create the basic shape with lines. After this I selected all the vertices and bevelled them. By modifying the width and segments of the bevel, I make the curves of the pipe.

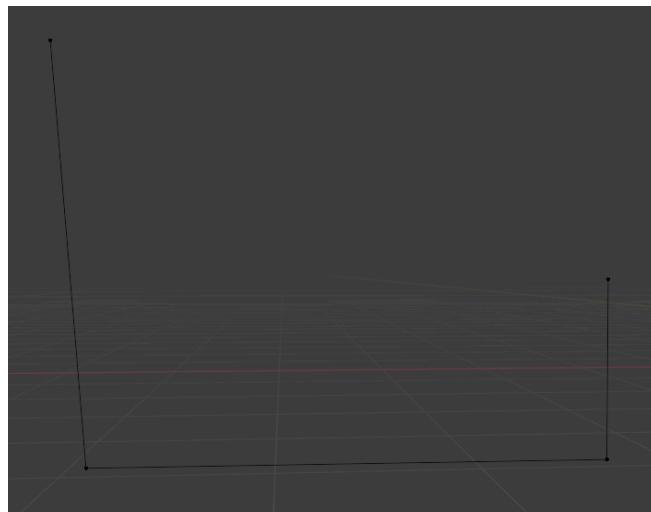


Figure 8. Pipe shape from extruding vertices

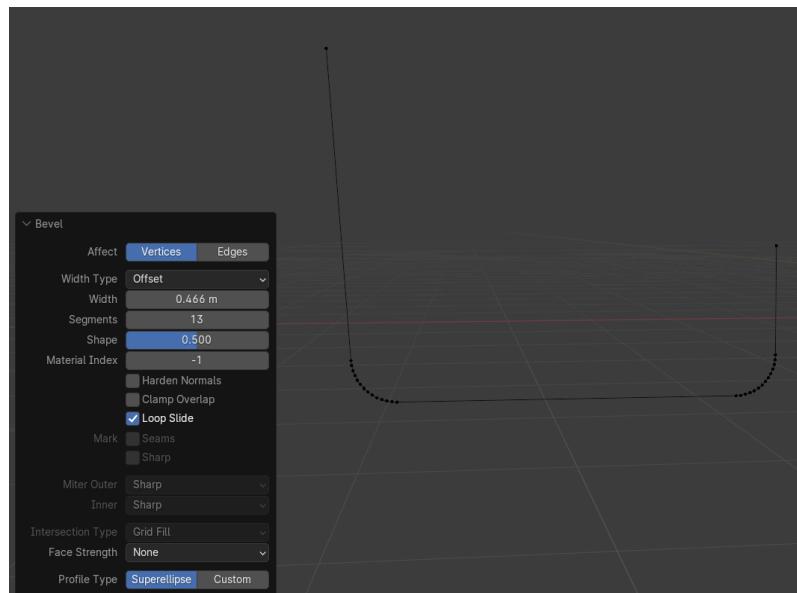
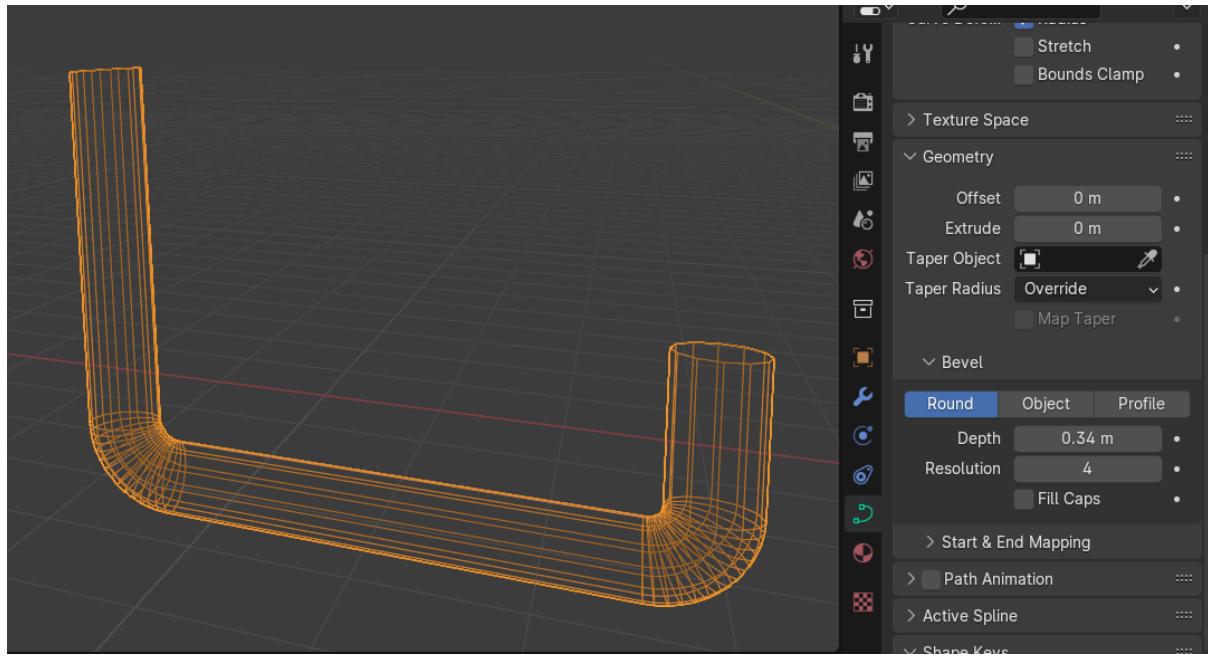
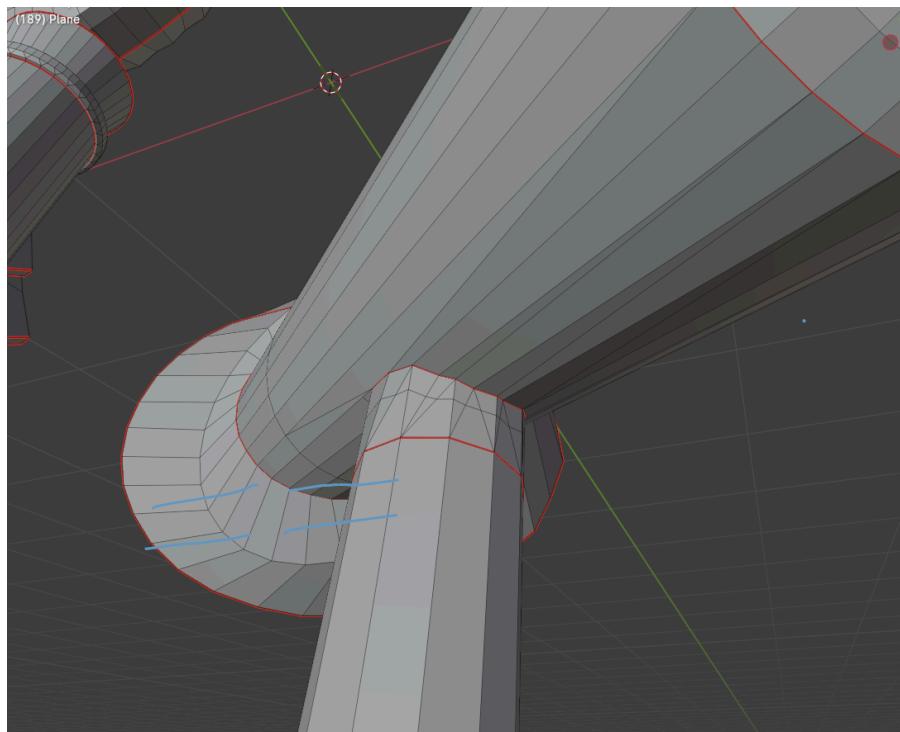


