

MODELING & TEXTURING

Introduction

Modeling and texturing were first done using only 3D Max and V-Ray.

In addition, based on my previous experience in building VR assets and environment, an alternative approach in texturing was adopted – using industry standard texturing engine Substance Painter and Substance Designer. The workflow is optimized for AR and VR production. To achieve high-quality seamless design, both texturing workflows require the process of unwrapping. All the texture sets generated by SP application are exportable to industry standard DCC applications including 3D Max and Maya and popular game engines such as Unity and UE4.

Unwrapping

Most of the modern tools that Chaos Group introduces in their latest version of V-Ray Next are highly compatible and work optimally and efficiently with unwrapped geometries. Furthermore, procedural modifiers such as V-Ray displacement modifier, V-Ray Fur modifier, and modern procedural materials such as the newly introduced "V-Ray Hair Next Material" are recommended to be used with unwrapped geometries for optimal results as well. Vertex painting in combination with unwrapping helps to organize UVs to generate masks and filters, and to render elements for further use in post-production applications such as Nuke. Lastly, shaders such as V-Ray blend material and procedural modifiers such as V-Ray displacement modifiers benefit from unwrapped geometries for faster and optimal rendering results. Unwrapping the geometries also helps to achieve cleaner and more seamless light baking results in case the model needs to be used in game engines for VR/AR outputs.



In this document **two** different approaches have been taken into consideration in the texturing the model.

1. Using V-Ray shaders and high resolution texture maps to generate required materials in 3D Max

The first approach involves two shaders, including V-Ray standard specular glossiness shader, and V-Ray blend material. All the mask and texture sets were created and revised in Photoshop for the final renderings in 3D Max and V-Ray. In this process, displacement map channel was employed along with normal map channel to introduce extrusion effect on the wood planked material. Some of the surfaces of the geometries have been augmented with V-Ray displacement modifier to augment the details. In V-Ray displacement modifier, 2D mapping was used as opposed to 3D mapping for optimum and faster render results. The actual raytracing of the displaced surface is done in texture space, and the result is mapped back into 3D space. The advantage of this method is that it preserves all the details in the displacement map. It requires that the object have valid UV coordinates, in this case dedicated UV island for each geometry.

2. Using procedural material authoring and painting using Algorithmic Substance Designer & Painter

The reason that this approach is being introduced here is the fact that DreamView Studios is involved in VR/AR projects. Substance family applications, now owned by Adobe, has begun a journey to become an industry standard package for design, AEC, VFX, and game industries. They are focused on VR/AR projects in the aforementioned fields. In 2016 when we were developing our VR software for DOD, our team went through testing for several applications and plug-ins including Foundry Mari and Mudbox. We also used UDIM approach between 3D Max and Unity using the Amplify plug-in family for Unity. (<http://amplify.pt/unity/amplify-texture-2/>)

The versatility and scalability of algorithmic package, specifically Substance Painter, in generating high quality and optimized texture sets for industry standard PBR shaders such as V-Ray Shaders and Unity PBR (Both specular glossiness and metal rough were tested) was promising. We also tested the texture sets in UE4 with new V-Ray plug for UE4. After the light baking process in Unity, we didn't have to add post process effects since the results were relatively realistic compared to similar VR applications on the market at that time, and application consisting of 1 million triangles was running stable and smoothly at 90 FPS in VR HTC platform.

The following sections explain the texturing process in Substance Painter using the same model. The model was exported to SP using FBX format. After baking geometry data textures such as ambient occlusion, normal, bump, and curvature maps, the model was carefully textured and rendered using I-Ray render engine developed by NVIDIA. With a few tweaks of the settings, the same results are achievable with the same texture sets rendering with V-Ray for Max.

