

Vehicle Shader Library

This page is meant to introduce you to our Shader Library for Vehicle Production. As a Library, with your help we can, and will, update and improve this library as production goes on.

The final purpose of this Library is to improve quality by reducing errors in setting up correct PBR values, and giving you full artistic flexibility on creating textures.

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How to use the Shader Library

This Shader Library is basically a collection of simple presets to be used in Substance Painter to recreate all vehicles materials. Being presets means that the Artist should still put some effort into texturing the asset properly. All the maps (and values) generated by the Library can be used in other software like Photoshop. The important thing to do is to always check in Unreal that the Texture created is in line with the given templates.

In our game project we have a map named "ShaderLib". There you can find sample meshes with the basic textures of the Library assigned. You can freely create and instance of the Master Material called "MM_Test" to check your own textures there. We strongly encourage you to check your work in that map, especially if you create custom colors or severe modifications of the templates provided.

As a basic workflow to follow, we can suggest the following steps:

1. Texture the mesh in Substance using our presets materials
2. Export the textures
3. Assign them to the mesh in Unreal via our Game Materials (or instances of the "MM_Test" shader/duplicates of the "MI_TestShader" material)
4. Check the asset in the "ShaderLib" map

If your work follows the standards provided and responds to light and to the environment as the shaders in the Library, you are good to go!

An in-depth description of the Test Material is provided in its proper section of the document.

Material List

The following is a list of the Template Materials we have created for you. They do are a solid base for starting more complex materials on the bike. All the presets can be mixed together in order to create a more complex result. Just be aware not to add Metallic contribution to Plastic, or a way to rough texture on polished surfaces.

Colors are quite a big issue here. We have created a shortlist of colors based on manufacturers and liveries, rounding them up to a small number. The idea is to uniform colors as much as we can for in the PBR realm colors act somehow a bit more unpredictable than what you might expect. So if you have to go for a red color, instead of guessing which shade, of color pick from pictures, you can use our DUCATI RED, or follow references for a proper red color (a Honda red). When you'll need a different shade start from that value, and contact us for any doubt. If needed we can add more color presets to the following list.

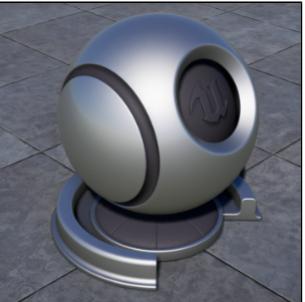
Color Name	sRGB Values	Color Sample	Notes
BMW White	186/186/186		The most white value for fairings and we suggest to consider it as pure white
Ducati Red	146/40/28		

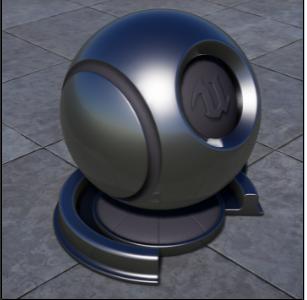
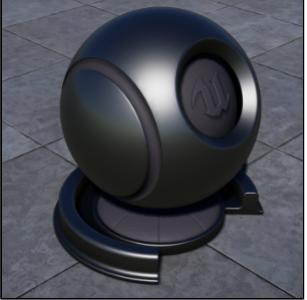
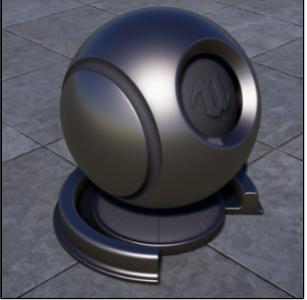
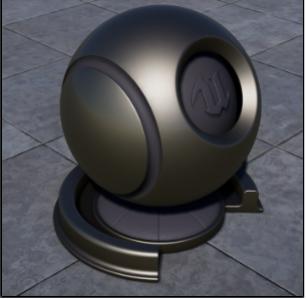
Ducati Yellow	168/123/0		
Kawasaki Green	56/146//20		
KTM Orange	158/70/0		
MV Grey	99/99/99		This could be considered as a 50% grey
Ninja Black	43/43/43		The most black value for fairings, and we suggest to consider it as pure black
Suzuki Cyan	0/115/174		
Yamaha Blue	20/43/117		

As you can notice the sRGB values are quite different from the final result, but this is expected and tested.

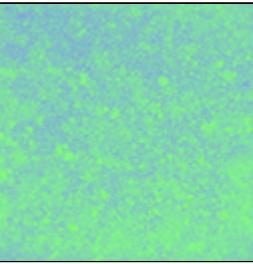
Basic Metal

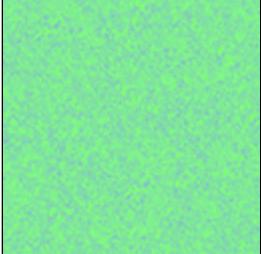
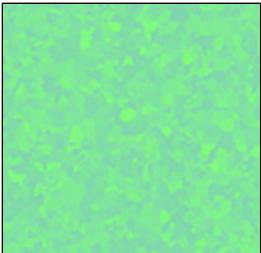
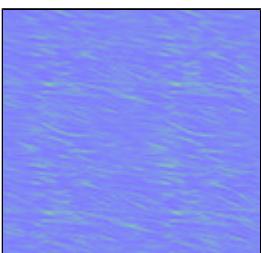
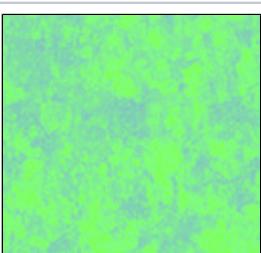
This is a list of generic metallic surfaces. From the Template you can choose from 6 different presets that will give you proper Diffuse and PBR values to start with. If by any means you'll need a "colored" therefore "painted" metal, the "Custom Color" presets will feature the correct PBR values and will just let you choose the paint color.