Figure 9. Shape after bevel

After this I convert everything to a curve, increase the bevel depth in the curve properties and convert everything to a mesh to complete the pipe.

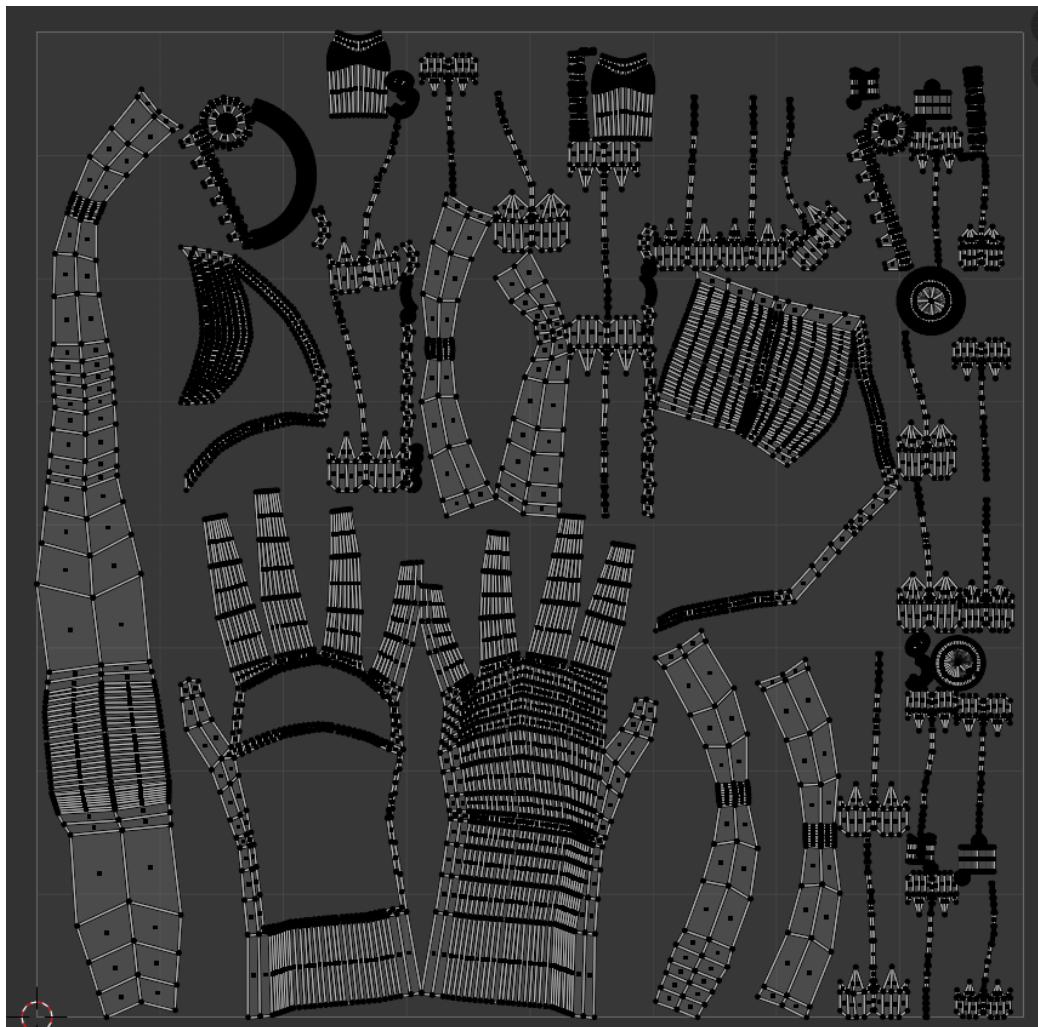


Once again, the G + B snapping technique was useful to attach objects together. To connect the pipes to the side tubes, I used a bool to make the pipe go through the vial; cut off the bit inside the pipe and joined the edge loops.



Section 3. UV Unwrapping