Biltmore TV Stand, SKU BTV60241



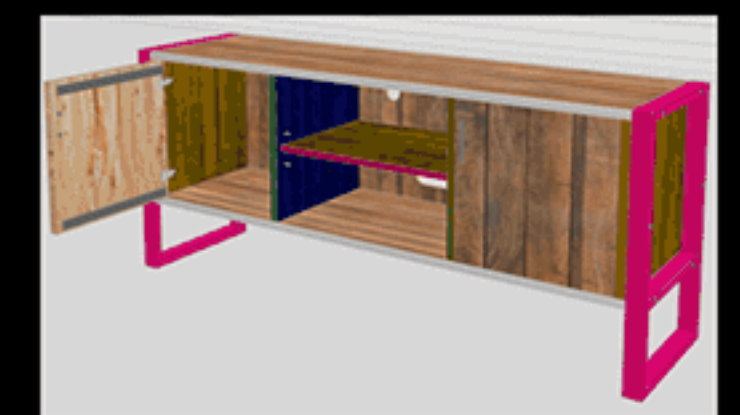
1. MODELING

Modeling Process

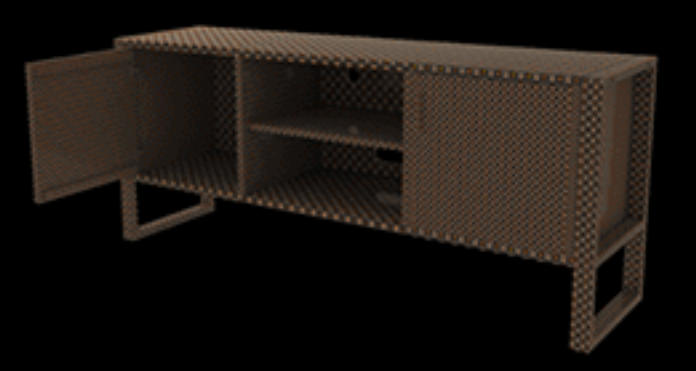
Modeling	2D modeler	2D modifier	3D models	3D modifiers
	3D Max basic shapes : • Line • Circle • ...	Editable spline : • Trim • Extend • Attachments • ...	Primitives and extended primitive geometries: • Box • Chamfer box • ...	Editable poly modifier: • Tesselate • Chamfer • Extrude • ...
Unwrapping	Unwrap UVW modifier • Pelt map tool		UDIM or Single UV • Single UV with material ID approach	



Shaded wire frame view using V-Ray Edge texture and blended with original material