Name	Sample	Notes
Aluminium Clear		A basic light aluminium perfect for parts like Steer Plates
Aluminium Painted		A painted version of the clear one. Perfect for parts like suspensions rigs (top section)

Chrome		Base for all chromed parts
Metal Clear		Base for all generic metals
Metal Tempered		A different type of metal, more burnished
Metal Painted		A basic painted metal, perfect for engine and other colored mechanics

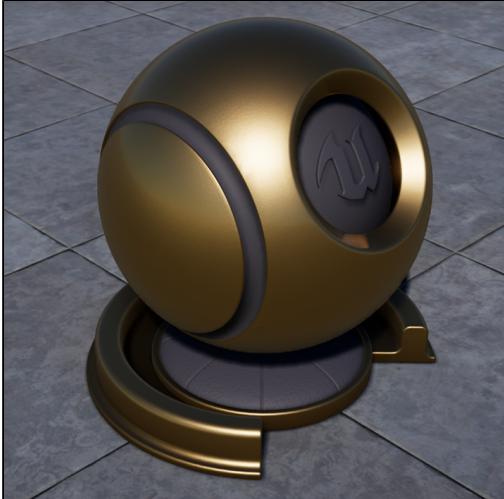
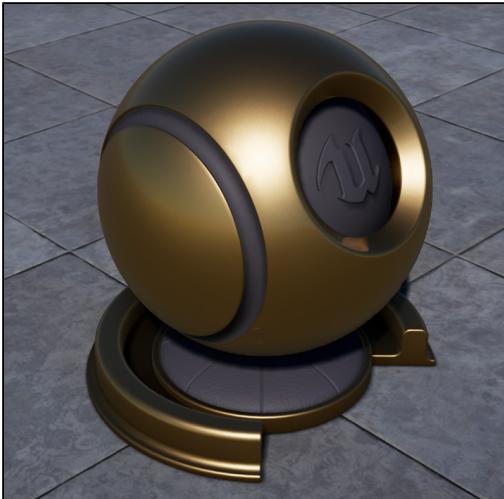
Along with this presets, you can choose and mix them with other 5 PBR templates that will affect both Roughness and Metallic in order to achieve a more worn and grungy result. You'll have separate sliders to dose properly the amount of dirt on both channels. A good use of paint masks is advised to achieve the proper variation.

Name	Sample	Notes
Dirt		A basic dirt that can be used (and should) on most metallic surfaces

Flakes		These Flakes are different from the Clear Coat ones!
Galvanized		Good for some parts of the engine
Scratches		Perfect for breaking the polished surface of a chrome
Stains		A heavier dirt map to be used on engine parts or other worn out mechanics

There are 5 additional presets only for Normal Maps. Please note that the Normal Map will automatically generate a cavity contribution in the Specular channel to enhance realism.

Name	Sample	Notes
Bumped Metal		Perfect for giving some movement on any surface

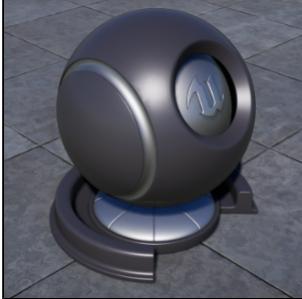
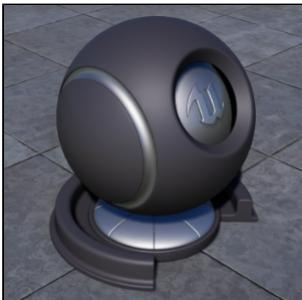
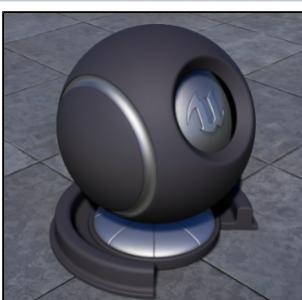
Hammered Metal		Good for breaking highlights
Rough Metal		Perfect for rough metal surfaces
Scratched Metal		Good for creating deep scratches

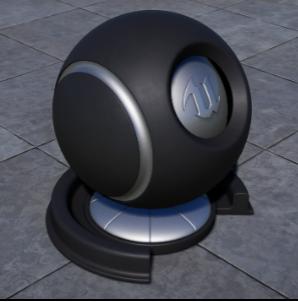
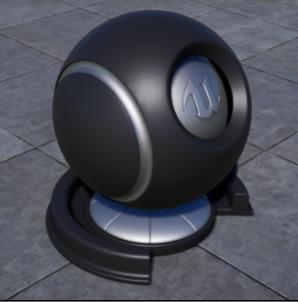
Satin Metal		Perfect for Aluminum
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By mixing all these presets at will you are able to create a good variety of metallic surfaces. Always try to follow reference as much as you can in creating the desired result.

Plastic

This is a list of generic Plastic and Rubber surfaces. Usually those materials are featured in parts of the bikes that are "touched" by the rider, and therefore are cleaner than metal. The color featured is the standard dark/black one but you can go for any color you need.

Name	Sample	Notes
Hard Plastic		Hard polished and glossy plastic
Matte Plastic		Matte rough plastic
Rubber		Rubber perfect for grips or similar

Tire A		An example of a Tire material
Tire B		An example of a Tire material

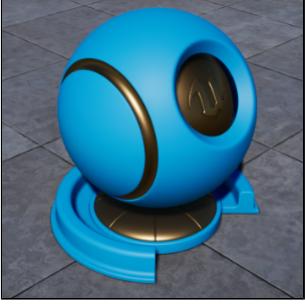
The two Tire presets are not likely to be used but they might come handy in some situations.

For having a more dirty effect, feel free to add a layer of dirt taken from the maps in the Basic Metal presets (Just don't add Metallic values!)

Fairings (Clear Coat)

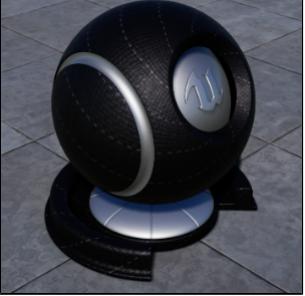
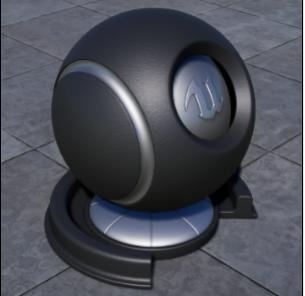
Fairings Clear Coat is very difficult to manage via Substance as there is no shader that actually works like in Unreal. Therefore you should use our presets, but you can't really have a proper result check until you export and go to Unreal. Anyway, we have prepared 4 basic templates for Fairings Materials.