I manually added seams and unwrapped every object while looking at the UV grid material I applied to everything. After unwrapping each object, I would unwrap it to see if the grid material would look alright. At first I smart unwrapped everything to look at what an unwrap should look like and based some of the more difficult objects (the pipes, dial etc) off of how they were unwrapped in the smart UV project. I had to move and rotate the dial UV to make the pressure gauge material centred on the object correctly.



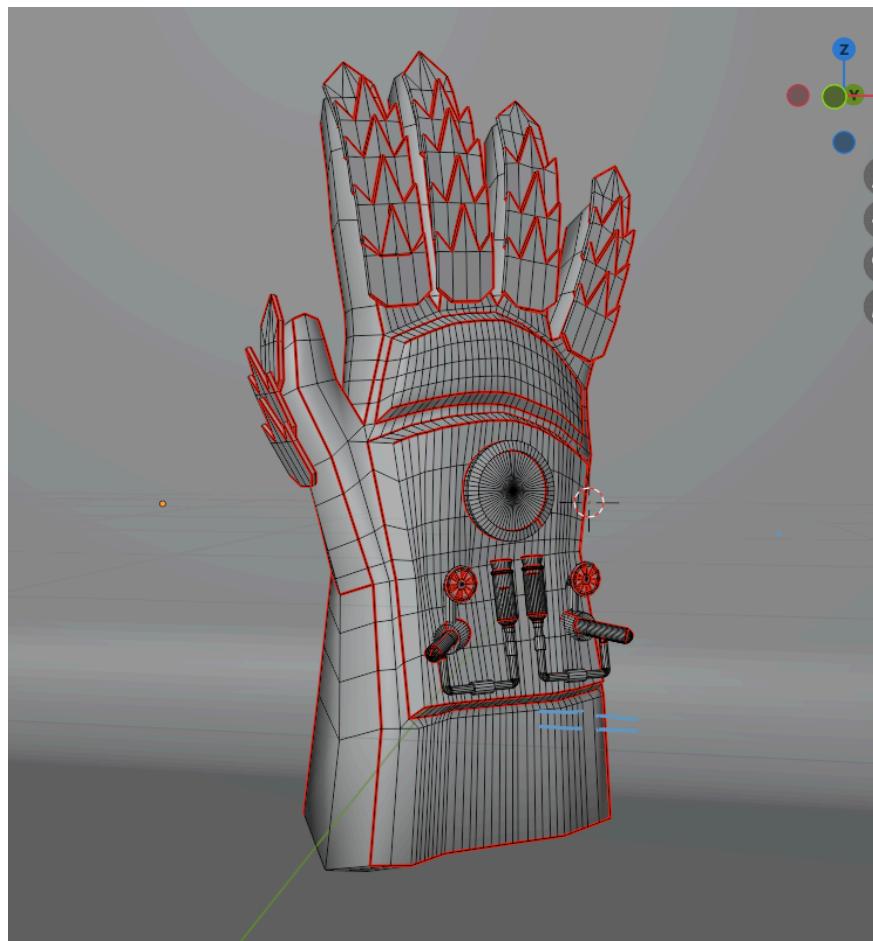
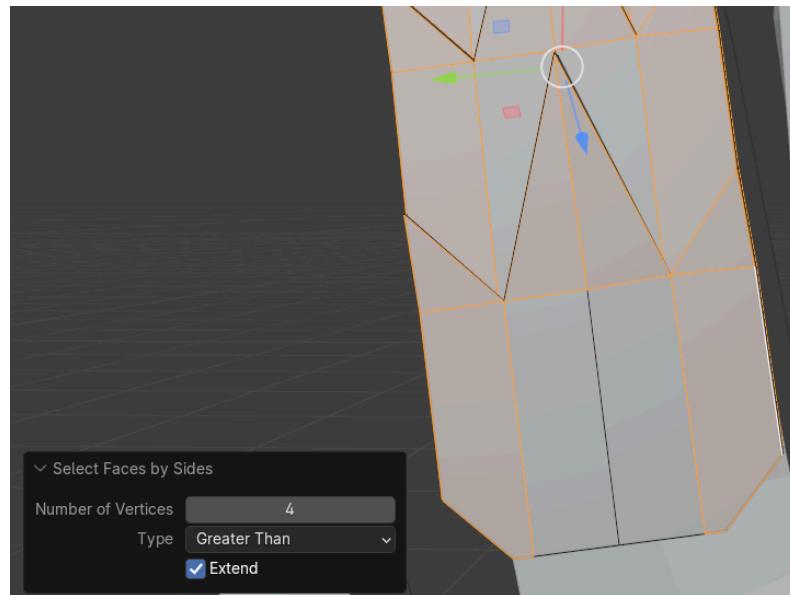


