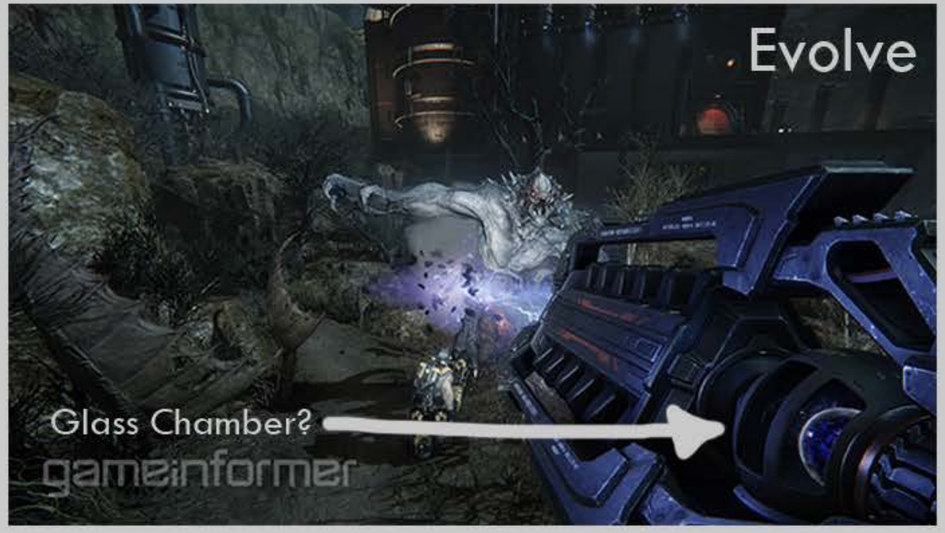
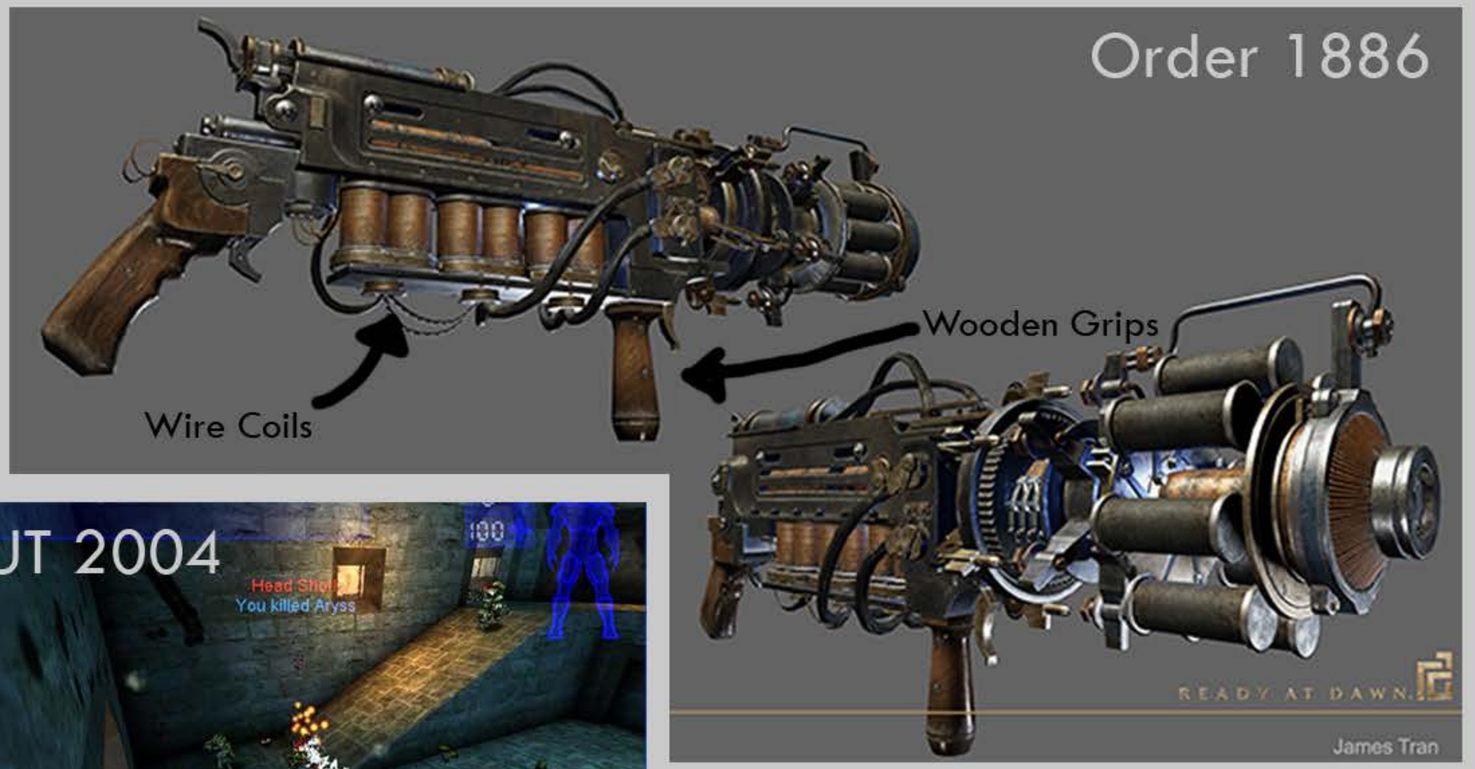
KYLE HANSELMAN

Lightning Pistol Process Book





There are few examples of lightning guns in media, allowing lots of room for creativity. In Evolve and Doom they fire a continuous bolt at close range. In UT and Order 1886 they act more like snipers, with 1886's requireing a few seconds to 'charge up.' I took Liked that idea and made a pistol that took a few seconds to wind up a charge with a coil before firing a large bolt.

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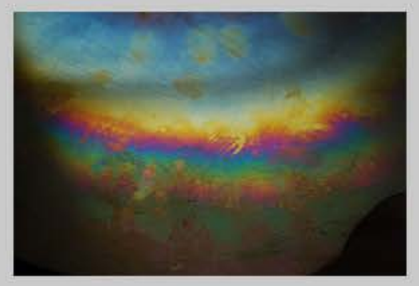
Lightning Gun Research



Brass

When brass is heated, it loses its shine. Once it is heated to a red-hot state, it gains a beautiful rainbow-like discoloradion. Brass melts at 1700 degrees.

Steel

When steel that is painted is heated high enough, the paint will burn or flake off. The melting point of steel is 1500 degrees.

Glass

Glass becomes maliable at 1400 degrees. With my design, the glass would remain hotter than the rest of the gun for longer, melting it.

Lightning temp: 10,300 degrees

Since lightning strikes so quickly, it would be unlikely to melt and of these metals, but it would potentially make them red-hot; this heat would only last moments longer than the actual lightning. Theoretically, the metals would melt before the glass would, but I'm going to make the glass melt because that's just a lot more fun.

Wood

Wood will catch fire at 2000 degrees, but begin to burn at about 1000. If lightning strikes close to wood, the wood would charm, but it's unlikely to burn.

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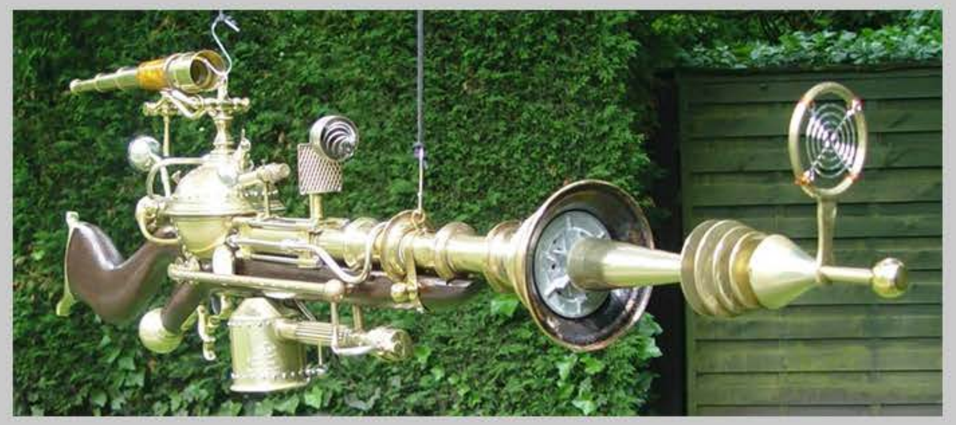
Material Research

Steampunk Guns

Steampunk is a style that has a LOT of variety. From the many different varients to the ability to look great with a realistic look as well as a low-poly hand painted look. The weapons are just as veried, but they are almost alway highly detailed with many different knobs, pipes, and gears which rarely appear to have any function. I wanted to step away from that and make a gun that has the crazy steampunk look, but also has parts that look purposeful and deliberate not 'glue some gears on it and it's steampunk!'

Types

Grungy
Western
British
Apocalyptic
Teslapunk
Dieselpunk
Clockpunk



Steampunk Grunge

Steampunk has many forms, but the one I chose to look at was a more grungy style of steampunk. This allowed me to make a gun that was more interesting and potentially less stable-looking. The colors here tend to me more mute and calm focussing on brown and grey, not copper and silver, which helps give the weapon a story.