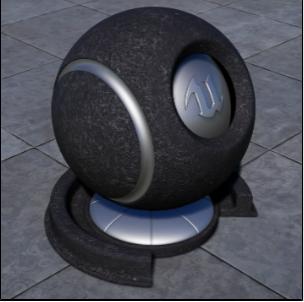
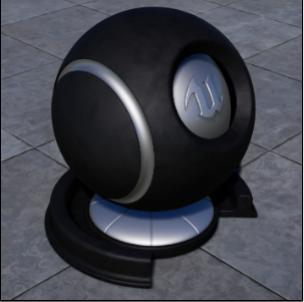
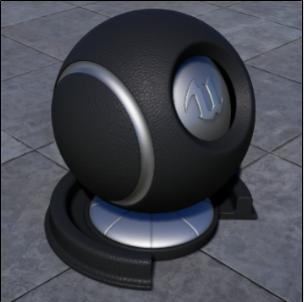
Name	Sample	Notes
Metallic Clear Coat		This is the standard Metallic Clear Coat Paint effect. Works both clean and with flakes
Plastic Clear Coat		This is for plastic Fairings that are coated for an extra polished effect. Very common in most bikes

Plastic Glossy		Simple glossy plastic with no coating
Plastic Matte		A matte plastic with a light rough surface effect

Miscellaneous Materials

In this category fall all the materials that are not just plastic or metal, but can still be found in our vehicles. We are talking about saddles, Kevlar wires and other parts. Use when needed and feel free to manually paint extra dirt at will.

Name	Sample	Notes
Kevlar		Perfect for most wires that are not coated in plastic or rubber
Smooth Fabric		Quite uncommon but still useful

Rough Fabric		Quite uncommon but still useful
Alcantara		Common on many bikes. Even if not a "pure" cloth, it still works very well on foam rubber used for saddles.
Leather		Common on old bikes

Even this part of the Library could be updated if new materials will come out and both you and us feel the need to have them on our list.

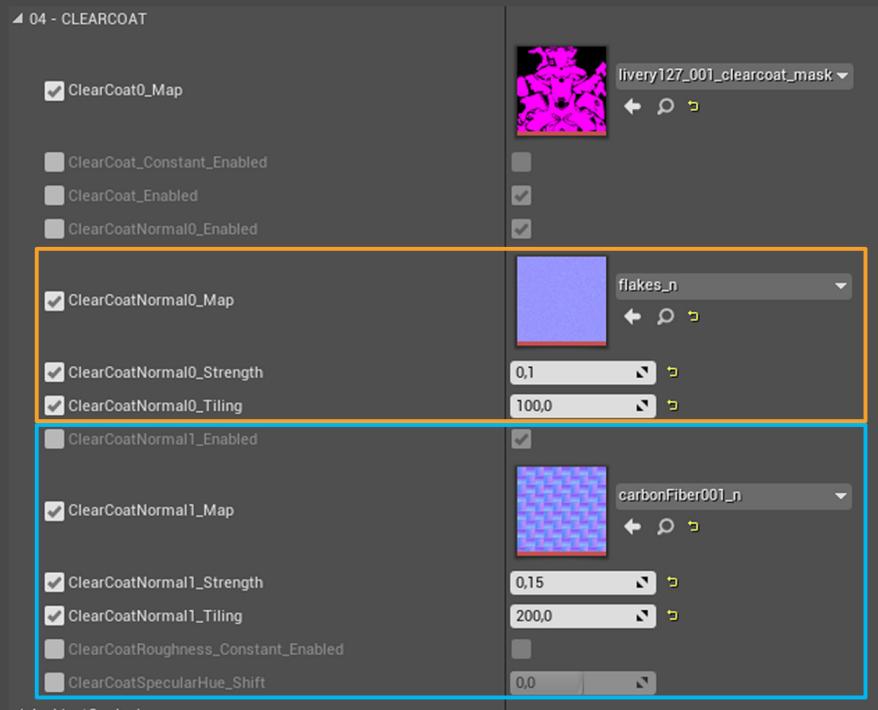
Coated Surfaces (Sample Look)

Coated Surfaces are not displayed correctly in Substance Painter. You just have to paint the Color and the PBR and in the shaders presets, and the Clear Coat Mask as explained below. The final effect can be seen only in Unreal and via our Game Shaders.

Clearcoat Mask

Our shaders can simulate the transparent protective paint used to cover different surfaces.

Clearcoat Material Setup

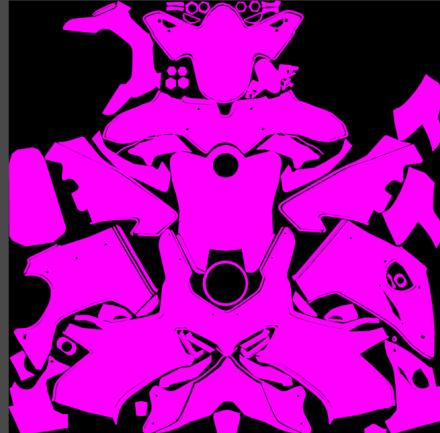


Clearcoat_Mask Texture Setup

Red Channel

White: Clearcoat: Enabled

Black: Clearcoat: Disabled



Green Channel

Clearcoat Roughness

Blue Channel

Enables Bottom Normals (1 and 2)

Alpha Channel

White: Enables **ClearCoatNormal0_Map** (usually set to Flakes map)

Black: Enables **ClearCoatNormal1_Map** (usually set to Carbon map)

Carbon fiber and Flakes parameters tuning:

Carbon/Flakes material setup

(must be set in livery/mechanics/cockpit only if are present some flakes/carbon parts)

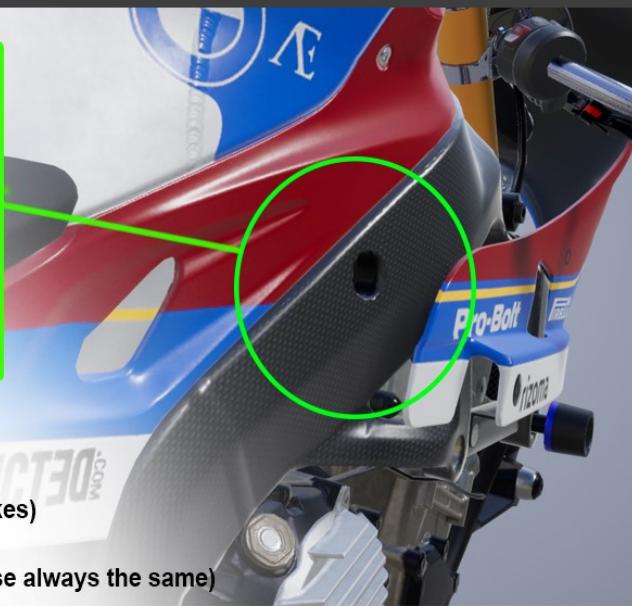


1 Turn On/Off the additional normalmap (Carbon or Flakes)

2 Set the kind of Normalmap needed (already in UE4, use always the same)

3 Normalmap strength (usually always set 1.0)

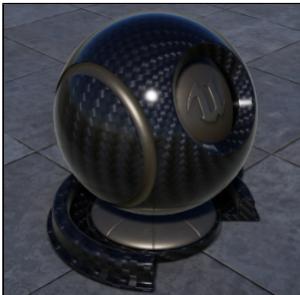
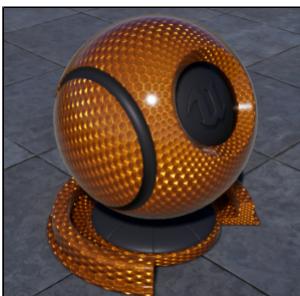
4 Normalmap Tiling (you can set the size of textures)



WARNING!

