

Cover Sheet

DIT1004 | 3D Modelling Studio

Semester 2 2023

Assessment 2: High-poly 3D Object

Student Name: Grace Turner

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Object: Gramophone

Ideation and Research

Collected Reference Images



Figure 1 (Antique Vintage HUB, n.d.)

My main reference image – I decided to use this one because I liked the octagonal shape and brass detailing of the base.

The image was from a shopping website (Antique Vintage HUB, n.d.), and so had multiple images from different angles and focusing on different parts:



Figure 2 (Antique Vintage HUB, n.d.)

Base close-up



Figure 3 (Antique Vintage HUB, n.d.)

Horn side view



Figure 4 (Antique Vintage HUB, n.d.)

Angle View



Figure 5 (Antique Vintage HUB, n.d.)

Horn front view close-up



Figure 6 (The Handmade Store, n.d.)

Secondary Reference Image – I used this gramophone as my secondary reference image as I preferred the look of the details on the horn on this one, but I still preferred the base shape of the main reference image. This image was also on a shopping website (The Handmade Store, n.d.) and had better close-up and angled pictures than the main reference, so I used these to make up for where the main reference lacked.

Different angles and close-ups:



Figure 7 (The Handmade Store, n.d.)

Needle Close-up



Figure 8 (The Handmade Store, n.d.)

Holder for Horn close-up

Other gramophone images I considered and looked at for ideas:



Figure 9 (LiveAuctioneers, n.d.)



Figure 10 (Mme Scherzo, n.d.)

This one had a similar shape to the one I ended up choosing as my main reference



Figure 10 (Indian Art Villa, n.d.)

Deconstructed gramophone – I used this to look at the record holder in more detail.



Figure 11 (Vintage World Australia, n.d.)

Individual component references:



Figure 12 (St. John, 2010)

Record close-up with visible texture

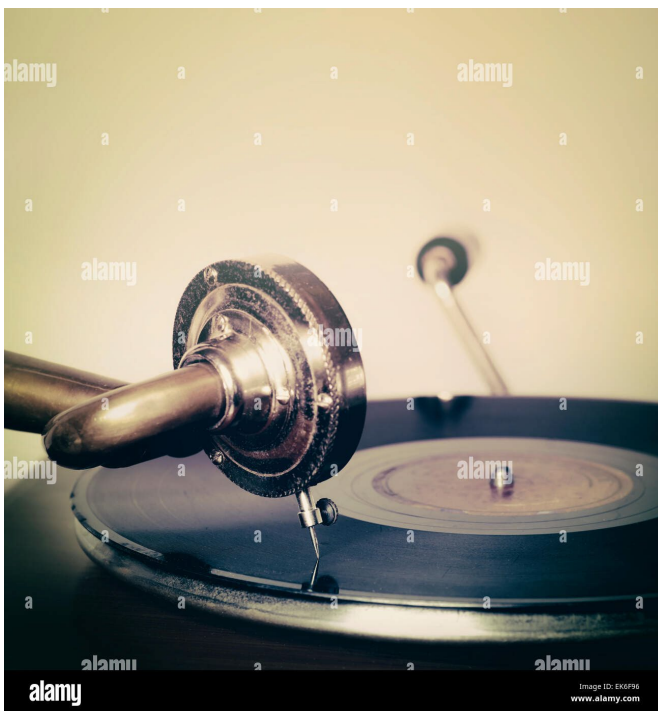


Figure 13 (Hill, 2014)

Needle close-up

Material references:



Figure 14 (deVOL, n.d.)

