

By Chuck for Reallusion Inc.

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Special thanks to Luke and Penny.

Introduction to AE Cloth

Character Creator is equipped with a powerful set of flexible Substance Material graphs driven by an interface aptly named **Appearance Editor**. These graphs are made to control all aspects of texture creation for characters and apparels. Character specific graphs are separated into regions by body part, such as the head, body, hair, and so forth. Apparel and accessory related items are universally driven by one type of monolithic material graph, henceforth referred to as **AE Cloth**. This reference guide will focus on **AE Cloth** only.

AE Cloth

The **AE Cloth** graph is composed of six main components with each one further broken down and explored in detail within this reference guide. AE Cloth supports both PBR (Physically Based) and traditional / legacy shading systems.

Parameter	Preset	Range	Usage
Output Size	512 x 512	List	Controls the final output resolution of **AE Cloth**.
Shading System	Physically Based	List	Switch between PBR and Traditional shading / rendering systems.
Flip Normal Y	Off	Boolean	Can be used during export for usage in DirectX applications.
Mesh Data...	-	-	Adjust and load mesh describing texture maps.
Materials...	-	-	5 optional materials with 1 base material partitioned by **Color ID**.
Patterns...	-	-	Generator for 3 universal **Pattern** types.
Decals...	-	-	Generator for 3 universal **Decal** types that don't obey **Color ID**.
Global FX...	-	-	Universally shared affects regardless of **Color ID**.
Diagnostics	-	-	Provides display modes to verify the inner workings of the graph.

Keep the following points in mind when reading the sections that lie ahead:

- Parameters highlighted in blue are exclusive to **Physically Based** Shading System.
- Parameters highlighted in red are exclusive to **Traditional** Shading System.
- Floating point **Preset** values are indicated by having decimal numbers.
- Integer based **Preset** values are presumed from whole numbers or the absence of decimals.
- A dash (-) as a **Preset** value means “not applicable”. Usually accompanies a controls group.
- “None […]” in the **Preset** column denotes an empty texture map channel.
- A parameter styled in bold followed by ellipsis (…) denotes a controls group.

Do not confuse Specular/Glossiness PBR workflow with Character Creator's (CC's) implementation of the Specular channel. CC's current PBR implementation is strictly the Roughness/Metallic model. It is incompatible with Specular/Glossiness PBR due to the following reasons:

- AE is missing the Glossiness input channel.
- CC's Specular channel supports only gray-scale texture maps.

Mesh Data

To understand **Mesh Data** one must have experience with using some kind of texture baking tool such as Substance Painter, Substance Designer, xNormal, Zbrush, and so forth. Simply put, a texture baker takes a high resolution mesh and uses an algorithm to project its details onto a low resolution mesh and bakes the recorded data in a series of texture maps. It is with the use of these maps in combination with the low-poly mesh that a real-time engine can derive much enhanced visual fidelity and affects. Since the baked maps all describe some aspect of the model and have a very specific use case, they are collectively called **Mesh Data**.

Mesh Data

Mesh Data is the most fundamental part of **AE Cloth**. It is relied upon for various graph based affects and, at a basic level, used to enhance textural details. Without a fully loaded **Mesh Data** set, some of the effects provided by **AE Cloth** will either offer undesirable results or none at all. To get the most out of **AE Cloth** make sure to derive and plug in all of the requested **Mesh Data** maps. However, do not worry about empty **Mesh Data** inputs, the graph will still work as usual as **AE Cloth** provide default values to circumvent missing textures.

Parameter	Preset	Range	Usage
Height	None […]	Input	Gray-scale map that defines the outermost to innermost points of mesh.
Normal	None [...]	Input	RGB map that supplements the fine details of the mesh.
Color ID	None [...]	Input	RGB map to segregate a single mesh into separate materials.
WS Normal	None [...]	Input	RGB map to define the facing sides of the mesh for directional effects.
AO	None [...]	Input	Gray-scale map that defines the exposed and occluded parts of the mesh.
Use Inputs	Off	Boolean	Reveals Height, Normal, Color ID, WS Normal, and AO input channels.
AO x Color	0.25	0.0 - 1.0	Multiplies mesh Ambient Occlusion on material Diffuse and Base Color.
Normal x Normal	1.00	0.0 - 1.0	Blends mesh Normals with material Normals.
AO x Specular	0.50	0.0 - 1.0	Occludes the gray-scale Specular map.
AO x Emissive	0.50	0.0 - 1.0	Occludes the glow / emissive effect.
AO x AO	1.00	0.0 - 1.0	Multiplies mesh Ambient Occlusion with material Ambient Occlusion.
Height x Height	1.00	0.0 - 1.0	Overlays mesh Height on material Height.

