



# Shading and Texturing Environments, Props, and Robots

Neil Blevins – Soulburn Studios

**DG3488** In this class, Neil shows his pipeline for shading and texturing environments, props, and hard surface characters—everything from organic plant life to buildings and hard surface robots. These techniques can be used to texture any high resolution object, whether for VFX and animated films, videogame cinematics, or even architectural work. He discusses shaders as well as all of the available methods for applying textures to your models. The class also covers pattern creation methods, from procedurals and hand-painted textures to photo manipulation. Focus is on efficiently shading thousands of individual objects without the need to spend a lot of time UV mapping everything (although UV mapping is discussed). Although Neil demos all of this using Autodesk® 3ds Max® software, Autodesk® Mudbox® software, Chaos Group's V-Ray®, and Adobe® Photoshop, the principles discussed can be applied to your paint application and renderer of choice.

## Learning Objectives

At the end of this class, you will:

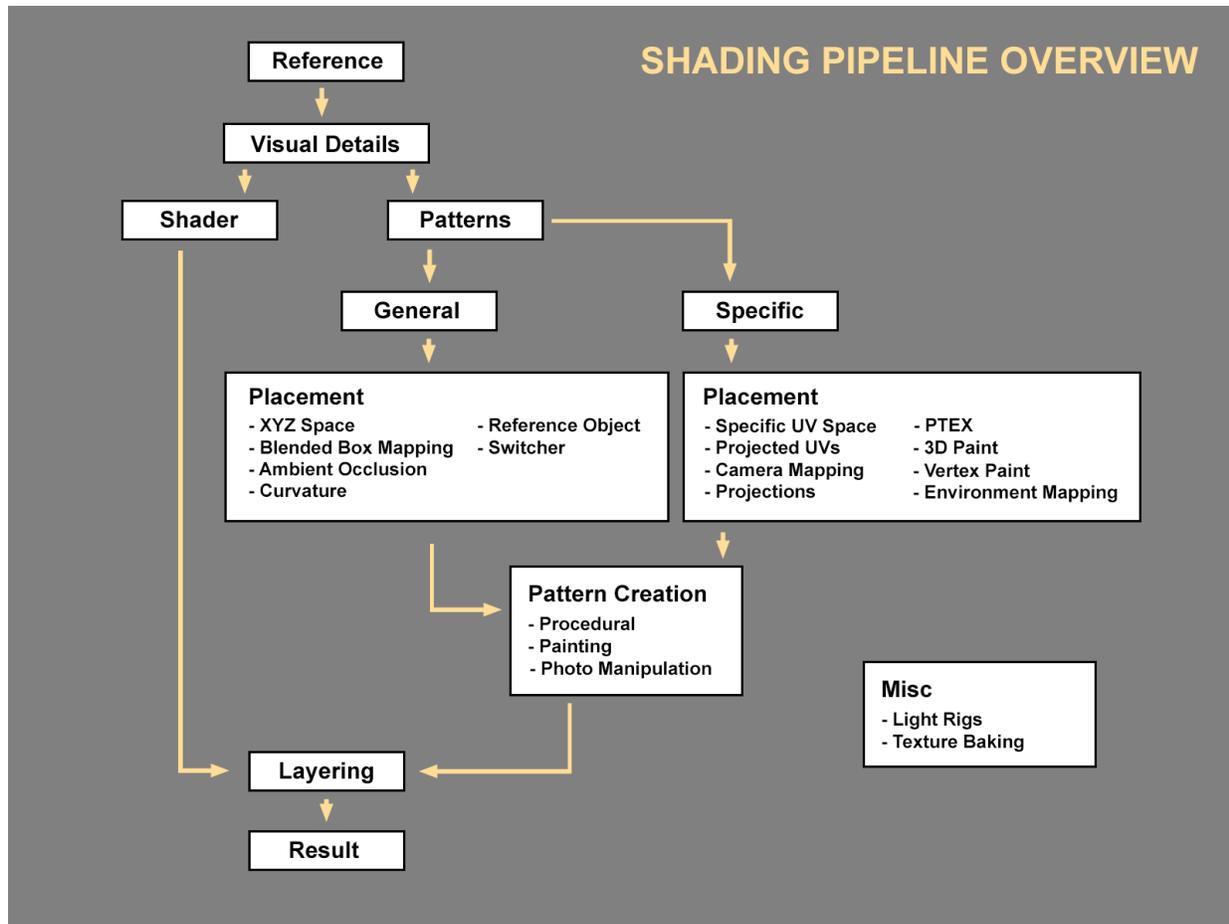
- Understand a process / workflow by which you can effectively shade / texture almost any object.
- Understand how to use my Dirty Rusty Decaled Painted Worn Metal Shader to quickly shade Hard Surface Objects (Including using Blended Box Maps and Blended Cubic Projection).
- Explore other methods of pattern creation and placement that are more appropriate for Organic Objects

## About the Speaker

Neil Blevins started off painting and drawing traditionally, and then got into 3d graphics while still living in his home country of Canada. After getting a BFA in Design Art, he moved to Los Angeles where he worked for Blur Studio. He now lives in San Francisco working as a Technical Director for Pixar. In his spare time, he makes sci-fi 3d/2d hybrid artwork, author tools and writes art related lessons and tutorials for his website.

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## Shading Pipeline Overview



Reference: Probably the most important thing you can do to make your project successful, even for objects that don't exist in real life. Sometimes we get so excited making an object in 3d that we don't stop to first think about and observe the thing we are going to make. Spend the time to get good reference!

Visual Details: Pick the 5 to 10 things that make this object look the way it looks and write them down.  
Example Rock:

- Rough Surface (Not Shiny)
- Cracks
- Large Crinkly Bump, Smaller Grainy Bump
- Grey / Yellow Color
- Spotty Color Pattern

Which Visual Details Are Shaders: A Surface Shader is a set of equations used to determine the appearance of a surface and how it responds to light.

Which Visual Details Are Patterns: Some properties of your list are patterns, or more commonly referred to as maps.

General Patterns are non-specific, stuff that pretty much covers your entire object. Example: Paint strokes on a fire hydrant

Specific Patterns are patterns that appear in only very specific spots on the object. Example: The drip of rust coming from the plug on the fire hydrant.