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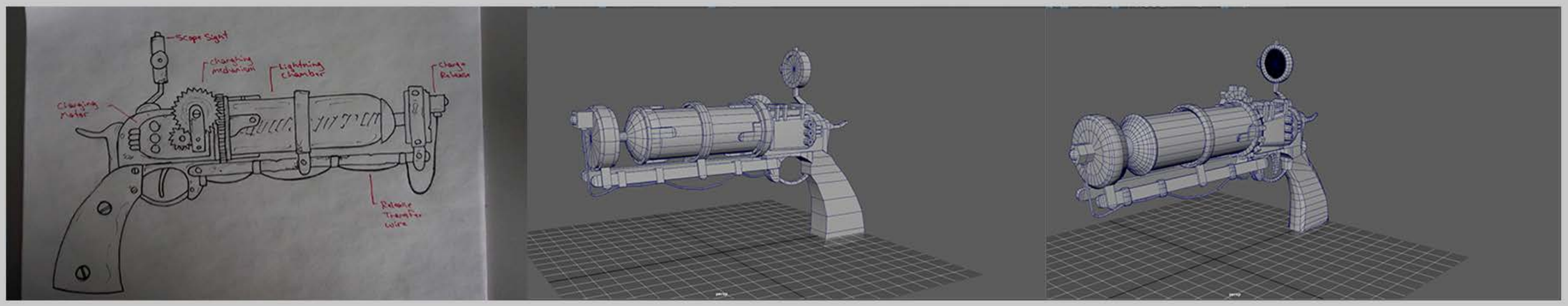
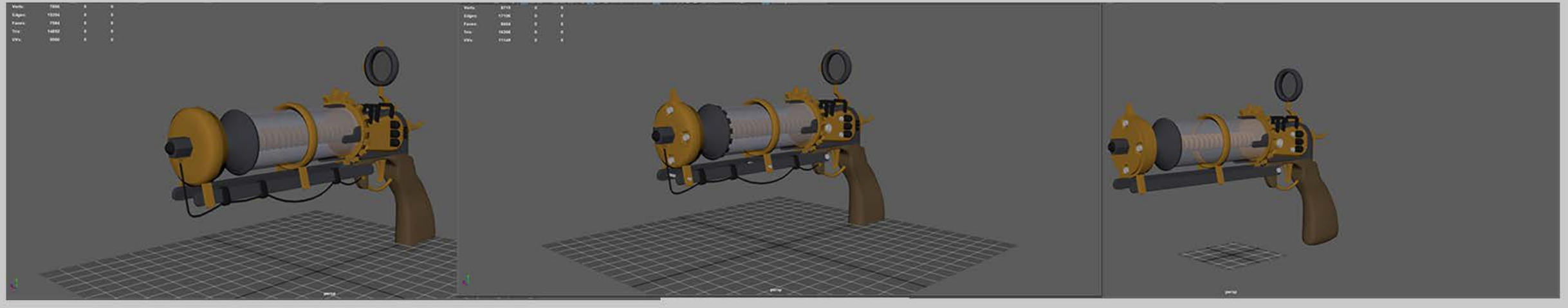
Style Research





These are the in progress shots for the model. It begins with a sketch that I made some years ago, and I slowly add detail and complexity. I begin to use materials in Maya to better separate my model and give myself an idea of what color scheme I am going for. The images on the next page are the final low-poly model and the final high-poly model.

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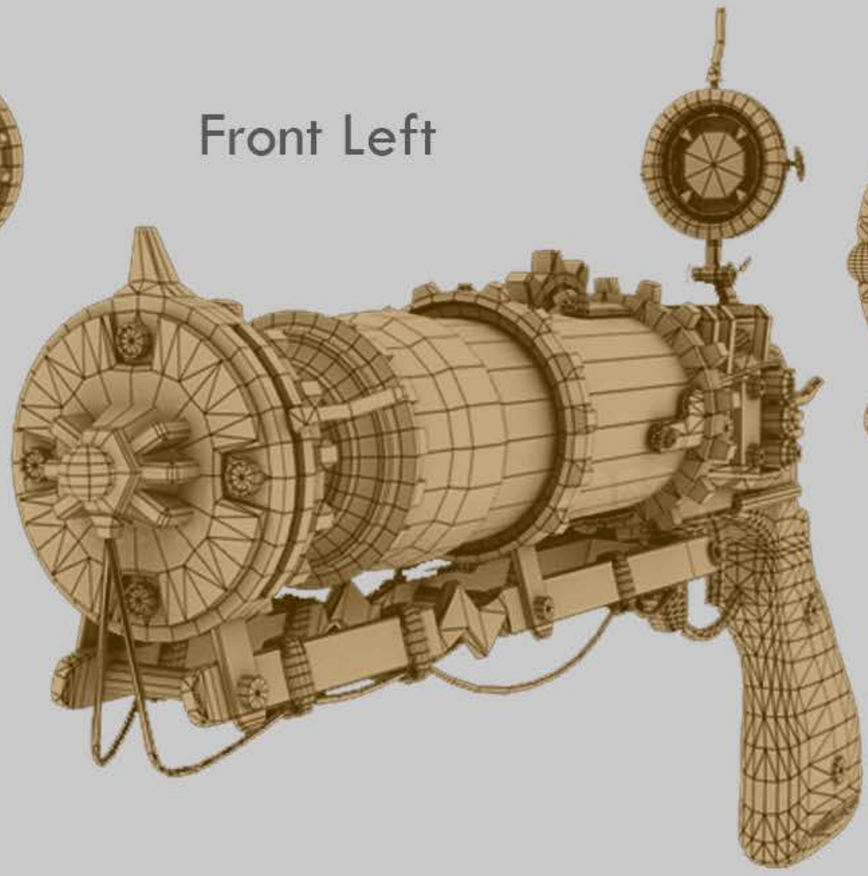
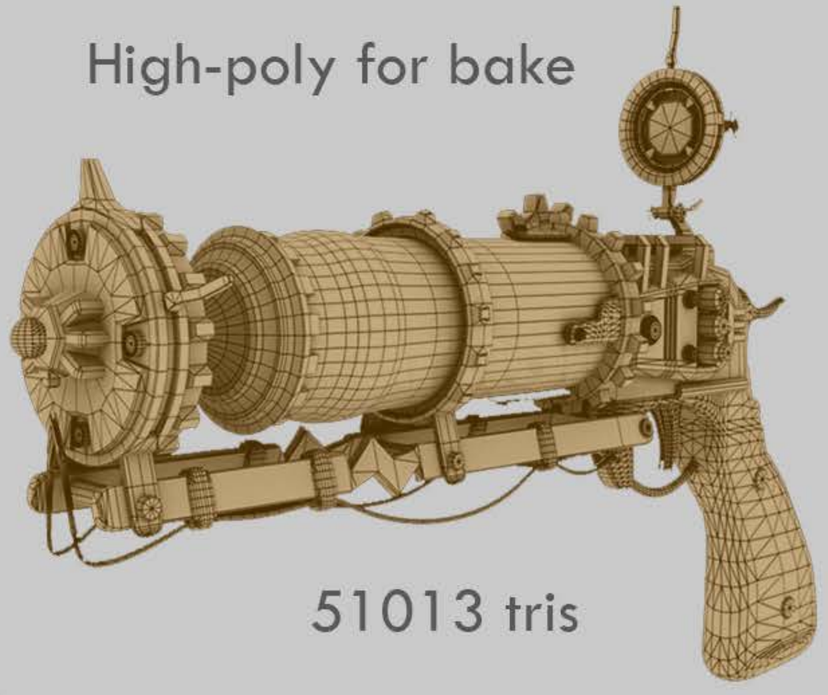
Progress Shots

Back Right

23799 tris



Front Left



High-poly for bake

51013 tris

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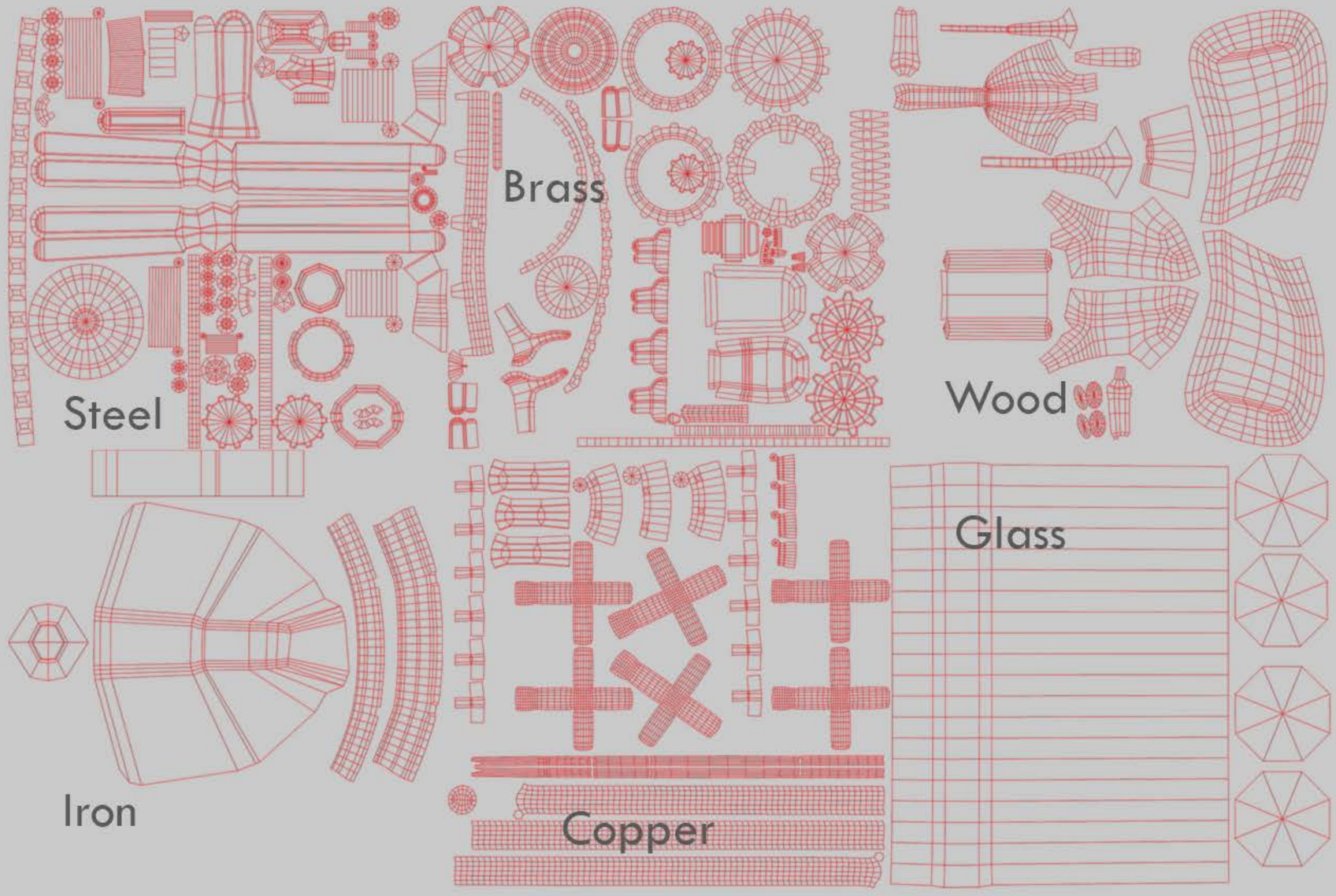
Finalized Model