Shaded wireframe screenshot from viewport



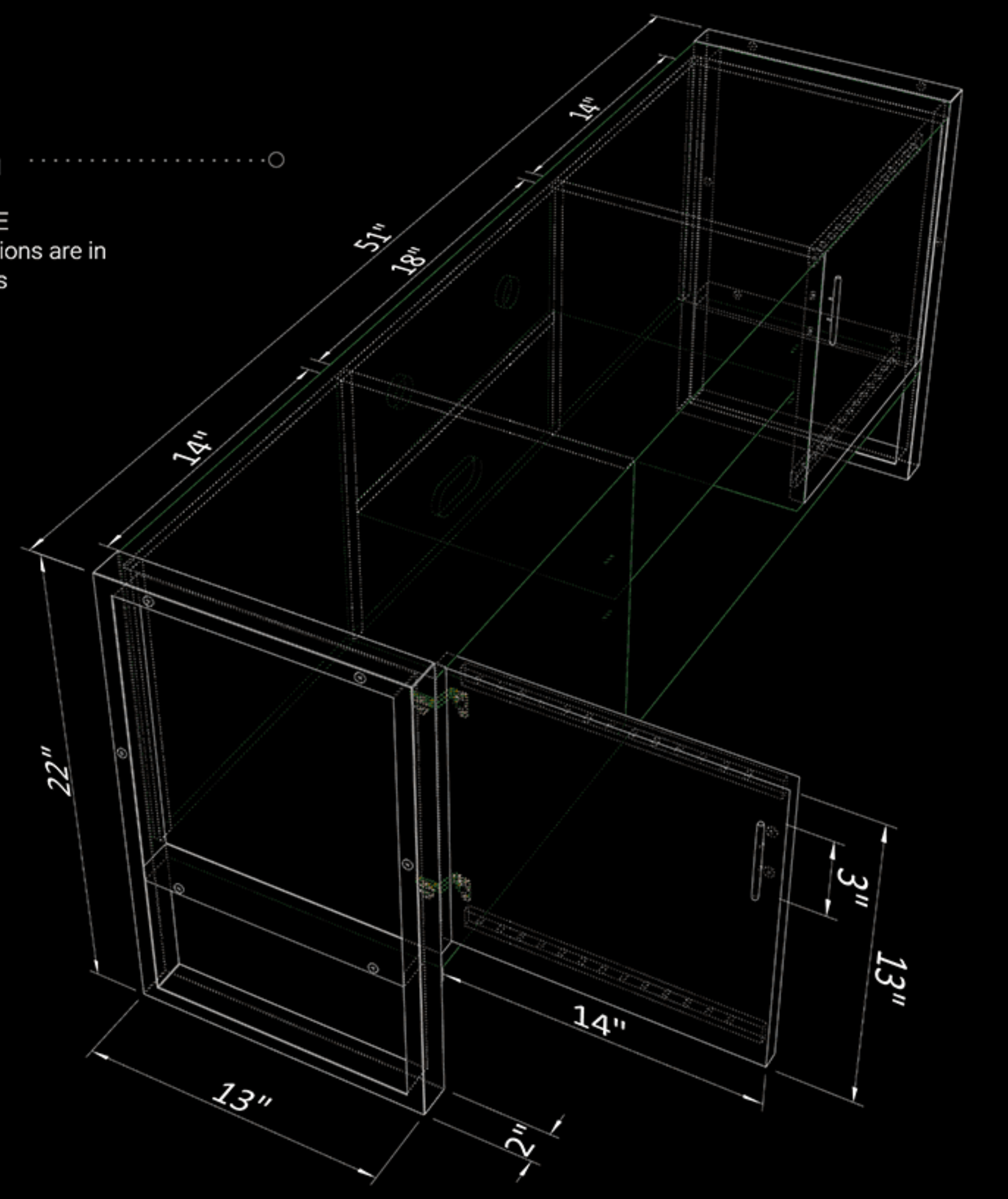
Unwrapped model using unwrap modifier

Geometry Specification

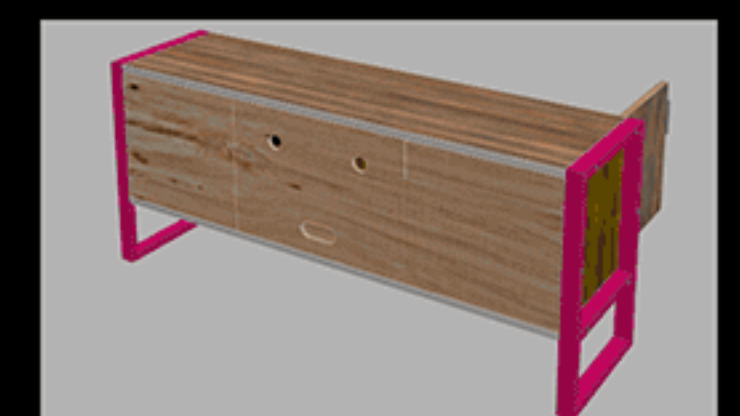
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Triangles 324 /096