General Pattern Placement:

- XYZ Space
- [Blended Box Mapping](#)
- [Ambient Occlusion](#)
- [Curvature](#)
- Reference Object
- Switcher

Specific Pattern Placement:

- Specific UV Space (Unwrapping)
- Projected UVs
- Camera Mapping
- [Projections](#)
- [PTEX](#)
- 3d Paint
- Vertex Paint
- Environment Mapping

General and Specific Pattern Creation:

- Procedural
- Painting
- Photo Manipulation

[Layering Shaders and Patterns To Make Materials:](#)

- Layering Materials
- Layering Patterns
- Layering In Paint Program

Light Rigs: Show your work in a [Neutral Lighting Setup](#) so color can be decided on, and use the same rig for everything to introduce consistency.

Texture Baking: Used to speed up renders, or to transfer one placement method to another. Example: Bake a procedural using XYZ Space into a texture map using PTEX so you can paint directly on top of the procedural.

## Hard Surface Shading

In this tutorial, I'm giving away a Dirty Rusty Decaled Painted Worn Metal material. It's great for robots, fighting suits, military vehicles, factories, buildings, etc. It's especially made to be thrown onto a model that has thousands of objects, and without the need to make time consuming UVs for those objects. So check out the tutorial below and see how to go about using it.

The Material will be posted to [www.neilblevins.com](http://www.neilblevins.com) after the class.

### Needed Plugins and Scripts

To use this material, you'll need the following plugins: [VRay \(Vray Renderer, VrayBlendMtl, VrayMtl\)](#), [VRayBumpMtl](#), [ColorCorrect](#), [WarpTexture](#), and [CameraMapGemini](#). Follow the links to get the plugins.

You'll also need my [Soulburn Script pack](#), as you'll be using these scripts: [blendedBoxMapMaker](#), [blendedCubeProjectionMaker](#), [cameraMapGeminiRenderer](#), [cornerEdgeToVertexMap](#) and [texmapPreview](#).

### Preparing Your Mesh

1. **Reset Xform:** Select your objects and use the Reset Xform utility to reset their xform. I like to them convert all the objects to Editable Polys, but this step isn't necessary.
2. **Blended Box Map:** Run the Soulburn Script [blendedBoxMapMaker](#), uncheck "Make Map", make sure "3 Sided UVW Mapping Method" is selected, and hit Apply. For more information on what you just did, see my [Blended Box Mapping](#) Tutorial.
3. **Blended Cube Projection:** Run the Soulburn Script [blendedCubeProjectionMaker](#), uncheck "Make Map", make sure "6 Sided CameraMapGemini Method" is selected, and hit Apply. For more information on what you just did, see my [Blended Cube Projection](#) Tutorial.
4. **Render Templates:** Turn off any lights in your scene so that the camera lights turn on, then with your objects selected, in the modifier stack, choose the CameraMapGemini Modifier, then run the Soulburn Script [cameraMapGeminiRenderer](#), choose an output directory, and hit apply. It will now render out templates to paint on top of. For more information on template rendering, see my [Blended Cube Projection](#) Tutorial.
5. **Bake Curvature:** Run the Soulburn Script [cornerEdgeToVertexMap](#), use the default settings and hit Do, this will bake a vertex map to your meshes where the flat areas are white and the edges are black. For more information on what you just did, see my [Worn Edges Using A Distorted Vertex Map](#) Tutorial.
6. **Apply Material Modifier:** Apply a Material modifier to your objects with a value of 1. More info below on why you need to do this.
7. **Apply Material:** Apply the Dirty Rusty Decaled Painted Worn Metal material from my example file to your mesh.

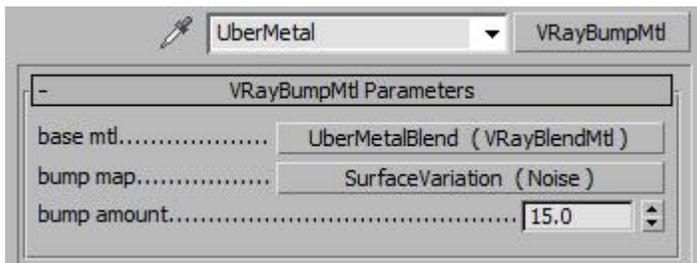
### Explaining The Material

Here's a detailed explanation of how the material works. After reading this once, you can jump down to the "Using The Material" section for just the bits you need to do to get the material to work on your model.

NOTE: All of the bitmaps that come with the material are reasonably low res, and are meant to be replaced with your own higher res maps. But these maps will do for testing purposes.

### Bump Layer

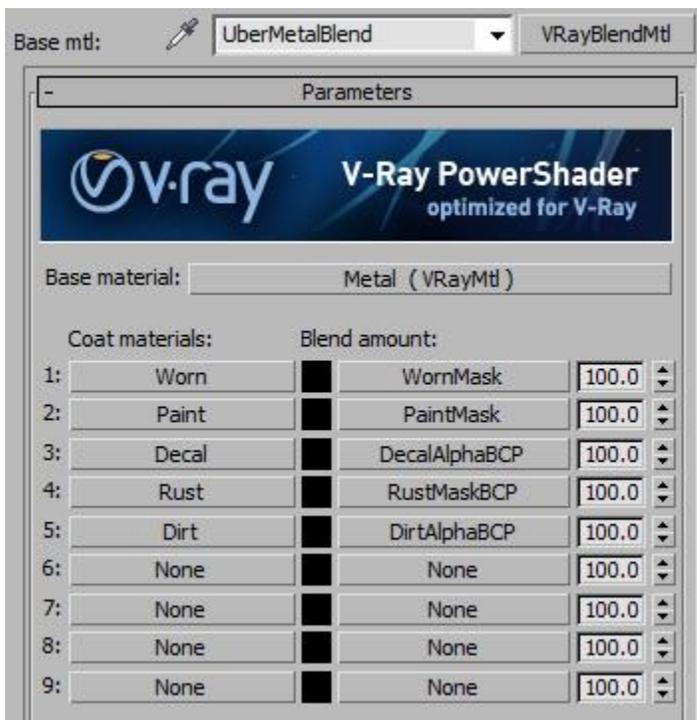
Here's a screenshot of the material.