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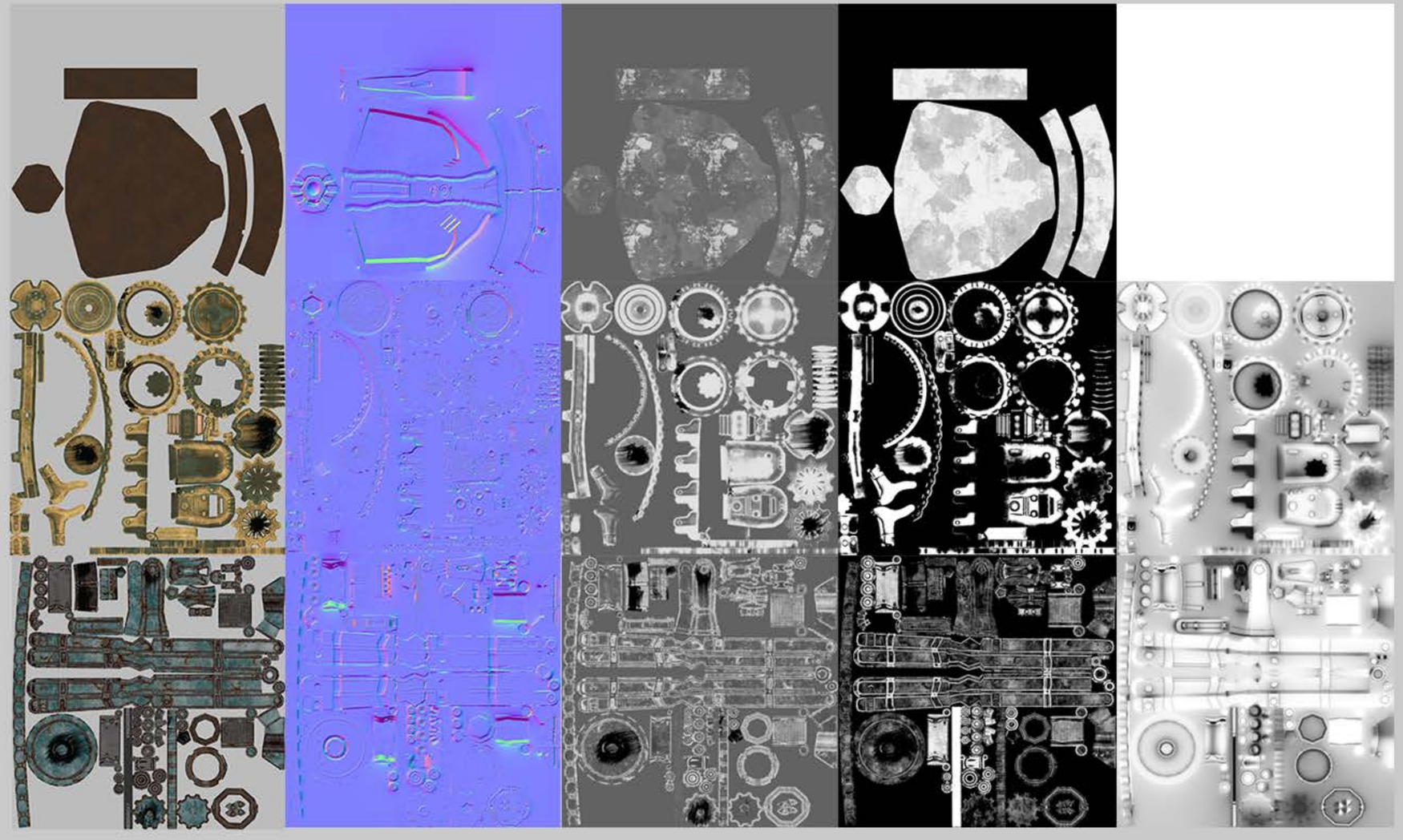
UV Sheets

Color Normal Roughness Metallic AO

Iron

Brass

Steel



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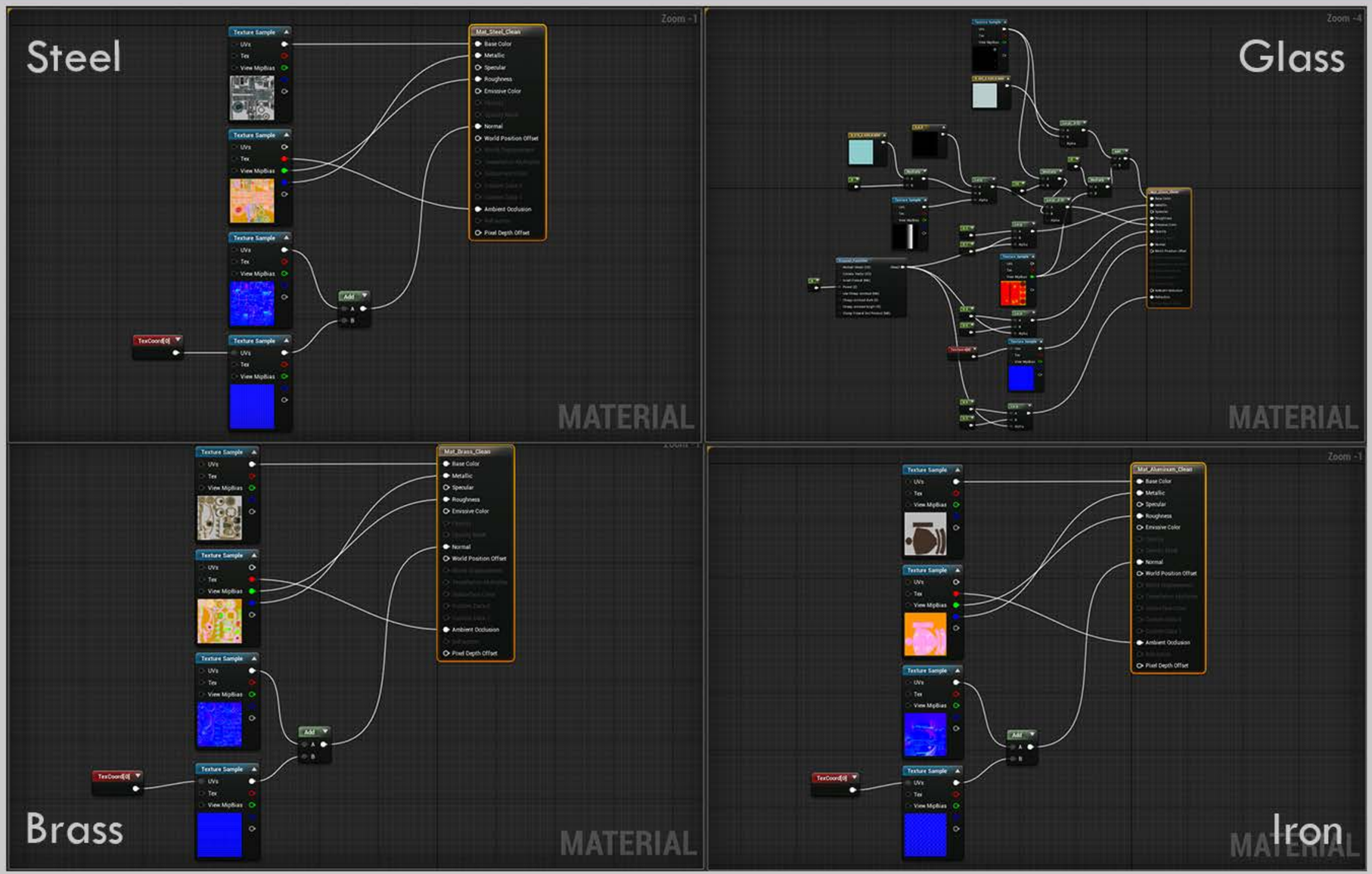
Material A (Clean) Texture Maps

The glass here was rather difficult. It was a difficult balance to make the glass look think and strong, but remain clear enough to look authentic. Not only that, but I had to create a gradient map to import to get the opacity and emmisive to change towards the back of the cylinder. I also added detail normals to get incredible detail, just like with the rest of my materials.