Edges 312,588
Vertex 165*14

Dimension

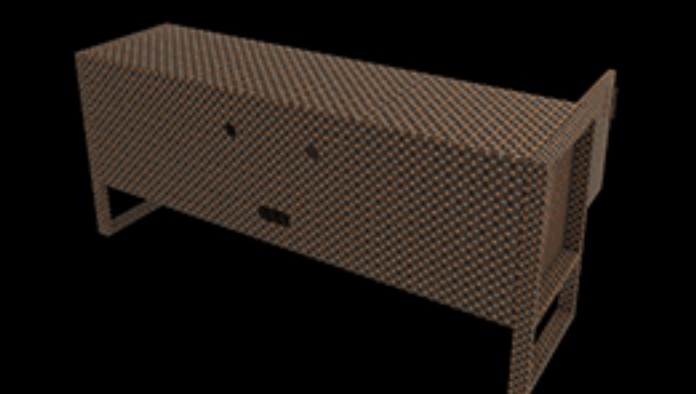
NOT TO SCALE
All the dimensions are in decimal inches



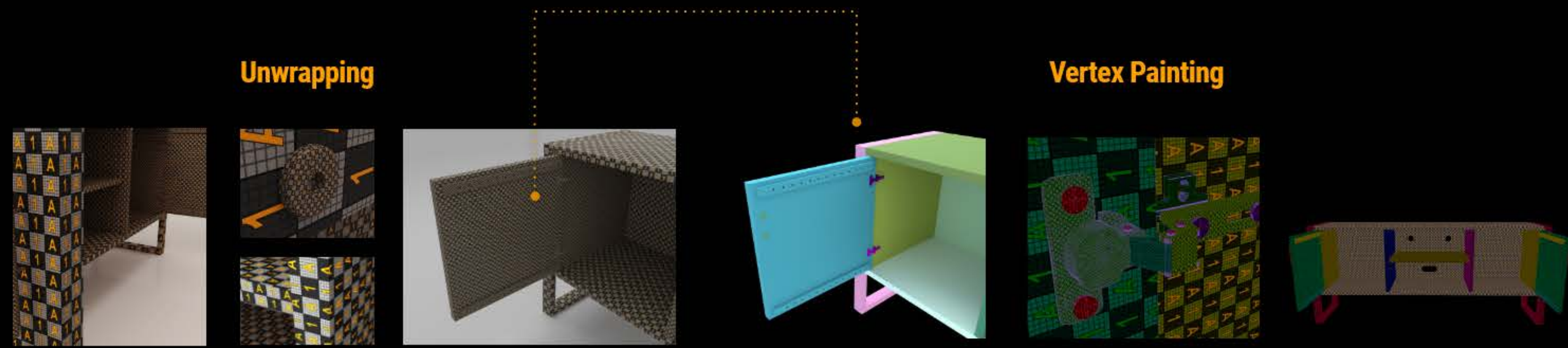
Shaded wire frame view using V-Ray Edge texture and blended with original material