 This part is still work in progress and is not implemented in Game yet!

There are few coated surfaces in our Shader Library. At the moment we can't implement in the current game shader these features completely, but you can still check how they look like as a stand-alone material. If a refactoring of the Clear Coat Game Shader will be done, this part will come handier. So far you can only create Clear Coat Masks following standard documentation.

Name	Sample	Notes
Carbon Fiber		Procedural Carbon Fiber Material. Can be used also without Coating.
Reflectors		Procedural Reflectors common in all bikes. Pattern can be changed if needed



Substance Painter Workflow

Importing Material Presets

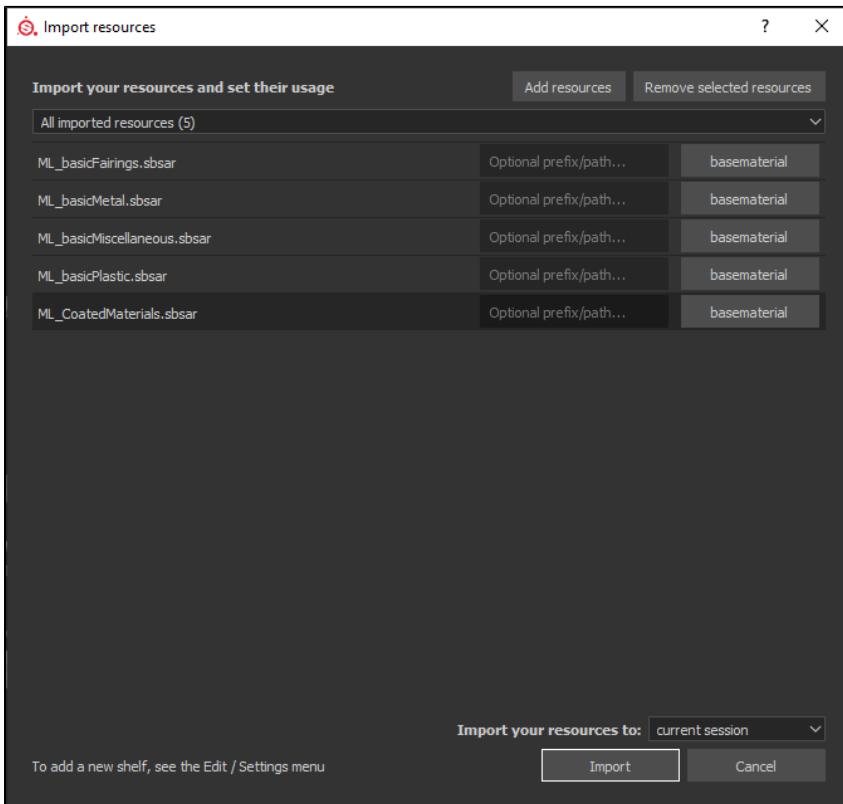
Import the materials needed from the following path: "...\\projects\\ride4\\datasource\\source\\asset\\graphics\\outsourcerShowcase\\ShaderLib". There you will find the following files:

- ML_basicFairings.sbsar
- ML_basicMetal.sbsar
- ML_basicMiscellaneous.sbsar
- ML_basicPlastic.sbsar
- ML_CoatedMaterials.sbsar

We strongly suggest you to create a Shelf Preset in Painter to store out Materials. To do so please follow the Official Substance Documentation at this [link](#).

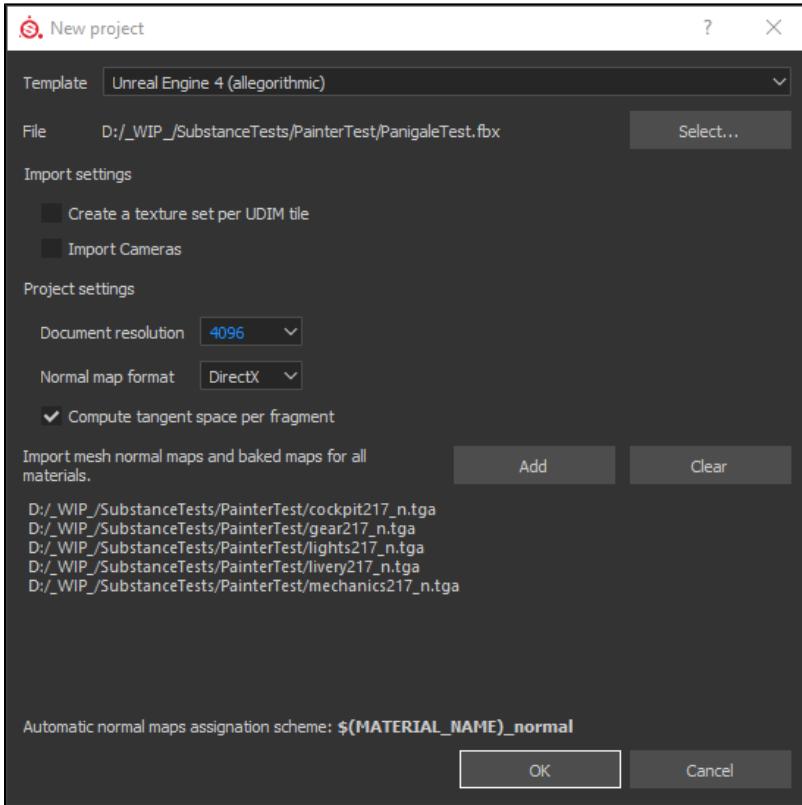
You can import the resources as detailed below, or you can just copy the .sbsar files on this directory C:\\Users\\...\\Documents\\Allegorithmic\\Substance Painter\\shelf\\materials

If we update the Shaders remember to update these files as well!



As you import the bike asset remember to import Normal Maps as well.

Please set texture resolution at 4096.