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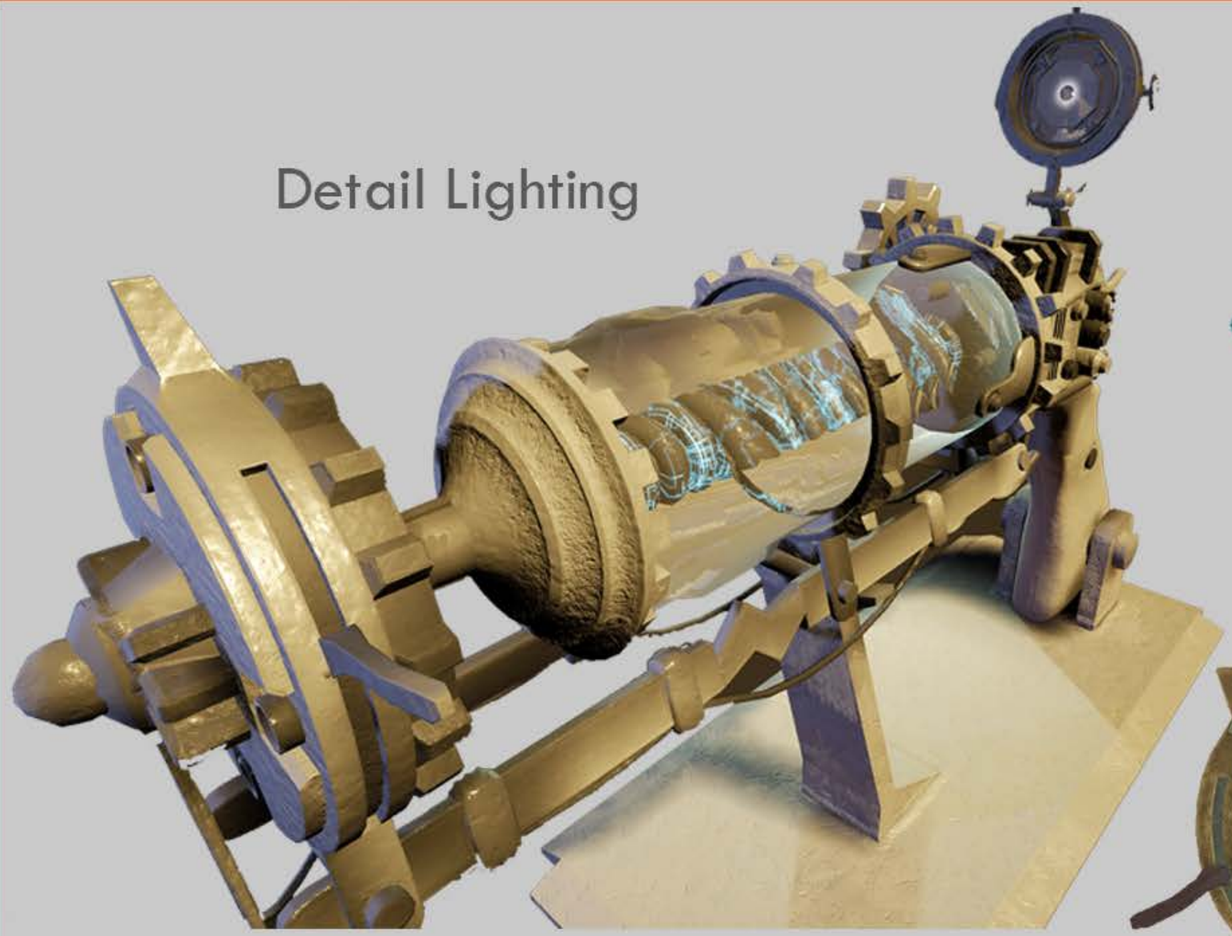
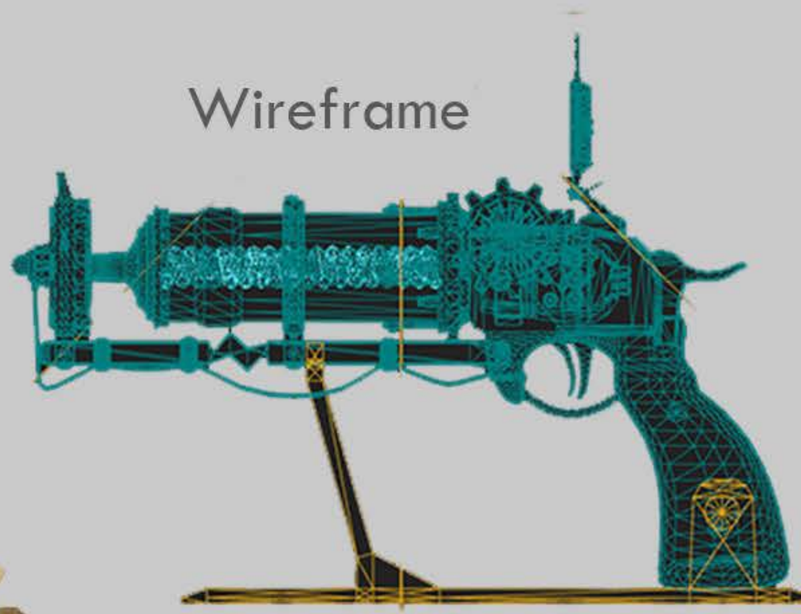
Material A (Clean) Material Editor

Detail Lighting



Wireframe



Unlit

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Material A Application Breakdown

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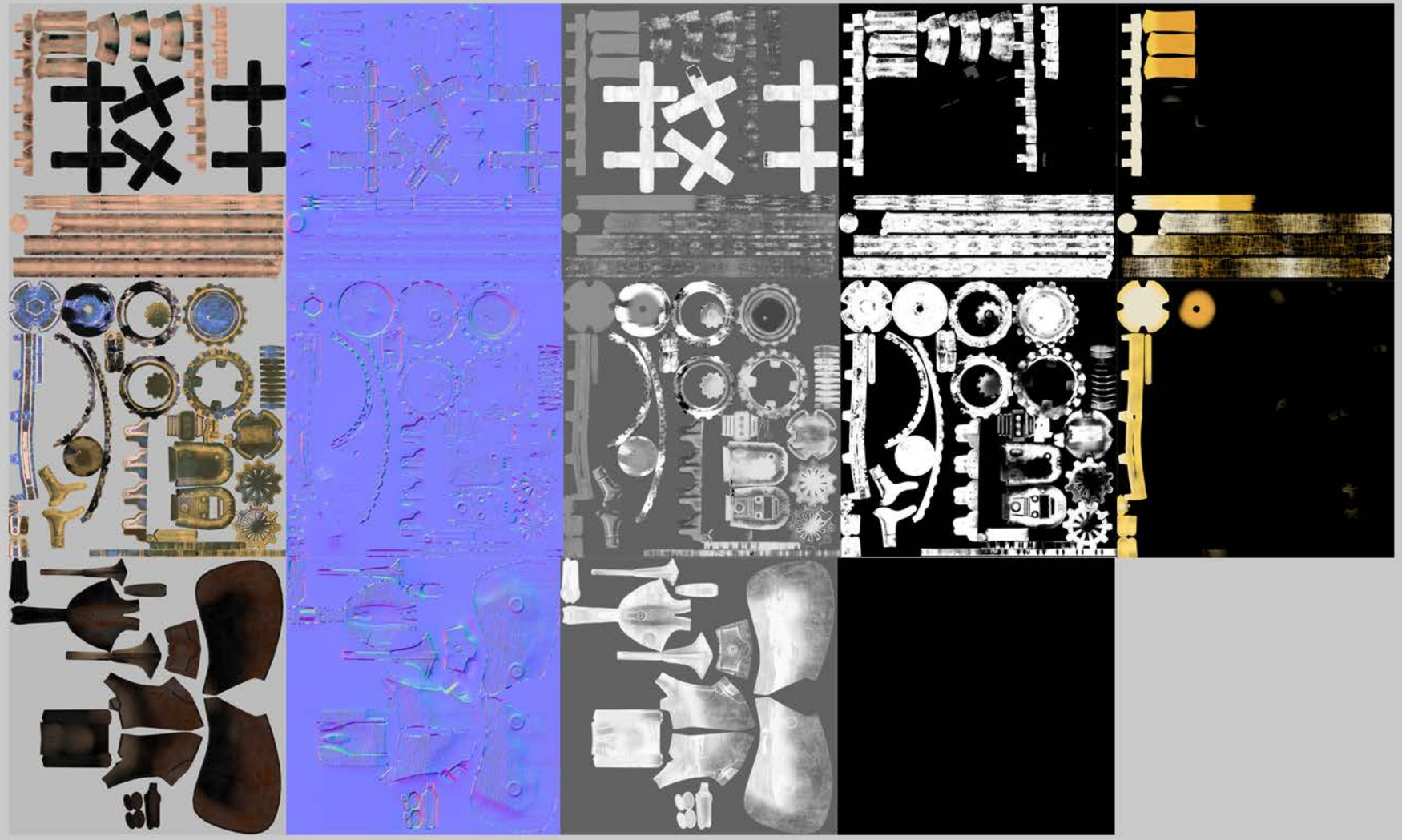
Material A Material Details

Color Normal Roughness Metallic Emissive

Copper

Brass

Wood



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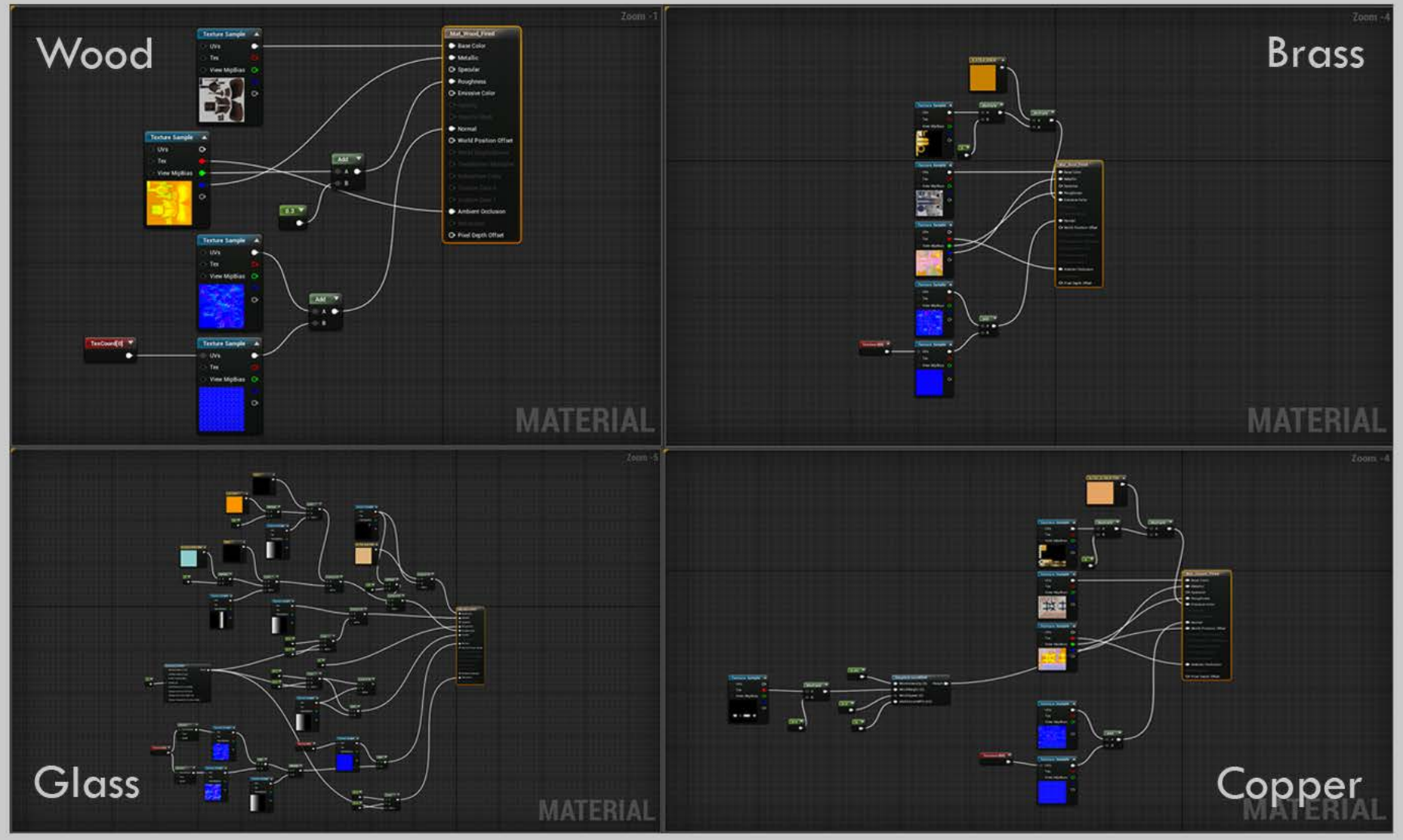
Material B (Fired) Texture Maps