The first level is using the V-RayBumpMtl to apply a large scale bump to all of the sub materials. I do this to give some slight variation to the reflections. For more info on this, feel free to check out my [Flat Metallic Surfaces](#) tutorial.

### Blend Layer

Down one level, we have the Vray Blend Material, that contains all of the sub materials.



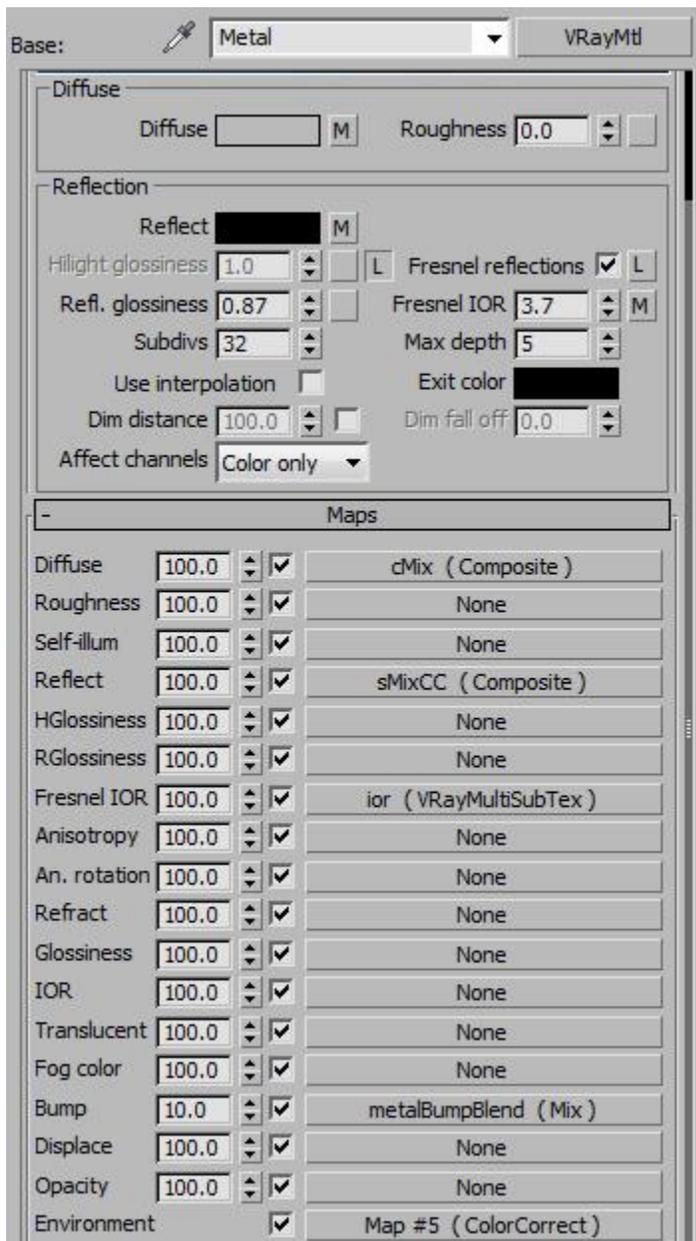
You have the "Metal" base material, and 5 coat materials. Each coat material has a mask that reveals a certain amount of the material above it in the list. So the "Worn" material sits on top of the "Metal" material, and appears everywhere defined by the black and white mask "Worn Mask".

Note: On your model, you may not need all 6 layers. If not, feel free to delete whatever submaterials you don't need. It's help unclutter the material editor, and in some cases may cause the material to even render faster.

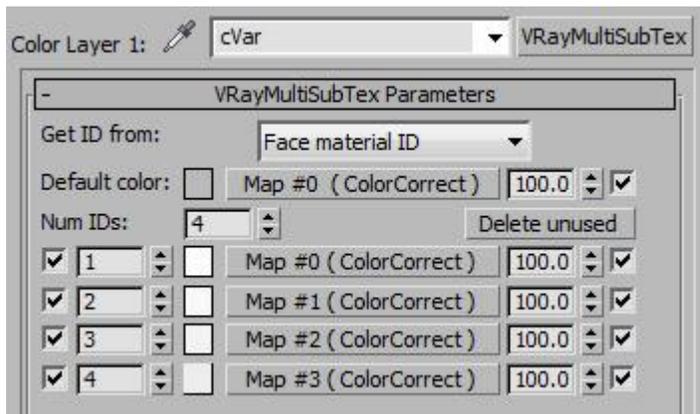
Now lets go through the layers one by one.

**Metal Layer**





- The material has a reflection glossiness of below 1, so the reflections are slightly blurry.
- The Diffuse color is a mix of a blended box map, and a color. The color is actually a VRayMultiSubTex map with 4 colors. This lets you apply the same material to a bunch of objects, but then control which metal color you want by changing the material ID of that object. So if you have a bunch of objects you want light metal, assign a Material modifier to these objects with a value of 1. Then if some metal you want to be darker, assign a Material modifier to these objects with a value of 2, and it will pick the color in the second slot, which happens to be darker. Material ID 4 is gold.