While all Mesh Data can be derived from a texture baker, Color ID is most likely to be made manually. Color ID is used to portion out a single mesh into segments of different materials. For this to work properly, one must input a Color ID map into Mesh Data following strict color code guidelines. That means the colors must have exact values and non-partial borders. Colors off by a single digit value will cause it to be counted as a Base color. AE Cloth supports up to 7 material partitions. For more information on Color ID, look at the following section.

For best results, make sure to fulfill all of the **Mesh Data** requirements. Missing or inappropriate **Mesh Data** maps may create undesirable results during usage.

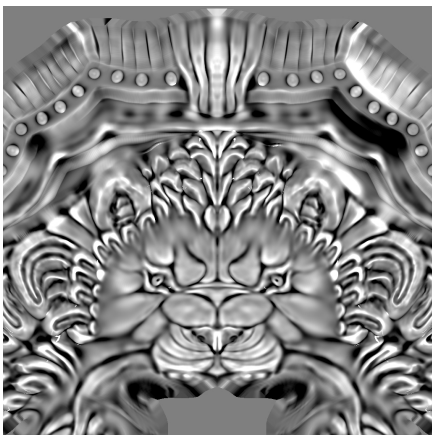
Mesh Data maps are plugged and utilized in the following effects:

Height		
	Abrasion	Materials > B, R, G, B, C, Y, M > Abrasion
Normal		
	Abrasion	Materials > B, R, G, B, C, Y, M > Abrasion
Color ID		
	Seams	Materials > B, R, G, B, C, Y, M > Seams
	Fabric Holes	Global FX > Fabric Holes
World Space Normals		
	Edge Wear	Materials > B, R, G, B, C, Y, M > Edge Wear
	Dust	Global FX > Dust
Ambient Occlusion		
	Dirtiness	Materials > B, R, G, B, C, Y, M > Dirtiness
	Dust	Global FX > Dust

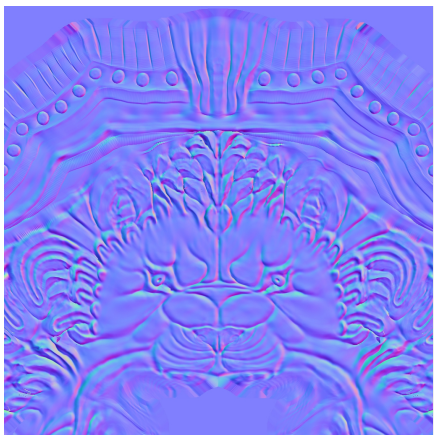
* All maps plug into Diagnostics and Mesh Data effects.

The five Mesh Data maps that AE uses:

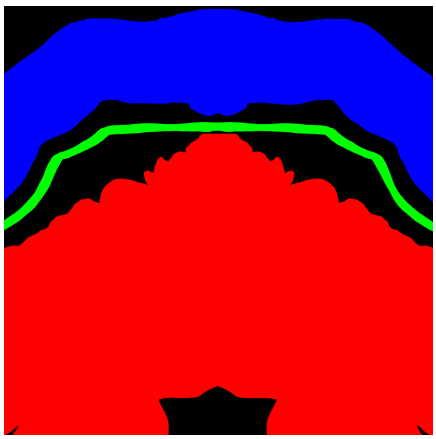
Height



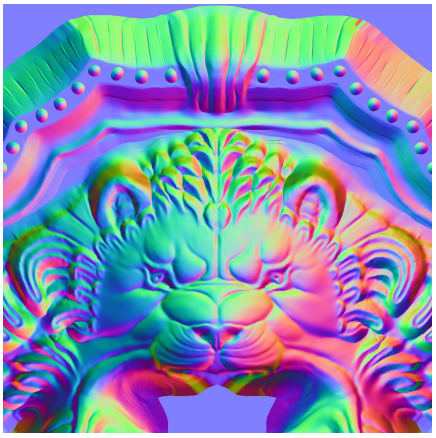
Normal



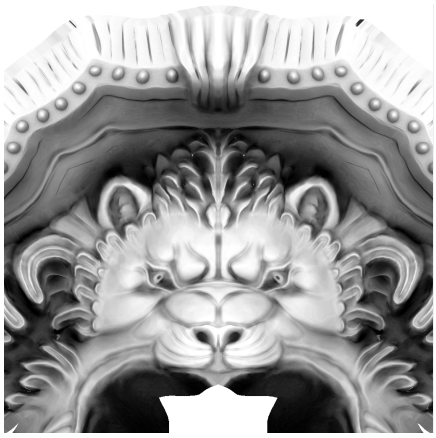
Color ID



World Space Normals



Ambient Occlusion



Materials x7

Materials are the meat and bones of **AE Cloth**, it is portioned out by **Color ID**. As such, **Materials** sport the largest range of material affects. Without a **Color ID** map, the graph resorts to the **Base** Material. It is recommended to use pure black to designate areas of the **Base** material.

Materials

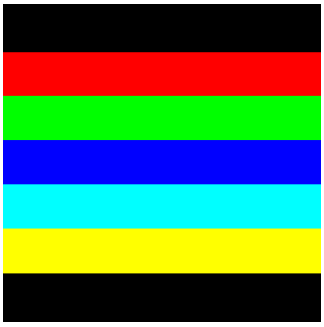
There are a total of 7 materials that can be mixed and matched to create an assortment of apparel designs. They are all on standby, waiting for instructions from the **Color ID** channel to appear.

Parameter	Preset	Range	Usage
Base...	-	-	Background Material demarcated by colors not of the following.
Red...	-	-	Material demarcated by pure Red RGB(255, 0, 0) in the **Color ID** map.
Green...	-	-	Material demarcated by pure Green RGB(0, 255, 0) in the **Color ID** map.
Blue...	-	-	Material demarcated by pure Blue RGB(0, 0, 255) in the **Color ID** map.
Cyan...	-	-	Material demarcated by pure Cyan RGB(0, 255, 255) in the **Color ID** map.
Yellow...	-	-	Material demarcated by pure Yellow RGB(255, 255, 0) in the **Color ID** map.
Magenta..	-	-	Material demarcated by pure Yellow RGB(255, 0, 255) in the **Color ID** map.

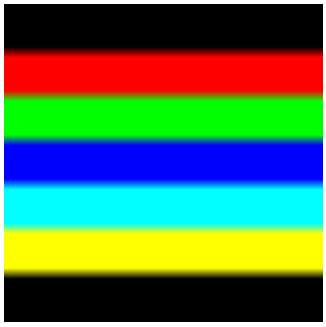
Color ID maps should have pure colors with clean and crisp edges and keep within the bounds of the seven designated options.

Dos and dont's of Color ID:

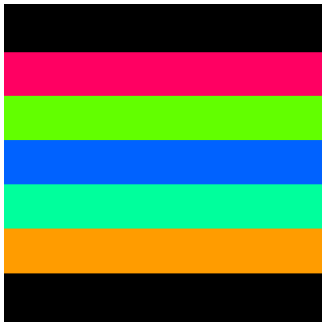
✓ A good Color ID map:



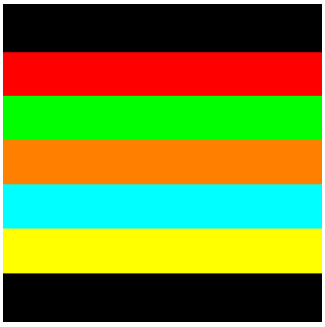
✗ Don't have blurry edges:



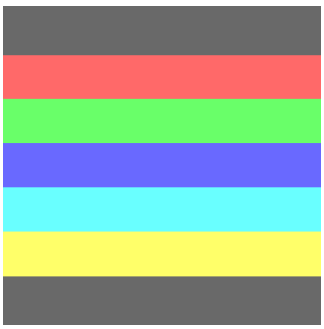
✗ Avoid shifts in hue:



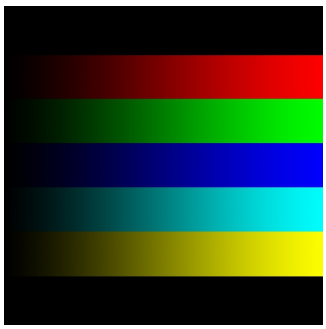
✗ Avoid off-limit colors:



✗ Don't include alpha:



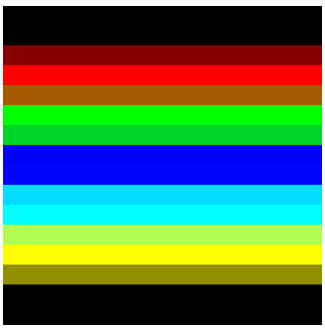
✗ Don't have gradients:



✗ Don't desaturate the colors:



✗ Don't blend the colors:



Materials > Base, Red, Green, Blue...

The following parameters are available for material Base, Red, Green, Blue, Cyan, Yellow, and Magenta. With the exception of the first base material, all other materials have the option to produce seams. Every material has a unique material type preset to facilitate regional display of the partitioning from **Color ID**. Input channels such as Diffuse, Base Color, Normal, Specular, Emissive, Roughness, Metallic, Height, Opacity, and AO channel inputs are invisible unless the **Material Type** is set to **Input**.

Parameter	Preset	Range	Usage
Diffuse	None [...]	Input	Input channel available when material type is set to **Input**.
Base Color	None [...]	Input	Input channel available when material type is set to **Input**.
Normal	None [...]	Input	Input channel available when material type is set to **Input**.
Specular	None [...]	Input	Input channel available when material type is set to **Input**.
Emissive	None [...]	Input	Input channel available when material type is set to **Input**.
Roughness	None [...]	Input	Input channel available when material type is set to **Input**.
Metallic	None [...]	Input	Input channel available when material type is set to **Input**.
Height	None [...]	Input	Input channel available when material type is set to **Input**.
Opacity	None [...]	Input	Input channel available when material type is set to **Input**.
AO	None [...]	Input	Input channel available when material type is set to **Input**.
Material Type	Fabric	List	Switch between Input Maps, Generator, Fabric, Leather, Metallic, or Other.
Fabric Type	*	List	Switch between the subcategories available for each **Material Type**.
Tweak...	-	-	Manipulates the color and gray-scale values of the material channels.
Generator...	-	-	Generates and adjusts procedural materials such as Wood and Leather.
Transform...	-	-	Manipulates the placement of the material textures.
Plaid...	-	-	Generates strips and plaid patterns on the material.
Patterns...	-	-	Generates repeat design patterns on the material.
Blemishes...	-	-	Gives metallic materials some characteristics such as nicks and streaks.
Paint Peel...	-	-	Creates a peeling effect either as a paint like material or an exposed material.
Rust...	-	-	Procedural generated rust overlay. Can be adjust to look like verdigris.
Edge Wear...	-	-	Edge wear effect derived from Height map in **Mesh Data**.
Abrasion...	-	-	Wear effect derived from protruding parts of a mesh.
Gashes 1...	-	-	Various gash and cut effects. Can be combined with **Gashes 2**.
Gashes 2...	-	-	Various gash and cut effects. Can be combined with **Gashes 1**.
Dirtiness...	-	-	Layers a thin film of dirt on top of the material.
Seams...	-	-	Customizes the look of borders between different material regions.

* The default for Fabric Type is different for each material.

* No matter how large or small, all input textures will be re-sampled to the resolution of the **Output Size**.

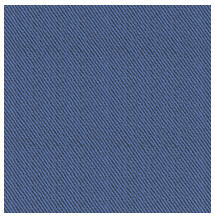
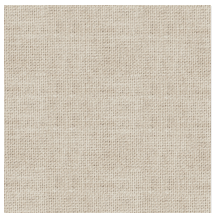
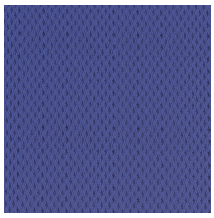
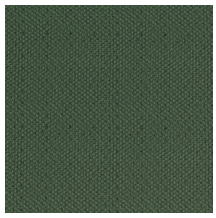
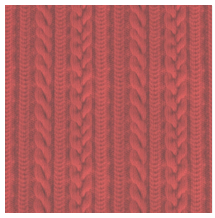
In the latter sections you may notice the **Enable** parameter which can be used to disable or enable the encompassing effect entirely. This lets the subset graph be skipped completely, making it a non-factor in the calculation of the **AE Cloth** graph, thus freeing up additional system resources.