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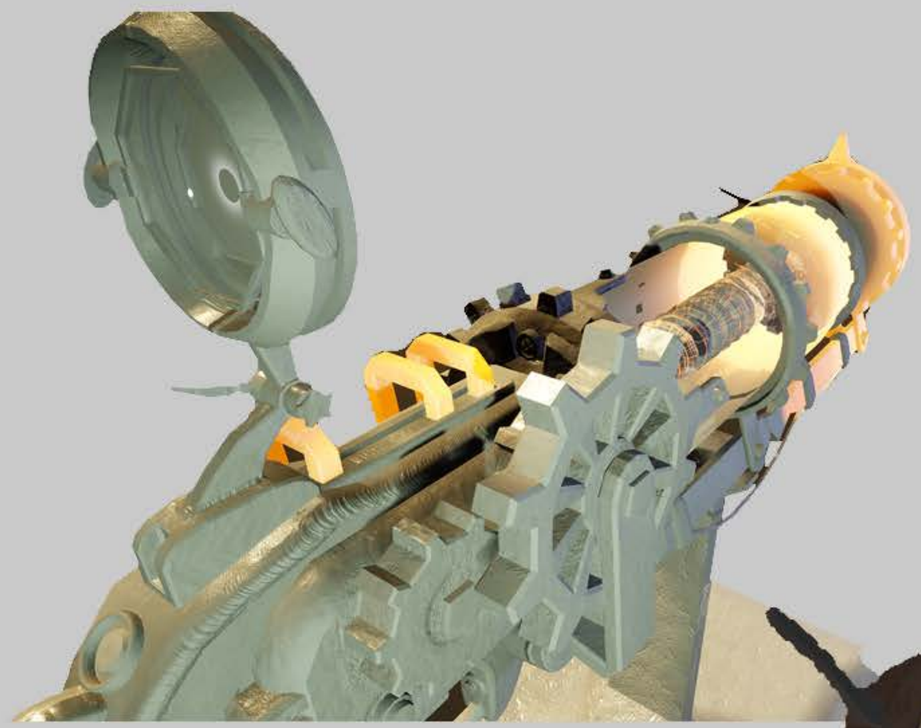
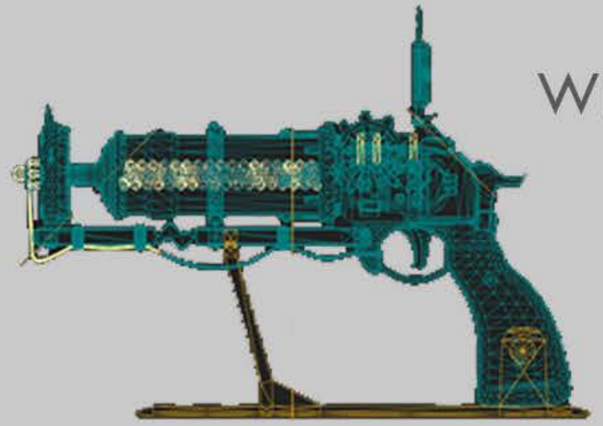
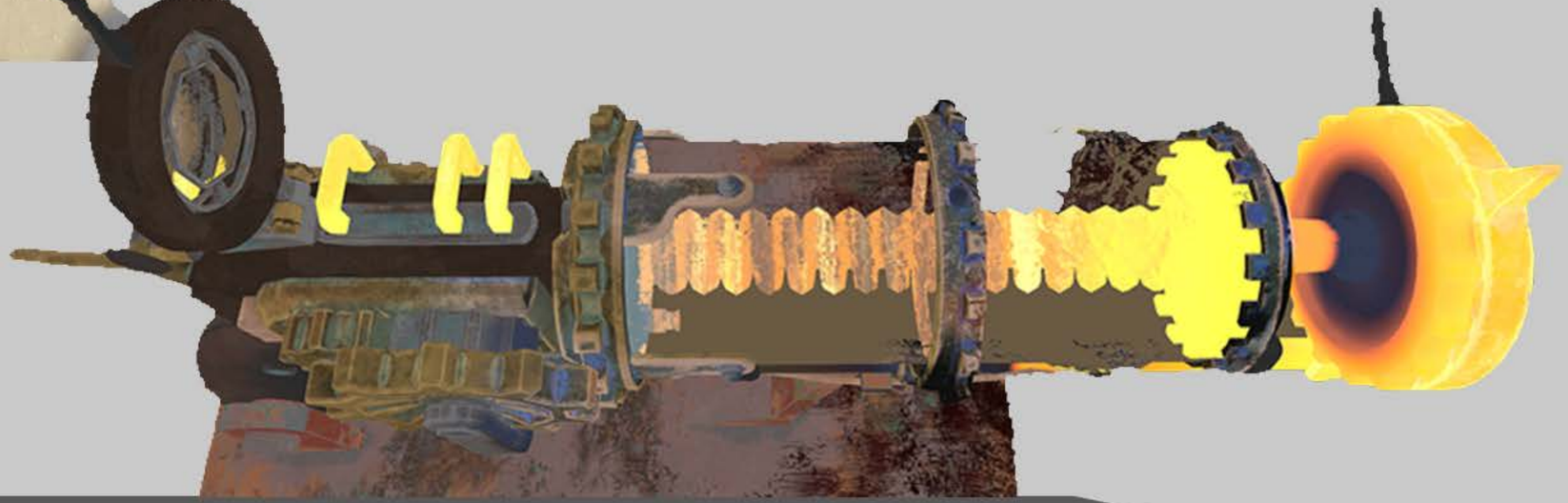
Material B (Fired) Material Editor



Detail Lighting



Wireframe



Unlit

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Material B Application Breakdown

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Material B Details

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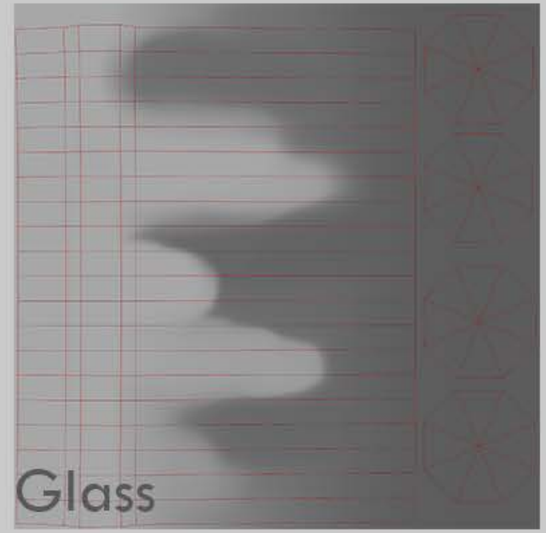

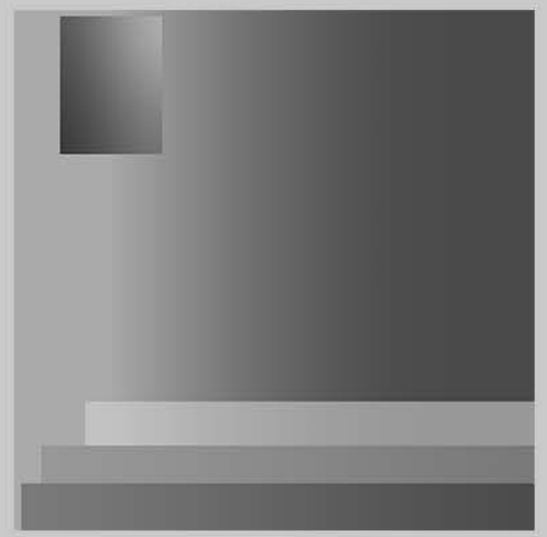

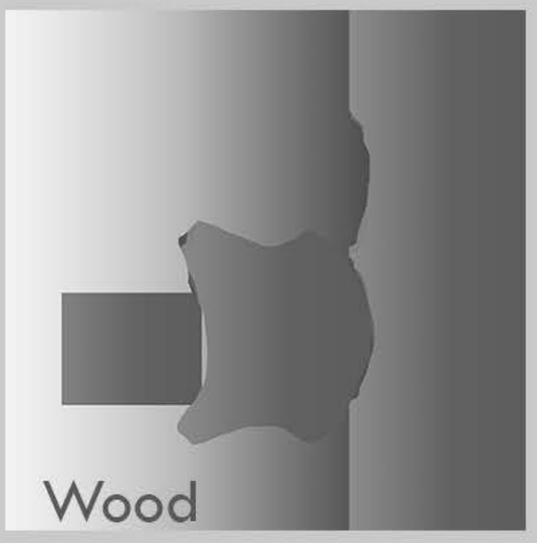

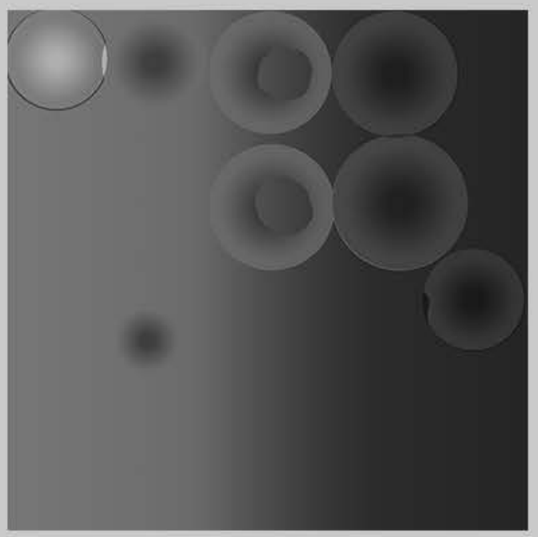

For the transition maps, I initially laid out my UV's so that the parts that are in front are on the left side of the map. This helped immensly in the tranision. In general, the pieces could all be on one gradient. As you can see, the bad layer of these maps is just a normal linear gradient. I made a few exceptions. For the glass I wanted it less eve, so I distorted the gradient. For the copper I wanted the glow to spiral down the central coil, you can see that in the bottom of the alpha. For the steel, there were some bolts here and there I wanted affected later than they were placed. The wood, I wanted it all to happen later in general and I had to even out the seem that woiuld normally happen because of the UV map. The aluminum had little change at all, so I left it alone. The brass was the most interesting, as I wanted the heated parts to start at the ends and work in towards the center.