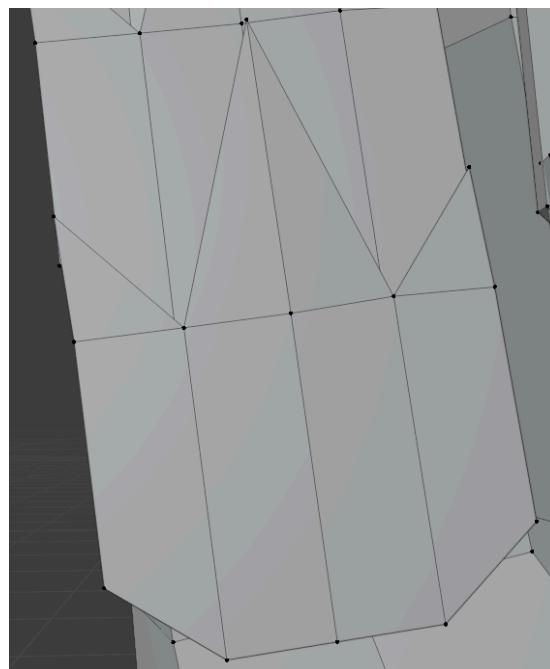
Figure 10. Model with seams

Section 4. Optimisation

The first thing I did for optimisation was flipping any wrong normals. Following this I checked for n-gons. Removing all the n-gons was a tiresome process as I had unknowingly created n-gons when making the initial finger plate which multiplied the issue when using the array to make all the plates.



Therefore I had to change the shape of all 21 plates manually using the G + B edge snapping technique.



Another issue with n-gons was the boolean I made with the pipes and tubes. This created many n-gons which I could only remove with the knife tool.

