

DEPLORABLE MOUNTAINEER

Deplorable Mountaineer values Quality, Integrity, Innovation, and Fun, with an emphasis on Fun!

Parametrized Metals Materials Pack

DEPLORABLE MOUNTAINEER

Parametrized Metals Materials Pack

© 2018 Deplorable Mountaineer
Moorefield, WV

Table of Contents

Introduction and Materials Provided	1
HOWTO: Create a Brass DiamondPlate Material	4
HOWTO: Create a Polished Uranium Material	6
HOWTO: Adjust Dirt and Corrosion Amount on a Material	8
HOWTO: Make a Worn Hazard Material	10
Material Parameters Reference.....	12
I. Diffuse Color	12
A. Diffuse	12
B. Tint	12
C. Gamma	12
D. Alpha Gamma	13
E. Diffuse Multiply	13
F. Texture Correction Multiplier	13
G. Use Diffuse.....	13
H. Alpha	13
I. Alpha Scale	13
J. Use Separate Alpha Texture	13
II. Normal Map	14
A. Normal.....	14
B. Detail Normal.....	14
C. Detail Scale	14
D. Use Normal	14
E. Use Detail Normal	14
III. Emissive Color	14
A. Emissive	14
B. Emissive Tint.....	14
C. Emissive Gamma	14
D. Emissive Multiply.....	15
E. Use Emissive.....	15
IV. Subsurface Color	15
A. Subsurface	15

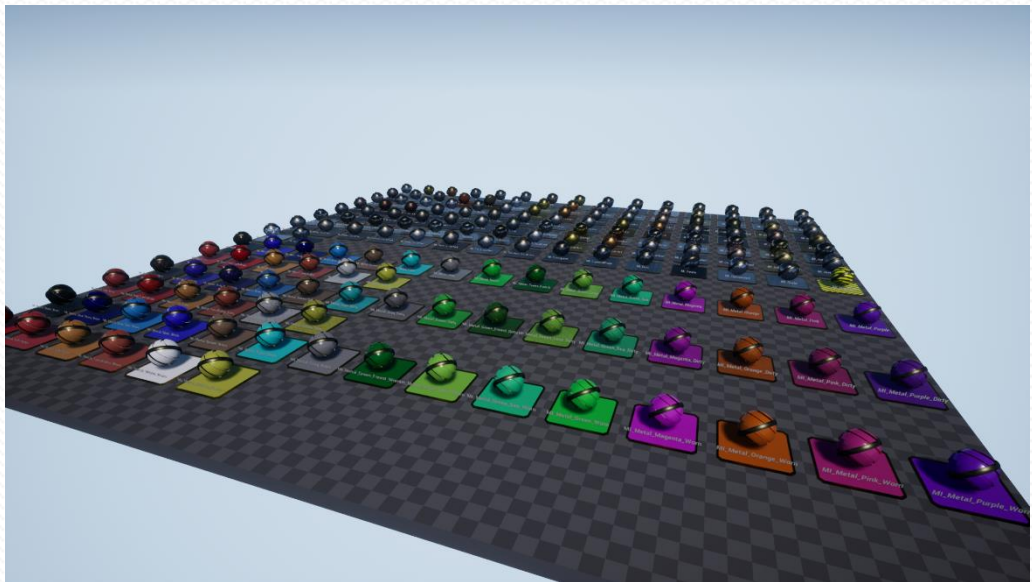
	B.	Subsurface Tint	15
	C.	Subsurface Gamma	15
	D.	Subsurface Multiply	15
	E.	Use Subsurface.....	15
V.		Metallicity	16
	A.	Metallic Mask.....	16
	B.	Metallic Tint	16
	C.	Metallic Gamma	16
	D.	Metallic Multiply	16
	E.	Use Metallic.....	16
VI.		Roughness.....	16
	A.	Roughness Mask.....	17
	B.	Roughness Tint	17
	C.	Roughness Gamma	17
	D.	Roughness Multiply	17
	E.	Use Roughness.....	17
VII.		Ambient Occlusion	17
	A.	AO Mask	17
	B.	AO Tint	17
	C.	AO Gamma	18
	D.	AO Multiply	18
	E.	Use AO.....	18
VIII.		Refraction.....	18
	A.	IOR Mask	18
	B.	IOR Tint.....	18
	C.	IOR Gamma	18
	D.	IOR Multiply.....	19
	E.	Fresnel Power	19
	F.	Fresnel Base Reflect Fraction In	19
	G.	Use Refraction.....	19
IX.		Dirt Map	19
	A.	Dirt.....	19
	B.	Dirt Tint.....	19
	C.	Dirt Gamma.....	19
	D.	Dirt Multiply.....	20
	E.	Cloud.....	20
	F.	Dirt Distribution Gamma	20
	G.	Dirt Texture Correction Multiplier	20
	H.	Dirt Scale.....	20

	I.	Use Dirt Map	20
X.		Macro Variation	20
	A.	Macro Scale	21
	B.	Use Macro Variation	21
XI.		UV Map	21
	A.	Scale 2d	21
	B.	Pan 2d	21

Introduction and Materials Provided

*Metals, painted metals, worn metals, dirty metals, corroded metals.
170 parametrized metals and instructions for making more!*

This materials pack provides 170 material instances, all parametrized from the same base material. This allows easy customization and creation of new materials.