Shaded wireframe screenshot from viewport

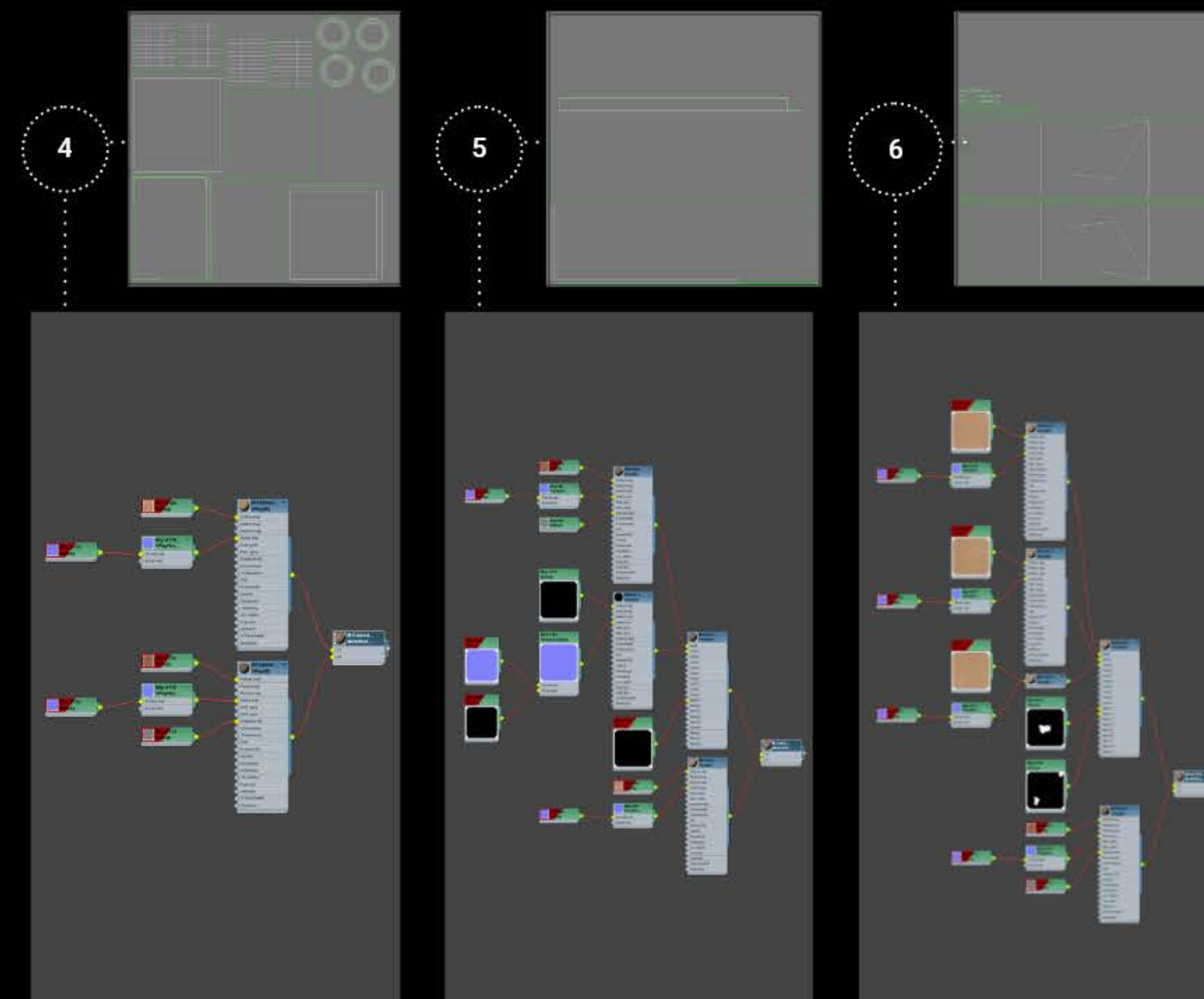
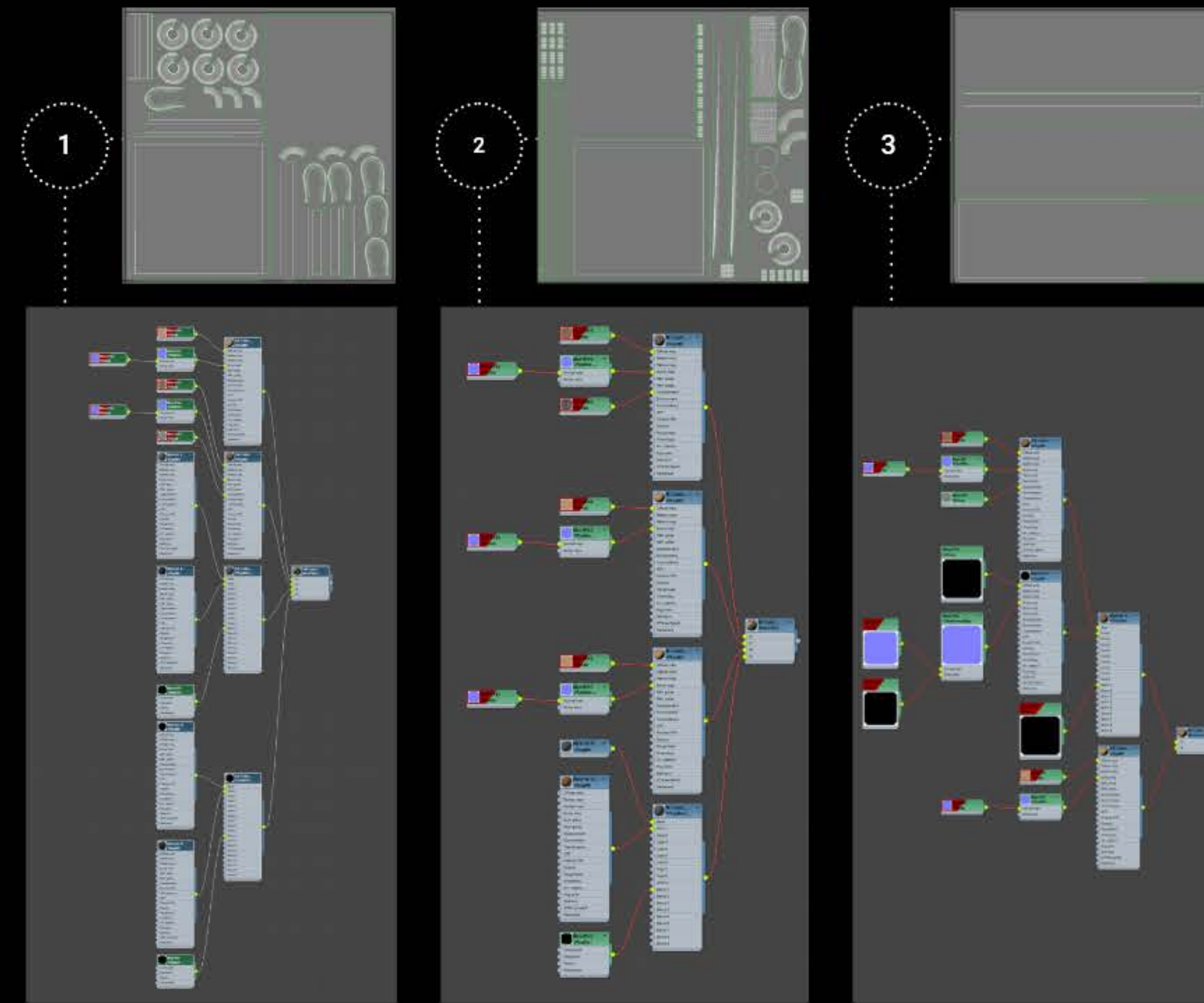