The following embedded material options are available for **AE Cloth**:

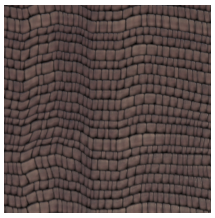
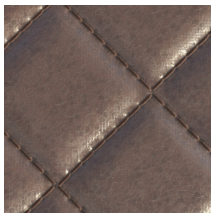
Different types of generators:

Leather	Wood
	

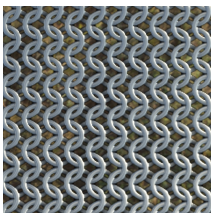
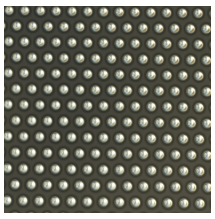
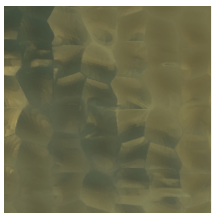
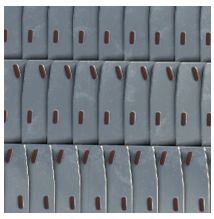
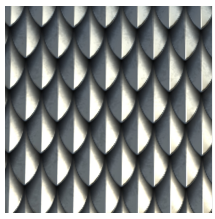
Different types of embedded fabrics:

Cotton	Denim	Linen	Lycra	Nylon	Sweater
					

Different types of embedded leathers:

Cordovan	Crocodile	Full Grain	Plush
			

Different types of embedded metals:

Chain-mail	Dotted	Faceted	Plated-mail	Pure Gold	Scale Armour
					

Other embedded materials:

Fur	Basket Weave
	

Materials > * > Tweak

Tweak is a material channel superset that is used to modify the input channels and output the results. When it is switched on, the material do not undergo changes as the default values are neutral (0.5). Parameters adjusted to the left and right of neutral will produce an effect that deviates from the mean.

Parameter	Preset	Range	Usage
Enable	Off	Boolean	Disable or enable the tweak effect.
Color	0.50, 0.50, 0.50, 0.50	0.0 - 1.0	Contrast, Luminosity, Hue, Saturation for Diffuse and Base Color.
Normal Intensity	0.50	0.0 - 1.0	Changes Normal from neutral flat to exaggerated.
Specular	0.50	0.0 - 1.0	Contrast, Luminosity controls for traditional shininess parameter.
Emissive	0.50, 0.5	0.0 - 1.0	Contrast, Luminosity controls for the Glow map.
Roughness	0.50, 0.50	0.0 - 1.0	Contrast, Luminosity controls for PBR micro-surface parameter.
Metallic	0.50, 0.50	0.0 - 1.0	Contrast, Luminosity controls for PBR parameter.
Ambient Occlusion	0.50, 0.50	0.0 - 1.0	Contrast, Luminosity controls for Ambient Occlusion.
Height	0.50, 0.50	0.0 - 1.0	Contrast, Luminosity controls for the mesh displacement.
Opacity	0.50, 0.50	0.0 - 1.0	Contrast, Luminosity controls for the visibility of the o

Materials > * > Generator

Material generators are procedural material originators. Texture channels are sourced from the generator which can then be manipulated down the graph assembly. Generators take up very little storage space in the overall graph due to it's mathematical nature. However, it is with this very same reason that generators can oftentimes be slower to operate due to its processing. Generators do not suffer resolution loss and downsize rather well with decent pixel sampling. Whether it is used or not, **Generator** is always available for adjustments.

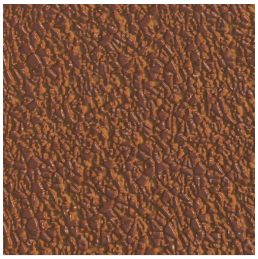
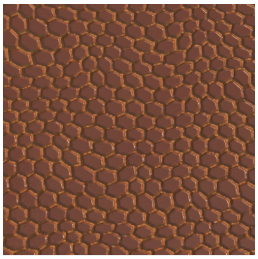
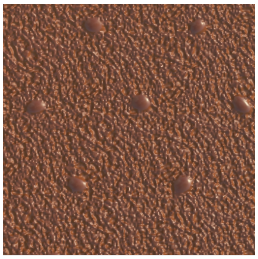
Parameter	Preset	Range	Usage
Category	Leather	List	Switches between procedural **Leather** or **Wood** generator.
Leather...	-	-	Procedural generator for creating various types of leather base materials.
Wood...	-	-	Procedural generator for creating various types of wood base materials.