Aging of brass appearance

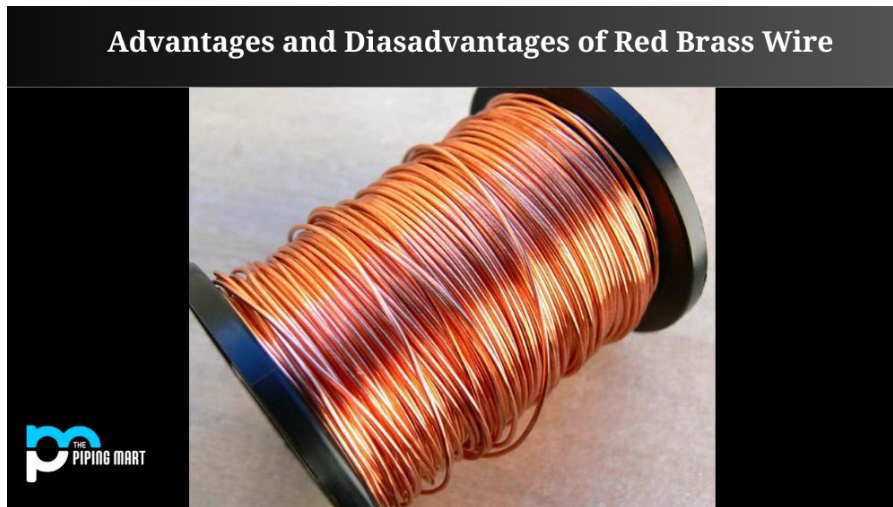


Figure 15 (The Piping Mart, 2022)

Red brass

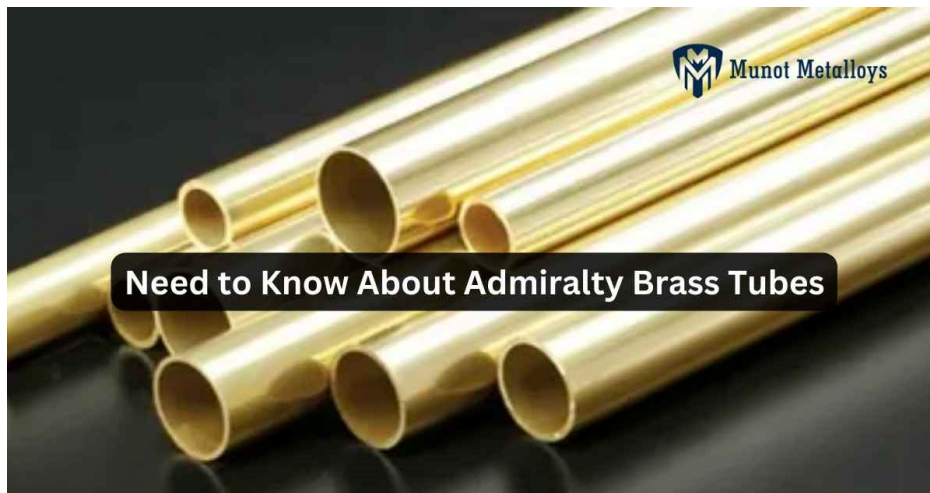


Figure 16 (Munot Metalloys, 2022)

Admiralty brass



Figure 17 (Metal Supplies, n.d.)

Brass texture close-up



Figure 18 (Filigree and Me, n.d.)

Verdigris brass

Planning

Planning polygon primitives



Figure 19 (adapted from Antique Vintage HUB, n.d.)



Figure 20 (adapted from Antique Vintage HUB, n.d.)

Planning geometry



Figure 21 (adapted from Antique Vintage HUB, n.d.)

Resources – Tutorials, videos, help documents and forums I used to help me develop my model:

What does baking do? <https://helpx.adobe.com/au/substance-3d-painter/using/baking.html>

(Adobe, 2021)

Why is an object on two layers at once in Maya? <https://forums.autodesk.com/t5/maya-forum/object-on-two-layers-bug/td-p/6589077> (Anifex09, 2016)

Bevel tool information:

<https://help.autodesk.com/view/MAYAUL/2024/ENU/index.html?guid=GUID-A1C5EC72-AD48-4A7D-8577-1823B3832E14> (Autodesk, 2023a)

UV mapping information:

https://documents.sessions.edu/eforms/courseware/coursedocuments/maya_i/lesson5.html (UV Mapping, n.d.)