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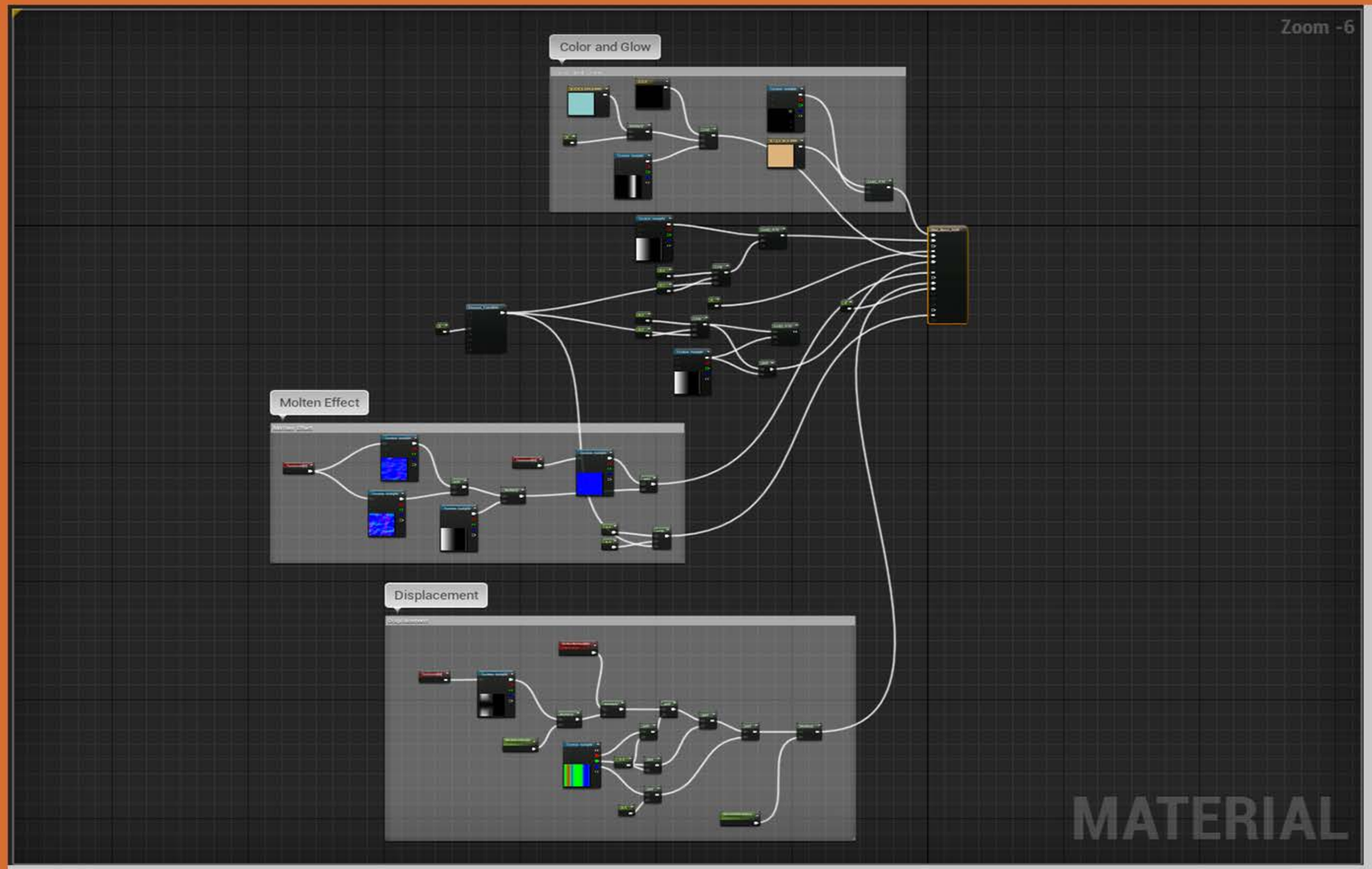
Material A to B Transition Alpha



After completeing my two materials, I decided to create a third just before working in a transition. I wanted a material that would show once the heat from the lightning blast cooled off. Luckily, because of how I made my heated material (B) this cool material (C) only needed to remove the emmisive. The only other difference in the materials is the glass, which warps using a displacement as it cools off. This material can be seen here to the left.

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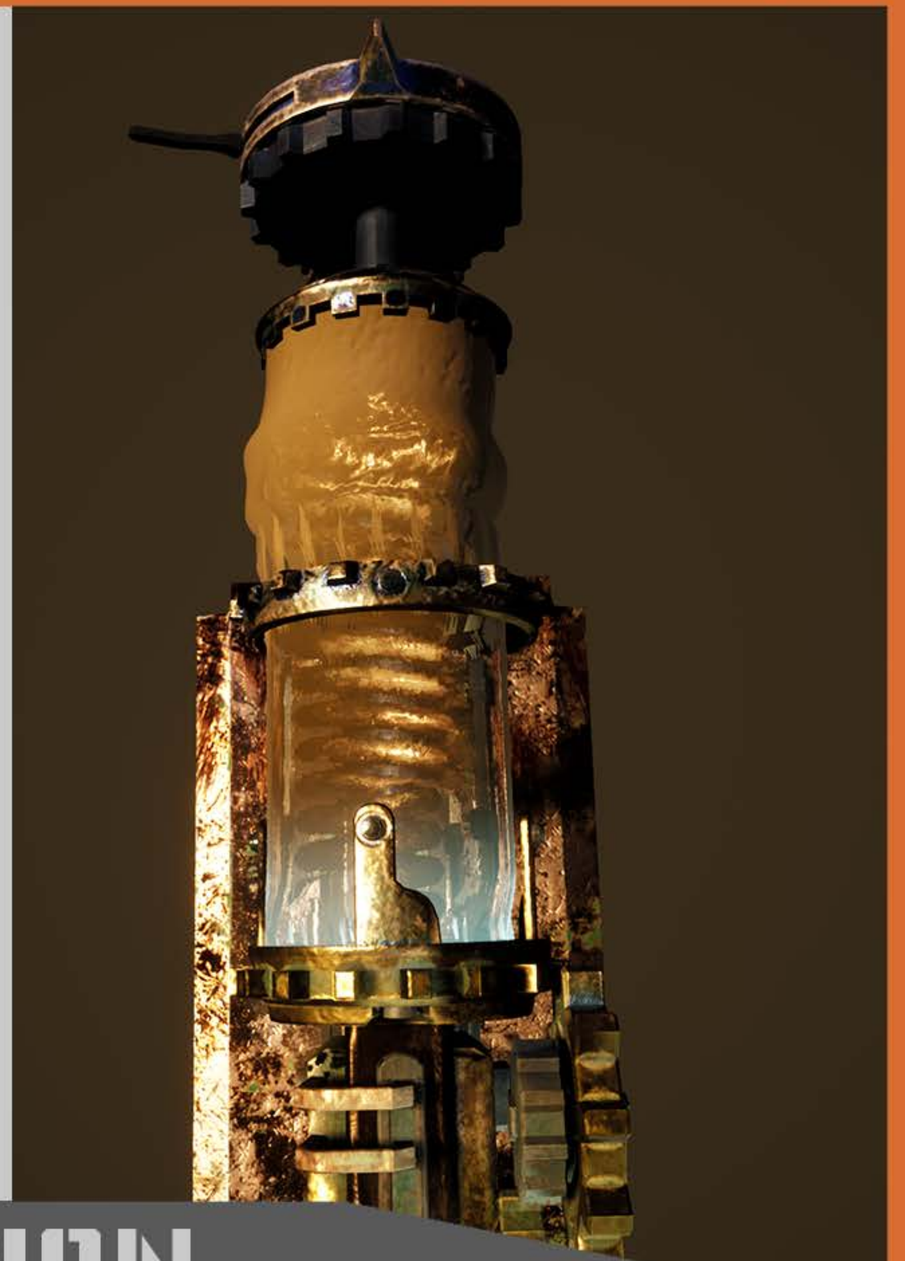
Material C Editor