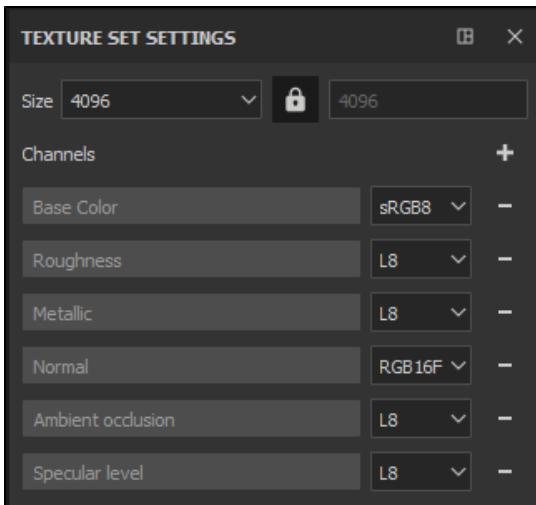


This will cover the basic project setup. The following steps are asset based, and are meant to help you get the most out of Substance Painter.

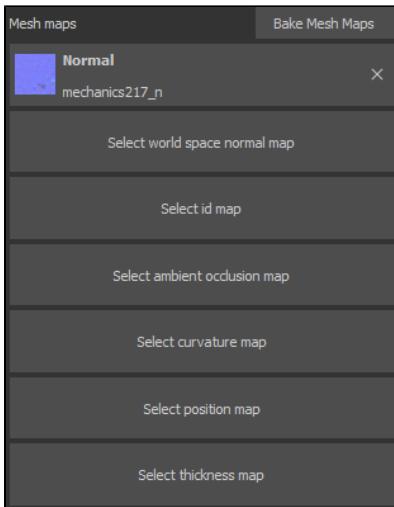
Asset Setup

The first step is to set the proper channels to work with our shaders:

- Remove Height Channel
- Add Specular Level Channel
- Add Ambient Occlusion Channel

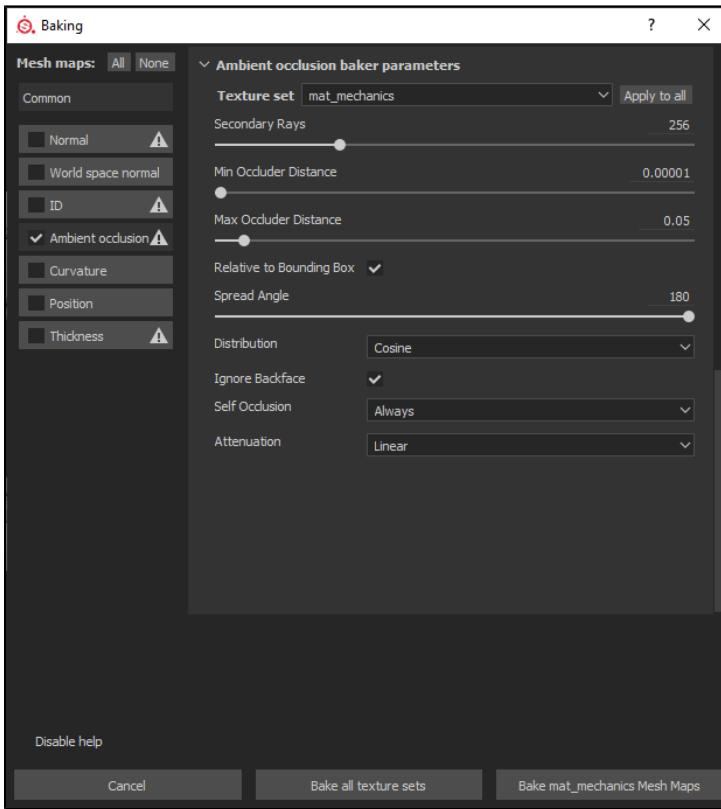


This should be done for EVERY part of the asset you are going to paint. Another mandatory step is to plug the Normal Map in the Mesh Map channel.



Baking Occlusion/Cavity

You should bake Ambient Occlusion and use it as a mask in Painter to drive dirt better. Here are the settings you should use.



With these settings you'll get a nice Cavity map that can be used to simply mask most of the dirt on the fly. Better masking should be done via painting.

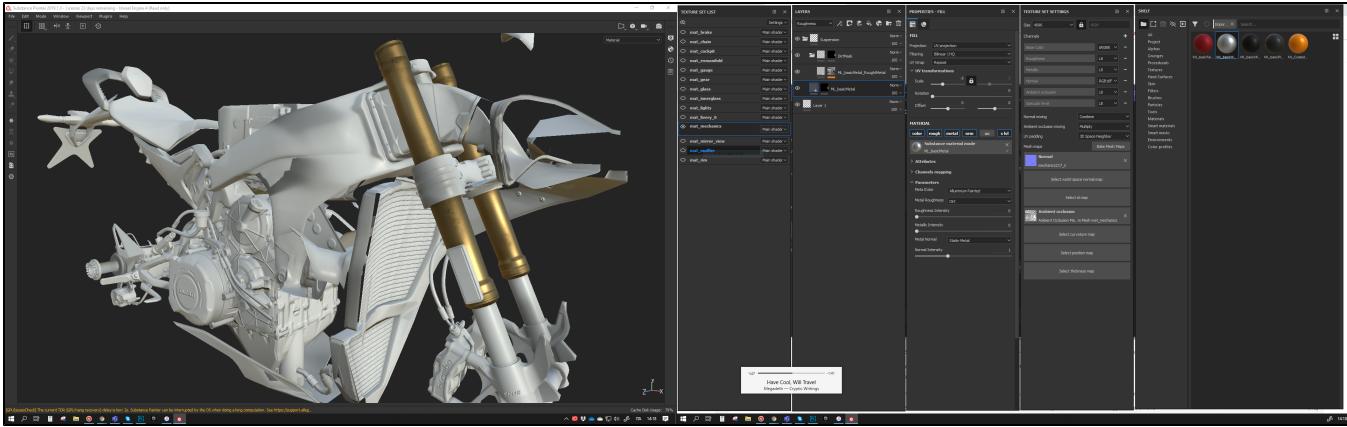
Assign it to the Mesh Maps just like you did with Normal Map.