Does a camera-based UV end up the same from whatever angle if you unfold it?

https://www.reddit.com/r/Maya/comments/tro15v/if_you_unfold_uvd_meshes_do_they_come_out_pretty/ (TsoTsoni, 2022)

Information about UV shells: <https://www.linkedin.com/advice/0/how-do-you-use-uv-shells-snapping-maya-organize-align> (LinkedIn Community, 2023)

Unfold and Optimise UV Tools information:

<https://help.autodesk.com/view/MAYAUL/2023/ENU/?guid=GUID-70261F06-09D3-4FFE-807B-7C5154D45EC5> (Autodesk, n.d. b)

Issues with focus in Maya: <https://forums.autodesk.com/t5/maya-forum/focus-is-not-working/td-p/7670571> (mspeer, 2019)

Using the connect tool in Maya to make an edge between selected vertices:

<https://forums.autodesk.com/t5/maya-modeling/how-to-create-an-edge-between-two-vertices/td-p/5526701> (DumbMonkey, 2015)

Why is edge loop selection not selecting the entire edge loop: <https://forums.cgsociety.org/t/edge-loop-select-doesnt-work/907580/7> (Mikademius, 2005)

Convert Selection information Maya:

<https://help.autodesk.com/view/MAYAUL/2024/ENU/?guid=GUID-DCE04BA9-A2CF-44AA-8045-FFF2392B6796> (Autodesk, 2023b)

How can I smooth and add edge loops in only one direction in Maya?

<https://help.autodesk.com/view/MAYAUL/2022/ENU/?guid=GUID-226AECD6-F2C0-48D7-BE16-39E52EE7F075> (Autodesk, n.d.a)

Creating UDIMs and exporting from Maya to Substance Painter:

<https://www.youtube.com/watch?v=mmhdxshgHEA> (3DWolf, 2021)

How to separate an object along an edge loop: <https://forums.cgsociety.org/t/how-to-separate-object-along-edge-loop/1178694> (r4inm4ker, 2008)

My Process

I began my modelling process by blocking out the main components of the gramophone with polygon primitives. This was composed of a cylinder for the horn, a cylinder with 8 divisions horizontally for the octagonal base, and a pipe for the record. I adjusted the horn cylinder to better reflect the shape of the horn. I then adjusted the sizes of these three main components until they reflected the scaling in my main reference image (Figure 1).

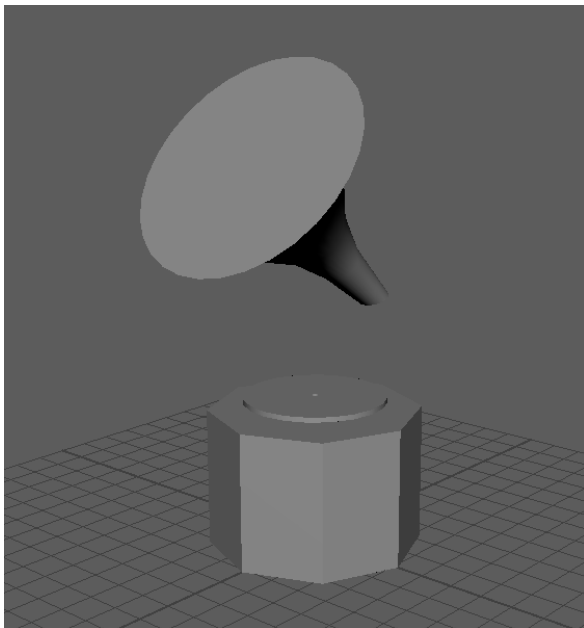


Figure 22 Blocking

I added and deleted edge loops as necessary and began adjusting these primitives to begin my low-poly stage. I began adding in the small details, like the needle holder and holder for the horn, with new polygon primitives. For the main part of the holder of the horn, I used a flat plane to cut out the side view first, and then extruded this to make a 3D shape, as this worked well with the component's form.