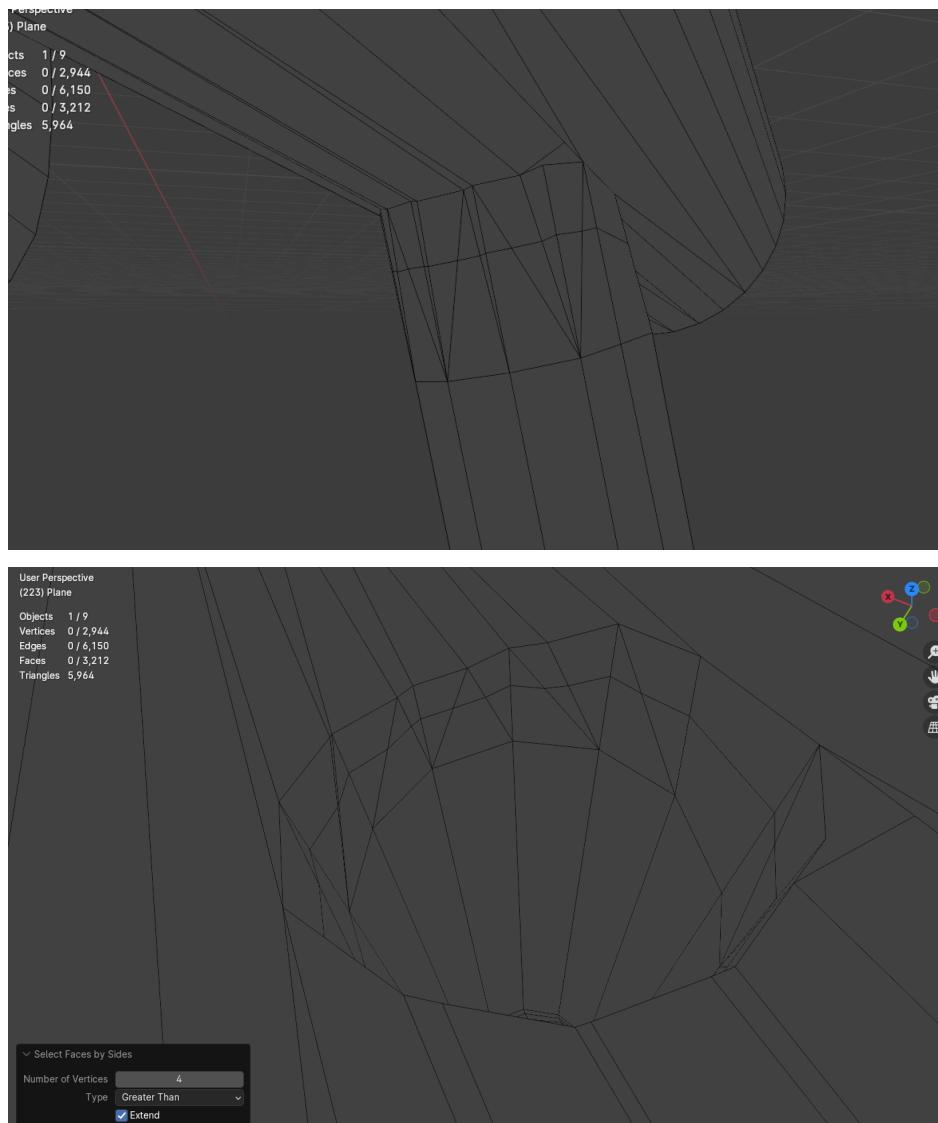


Figure 11. Bool with no n-gons after knife tool

I also had to optimise the UVs by changing where the seams were on the pipes and the dial. I had made the seams on the front of the pipes so the textures were applied strangely. To solve this I simply made the seams on the back where they can't be seen.

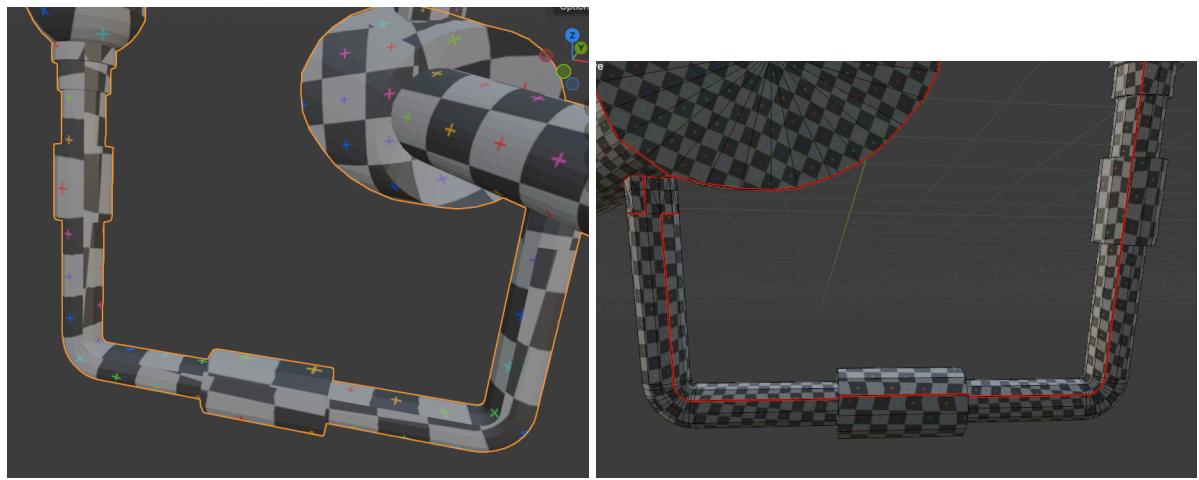


Figure 13. Texture before (left) and redone UV (right)