Materials > * > Generator > Leather

This generator can be used to provide a fundamental starting point for fabric made of animal hide. Attention should be paid to creating micro level details while the surface level details should still be derived from **Mesh Data** such as folds, large wrinkles, etc.

Parameter	Preset	Range	Usage
Type	Cow	List	Switch between Cow, Snake, Crocodile, Ostrich, and Raw Hide.
Color	0.675, 0.420, 0.238	RGB	RGB controls for Diffuse and Base Color of the leather material.
Pattern	0	0 - 10	Provides 11 possible variations for the procedural parts of the graph.
Varnish	0.25	0.0 - 1.0	Apply and adjust a thin layer of lacquer on the leather.
Texture	0.30	0.0 - 1.0	Weaken or strengthen the Normal and AO strength.
Variation...	-	-	Varies **Color** with random noise pattern.
Scratches...	-	-	Creates a variation of small to tiny scratch marks.
Winkles...	-	-	Creates a variation of surface level wrinkles and crinkles.
Warp...	-	-	Varies and smears the pattern of the leather.
Rot...	-	-	Can be used to create molding or dirt patterns.

Available leather generator types:

Cow	Snake	Crocodile	Ostrich	Raw Hide
				

Materials > * > Generator > Leather > Variation

Leather variation can be used to mix in other color hues based on a random pattern. The variation color itself is a derivation of the base leather colors adjustable with hue, saturation, and lightness controls. With the absence of color variation, the leather can look artificial.

Parameter	Preset	Range	Usage
Amount	0.25	0.0 - 1.0	Increase or decrease the **Color** variation for the leather material.
HSL	0.50, 0.50, 0.53	0.0 - 1.0	Hue, saturation, lightness adjustments for leather **Variation**.

Materials > * > Generator > Leather > Scratches

Leather scratches is one of the several imperfections that can be added to the generator. Scratches purpose is to provide surface level micro-details that is the result of rubbing or abrasive contact with other rough surfaces.

Parameter	Preset	Range	Usage
Intensity	0.50	0.0 - 1.0	Weaken or strengthen the scratches effect.
Amount	100	0 - 10,000	Decrease or increase the number of strands.
Scale	0.10	0.0 - 1.0	Shorten or length the strands of scratches.

Materials > * > Generator > Leather > Wrinkles

Leather wrinkles is one of the several imperfections that can be added to the generator. Wrinkles purpose is to provide surface level micro-details that is the result of temperature or compressive pressures.

Parameter	Preset	Range	Usage
Intensity	0.50	0.0 - 1.0	Weaken or strengthen the wrinkles effect.
Amount	250	1 - 500	Decrease or increase the number of strands anywhere from 1 to 250.
Scale	1.00	0.0 - 1.0	Shorten or length the strands of wrinkles.

Materials > * > Generator > Leather > Warp

Leather warp can be used to distort the generator at a cellular level. Uniform warp is distributed across all directions while horizontal and vertical warp mimic the effect of stretching.

Parameter	Preset	Range	Usage
Type	Uniform	List	Select between uniform, horizontal, and vertical forms distortions.
Amount	0.50	0.0 - 1.0	Decrease or decrease the amount of distortions.

Materials > * > Generator > Leather > Rot

Leather rot can be used to apply the effects of molding. With some hue, saturation, and level adjustments, rot can also be used to mimic chemical based discolorations.

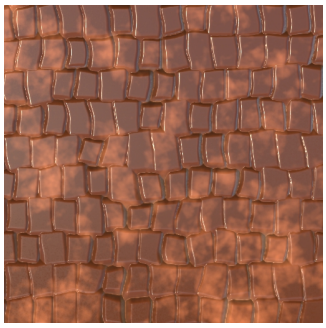
Parameter	Preset	Range	Usage
Amount	0.00	0.0 - 1.0	Add splotches of mold.
HSL	0.54, 0.31, 0.47	0.0 - 1.0	Hue, saturation, lightness controls for diffuse and base color of **Rot**.