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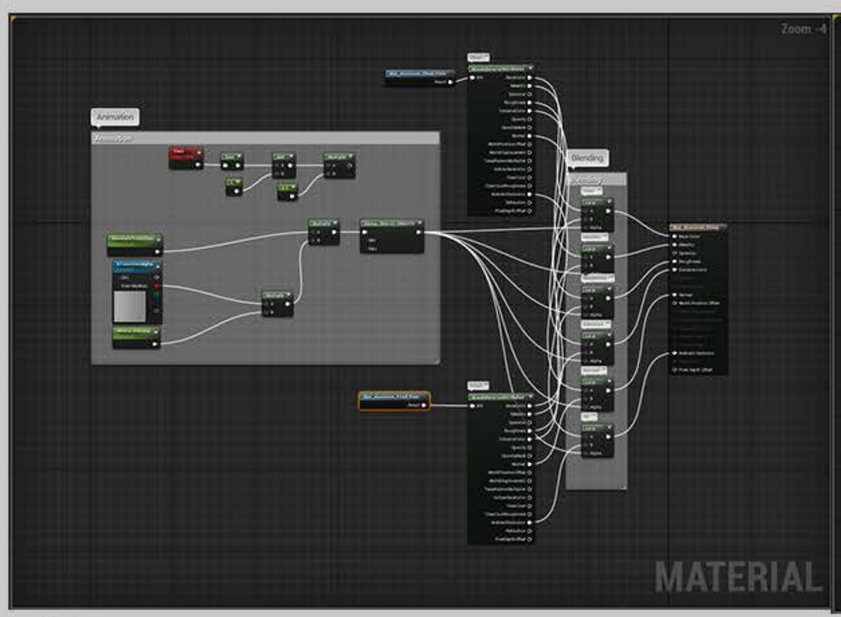
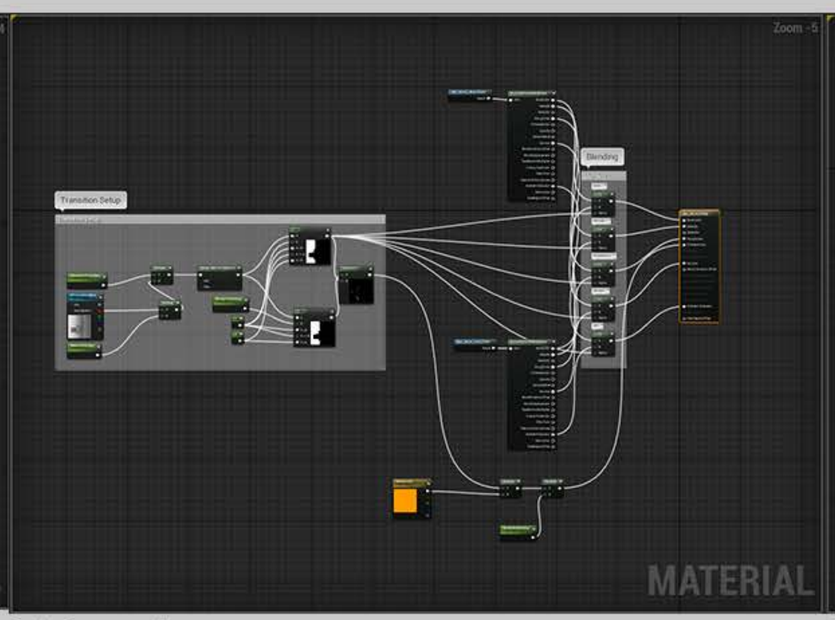
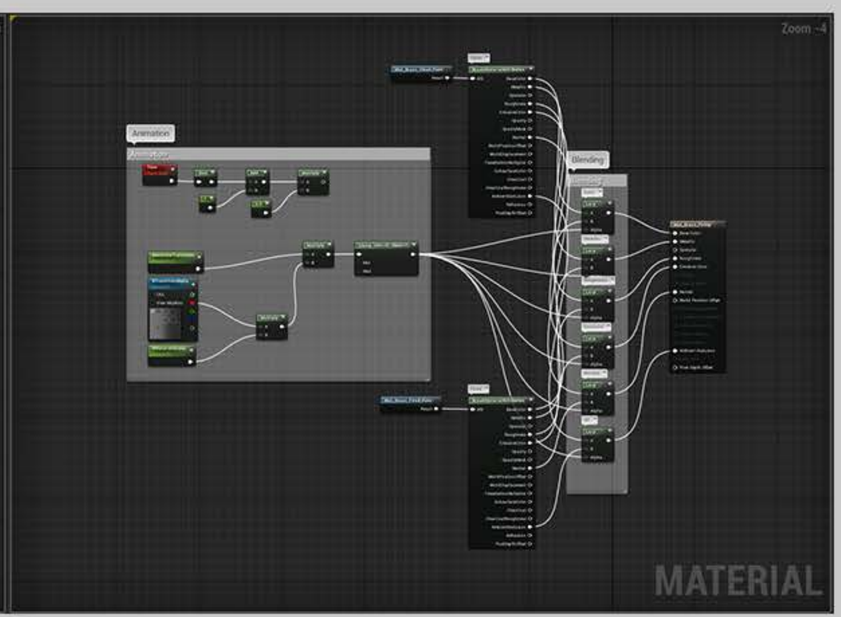
Material C Details



Aluminum

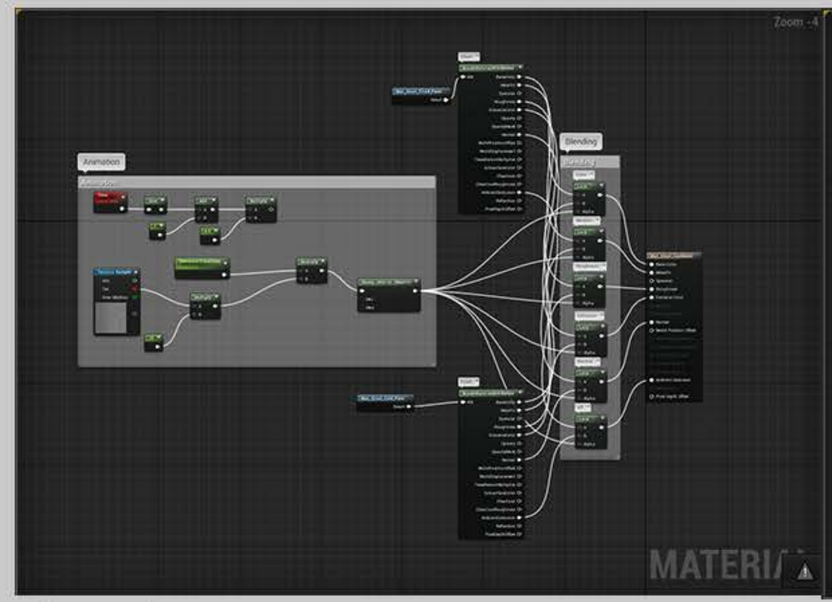


Wood

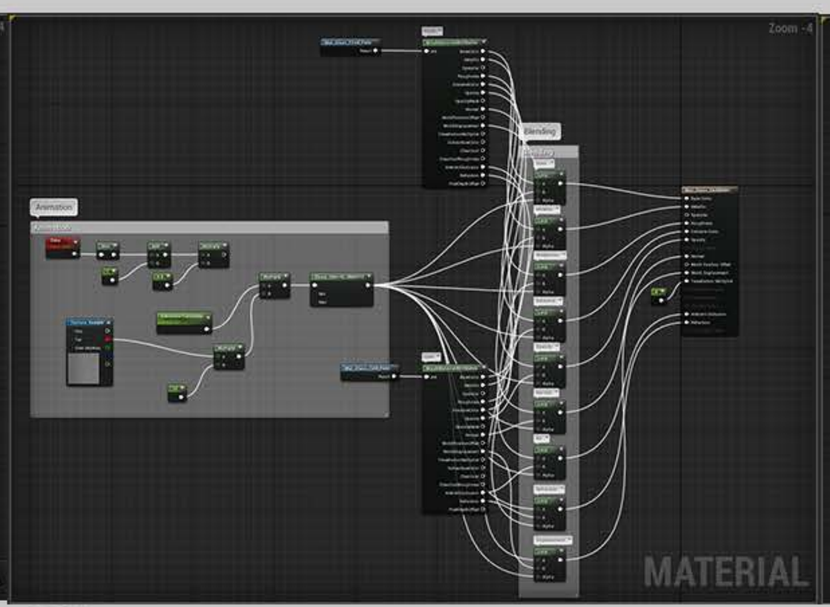


Brass

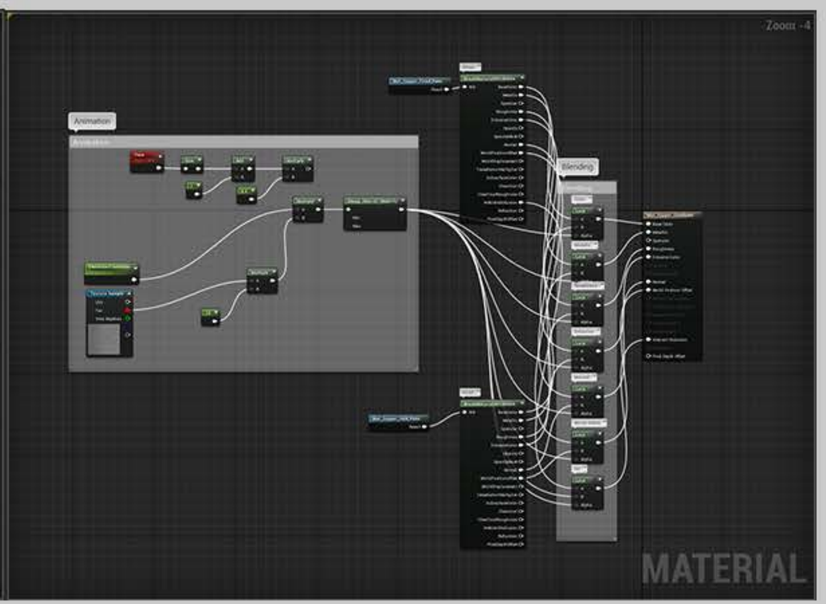
These are the master materials I created for the transitions. I have three materials, Aluminum, wood, and brass presented here, the other three are showcased for the second transition. For each transition I created a custom transition map, or alpha, to control the change with a lot of precision and detail to make sure that when the gun heated up, it did so in a believable and realistic way. The different parameters were made and then controlled through a blueprint construction script, which are shown later. Then, when in sequencer, I can control the exact speed, position, and completion of the transition of each material.