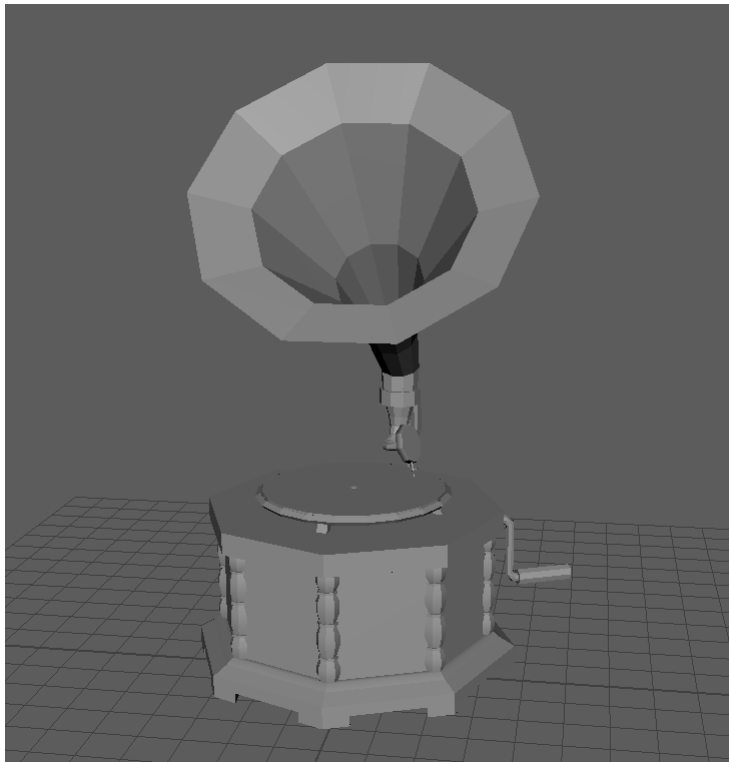
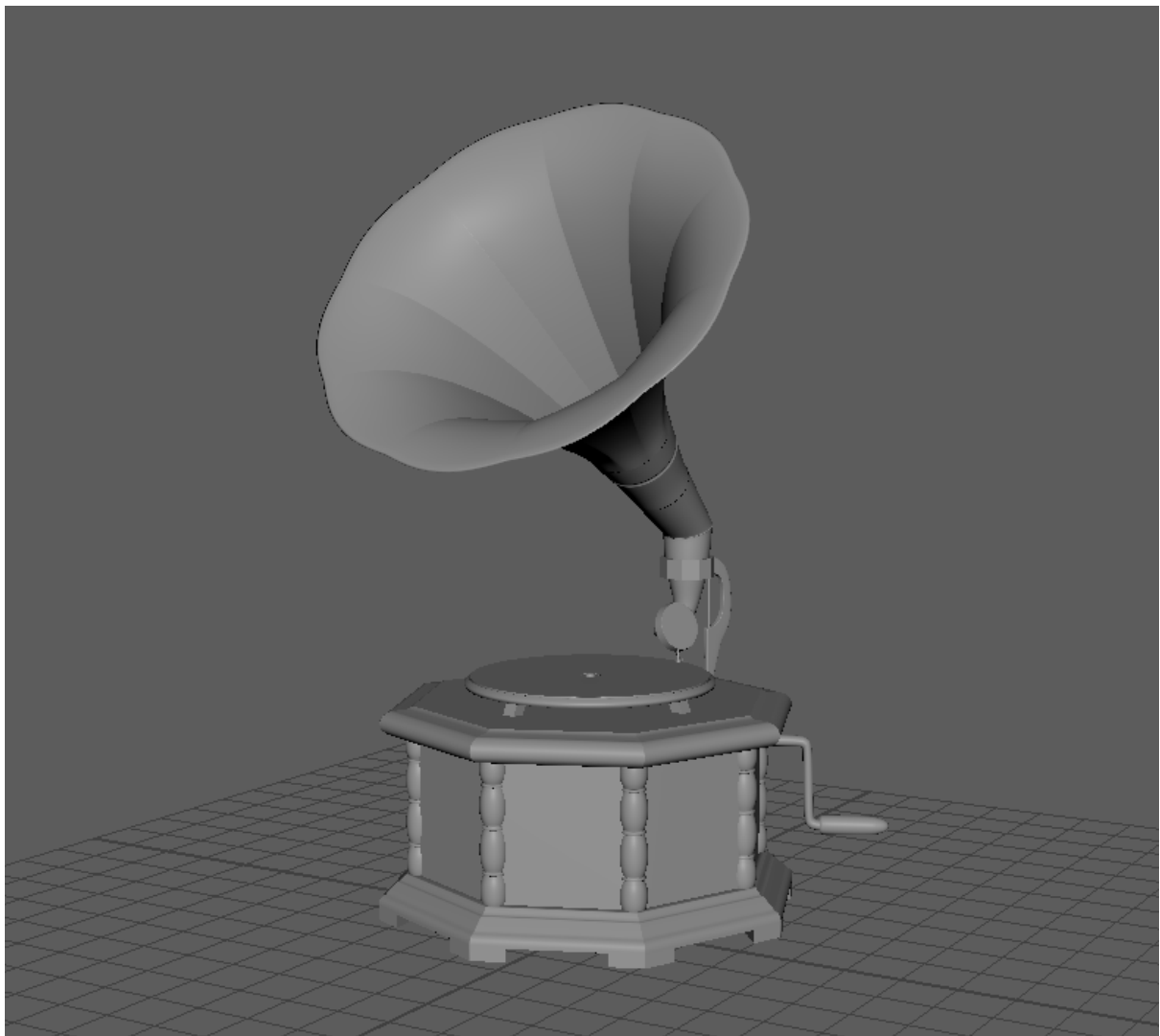