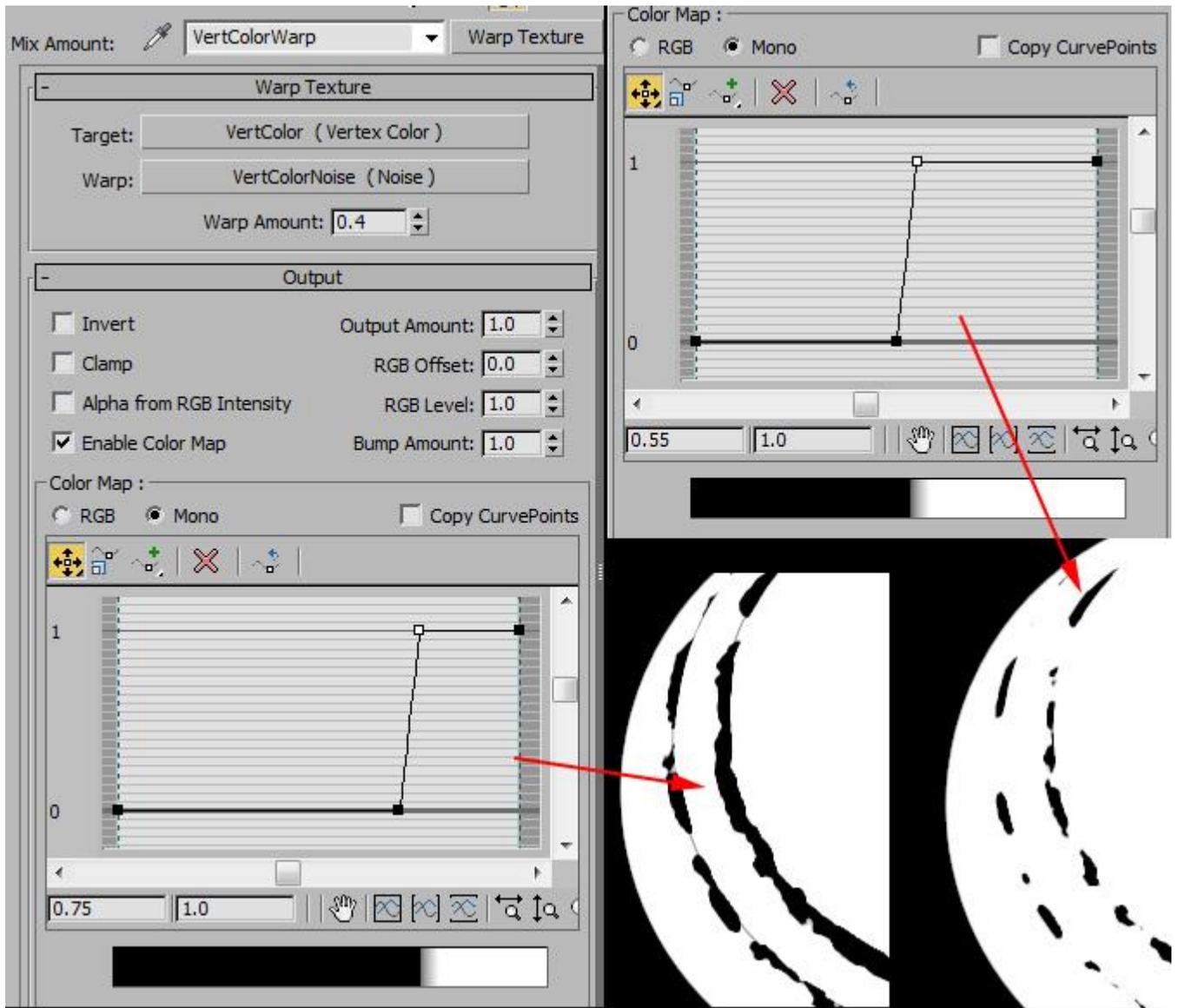


- The reflectivity is a mix of a blended box map, and a color. The Blended box map is just a worn pattern, so you get some specular variety to your surface.
- IOR is another VRayMultiSubTex so that each metal color is a slightly different ior value.
- Bump is a blended box map bump.
- Environment is an hdri I took, please feel free to replace it with any hdri you'd like. Metal looks best in an environment that has really bright spots and really dark areas to create contrast in the reflections. This bitmap is instanced into all of the submaterials so the entire material has a single environment map.