Steel

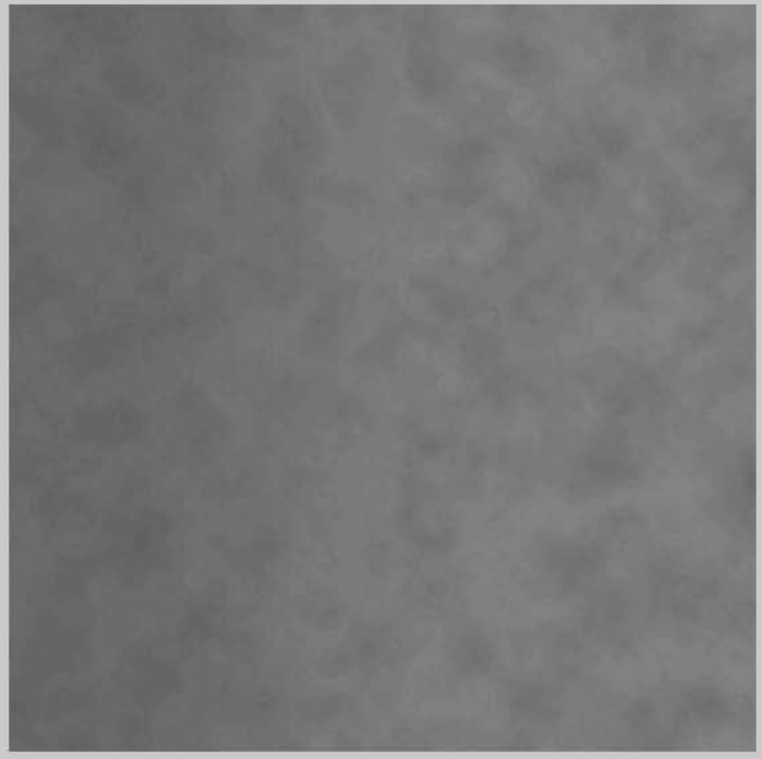


Glass



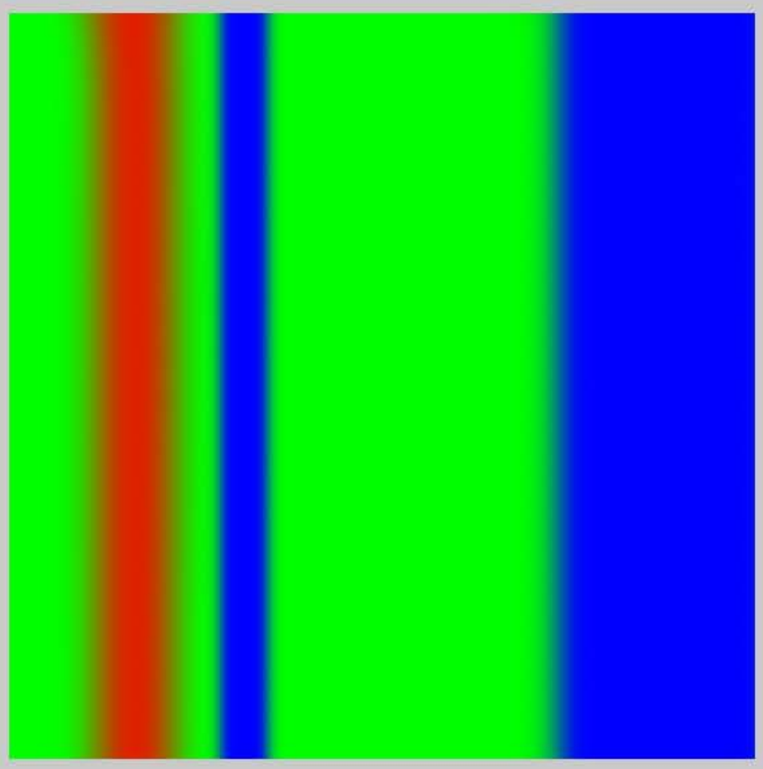
Copper

These are the other three materials shown in the B to C transition, from hot to cold. Same as before, I used an alpha do create detailed transition maps to create a realistic cooling effect. The glass was really fun, and significantly more complex than the other materials due to the distortion, displacement, and other effects.



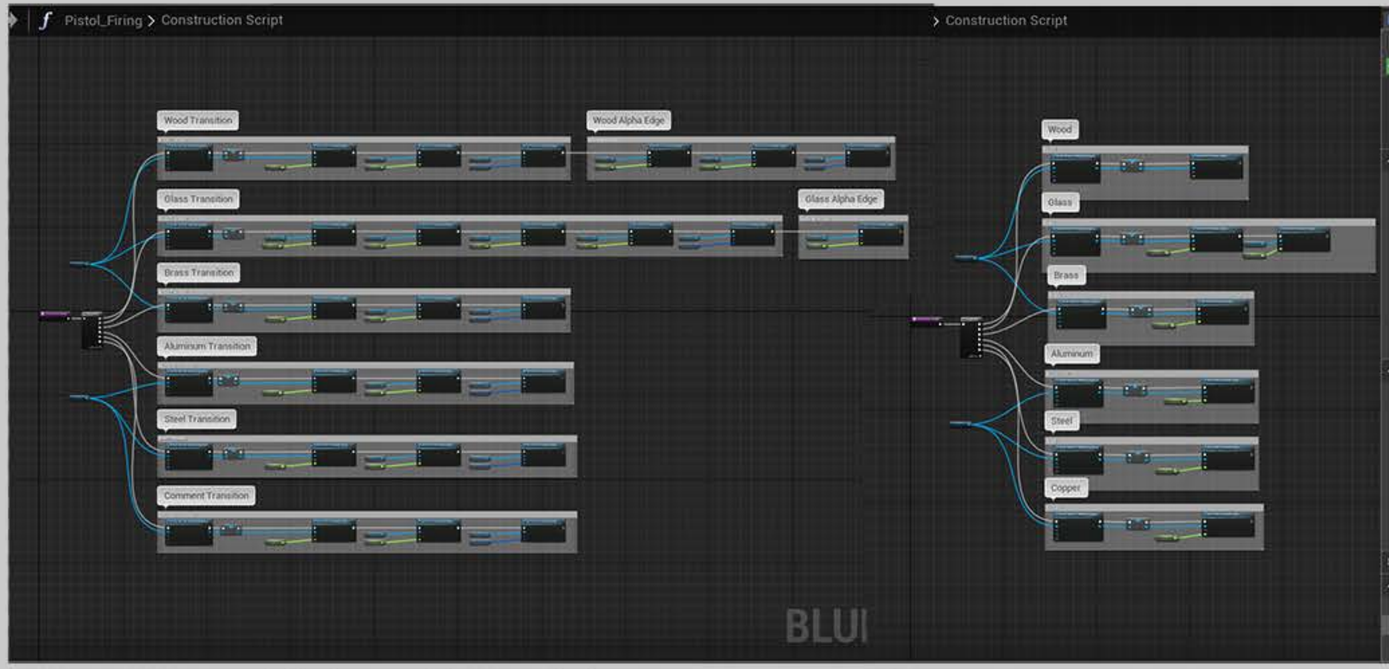
Transition Alpha

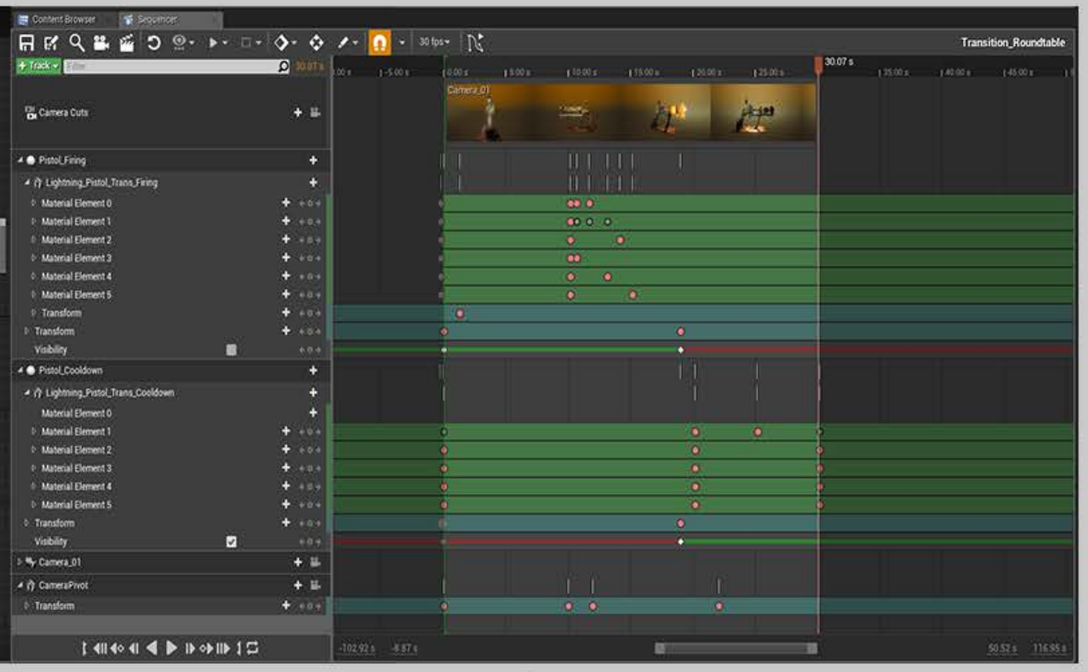
Displacement Alpha



Displacement Mask

For the transition I thought it would be more successful to keep it simple. So, because of how I set up my UV maps as mentioned earlier, a gradient would uniformly cool from back to front. This wasn't quite interesting enough, though, so I set it up to have some irregularity and that worked out pretty nicely. The glass displacement was very interesting. Since displacements only work in the positice UV space, I had to subtract them to get the glass to sag down in the top. This moved the whole object, so I created and RGB mask so that the sag would affect different areas on the glass differently. This turned out great and I got a nice, subtle displacement on the glass.





Firing Transition

Cooldown Transition

Sequencer

To get the effect I was looking for I created two separate actors that were identical. For one I assigned my AB master material, and the other I assigned my BC master material. Then I used a construction script to access the parameters of these materails and make them instance editable. With that set up, I could bring the two actors to the identical position in the world, then use sequencer to create the transition at the correct speed, swith out the actors, then do the second transition. This creates a really nice effect.

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