Unwrapped model using unwrap modifier



2.1 MATERIALS & TEXTURE

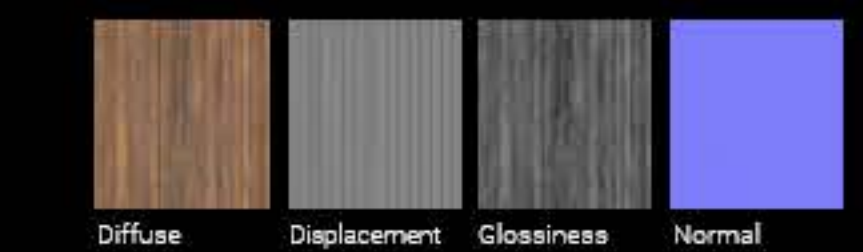
v-ray 3ds Max



Poliigon Maps

Source: <https://www.poliigon.com>

Wood Planks Texture



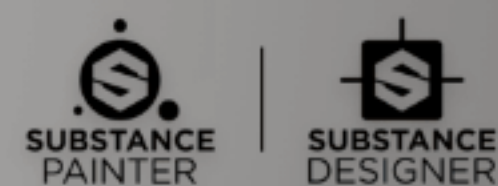
Fine Wood Texture



All the parts have been carefully unwrapped to facilitate the process of texturing, and later help to better optimize the scene in case the model is to be used in game engine for VR/AR asset creating.



2.2 MATERIALS & TEXTURE



There are three different materials used in the texturing process, two of which are Substance Painter's native materials that have been altered to be used in the texturing process. The third material, "Old Painted Plank," has been authored in Substance Designer and then opened in Painter for the texturing process.

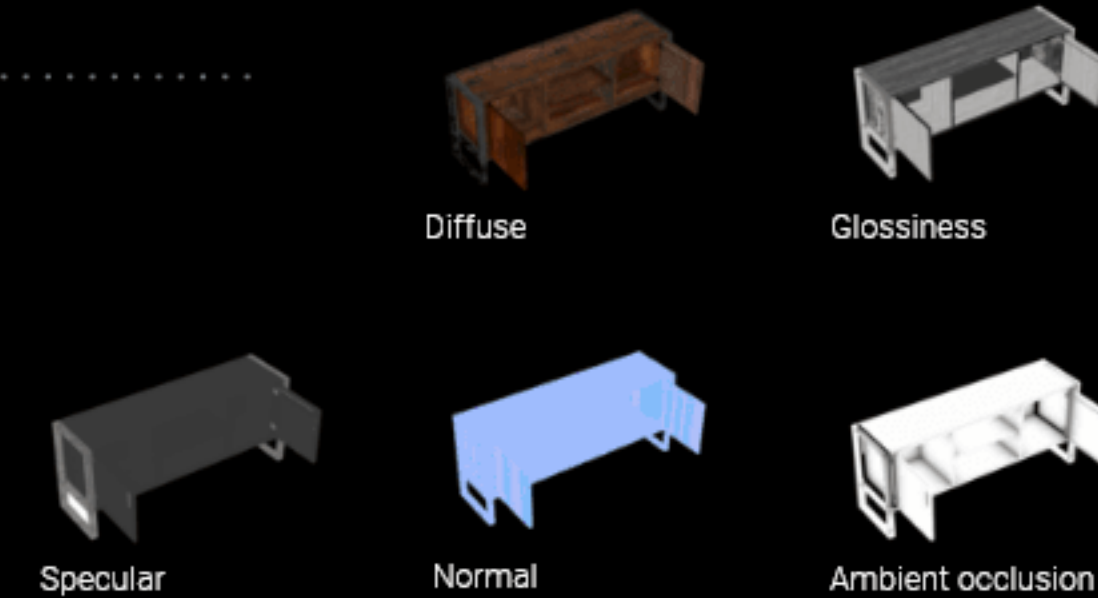
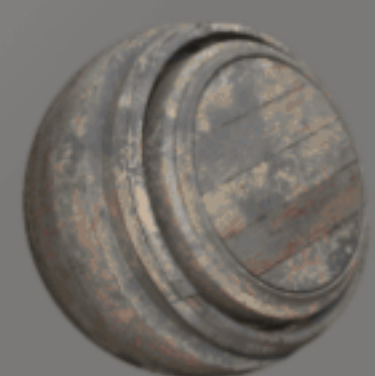
Custom PBR material

This material has been authored in Substance Designer, and exported to Substance Painter for the texturing process.



Wood Walnut Steel Stained

PBR materials Wood Walnut and Steel Stained shown on the left are native to Substance Painter.



Metal Roughness vs. Specular Glossiness

In developing texture sets in Substance, specular glossiness workflow was developed as opposed to metal rough workflow, which matches V-Ray PBR shader system.