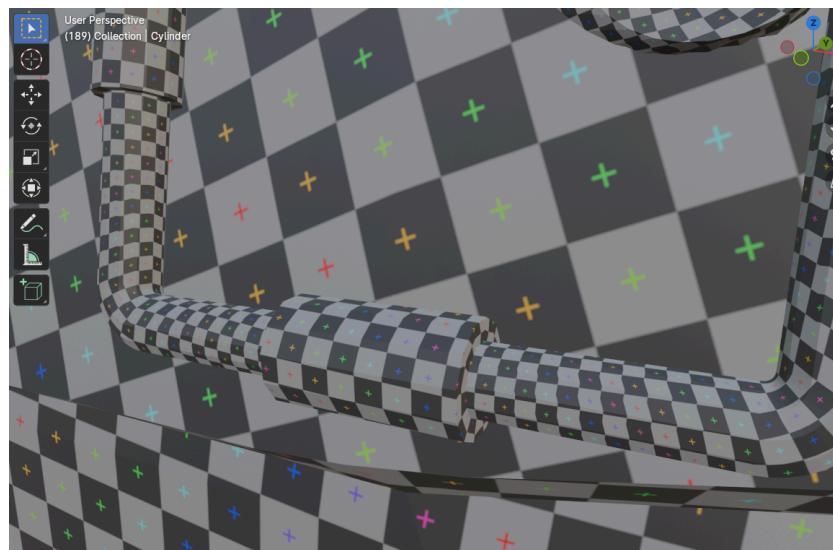


Figure 14. Texture after redone UV

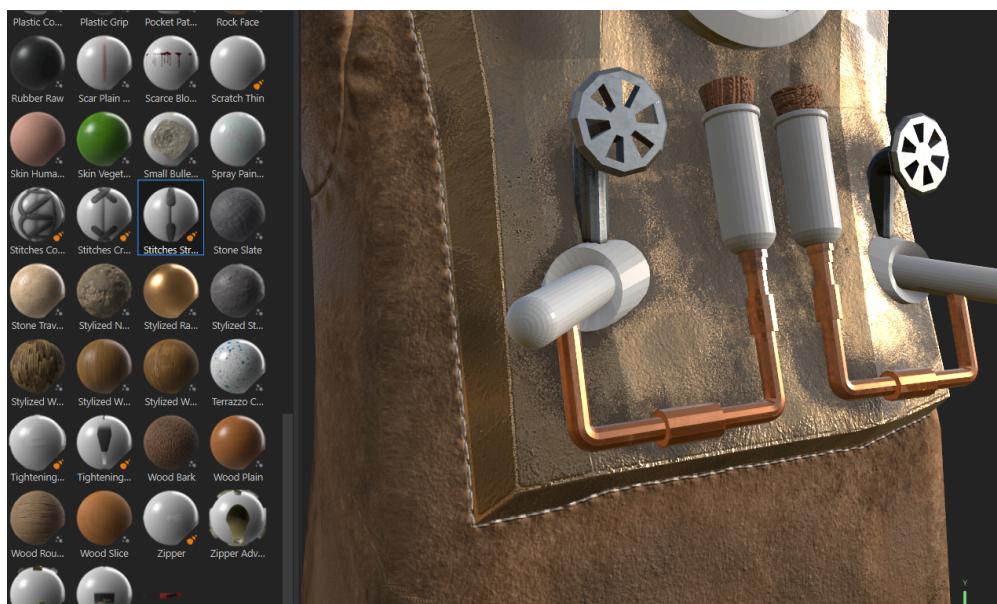
Section 5. Texturing

First I decided which parts of the model should have which texture. After that I applied different materials to the different parts before I exported the model to Substance Painter 3D.



Figure 15. Different colours for each material

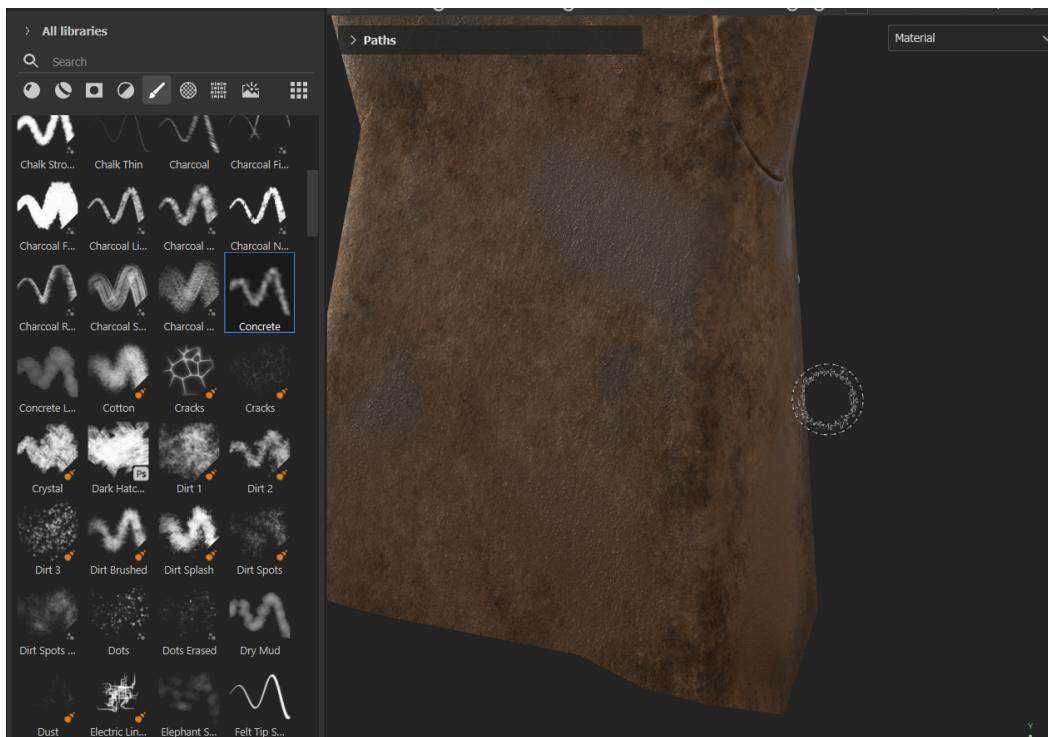
In Substance Painter, I first added some smart materials on each material slot. I also used a modified cork material for the vial stoppers. I then added some masks for dirt and to add more grime and rusty spots on the metal. I then found a “stitching” brush which when I made it a more metallic silver, it looked great around the edges of the hand/knuckle armour. This made the glove surface look a lot less flat and connected the armour to the glove better.



To make the glove more realistic, I added a seam around the base of the thumb similar to a real glove.



I then modified the concrete brush to look like mud which I applied on the glove.



This brush is extremely versatile and I modified it again to add darker blemishes/dirt all over the gauntlet (especially near the fingers). This helped add a lot more realism to make every object/material blend together. After this, I added scratches and scrapes on the metal and glove to add more detail. The scratches/tear that wrap around the sides of the glove contribute a lot subtly to the shaping.