The materials are found in the *Content ▶ ParametrizedMetals ▶ Materials ▶ Metals* folder and in subfolders. The 17 basic metals are in the top level *Metals* folder. Subfolders contain variations of metals and painted metals: *Brushed, Corroded, Dull, Painted, Painted ▶ Dirty, Painted ▶ Worn, Patterned, Polished, and Scratched*. The painted, dirty, and worn metals are in 21 colors. It is easy to create new, customized-color metals from the assets provided, as well as to change the amount of dirt, corrosion, and so on.

We now list all materials provided in this pack.

Content► ParametrizedMetals► Materials► Metals (17)

MI_Aluminum, MI_Brass, MI_Bronze, MI_Chrome, MI_Cobalt, MI_Copper, MI_Gold, MI_Iron, MI_Lead, MI_Mercury, MI_Nickel, MI_Pewter, MI_Platinum, MI_Silver, MI_Steel_Rough, MI_Tin, and MI_Titanium.

Content► ParametrizedMetals► Materials► Metals► Brushed (15)

MI_Aluminum_Brushed, MI_Brass_Brushed, MI_Bronze_Brushed, MI_Chrome_Brushed, MI_Cobalt_Brushed, MI_Copper_Brushed, MI_Gold_Brushed, MI_Iron_Brushed, MI_Lead_Brushed, MI_Nickel_Brushed, MI_Pewter_Brushed, MI_Platinum_Brushed, MI_Silver_Brushed, MI_Tin_Brushed, and MI_Titanium_Brushed.

Content► ParametrizedMetals► Materials► Metals► Corroded (20)

MI_Aluminum_Tarnished, MI_Brass_Corroded, MI_Bronze_Corroded, MI_Chrome_Tarnished, MI_Cobalt_Corroded, MI_Copper_Corroded, MI_Copper_Corroded2, MI_Copper_Corroded_Holey, MI_Corrosion, MI_Gold_Tarnished, MI_Iron_Rusted, MI_Iron_Rusted2, MI_Iron_Rusted3, MI_Iron_Rusted_Holey, MI_Lead_Corroded, MI_Nickel_Tarnished, MI_Pewter_Tarnished, MI_Platinum_Tarnished, MI_Rust, and MI_Silver_Tarnished.

Content► ParametrizedMetals► Materials► Metals► Dull (14)

MI_Aluminum_Dull, MI_Brass_Dull, MI_Bronze_Dull, MI_Chrome_Dull, MI_Cobalt_Dull, MI_Copper_Dull, MI_Gold_Dull, MI_Iron_Dull, MI_Lead_Dull, MI_Nickel_Dull, MI_Pewter_Dull, MI_Platinum_Dull, MI_Silver_Dull, and MI_Tin_Dull.

Content► ParametrizedMetals► Materials► Metals► Painted (21)

MI_Metal_Black, MI_Metal_Blue, MI_Metal_Blue_Navy, MI_Metal_Blue_Sky, MI_Metal_Brown, MI_Metal_Cyan, MI_Metal_Gray, MI_Metal_Green, MI_Metal_Green_Forest, MI_Metal_Green_Lime, MI_Metal_Green_Sea, MI_Metal_Magenta, MI_Metal_Orange, MI_Metal_Pink, MI_Metal_Purple, MI_Metal_Red, MI_Metal_Red_CandyApple, MI_Metal_Tan, MI_Metal_TerraCotta, MI_Metal_White, and MI_Metal_Yellow.

Content► ParametrizedMetals► Materials► Metals► Painted► Dirty (21)

MI_Metal_Black_Dirty, MI_Metal_Blue_Dirty, MI_Metal_Blue_Navy_Dirty, MI_Metal_Blue_Sky_Dirty, MI_Metal_Brown_Dirty, MI_Metal_Cyan_Dirty, MI_Metal_Gray_Dirty, MI_Metal_Green_Dirty, MI_Metal_Green_Forest_Dirty, MI_Metal_Green_Lime_Dirty, MI_Metal_Green_Sea_Dirty, MI_Metal_Magenta_Dirty, MI_Metal_Orange_Dirty, MI_Metal_Pink_Dirty, MI_Metal_Purple_Dirty, MI_Metal_Red_Dirty, MI_Metal_Red_CandyApple_Dirty, MI_Metal_Tan_Dirty, MI_Metal_TerraCotta_Dirty, MI_Metal_White_Dirty, and MI_Metal_Yellow_Dirty.

Content►ParametrizedMetals►Materials►Metals►Painted►Worn (21)

MI_Metal_Black_Worn, MI_Metal_Blue_Worn, MI_Metal_Blue_Navy_Worn, MI_Metal_Blue_Sky_Worn, MI_Metal_Brown_Worn, MI_Metal_Cyan_Worn, MI_Metal_Gray_Worn, MI_Metal_Green_Worn, MI_Metal_Green_Forest_Worn, MI_Metal_Green_Lime_Worn, MI_Metal_Green_Sea_Worn, MI_Metal_Magenta_Worn, MI_Metal_Orange_Worn, MI_Metal_Pink_Worn, MI_Metal_Purple_Worn, MI_Metal_Red_Worn, MI_Metal_Red_CandyApple_Worn, MI_Metal_Tan_Worn, MI_Metal_TerraCotta_Worn, MI_Metal_White_Worn, and MI_Metal_Yellow_Worn.

Content►ParametrizedMetals►Materials►Metals►Patterned (10)

MI_Corrugated, MI_DiamondPlate, MI_Duct, MI_Fence, MI_Galvanized, MI_Grate, MI_Hazard, MI_Hazard_Dirty, MI_Holes_Round, and MI_Vent.