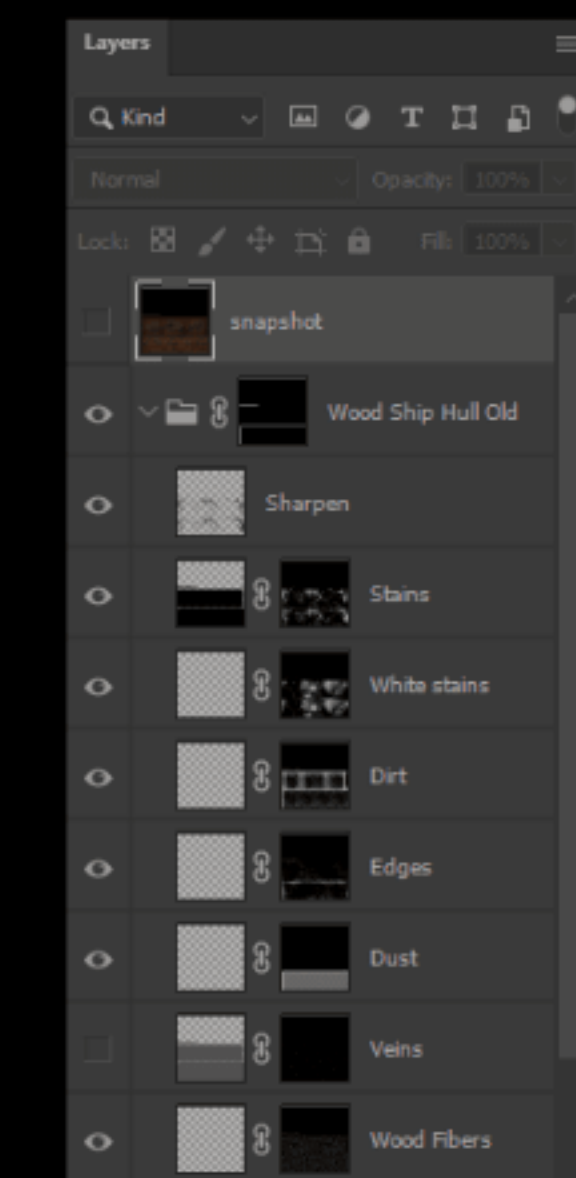
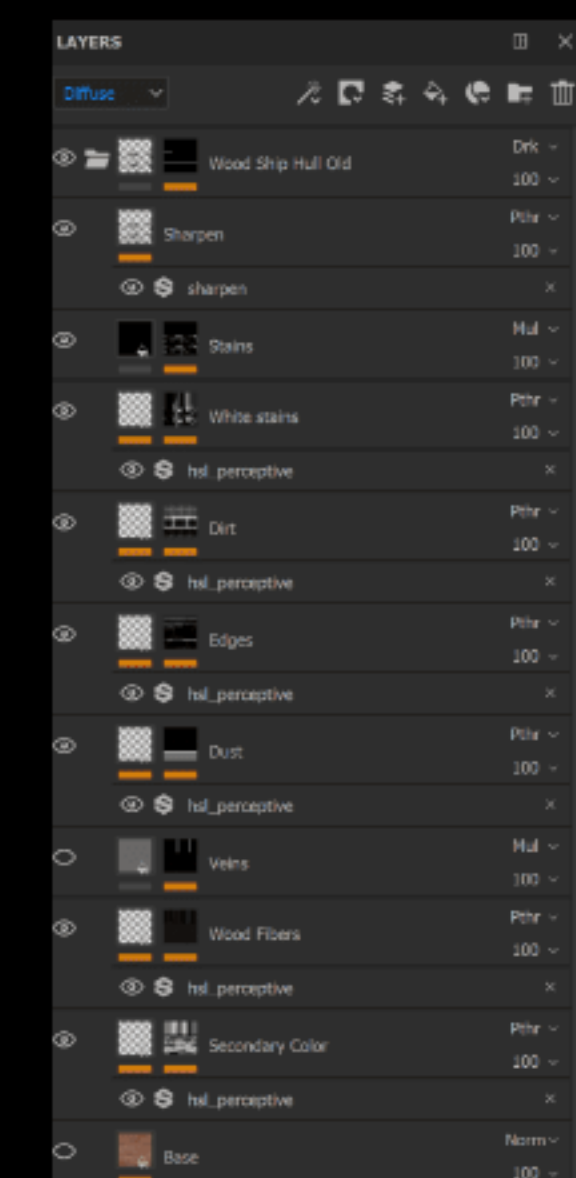
Source: <https://academy.substance3d.com/courses/the-pbr-guide-part-2>

As the diagrams below suggest, the texture sets, in this case diffuse map, have been exported to Photoshop in a layered PSD format to add additional detail.