Painting Tips

A super easy workflow could be the following (see example below):

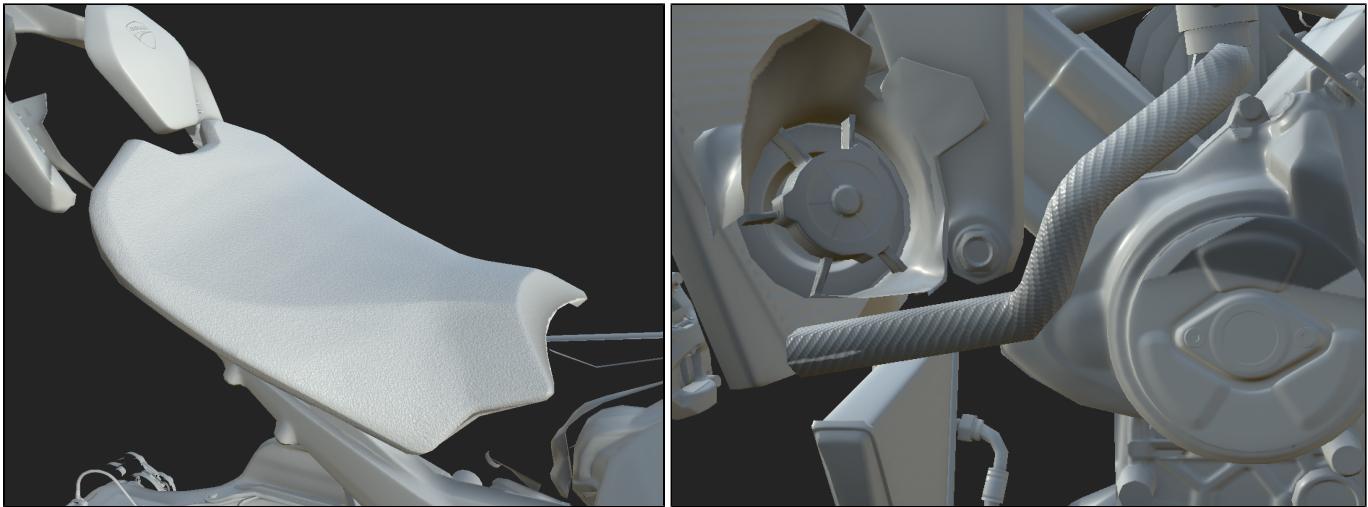
- Drop a material in the **Layers**
- Mask it by creating a **Black Mask**, then fill it white by selecting the faces that you need
- Set the material as you need (remember to set UV scale and Rotation)
- Create a **Folder** and drop a material inside to create another **Layer** and have only "**metal**", "**rough**" and "**s level**"
- Mask the **Folder** creating a **Black Mask**, then fill it white by selecting the faces that you need like before
- Mask the new **Layer** using **Occlusion**, then Invert it and tweak the Levels

- Set the new **Layer** material to generate the proper dirt
- Repeat for every part need a distinctive dirt or add parts to the **Folder** mask



With this simple technique you'll be able to tackle any texturing in no time. Of course painting finer details is always advised.

Another important thing to keep in mind is to avoid baking in the Normal Map details that you'll take care in Substance. The saddle is an example: there is normal information that will "fight" with any material normal you'll add. The same thing goes for this coated cable.



As further tips we can suggest to bake all the maps into Substance Painter. Other maps can be generated to help you paint better.

Also feel free to use ID masks to speed up the material assignment process.

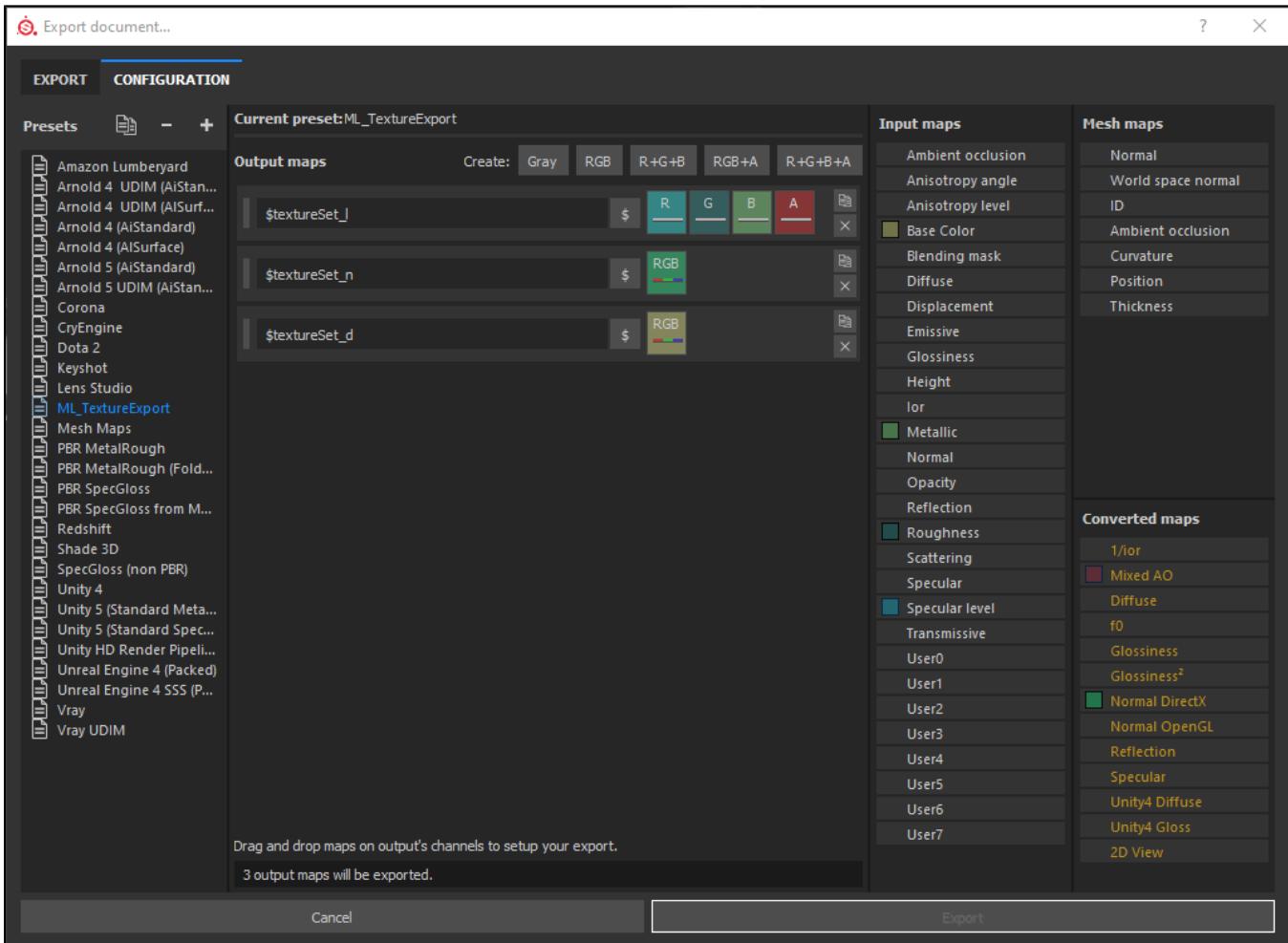
Exporting Maps

Once you are done, you can export the maps you have generated.