Content►ParametrizedMetals►Materials►Metals►Polished (15)

MI_Aluminum_Polished, MI_Brass_Polished, MI_Bronze_Polished, MI_Chrome_Polished, MI_Cobalt_Polished, MI_Copper_Polished, MI_Gold_Polished, MI_Iron_Polished, MI_Lead_Polished, MI_Nickel_Polished, MI_Pewter_Polished, MI_Platinum_Polished, MI_Silver_Polished, MI_Tin_Polished, and MI_Titanium_Polished.

Content►ParametrizedMetals►Materials►Metals►Scratched (16)

MI_Aluminum_Scratched, MI_Brass_Scratched, MI_Bronze_Scratched, MI_Chrome_Scratched, MI_Cobalt_Scratched, MI_Copper_Scratched, MI_Gold_Scratched, MI_Iron_Scratched, MI_Lead_Scratched, MI_Nickel_Scratched, MI_Pewter_Scratched, MI_Platinum_Scratched, MI_Silver_Scratched, MI_Steel_Scratched, MI_Tin_Scratched, and MI_Titanium_Scratched.

In the next sections, we detail how to create new metal materials from the assets provided. We start with something simple: the Diamond Plate metal is based on Iron, but what if we wanted brass? It is a simple color change in this case. It is equally easy to create a normal, polished, scratched, brushed, dull, or corroded version of any metal not provided whose color can be found on the Internet. We show how to create Polished Uranium. One can adjust the dirt or corrosion levels on metals easily as well. A little more difficult is creating a “worn” Hazard stripe material, or using the same technique to make any other “worn” metal material.

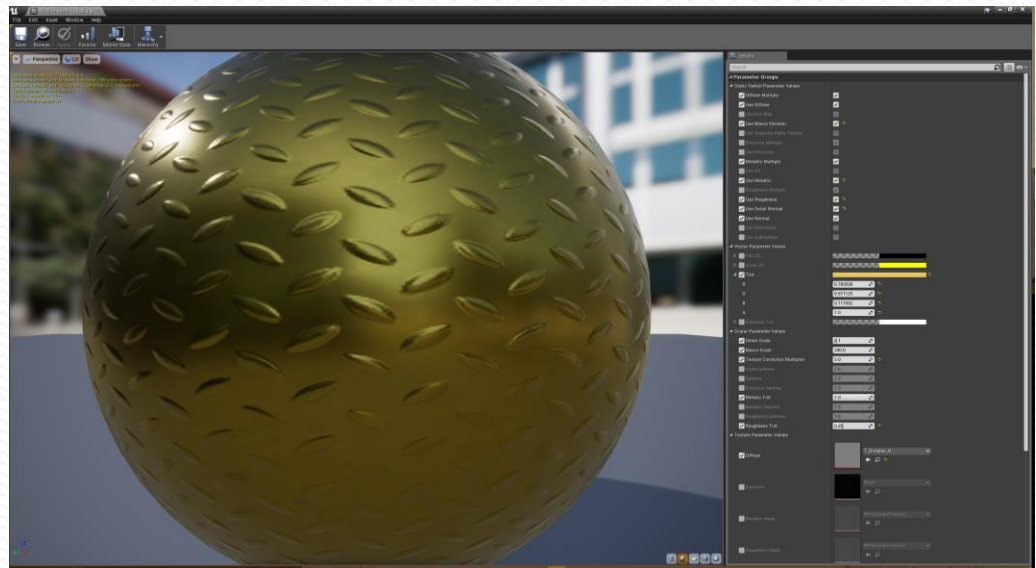
The final section is a reference for the base material,

Content►ParametrizedMetals►Materials►Base►M_Base. This is useful for advanced users who want to modify the materials and create new materials.

HOWTO: Create a Brass DiamondPlate Material

No “Brass DiamondPlate” material was provided, but it is easy to create one!

To create a “Brass DiamondPlate” material, one can simply copy the existing MI_DiamondPlate material to a new material named MI_DiamondPlate_Brass, and then change the diffuse tint to that of brass (which can be found by peeking in the MI_Brass material). We detail the procedure here.



1. Navigate to *Content* ► *ParametrizedMetals* ► *Materials* ► *Metals* ► *Patterned* in the *Content Browser*.
 2. Right-click the *MI_DiamondPlate* material and select “Duplicate” to create a copy.
-

3. While the name of the duplicate material is still highlighted, change it to *MI_DiamondPlate_Brass*.
4. Double-click the *MI_DiamondPlate_Brass* material to open it in the Material Editor.
5. Find the *Details* panel (by default, to the right of the Material Editor window) and find the *Tint* property (under *Parameter Groups* ► *Vector Parameter Values*).
6. Double-click the off-whitish colorbar to open the *Color Picker*.
7. Find the *Hex sRGB* property near the bottom right of the *Color Picker* window.
8. Change the value to the color of brass: *E5C75EFF*. Note that you can easily find the color of brass by opening up one of the *Brass* metal materials and finding the *Tint* property, opening the *Color Picker*, and reading the *Hex sRGB* property.
9. Click the *Save* button (icon looks like a floppy disk) to save the material, then close the *Material Editor* window or tab.
10. Enjoy!

HOWTO: Create a Polished Uranium Material

No “Polished Uranium” material was provided, but it is easy to create one!

To create a “Polished Uranium” material, one can simply copy the existing MI_Aluminum_Polished material to a new material named MI_Uranium_Polished, and then change the diffuse tint to that of Uranium (which can be found with a web search). We detail the procedure here.