Figure 23 Low-Poly

I then progressed to making my mid-poly model, using preview smooth to preview the high poly version of smoother shapes and adding edge loops as necessary to sharpen hard edges. However, after making progress on the shape of the horn, I realised I had completely missed key elements in my low-poly stage, specifically the handle, needle and record holder. In order to resolve this, I went back to editing a previous iteration of my work that I had saved at the low poly stage and added these elements. Once I had checked to ensure I had included everything this time, I was informed by my lecturer how to import elements of one project into a different project, and I used this to transfer the new low-poly elements into the mid-poly project. It was at around this stage that I posted my progress to the class forum on StudyDesk for peer feedback, which resulted in a discussion about the appearance of the horn looking too much like fabric and about whether it would be best to delete or keep the extra edges. I ended up deciding to keep the extra edges, agreeing with fellow student Rosalie McCallum that they were necessary to define each section, which would also make for easier UV unwrapping and texturing later as it is a repeated pattern on

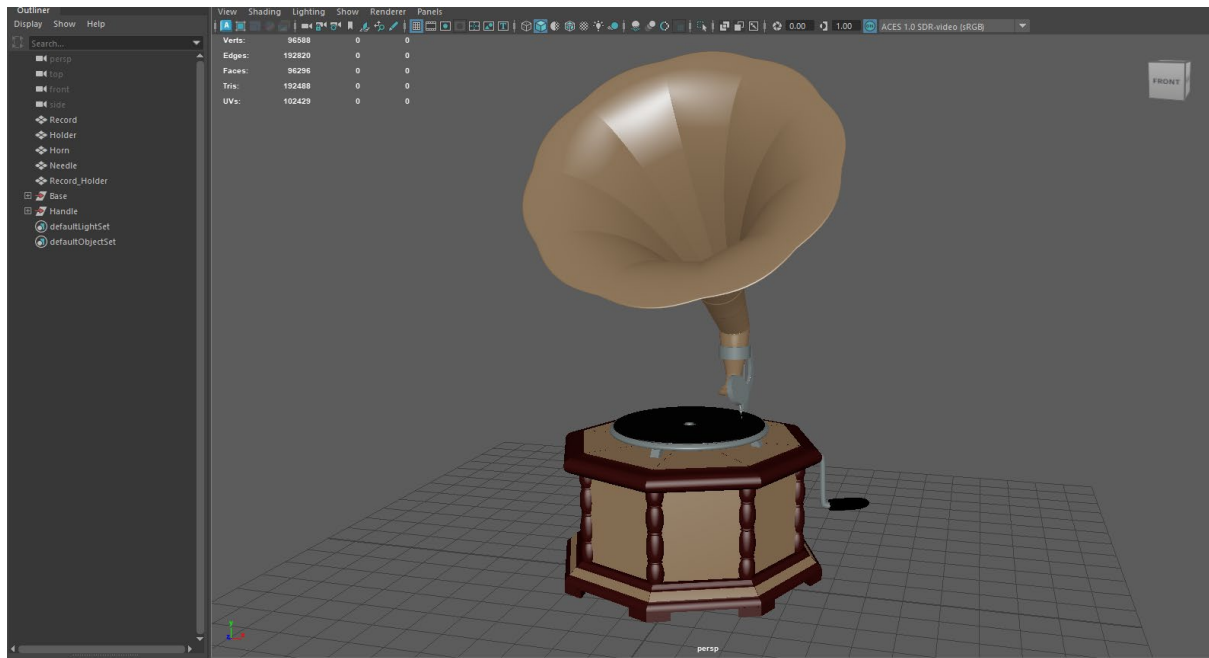
each of the sections. However, in response to Nicole Chipangura's suggestion of the horn resembling fabric too much, I thought I would see how it looked once I applied the smoothing, and would adjust some edges if it didn't look right. I ended up not needing to adjust anything, as once I had smoothed the model, I had to add another edge loop between the two defining each section edge to make UV unwrapping and stacking the panels easier, which resulted in more definition of those edges and made it look less smooth like fabric.