First thing first go in the CONFIGURATION tab and create an **EXPORT PRESET** following this rules:

- Create an Output Map called \$textureSet_I
 - Create R+G+B+A channels
 - Assign (drag&drop) **Specular Level** to R as Grey
 - Assign (drag&drop) **Roughness** to G as Grey
 - Assign (drag&drop) **Metallic** to B as Grey
 - Assign (drag&drop) **Mixed AO** to A as Grey
- Create an Output Map called \$textureSet_n
 - Create RGB channels
 - Assign (drag&drop) **Normal DirectX** to RGB as RGB
- Create an Output Map called \$textureSet_d
 - Create RGB channels
 - Assign (drag&drop) **Base Color** to RGB as RGB

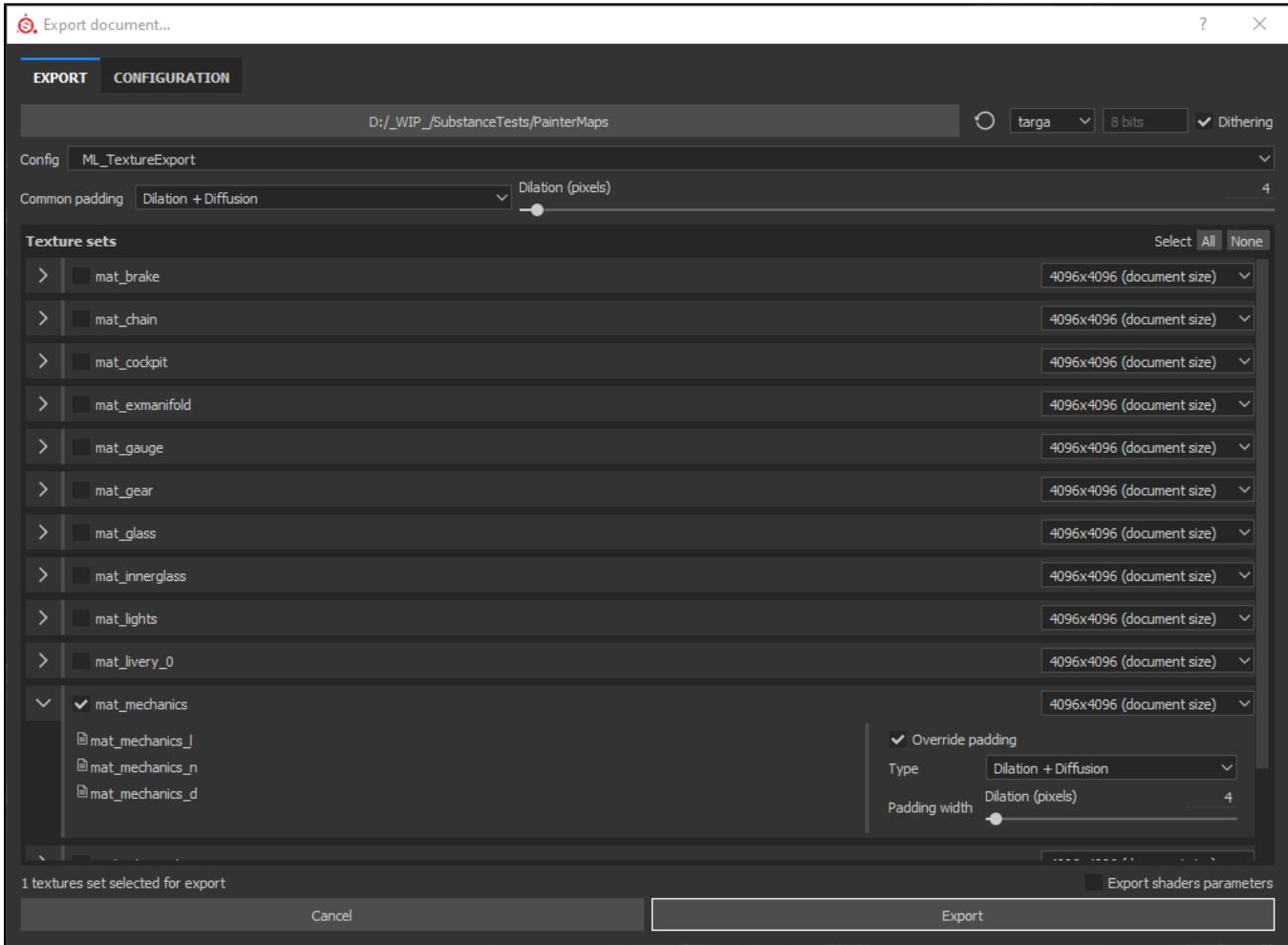
The Export Preset should look like this



Then set up the export following these steps:

- Choose the right **Config** template
- Set file type to **TARGA**
- Set **Common Padding** to "Dilatation + Diffusion" and set **4 pixels**
- Unflag "Export shaders parameters"

Feel free to override the pixel padding if needed but don't go for less than 4 pixels.