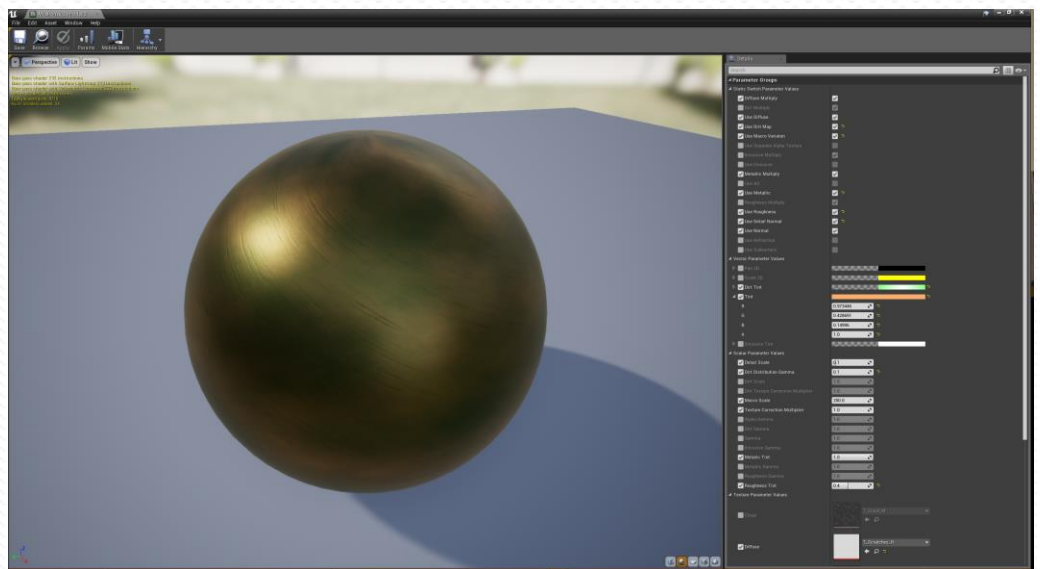


1. Navigate to *Content* ► *ParametrizedMetals* ► *Materials* ► *Metals* ► *Polished* in the *Content Browser*.
 2. Right-click the *MI_Aluminum_Polished* material and select “Duplicate” to create a copy.
-

3. While the name of the duplicate material is still highlighted, change it to *MI_Uranium_Polished*.
4. Double-click the *MI_Uranium_Polished* material to open it in the Material Editor.
5. Find the *Details* panel (by default, to the right of the Material Editor window) and find the *Tint* property (under *Parameter Groups* ► *Vector Parameter Values*).
6. Double-click the colorbar to open the *Color Picker*.
7. Find the *Hex sRGB* property near the bottom right of the *Color Picker* window.
8. Change the value to the color of uranium: *7D7C78FF*. Note that you can find the color of uranium by searching for a picture of uranium and using a color eyedropper tool to get its hexadecimal color. Append “FF” to the color because UE4 requires an alpha value in addition to the RGB.
9. Click the *Save* button (icon looks like a floppy disk) to save the material, then close the *Material Editor* window or tab.
10. Enjoy!

HOWTO: Adjust Dirt and Corrosion Amount on a Material

To adjust dirt and corrosion, just change the *Dirt Distribution Gamma* parameter of a dirty or corroded metal material. We detail an example here.

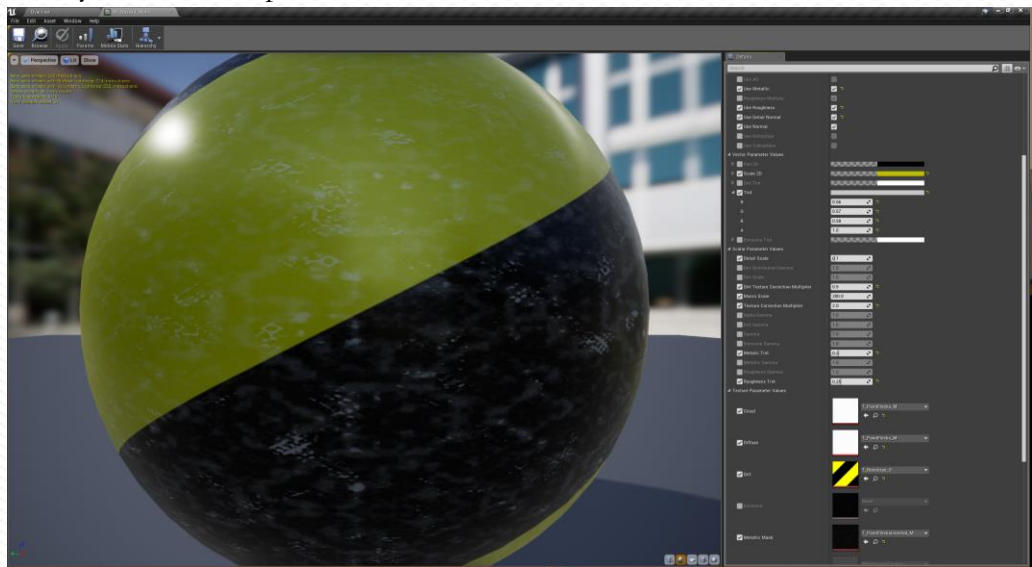


1. Navigate to *Content* ► *ParametrizedMetals* ► *Materials* ► *Metals* ► *Corroded* in the *Content Browser*.
 2. Right-click the *MI_Bronze_Corroded* material and select “Duplicate” to create a copy.
 3. While the name of the duplicate material is still highlighted, change it to *MI_Bronze_Corroded2*. This will be a version with a higher level of corrosion.
-