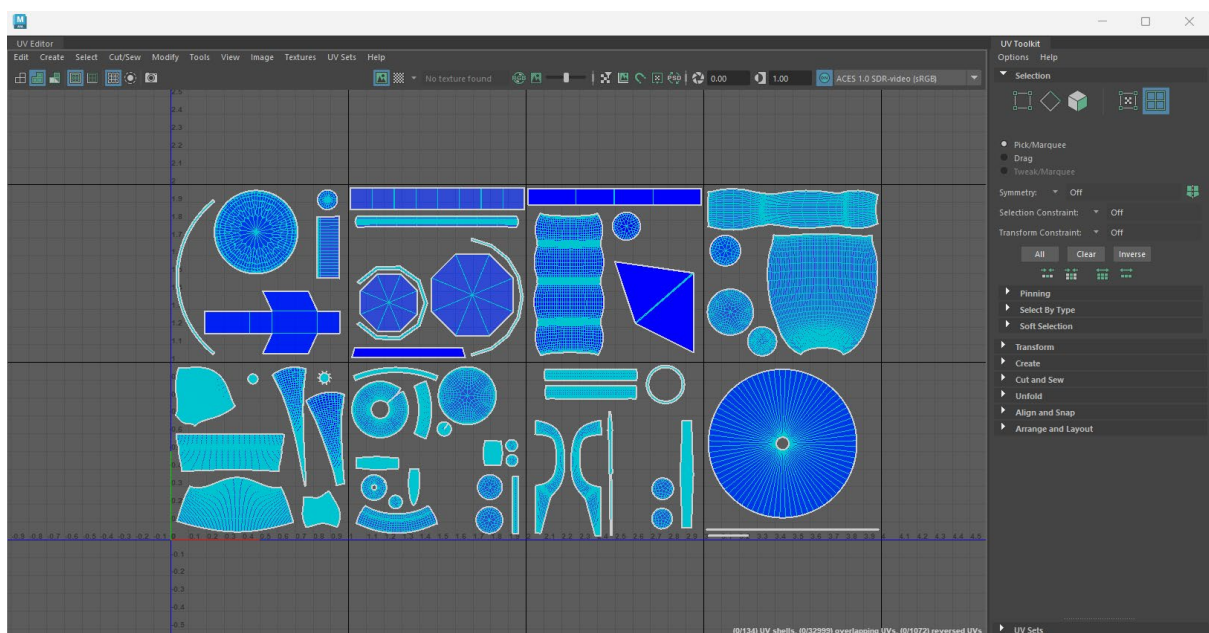
To finish off the mid-poly mesh, I continued preview smoothing elements that were rounded and adjusting them accordingly, as well as bevelling select edges on objects where the entire object wasn't necessarily smooth but some of the edges were. I had some issues with bevelling some of the edges on my model, so I posted to the forum to see if anyone knew what might be causing it. Rosalie

McCallum replied with the suggestion that it was caused by non-manifold geometry, and sent links to videos and information on how to fix it. After following the tutorial in one of the links, the issue was fixed, and I was able to bevel the edges. After completing my mid-poly model, I UV unwrapped the objects. My lecturer suggested UV unwrapping at this stage as it is easier to UV unwrap the mid-poly model than the high-poly model. I then posted my work to the forum for feedback, as I was not very confident in my UV unwrapping abilities and I was having some minor issues with warping along the seams of objects with preview smooth applied. Rosalie McCallum suggested looking at the amount of warping using the colour filter, and showed there was minimal warping anyway. I also considered that preview smooth may have been causing it and actually applying the smooth would fix it, which it mostly did.