Different leather generator effects:

Original Crocodile



Variation



Scratches



Wrinkles



Warp



Rot



Materials > * > Generator > Wood

This generator can be used to provide a fundamental starting point for hard materials made of wood. Take care not to mix cloth related effects on top of wood, in which case, the result may look unsuitable.

Parameter	Preset	Range	Usage
Pattern	0	0 - 10	Up to 11 combinations to vary the procedural parts of **Wood**.
Color	0.824, 0.577, 0.375	RGB	Adjusts the Diffuse and Base Color for the wood material.
Age	0.00	0.0 - 1.0	Used to make the wood textures look older.
Lacquer	0.50	0.0 - 1.0	Applies and adjust a thin layer of varnish on the wood.
Texture	0.10	0.0 - 1.0	Increases or decreases the Normal and Ambient Occlusion.
Strands...	-	-	Adds and modifies the look of the primary wood grains.
Knots...	-	-	Adds and modifies the look of wood knots.
Cross Grains...	-	-	Adds and modifies the look of minute wood cross grains.
Rot...	-	-	Can be used to create molding or dirt spots.

Materials > * > Generator > Wood > Strands

Wood strands are the primary wood grains which stand out as the most prominent feature. Wood strands gives this material it's characteristic wooden look and feel.

Parameter	Preset	Range	Usage
Amount	0.50	0.0 - 1.0	Increase or decrease the number of primary wood grains.
HSL	0.49, 0.60, 0.40	0.0 - 1.0	Hue, saturation, lightness controls for the primary wood grains.
Length	0.50	0.0 - 1.0	Contracts or lengthens the strands of the primary wood grains.
Polish	0.50	0.0 - 1.0	Increases or decreases the smoothness of the primary wood grains.
Depth	0.25	0.0 - 1.0	Increases or decreases the deepness of the primary wood grains.

Materials > * > Generator > Wood > Knots

Wood knots are derived from the wood strands by taking the ones available and warping them in a circular formation. For this very reason, the visual result of the knots are highly dependent on the visual settings of the strands.

Parameter	Preset	Range	Usage
Amount	0.50	0.0 - 1.0	Increase or decrease the number of wood knots.
Disorder	0.00	0.0 - 1.0	Decrease or increase the uniformity of the wood knots.

Materials > * > Generator > Wood > Cross Grains

Cross grains are smaller wood grains that run perpendicular to the wood strands. Cross grains supplement the primary wood grains with greater detail and character.

Parameter	Preset	Range	Usage
Amount	0.25	0.0 - 1.0	Increases or decreases the number of tiny cross grains running parallel to **Strand**.
Depth	0.50	0.0 - 1.0	Shallow or deepen the tiny cross grains.
Length	0.50	0.0 - 1.0	Increase or decrease the size of the cross grains length-wise.

Materials > * > Generator > Wood > Rot

Wood rot can be used to mimic the growth of mold or chemical agitants that discolor the wood in some form or another. Wood rot starts growing from the wood strands spreading outward.

Parameter	Preset	Range	Usage
Amount	0.00	0.0 - 1.0	Increase or decrease the number and spread of the rot.
HSL	0.52, 0.48, 0.39	0.0 - 1.0	Hue, saturation, lightness adjustments for the rot color.

Strands



Knots



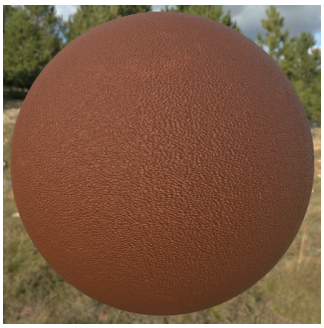
Cross Grains



Rot



The varnish effect:

Leather with no varnish.	Leather with max varnish.	Wood with no varnish.	Wood with max varnish.
			

Materials > * > Transform

Material transform is a superset modifier that seamlessly manipulates the UV dimensions of the input channels. Material transform only influences generators, input maps, and embed textures.