4. Double-click the *MI_Bronze_Corroded2* material to open it in the Material Editor.
5. Find the *Details* panel (by default, to the right of the Material Editor window) and find the *Dirt Distribution Gamma* property (under *Parameter Groups* ► *Scalar Parameter Values*).
6. Check the box to the left of the property to make it editable. When checked, the property will no longer be grayed out.
7. Change the gamma value to 0.1. (Lower values mean more corrosion/dirt. Zero means 100% corrosion, 1 means 50% corrosion, and a very large value would be nearly 0% corrosion. It is a logarithmic scale.)
8. Click the *Save* button (icon looks like a floppy disk) to save the material, then close the *Material Editor* window or tab.
9. Enjoy!

HOWTO: Make a Worn Hazard Material

Making a worn material is a bit more involved than the previous examples. It would be easy to create a new worn material of a solid color by copying a painted worn material and changing the color. We shall describe the more difficult case of making a worn material from one with a non-solid texture, namely the hazard stripes material.



1. Navigate to *Content* ► *ParametrizedMetals* ► *Materials* ► *Metals* ► *Patterned* in the *Content Browser*.
 2. Right-click the *MI_Hazard* material and select “Duplicate” to create a copy.
 3. While the name of the duplicate material is still highlighted, change it to *MI_Hazard_Worn*.
 4. Double-click the *MI_Hazard_Worn* material to open it in the Material Editor.
-

5. The paint will be the “dirt” in this material. Find the *Use Dirt Map* property under *Parameter Groups* ► *Static Switch Parameter Values*, and check the box to the left to make it editable.
6. Also check the box to the right of the property name to activate it. The material will now have corrosion spots on it.
7. Find the *Dirt* property under *Parameter Groups* ► *Texture Parameter Values*, and check the box to the left to make it editable.
8. Change the texture to *T_BeeStripe_D*. Just start typing the name after clicking the texture to search for it. The corrosion will disappear, since it now blends with the diffuse texture.
9. Find the *Diffuse* property under *Parameter Groups* ► *Texture Parameter Values*. It should already be editable.
10. Change the texture to *T_Paintflecks_M*.
11. Find the *Dirt Texture Correction Multiplier* property under *Parameter Groups* ► *Scalar Parameter Values*, and check the box to the left to make it editable.
12. Change its value to 0.5.
13. Find the *Metallic Multiply* property under *Parameter Groups* ► *Static Switch Parameter Values*. It should already be editable.
14. Uncheck the box to the right of the property name to deactivate it. This causes the metallic map to be additive instead of multiplicative. The material will appear slightly more metallic overall.
15. Find the *Metallic Mask* property under *Parameter Groups* ► *Texture Parameter Values*, and check the box to the left to make it editable.
16. Change the texture to *T_PaintFlecks_Inverted_M*.
17. Find the *Cloud* property under *Parameter Groups* ► *Texture Parameter Values*, and check the box to the left to make it editable.
18. Change the texture to *T_PaintFlecks_M*. The material will now look like a Bee Stripe-painted metal with the paint chipped off in places.
19. Click the *Save* button (icon looks like a floppy disk) to save the material, then close the *Material Editor* window or tab.
20. Enjoy!

Material Parameters Reference

More advanced users will want to do more with the assets in this package. This section describes all the parameters available in the *Content ▶ Parametrized Metals ▶ Materials ▶ Base ▶ M_Base* base material, which all material instances in this pack are based on.

I. Diffuse Color

The base color, or diffuse color, of the material sets the stage for just about every other aspect of its appearance. We describe the parameters that primarily affect this diffuse color.

A. Diffuse

The *Diffuse* parameter is a texture (default: plain white, but most metals use a dimpled gray texture). This texture, with modifications from other parameters, is sent directly to the *Base Color* pin of the material. The alpha channel of this texture is sent both to the *Opacity* pin and the *Opacity Mask* pin (which by default are not used, unless you override the shading model). An alpha of 1 is completely opaque, and an alpha of 0 is invisible. Values in between cause different levels of transparency.

B. Tint

The *Tint* parameter (default: white) alters the color of the diffuse texture, either by adding to it or multiplying it. This is where the colors of most metals and most paint is set. The alpha channel is also combined with the diffuse texture's alpha channel, either by adding or multiplying.

C. Gamma

The *Gamma* parameter adjusts the color model of the diffuse color by applying its value as an exponent to the red, green, and blue channels. A gamma of 1 leaves the color unchanged. A gamma of 0 makes it completely white. A very large gamma is nearly

black, except where the red, green, or blue channels are equal to 1. In general, smaller gammas make the colors brighter, and larger gammas make them darker.

D. Alpha Gamma

This is like the *Gamma* parameter, except it is for the alpha channel instead of the red, green, and blue channels. A gamma of 1 leaves the alpha unchanged. A gamma of 0 disables transparency completely. A very large gamma makes the entire material nearly invisible, except where the alpha is equal to 1. In general, smaller gammas make the material more opaque, while larger gammas make it more transparent.

E. Diffuse Multiply

The *Diffuse Multiply* switch, when set to true (which is the default) causes the tint to multiply the diffuse texture to create the base color input. If it is set to false, the tint is added to the diffuse texture instead.