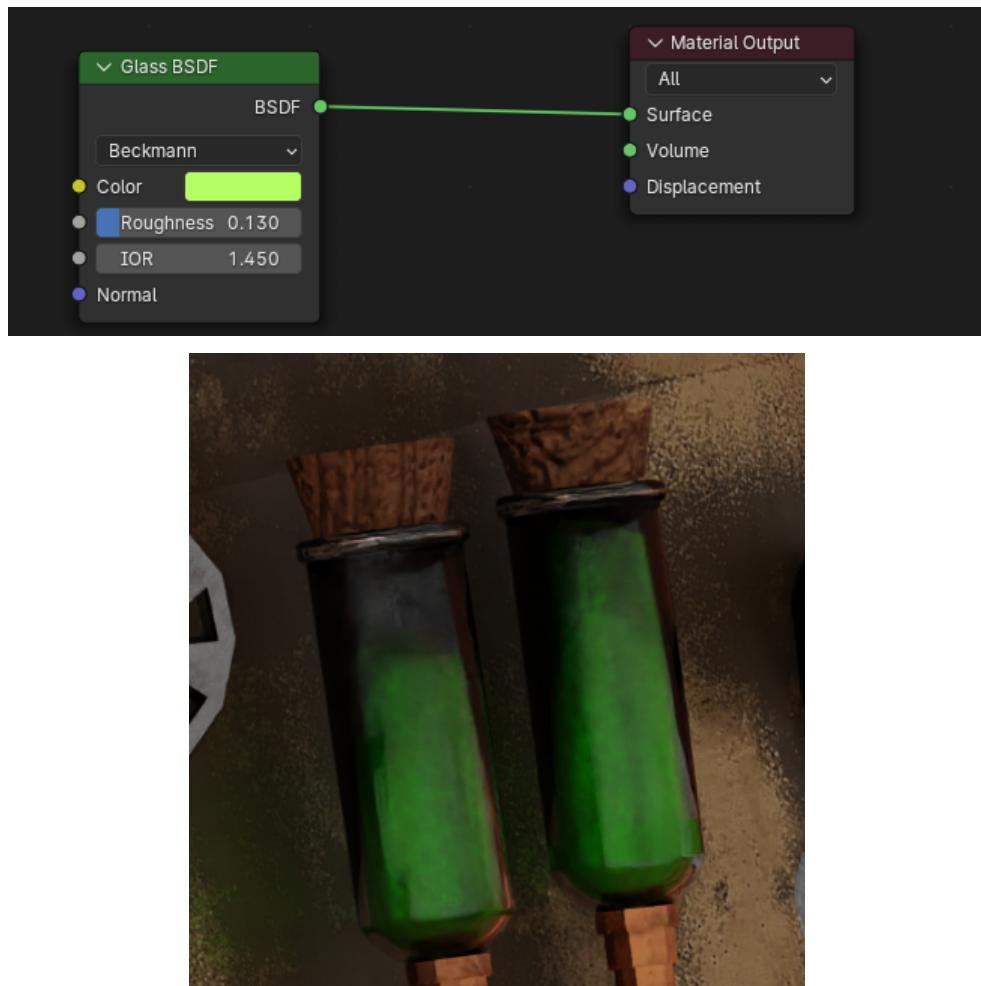
Finally I added a texture onto the knuckle armour. This is a symbol from the very dark (Japanese) manga Berserk which I feel matches with the darker idea of the gauntlet injecting drugs into your blood. This also helped make the blank space of the armour more filled in. To “engrave” the symbol in, I added a black mask onto the whole knuckle armour texture and applied a white mask around the symbol to make it visible.



Figure 16. Miura, K. (1989-2021). Berserk. Hakusensha.