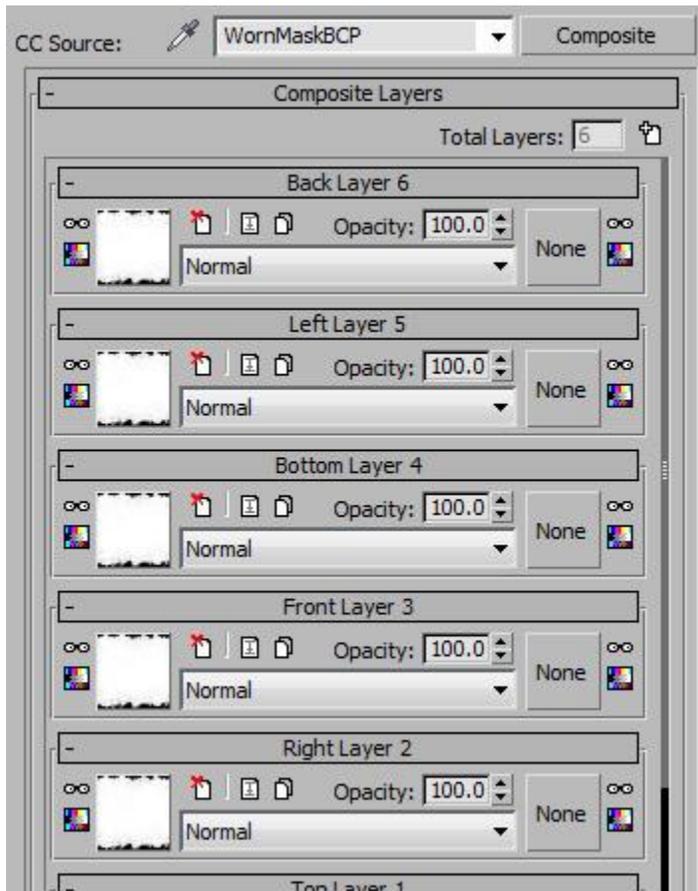
## Worn Layer



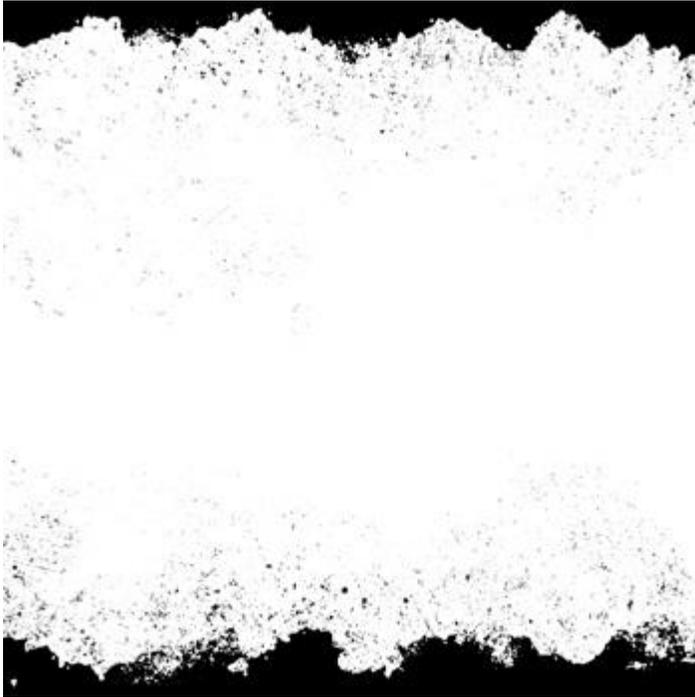
- The Worn layer is very similar to the metal material, with just a few changes. The Glossiness is lower, to simulate extra worn metal. And the color and iors are lower so that the metal is darker.
- The Worn mask is a mix between a procedural pattern and a painted pattern.
- The procedural pattern uses the Curvature you baked to remove the worn material off at the edges of your mesh. To see how this part looks on your mesh, feel free to use my texmapPreview script to view the procedural pattern on the mesh. You may need to change the size of the noise (depending on the scale of your scene), and the color map of the "VertColorWarp" to reveal more or less of the original metal...



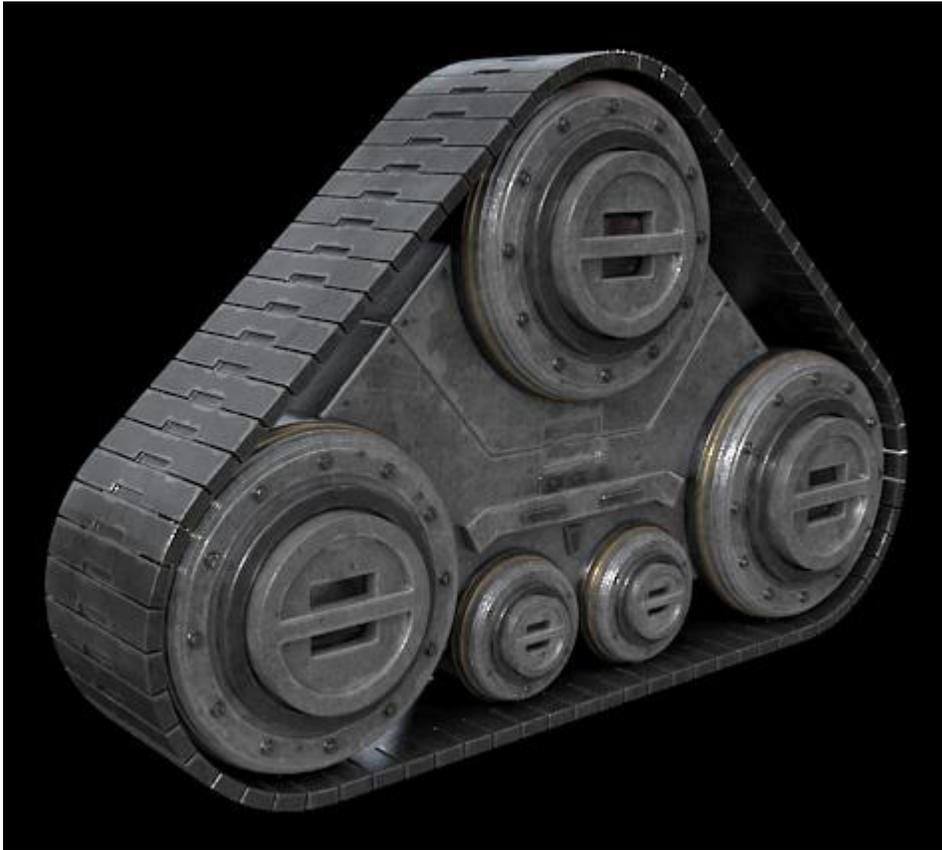
- The painted pattern inside the mask uses a blended cube projection.



- The top, bottom, left, right, front and back maps are currently all hooked up to a single map that looks like this:



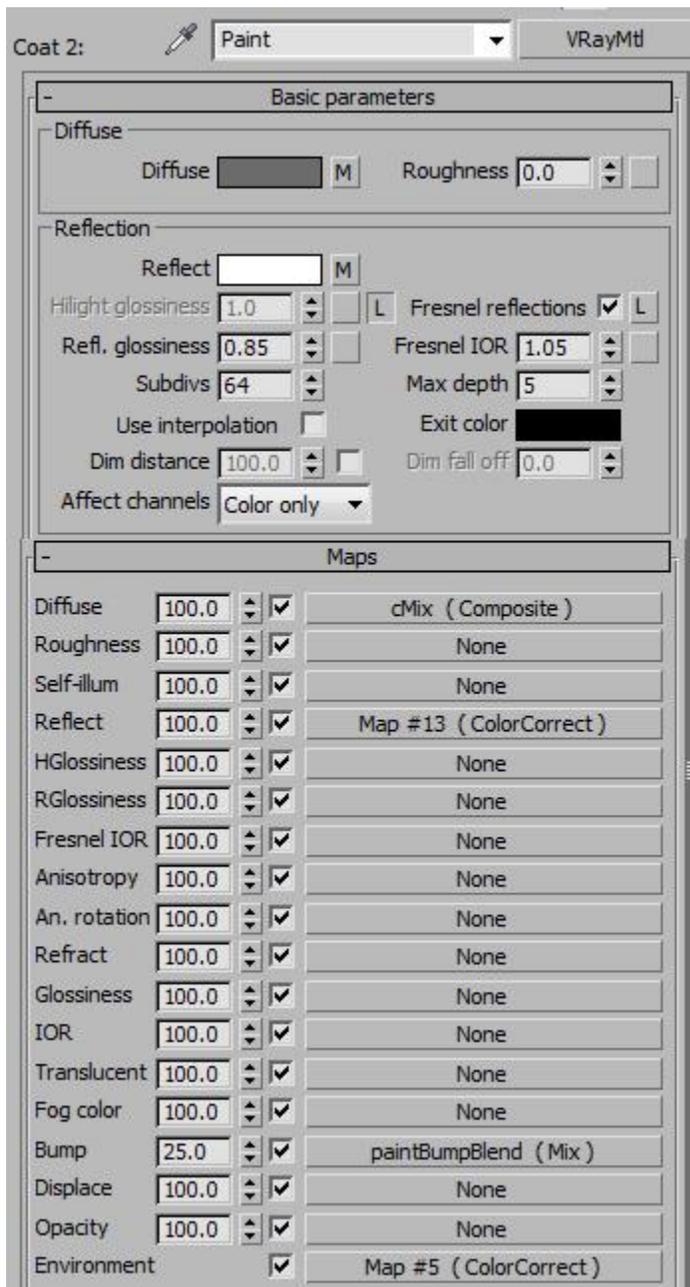
- You should replace this map with 6 separate maps that you paint using the templates you rendered out. Each should be black and white, white where you want to see the "Worn" material, black where you want to see the "Metal" material. Or, feel free to just remove the blended cube projection entirely if you want to rely only on the procedural pattern.