F. Texture Correction Multiplier

This is a scalar value that multiplies the red, green, and blue channels of the diffuse texture to correct for it being too bright or too dark. The default value is 1 (no correction). Larger values make it brighter, and smaller values make it darker. A value of 0 makes it black.

G. Use Diffuse

This is a static switch, which is true by default. When true, the diffuse parameters mentioned above are available and contribute to the base color. When false (sometimes useful on glowing materials to save shader cycles), a diffuse value of black is used and the parameters are not even compiled into the shader. As a side effect, turning off the *Use Diffuse* switch disables the macro variation and the dirt map (described later).

H. Alpha

This is a texture value that can be used in place of the alpha channel in the *Diffuse* texture. This is useful when you already have a texture that you want to use as a mask, for example. By default, it is not used and is set to a cloud texture. It is modified by the *Alpha Gamma* parameter just like the alpha channel of the *Diffuse* texture.

I. Alpha Scale

This is a scalar value for scaling the alpha texture just mentioned. This is useful if the mask is a different scale from the diffuse. The default scale is 1 (unscaled). 0 is not valid and results in a division-by-zero error. Larger values give larger alpha textures.

J. Use Separate Alpha Texture

If this is set to true (the default is false), then the *Alpha* texture and *Alpha Scale* value are used in place of the alpha channel of the *Diffuse* and *Tint* parameters for *Opacity* and the *Opacity Mask*.

II. Normal Map

A. Normal

This is a texture parameter that holds the normal map (default: *dimples*) for the *Normal* pin of the material. This determines how the surface reflects light and gives a fine-scaled texture to the surface that is cheaper than when done through geometry of the mesh. The normal output also affects the refraction of transparent materials if *Use Refraction* is on and the shading model is translucent.

B. Detail Normal

This is combined with the normal to give texture at an even finer scale. The default is a dimpled normal texture.

C. Detail Scale

This is a scalar value (default: 0.1) determining how fine the detail normal should be. 1 means the same scale as the normal. Smaller values are finer and larger values are courser. A value of 0 will cause a division-by-zero error.

D. Use Normal

If true (the default), the normal map will be used. Otherwise, a default flat normal will be used (which saves on shader cycles when a normal map is not needed). Turning it off also disables the detail normal.

E. Use Detail Normal

If true (default is false) and if *Use Normal* is also true, the *Detail Normal* will be combined with the Normal. Otherwise, no additional detail normal will be used.

III. Emissive Color

The glow color, or emissive color, of the material allows the material to literally “shine”. None of the metals in this pack use the emissive color.

A. Emissive

The *Emissive* parameter is a texture (default: black for no emission). This texture, with modifications from other parameters, is sent directly to the *Emissive* pin of the material.

B. Emissive Tint

The *Emissive Tint* parameter (default: white) alters the color of the emissive texture, either by adding to it or multiplying it. This is useful for an overall glow color.

C. Emissive Gamma

The *Emissive Gamma* parameter adjusts the color model of the emissive color by applying its value as an exponent to the red, green, and blue channels. A gamma of 1 leaves the color unchanged. A gamma of 0 makes it completely white. A very large gamma is nearly black, except where the red, green, or blue channels are equal to 1. In general, smaller gammas make the glow brighter, and larger gammas make it darker.

D. Emissive Multiply

The *Emissive Multiply* switch, when set to true (which is the default) causes the emissive tint to multiply the emissive texture to create the base color input. If it is set to false, the tint is added to the emissive texture instead.

E. Use Emissive

This is a static switch, which is false by default. When true, the emissive parameters mentioned above are available and contribute to the emissive color. When false, an emissive value of black is used for no glow, and the parameters are not even compiled into the shader.

IV. Subsurface Color

The subsurface color of the material allows the material appear like plastics, ceramics, wax, or skin, with light seeming to shine into the substance and reflect with possibly a different color and angle from the diffuse “surface” color. None of the metals in this pack use the subsurface color. This only works if a subsurface shading model is used.

A. Subsurface

The *Subsurface* parameter is a texture (default: white). This texture, with modifications from other parameters, is sent directly to the *Subsurface* pin of the material. Note that the alpha (in the *Diffuse* section) affects how strong the subsurface color seems to be. Lower alpha values give stronger results.

B. Subsurface Tint

The *Subsurface Tint* parameter (default: white) alters the color of the subsurface texture, either by adding to it or multiplying it.

C. Subsurface Gamma

The *Subsurface Gamma* parameter adjusts the color model of the subsurface color by applying its value as an exponent to the red, green, and blue channels. A gamma of 1 leaves the color unchanged. A gamma of 0 makes it completely white. A very large gamma is nearly black, except where the red, green, or blue channels are equal to 1. In general, smaller gammas make the color brighter, and larger gammas make it darker.

D. Subsurface Multiply

The *Subsurface Multiply* switch, when set to true (which is the default) causes the subsurface tint to multiply the subsurface texture to create the subsurface input. If it is set to false, the tint is added to the subsurface texture instead.

E. Use Subsurface

This is a static switch, which is false by default. When true, the subsurface parameters mentioned above are available and contribute to the subsurface color. When false, a subsurface value of black is used for no subsurface color, and the parameters are not even compiled into the shader. Note that a subsurface shading model is needed for the subsurface pin to work.

V. Metallicity

The metallicity of the material allows the material appear like metals, with a different reflection model. All of the metals in this pack use the metallicity.