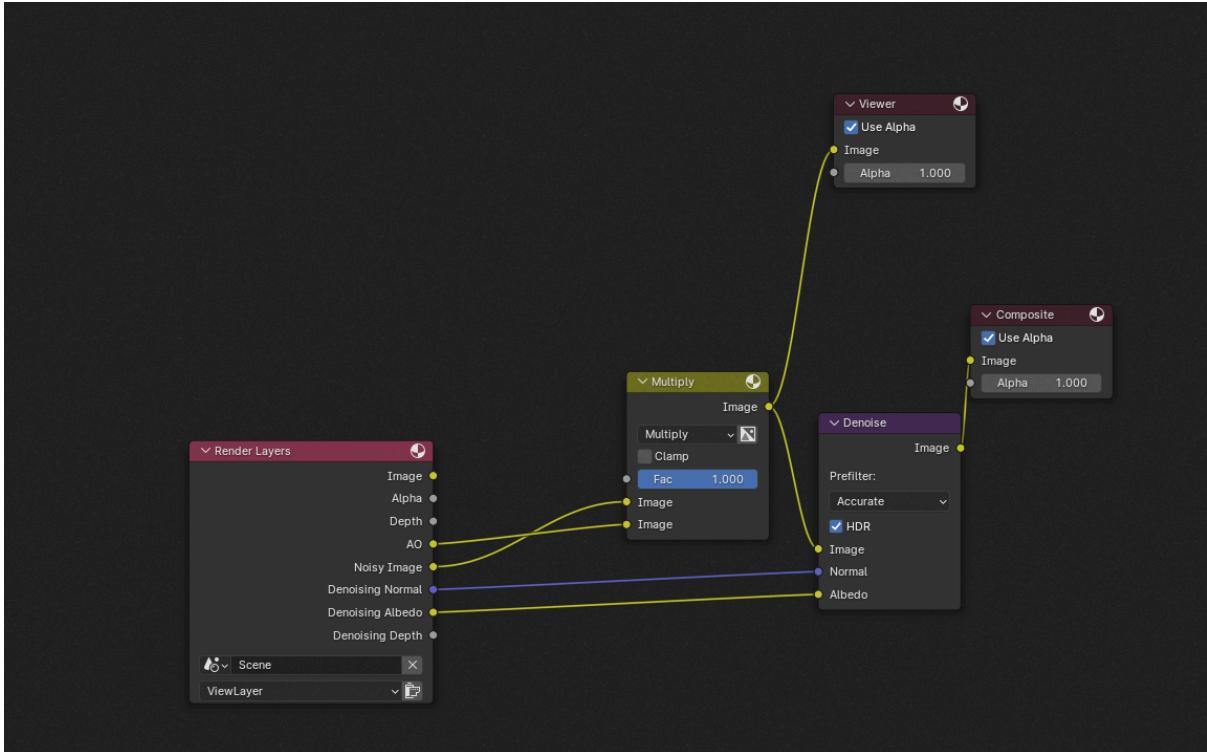


The vial and liquid were made with different coloured Glass BSDF in Blender



Section 6. Rendering

To render, I used the Cycles renderer in Blender in 2k with a high 400 samples. I adjusted the lighting and added ambient occlusion and denoising.



When rendering in Unreal Engine, I imported an asset map pack (<https://www.unrealengine.com/marketplace/en-US/product/fantasy-interior-environment>) and used that to render a short zoom out animation after which I selected a frame to use.

Unfortunately BSDFs don't work in Unreal so I had to find another glass material.



Figure 17. Blender render



Figure 18. Unreal 5 render

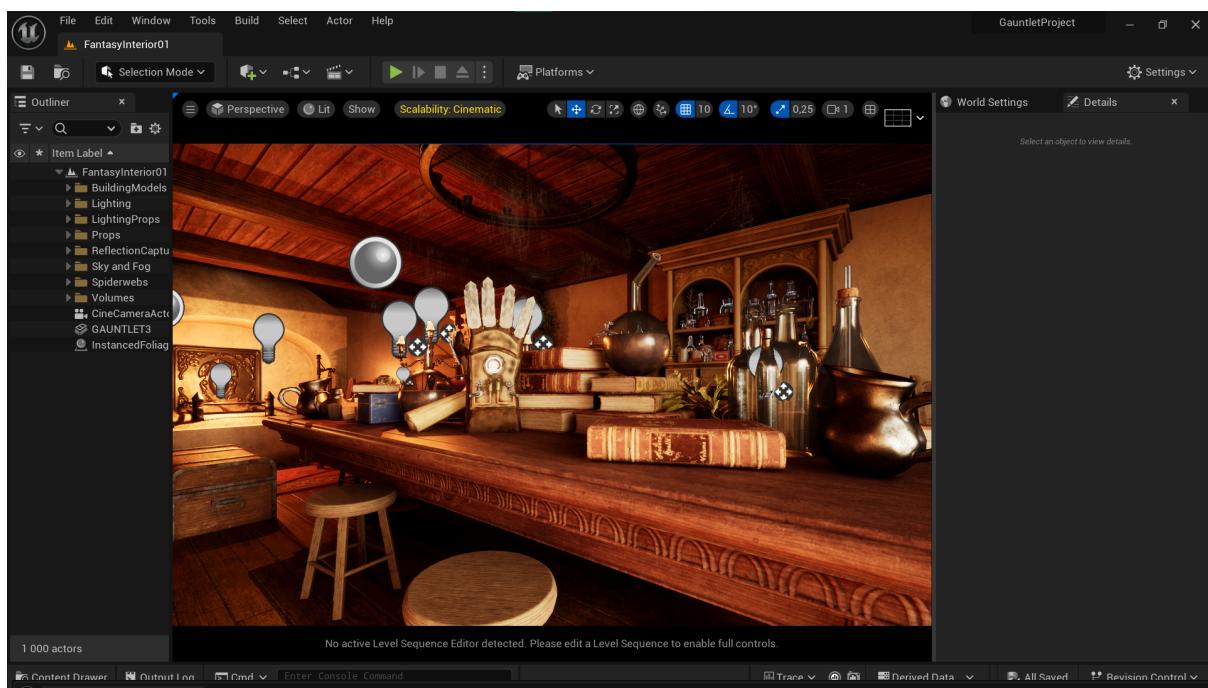


Figure 19. Gauntlet in Unreal 5

Section 6. Critical Reflection

I am satisfied with the work I produced although there are some things which cost me a lot of needed time. If I had known to look for n-gons, I would have removed them earlier (before making the finger arrays). My UV unwraps could also improve as I made some unnecessary seams which I had to remove and reimport to Substance Painter.

Section 7. References

Miura, K. (1989-2021). Berserk. Hakusensha.

Unknown. (n.d.). 3D Printed Nazgul Gauntlets - The Lord of the Rings for Cosplay. Retrieved from Pinshape.

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Unknown. (n.d.). Steampunk Glove. Retrieved from Sketchfab.

<https://sketchfab.com/3d-models/steampunk-glove-1890ba9b1bb040bb864641d81a662495>