Above is an example of the "Metal" and "Worn" materials on a more complex model.

Paint Layer





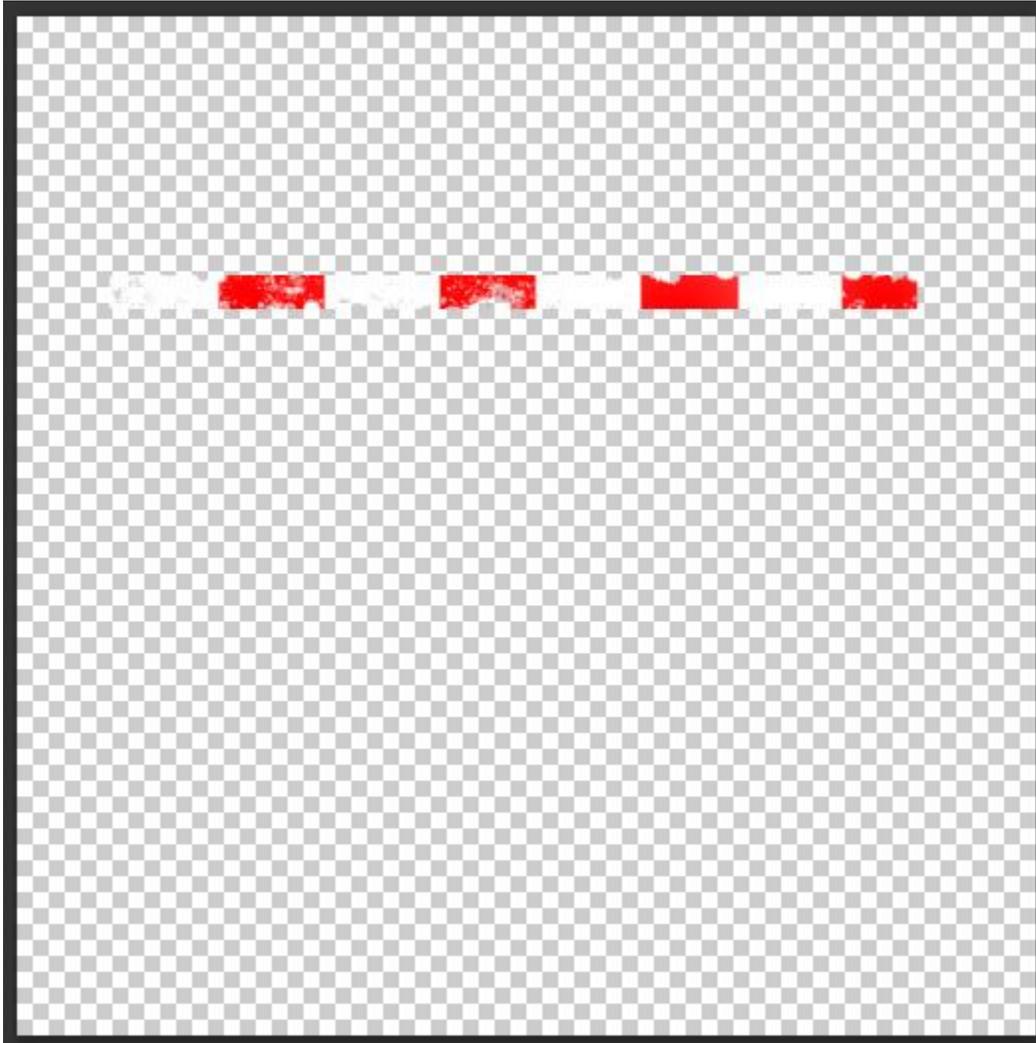
- Diffuse is a color mixed with a blended box map. Switch the color to whatever color you want your paint to be, currently its dark gray.
- Reflectivity is just a simple value.
- Bump is a bump map using a blended box map.
- Environment is the same environment as the other layers.
- The mask is similar to the worn mask, a mix between 6 hand painted maps and a procedural map using curvature. For the procedural map, you may need to change the size of the noise (depending on the scale of your scene), and the color map of the "VertColorWarp" to reveal more

or less of the original metal below the "paint" layer. As for the 6 hand painted maps, paint them in photoshop using the templates to replace the temporary map that's in there, black is where you see through to the "Metal Worn" material, white is where you see the "Paint" material. Or, feel free to just remove the blended cube projection entirely if you want to rely only on the procedural pattern.