A. Metallic Mask

The *Metallic Mask* parameter is a texture (default: white for fully metallic). This texture, with modifications from other parameters, is sent directly to the *Metallic* pin of the material. Note that it is the maximum of the red, green, and blue channels at a given point that is sent as a scalar value to the Metallic pin.

B. Metallic Tint

The *Metallic Tint* parameter (really a scalar value with a default of 1) alters the metallic masks's value, either by adding to it or multiplying it.

C. Metallic Gamma

The *Metallic Gamma* parameter adjusts the influence of the metallicity value by applying the gamma value as an exponent to the metallicity. A gamma of 1 leaves the metallicity unchanged. A gamma of 0 makes it completely metallic. A very large gamma is nearly nonmetallic, except where the metallicity is equal to 1. In general, smaller gammas make it more metallic, and larger gammas make it less metallic.

D. Metallic Multiply

The *Metallic Multiply* switch, when set to true (which is the default) causes the metallic tint to multiply the metallic mask texture to create the metallic input. If it is set to false, the tint is added to the metallic mask texture instead.

E. Use Metallic

This is a static switch, which is false by default. When true, the metallic parameters mentioned above are available and contribute to the metallicity. When false, a metallicity value of 0 is used for fully nonmetallic, and the parameters are not even compiled into the shader.

VI. Roughness

The roughness of the material adjusts the reflection model to make it appear more smooth or more rough. All of the metals in this pack use the roughness.

A. Roughness Mask

The *Roughness Mask* parameter is a texture (default: white for fully rough). This texture, with modifications from other parameters, is sent directly to the *Roughness* pin of the material. Note that it is the maximum of the red, green, and blue channels at a given point that is sent as a scalar value to the *Roughness* pin.

B. Roughness Tint

The *Roughness Tint* parameter (really a scalar value with a default value of 1.0 for fully rough) alters the roughness masks's value, either by adding to it or multiplying it.

C. Roughness Gamma

The *Roughness Gamma* parameter adjusts the influence of the roughness value by applying the gamma value as an exponent to the roughness. A gamma of 1 leaves the roughness unchanged. A gamma of 0 makes it completely rough. A very large gamma is nearly smooth, except where the roughness is equal to 1. In general, smaller gammas make it more rough, and larger gammas make it more smooth.

D. Roughness Multiply

The *Roughness Multiply* switch, when set to true (which is the default) causes the roughness tint to multiply the roughness mask texture to create the roughness input. If it is set to false, the tint is added to the roughness mask texture instead.

E. Use Roughness

This is a static switch, which is false by default. When true, the roughness parameters mentioned above are available and contribute to roughness. When false, a roughness value of 0.5 is used for medium rough, and the parameters are not even compiled into the shader.

VII. Ambient Occlusion

The *Ambient Occlusion* (*AO*) of the material darkens a material to simulate self-shadowing (for example, on the mortar between bricks in a brick wall material). The amount of darkening varies according to the distance and angle of the camera with respect to the surface. None of the metals in this pack use the *AO*.

A. AO Mask

The *AO Mask* parameter is a texture (default: white for no shadowing). This texture, with modifications from other parameters, is sent directly to the *Ambient Occlusion* pin of the material. Note that it is the maximum of the red, green, and blue channels at a given point that is sent as a scalar value to the *Ambient Occlusion* pin.

B. AO Tint

The *AO Tint* parameter (really a scalar value with a default of 1 for no shadowing) alters the AO masks's value, either by adding to it or multiplying it.

C. AO Gamma

The *AO Gamma* parameter adjusts the influence of the AO value by applying the gamma value as an exponent to the AO. A gamma of 1 leaves the AO unchanged. A gamma of 0 makes it shadow-free. A very large gamma is nearly fully shadowed, except where the AO is equal to 1. In general, smaller gammas make it less shadowed, and larger gammas make it more shadowed.

D. AO Multiply

The *AO Multiply* switch, when set to true (which is the default) causes the AO tint to multiply the AO mask texture to create the AO input. If it is set to false, the tint is added to the AO mask texture instead.

E. Use AO

This is a static switch, which is false by default. When true, the AO parameters mentioned above are available and contribute to roughness. When false, an AO value of 1.0 is used for no shadowing, and the parameters are not even compiled into the shader.

VIII. Refraction

The refraction input causes a translucent material to simulate the bending of light that real materials do. None of the metals in this pack use the refraction. The amount of refraction is determined by the Index of Refraction (IOR). An IOR of 1 is no refraction at all. Most real materials have an IOR greater than 1, with 1.5 being close to many values. Physically, the speed of light in a real material is $1/\text{IOR}$ times the speed of light in a vacuum, resulting in the bending of the light. Thus, an IOR of less than 1 is physically unrealistic. Refraction only works for translucent shading models, and then where the opacity is less than 1.

A. IOR Mask

The *IOR Mask* parameter is a texture (default: white for no refraction). This texture, with modifications from other parameters, is sent through a Fresnel function (to simulate edge effects seen in refracting materials in real life, as well as to apply the normal map if it is used) and ultimately to the *Refraction* pin of the material. Note that it is the maximum of the red, green, and blue channels at a given point that is sent as a scalar value.

B. IOR Tint

The *IOR Tint* parameter (really a scalar value with a default of 1.4 for simulating plain glass) alters the IOR masks's value, either by adding to it or multiplying it.