In Editor Check - Test Material

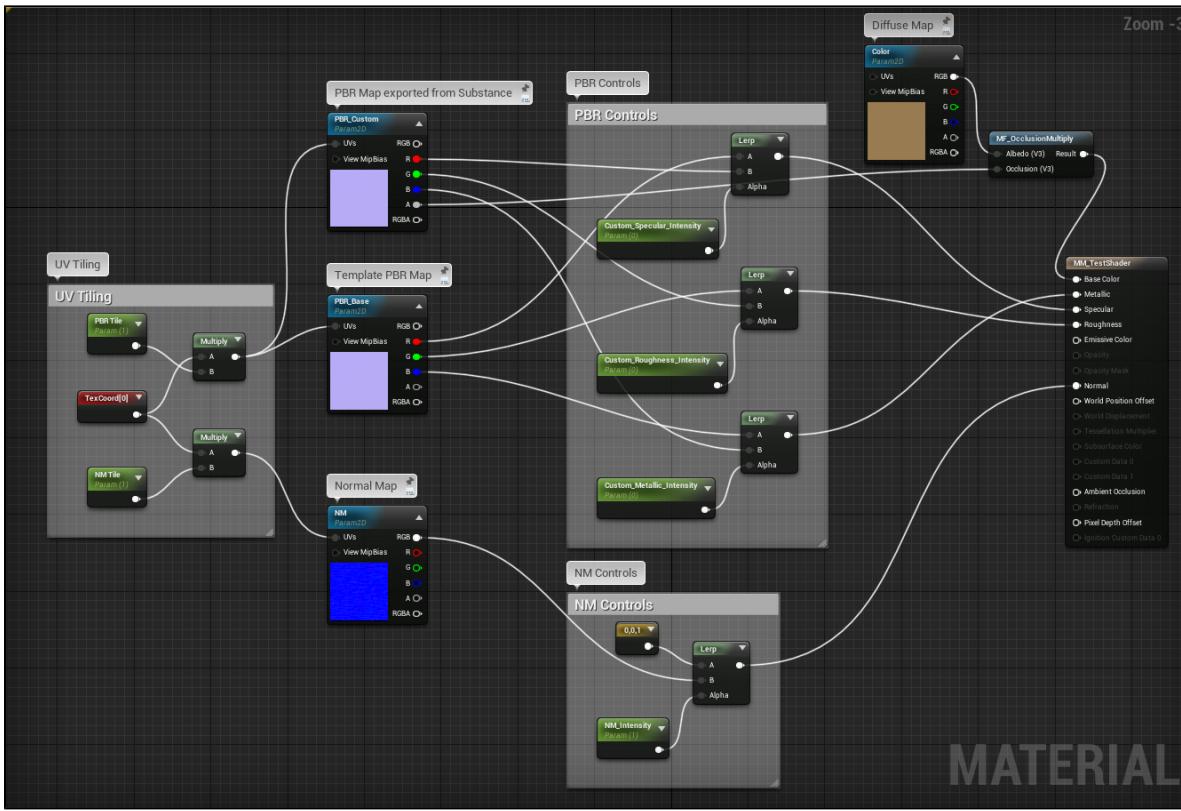
WARNING

The final check on your textures has to be done with our GAME SHADER.

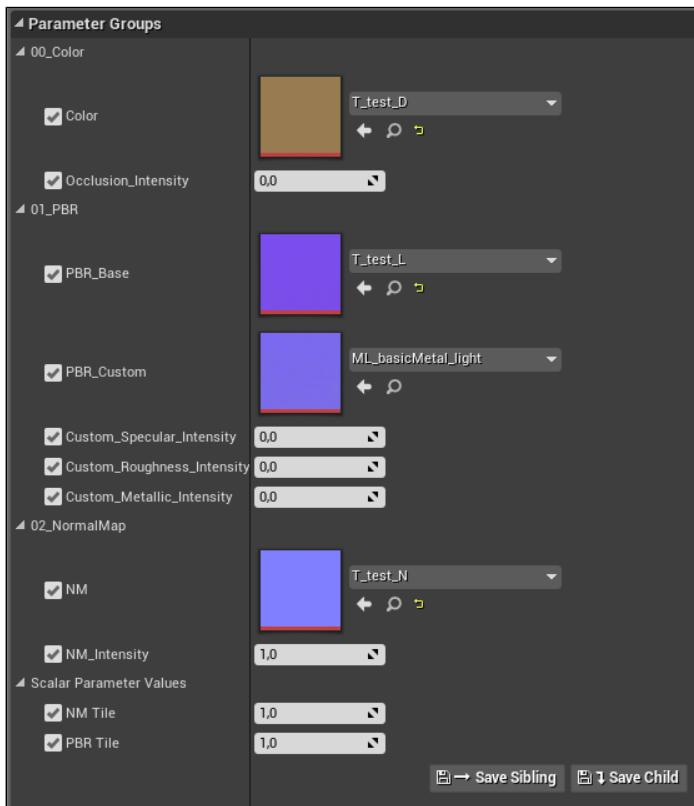
As a final step of your workflow, you should test your textures in the "ShaderLib" map. You can find the map in: "Content\maps\OutsourcerShowcase\ShaderLib"

There you'll find an array of test meshes featuring the basic outcome of the template shaders in a neutral daylight scene with the same setup that we will feature in game. There you can locally import a mesh and assign an instance of the "MM_Test" for checking your work more quickly than setting up our game shaders. The Test Material can be found at this location: "Content\assets\graphics\OutsourcerShowcase\ShaderLib\Materials" there you can create multiple instances of MI_TestShader.

This is an overview of the "MM_Test"



As you can see it's pretty straight forward. You'll be able to plug in textures for Diffuse, Normal Map and PBR. For the PBR itself you have two maps, a "basic" one that is the base PBR values of the shader, and another "custom" one that is the one exported from Substance. This texture should provide Occlusion information in the Alpha channel as well. You'll have sliders to balance from "template" to "custom" and if needed check if some further tweaking is needed, or to compare different versions of the same map. This feature is for PBR only for its the part of the shader that establishes the balance between a "realistic" material and a simply wrong one.



It features Occlusion as well if it's part of your export, such as in Liveries, Mechanics or Cockpit.

In the map there will be featured also some ClearCoat shaders, but at the moment we cannot provide you a test shader that mimics the same functionality of our in-game one. The texture created in substance for coated surfaces can still be imported in our shaders and the values from the templates will respond properly.

Please use this feature to have reviews and suggestions from our team!

Final Notes

This is a list of overall suggestion on how to get the best out of this Library, as well as for any kind of texturing process.

- Try to always add variations in roughness to achieve a more realistic result. Roughness define how lights scatter (or better gets reflected) on a surface and our bikes are not built in outer space but they actually ride and get dirty.
- Roughness itself is a very sensitive value. Try not to go for high contrast or the result will be very poor. Super tiny variations in values are way more advised.
- Try to avoid pushing Roughness values to the extremes. No values like 0 or 1 for roughness please!
- Metallic is usually 0 or 1. All PBR guides will tell you that. But still our bikes are not built in outer space and all the metallic parts are usually covered in dirt or oil or grease. You can and should add some very soft texturing on the metallic channel to enhance realism and let light move better on the surface.
- Your metallic values, if edited via texturing, try not to go lower than 0.8 otherwise you'll generate a hybrid material that is not physically correct.
- Use reference for painting. Do not sit back and just plug the materials but try to aim for a desired result.
- If you feel something is missing from the Library, colors, dirt maps, normal maps, that you feel you are gonna use a lot, please ask and we will integrate.