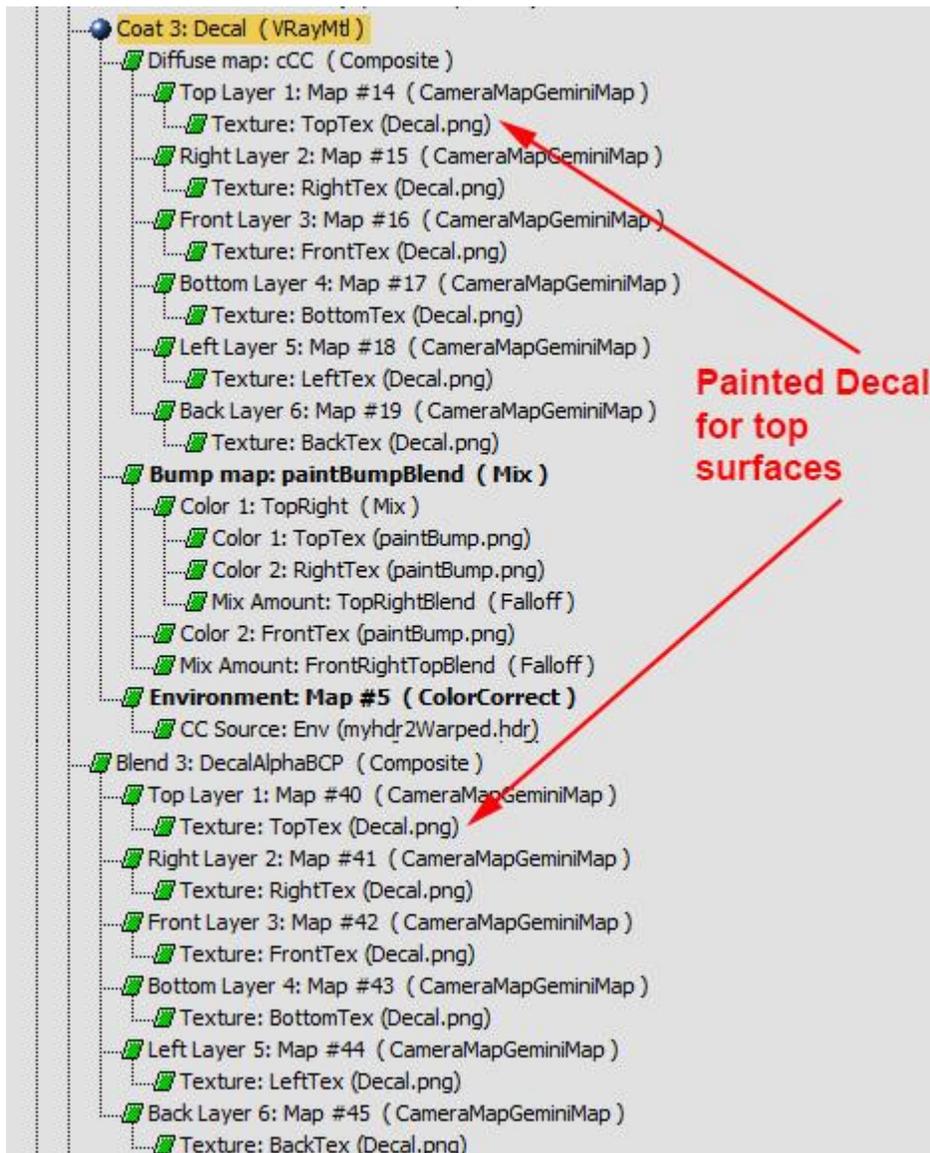
### Decal Layer



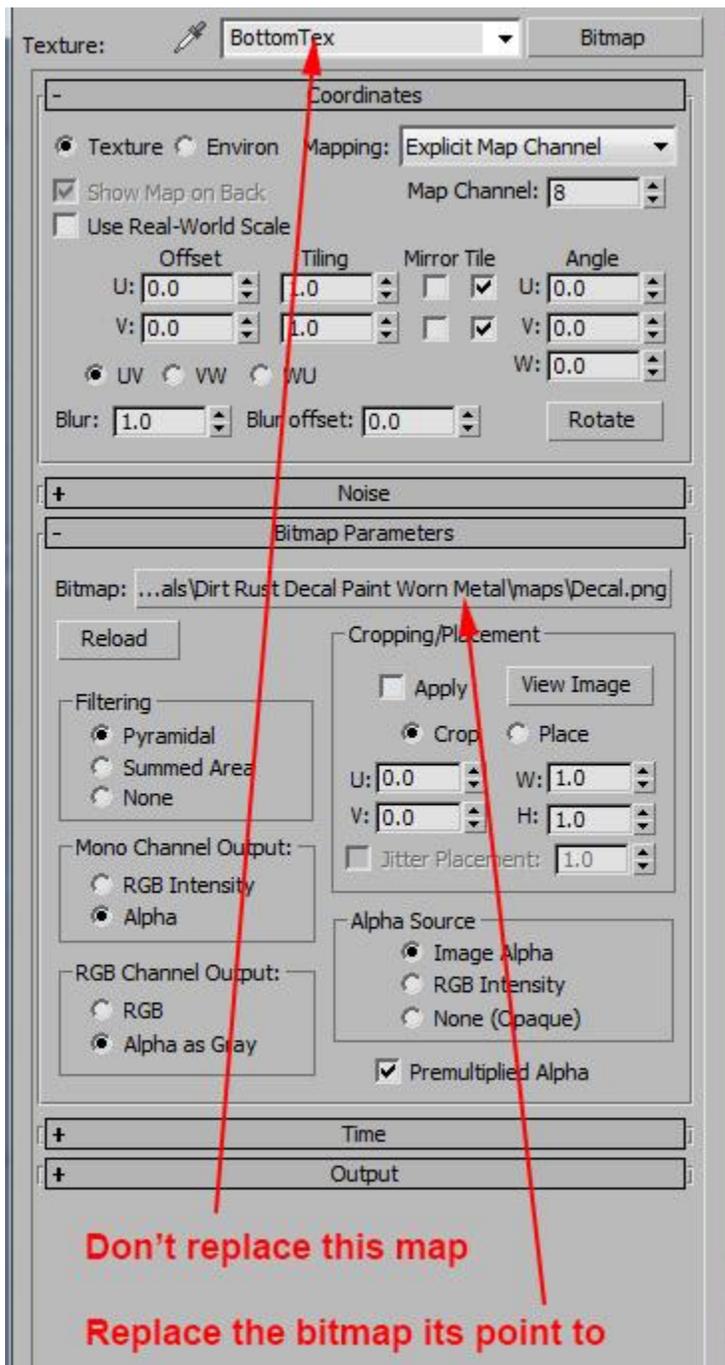
- This is the layer for any graphics or decals you want to place on your object. They are projected using a Blended Cube Projection (6 sides). For the example above, here's the map I'm projecting...