C. IOR Gamma

The *IOR Gamma* parameter adjusts the influence of the IOR value by applying the gamma value as an exponent to the IOR. A gamma of 1 leaves the IOR unchanged. A gamma of 0 makes it refraction-free. A very large gamma simulates an unrealistic infinite speed of light, except where the IOR is equal to 1. In general, smaller gammas make it less refracting, and larger gammas make it more refracting.

D. IOR Multiply

The *IOR Multiply* switch, when set to true (which is the default) causes the IOR tint to multiply the IOR mask texture to create the IOR input. If it is set to false, the tint is added to the IOR mask texture instead.

E. Fresnel Power

The *Fresnel Power* value is the exponent (similar to gamma) used to determine how much the Fresnel edge effects are modeled in the refraction profile. 5 is the default, for a fairly realistic scenario.

F. Fresnel Base Reflect Fraction In

This value is the fraction of specular reflection when the surface is viewed straight on. The default is 0.04 for realism. 1 effectively disables Fresnel effects.

G. Use Refraction

This is a static switch, which is false by default. When true, the refraction parameters mentioned above are available and contribute to refraction. When false, an IOR value of 1.0 is used for no refraction, and the parameters are not even compiled into the shader. Note that refraction only works for translucent shading models, and only where the opacity is less than 1.

IX. Dirt Map

The dirt map allows spotting, dirt, corrosion, and so on to be added to a material. In the metals pack, it is used for corroded metals and dirty metals. It is also used (in a kludgy way) for the paint layer in worn painted metals. A cloud texture parameter is what determines the pattern of dirt versus underlying material.

A. Dirt

The *Dirt* parameter is a texture (default: verdigris, i.e. corroded copper). This texture, with modifications from other parameters, is combined with the diffuse input and sent to the *Base Color* pin of the material.

B. Dirt Tint

The *Dirt Tint* parameter (default: white) alters the color of the dirt texture, either by adding to it or multiplying it.

C. Dirt Gamma

The *Dirt Gamma* (not to be confused with *Dirt Distribution Gamma*) parameter adjusts the color model of the dirt color by applying its value as an exponent to the red, green, and blue channels. A gamma of 1 leaves the color unchanged. A gamma of 0 makes it completely white. A very large gamma is nearly black, except where the red, green, or blue channels are equal to 1. In general, smaller gammas make the color brighter, and larger gammas make it darker.

D. Dirt Multiply

The *Dirt Multiply* switch, when set to true (which is the default) causes the dirt tint to multiply the dirt texture to create the dirt input. If it is set to false, the tint is added to the subsurface texture instead.

E. Cloud

The *Cloud* texture parameter determines where the texture is applied. Only the green channel is used. Where the texture is fully green, the material is fully dirt, and where it has no green, the material is fully the base color. Values in between take a weighted average (linear interpolation) of the two extremes.

F. Dirt Distribution Gamma

The *Dirt Distribution Gamma* scalar parameter adjusts the amount of dirt on the material. It does so by acting as an exponent on the green channel of the *Cloud* texture. A value of 1 (the default) means no change. A value of 0 makes it fully dirty except where the green channel is equal to 0. A very large value corresponds to very little dirt. In general, higher values mean less dirt, lower values mean more dirt.

G. Dirt Texture Correction Multiplier

This is a scalar value that multiplies the red, green, and blue channels of the dirt texture to correct for it being too bright or too dark. The default value is 1 (no correction). Larger values make it brighter, and smaller values make it darker. A value of 0 makes it black.

H. Dirt Scale

The *Dirt Scale* scalar value determines how large the cloud map is. The default value of 1 means the cloud is at the same scale as the dirt texture. Larger values mean the dirt spots determined by the cloud texture are larger.

I. Use Dirt Map

This is a static switch, which is false by default. When true, the dirt parameters mentioned above are available and contribute to the base color. When false, the diffuse is sent unaltered (or perhaps altered by the *Macro Variation* only) to the *Base Color* pin, and the parameters are not even compiled into the shader.

X. Macro Variation

Macro variation is a way of making a material subtly more realistic by causing it to not be exactly the same throughout. In these materials, the macro variation multiplies the diffuse red, green, and blue channels by a number between 0.85 and 1.15 according to a computed cloud-ish pattern. World-position coordinates are used, so the variation is smooth regardless of the UV mapping. This however means if the material is on a moving object, the variation will stay in place, appearing to be a world lighting variation instead. It is subtle enough that it may work. If not, it should be turned off. (Advanced users: subtract from the world coordinates the object coordinates instead of turning it off.)

A. Macro Scale

The *Macro Scale* scalar value determines how large the variation cloud map is. The default value of 200 means the changes are visible only at a moderately large scale (on the order of meters). Larger values mean the variation occurs over a larger scale.

B. Use Macro Variation

This is a static switch, which is false by default. When true, the macro parameter mentioned above is available and the cloud map contributes to the base color. When false, the diffuse is sent unaltered (or perhaps altered by the *Dirt Map* only) to the *Base Color* pin, and the parameters are not even compiled into the shader.

XI. UV Map

The UV map parameters allow one to scale and pan a material. This lets one customize the material to a specific UV situation.

A. Scale 2d

The *Scale 2D* vector value determines how large the material is. The default value of (1, 1) means the textures, including mask textures, tile at the one meter scale (100 Unreal units). This is multiplied by additional scaling for textures that have that, such as the macro variation. Larger values make the material larger.

B. Pan 2d

The *Pan 2D* vector value shifts the material. The default value of (0, 0) means the textures, including mask textures, are unshifted. (1,1) is the same as (0,0). (0.5,0.5) shifts it half a texture in the X and Y directions.