I then moved onto creating my high poly model. I applied the smooth on objects that I had on preview smooth, adjusting the number of edge loops added to suit the size and detail of the object and manually adding extra edge loops as necessary. I then checked and adjusted the UVs to fit the newly smoothed object. Before exporting to substance painter, I also applied different shaders to different parts of the model and named them appropriately after the materials they were made from, to make it easier to work with in Substance Painter.



Once I had completed my model, I exported it into substance painter. This took me a few tries as I was struggling with how I should lay out the UVs for them to import neatly into substance painter. I ended up using UDIMs to give me extra working space and to organise the UVs for different components. I used a tutorial (3DWolf, 2021) to learn how to create them.



I initially baked the model at 4096 resolution, however, after doing some work on it and having significant issues with lagging and the program crashing, I rebaked it at 2048 resolution. I began by

applying a fill layer to each of the different material textures and adjusting values to accurately represent the material. Next, I added the details to the brass. I did this by exporting UV snapshots from Maya as PNGs, importing them into Photoshop and drawing the patterns in white over a black background. I then exported these patterns as PNGs, imported them into Substance Painter as a texture, and then used them as stencils, which I painted onto the 2D UVs and adjusted the height attribute to create the illusion of 3D details in the brass. I used a bark brush from Substance Painter to add the red details in the wood, increasing the believability and realism of the wood, and adjusted the roughness to make it more shiny, as it appears to have a coat of gloss varnish over it in the reference image. I adjusted the colour of the brass multiple times throughout the texturing process, as I was having trouble getting a colour similar to the reference image. I used some of the textures in Substance Painter as a stencil to add scratching, smudging, dirt and fingerprints to the steel, scratches and dents to the wood, dust and scratching to the record, and dust to the brass. I attempted to add tarnishing to the brass as well, but had difficulty getting this to appear how I wanted, so I left it out. I tried to make the level of details and damage create a narrative of a gramophone family heirloom that gets polished and dusted every now and then, so the brass and steel stay somewhat shiny, but still has some damage and dust from handling and sitting in a house on display, as opposed to in a museum or a brand new product. I had trouble finding an indoor environment in Substance Painter that resembled the inside of a house, so I instead decided to use Soft 1Front 2Backs, as it looks like synthetic indoor lighting and could potentially resemble it on display in front of a window. It also made all the details and colours clearly visible.

Finally, I exported the finished model to Substance Stager. I significantly increased the intensity of the lighting, as it appeared very dim by default. I also made the background a lighter grey to match this change in lighting while keeping the neutrality of grey so as not to affect the selected colours of the model. I tried adjusting it to a warmer coloured light, but eventually decided to just leave it as

white, once again to show the colours I initially selected. I set the model to rotate twice, and exported the finished mp4.

Written Feedback Provided to Peers

I discussed the feedback I received in the StudyDesk forum in my explanation of my process. I also gave other students who posted their work on the StudyDesk forum feedback on their work. I looked for any ngons in their models, anything that didn't look quite right in the model, and any differences I noticed in comparing their model to their reference image. I then responded with screenshots to depict what I was referring to.

Reflection

I was very happy with the final product of my modelling process. Obstacles I encountered during the process included not being able to access the Substance Painter and Stager software until very close to the due date, which meant I had less time to work on my texturing; the red label on the record did not seem to show up in Substance Stager, however I did not think this was a significant issue and I was short on time at this point in the task so I just exported it as is; I had a lot of issues with Substance Painter lagging, freezing and crashing, which meant I had to recreate lost work multiple times and had to constantly save after making only a few minor changes; and I couldn't find any close-up images that clearly showed the record holder legs shape. To troubleshoot these issues, I contacted the university technology support, Adobe Support team, posted questions to my peers in the StudyDesk forum, and researched solutions in websites, public forums, official troubleshooting and tutorials on the websites of the software products, and video tutorials on YouTube. Next time, I would start my texturing earlier, giving me more time to enhance believability and realism, as I found this made a significant difference to the appearance of the model, but it took a lot of time, particularly making the patterns on the brass. I would also import my main reference image into the Maya document to help with scaling and proportions in the blocking stage, and to make sure I don't miss any details. I would try to create more detailed legs for the record holder, to make it better suit the level of elegance and intricacy of the rest of the model. My biggest takeaway from this task is the

importance of texturing and how it can make a significant difference to the appearance of a model, and hence the importance of leaving plenty of time to work on this stage of the process.

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