- So paint whatever graphics you want on a transparent background in photoshop, and this will project them onto your object.
- The mask is just the alpha of your bitmaps you just painted in photoshop. So here's a screenshot of the "Decal" material's map tree...



- So for example, paint any graphics you want on the top facing surfaces of your model on a transparent background (using the template to line them up), save as a transparent png file, then make sure to plug this bitmap into both the color map and the mask map as you see above. Make sure not to change the bitmap maps themselves, just the bitmap they're pointing to.



- Then do the same with the 5 other directions.

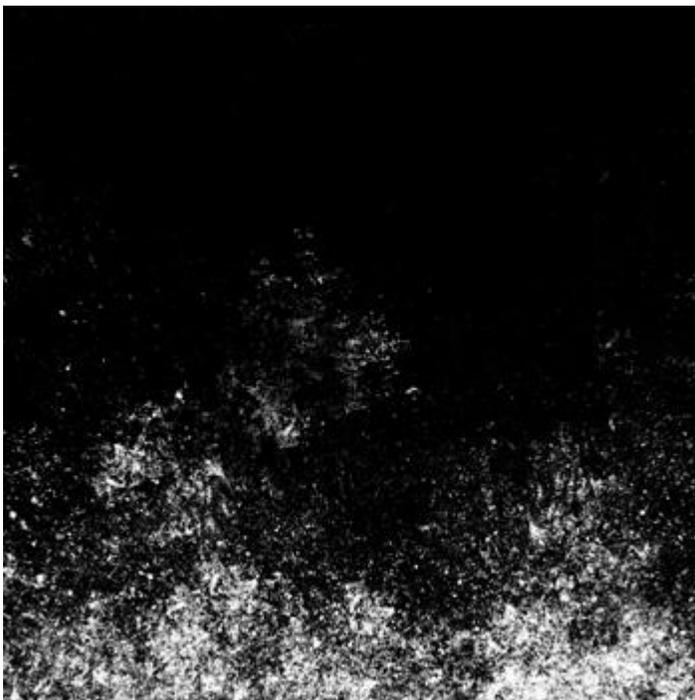
## Rust Layer



- The rust material is already setup for you. You can change its color correction to make darker or lighter rust.



- The mask is a black and white mask using a blended cube projection, the top, bottom, left, right, front and back maps are currently all hooked up to a single map that looks like this:

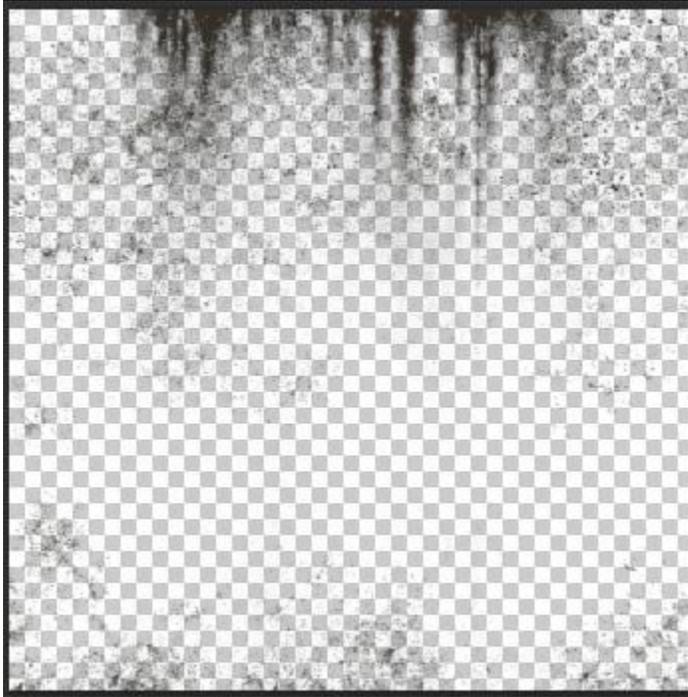


- You should replace this map with 6 separate maps that you paint using the templates you rendered out. Each should be black and white, white where you want to see the "Rust" material, black where you want to see the materials below.

### Dirt Layer



- Similar to the "Decal" material, paint the dirt you want on a transparent background, paint all 6 maps for the blended cube projection, then plug the maps into both the color and the mask.



### Using The Material

Ok, you've now read the more detailed explanation, now here's the cheat sheet, follow the steps below to use the material on your model.

1. Replace the environment map with an appropriate environment map for the scene you're trying to make. Or remove entirely if you want to use only raytraced reflections.
2. Assign Material modifiers to your objects, change their value depending on what color of metal you want: 1 is regular metal, 2 is darker metal, 3 is darkest metal, 4 is gold.
3. Change the noise size and output values of the "Worn" procedural mask to get the results you want.
4. Paint the 6 maps for the "Worn" mask's blended cube projection using the rendered templates. These maps are black and white.
5. Choose a paint color.
6. Change the noise size and output values of the "Paint" procedural mask to get the results you want.
7. Paint the 6 maps for the "Paint" mask's blended cube projection using the rendered templates. These maps are black and white.
8. Paint the 6 maps for the "Decal" layer's blended cube projection using the rendered templates. These maps are color on transparent. Plug into both the color and the mask maps of the material.
9. Choose the brightness of the rust.
10. Paint the 6 maps for the "Rust" mask's blended cube projection using the rendered templates. These maps are black and white.
11. Paint the 6 maps for the "Dirt" layer's blended cube projection using the rendered templates. These maps are color on transparent. Plug into both the color and the mask maps of the material.

And you're done.

## Organic Shading

For Organic Models, we'll use less General Patterns, and More Specific Patterns. Here's the placement methods we'll use:

- Specific UV Space (Unwrapping)
- PTEX
- 3d Paint

Thanks for reading!