Substance Painter Adobe Photoshop

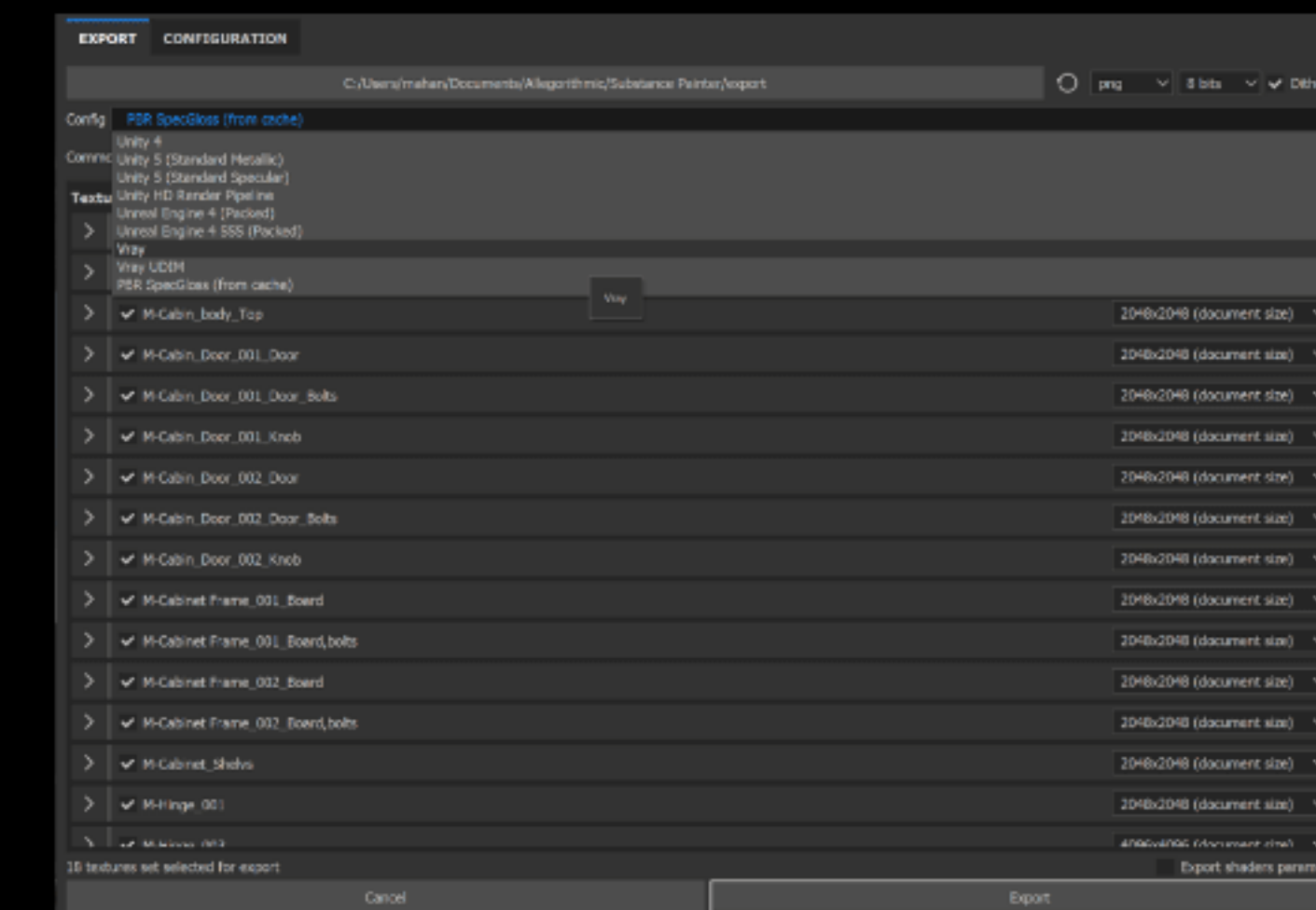
Diffuse channel

Diffuse channel



Substance has a smart texture set exporting system which is able to export V-Ray specific map channels including IOR.

Substance Painter to V-Ray



2048x2048 (document size)
8192x8192 (experimental)
4096x4096
2048x2048 (document size)
1024x1024
512x512
256x256
128x128

Optimization



In order to achieve realism in VR, it is necessary to make sure that we optimize the geometries in terms of polygon number and pay more attention to 3D texturing. Quad meshes are better than triangular ones since they leave fewer seams in unwrapping and provide cleaner light baking results in the case that the model is used in game engines for real time rendering. One good habit is to dedicate enough Texel Density to each geometry in 0,1 UV space as well as dedicating separate light UV map channel with larger padding space among UV islands to avoid light leaking after packaging the project for RT rendering in platforms such as AR and VR.