Parameter	Preset	Range	Usage
Enable	Off	Boolean	Disable or enable the material texture UV transformations.
Horizontal	0.00	-1.0 - 1.0	Move the wrapped textures toward the left or right of the UV space.
Vertical	0.00	-1.0 - 1.0	Move the wrapped textures toward the bottom or top of the UV space.
Rotate	0.00	-1.0 - 1.0	Spin the wrapped textures counter-clockwise or clockwise.
Tiling	1	1 - 20	Integer control for increasing or decreasing the density of the texture space.
Scale	1.00	0.01 - 1.0	Decrease or increase the width and height of the textures.
Width	1.00	0.01 - 1.0	Contract or elongate the width of the textures.
Sheer Horizontal	0.00	-1.0 - 1.0	Causes the top and bottom side of the textures to shift left and right.
Sheer Vertical	0.00	-1.0 - 1.0	Causes the right and left side of the textures to shift up and down the UV.

Materials > * > Plaid

Plaid generator is a material enhancer that can be used to create crisscrossed horizontal and vertical bands in multiple colors such as the Scottish Tartan. It can also be modified to create stripes by re-aligning or taking out perpendicular facing stripes to create patterns like the French Breton Stripes. Plaid can also be applied in other creative ways like making the crevices in wood planks.

Parameter	Preset	Range	Usage
Enable	Off	Boolean	Disable or enable the **Plaid** enhancer.
Strip A	1.00, 0.00, 0.00	RGB	RGB control for the Diffuse and Base Color of the first stripe option.
Strip B	0.00, 1.00, 0.00	RGB	RGB control for the Diffuse and Base Color of the second stripe option.
Strip C	0.00, 0.00, 1.00	RGB	RGB control for the Diffuse and Base Color of the third stripe option.
Strip D	1.00, 0.00, 1.00	RGB	RGB control for the Diffuse and Base Color of the fourth stripe option.
Opacity	1.00, 1.00, 1.00, 1.00	0.0 - 1.0	Consolidated stripe visibility controls for **Stripe A**, **B**, **C**, **D**.
Blur	0.00, 0.00, 0.00, 0.00	0.0 - 10.0	Consolidated stripe blurring controls for **Stripe A**, **B**, **C**, **D**.
Stripes...	-	-	Placement related controls for each individual stripe.
Normals...	-	-	Emboss related controls for all of the stripes.
Material...	-	-	Other material related controls not related to Color for all of the stripes.

Materials > * > Plaid > Stripes

Plaid stripes can be used to modify the positioning and the spacing of the stripe bars. With the exception of **Tile**, all of the stripe parameters control the bars on an individual basis.

Parameter	Preset	Range	Usage
Iteration	4, 4, 4, 4	0 - 8	Decreases or increases the number of stripes.
Thickness	0.20, 0.20, 0.20, 0.20	0.0 - 0.5	Contracts or widens the thickness of the stripes.
Offset	0.00, 0.10, 0.20, 0.30	-1.0 - 1.0	Shifts the position of the stripes sideways.
Rotation	0, 90, 0, 90	-360 - 360	Angle the stripes from -360 to 360 degrees.
Tile	1, 1	1 - 10	Decrease or increase the density of stripes horizontally and vertically.

Materials > * > Plaid > Normals

The purpose of plaid Normals is to create a dimensional look and feel from the stripes. Regardless of individual stripe settings, all of the strips are combined together when calculating the Normals effect.

Parameter	Preset	Range	Usage
Invert	On	Boolean	Emboss outward or bevel inward for all of the strips.
Bevel	2.00	0.0 - 50.0	Decrease or increase the degree of beveling and embossing.
Distance	0.00	-1.0 - 1.0	Float control for changing the edge thickness of the beveling and embossing.
Flatness	0.00	0.0 - 1.0	Preserve or flatten out the Normals underneath all of the stripes.
Smoothing	0.60	0.0 - 5.0	Float control to change the softness of the beveling and embossing edges.

Materials > * > Plaid > Material

Plaid material controls some material based parameters of the entire plaid pattern, irrespective of individual stripes and their settings. This is so that the plaid pattern can distinguished as it's own unique material.

Parameter	Preset	Range	Usage
Roughness Adjustment	0.50	0.0 - 1.0	Decrease or increase the smoothness of the micro-surfaces.
Metallic Contrast	0.00	-1.0 - 1.0	Increase or decrease blending of the metallic and non-metallic parts.
Metallic Luminosity	0.00	-1.0 - 1.0	Decrease or increase the strength of the metallic parts.
Specular Contrast	0.00	-1.0 - 1.0	Decreases or increases the starkness of the specularity on the stripes.
Specular Luminosity	0.00	-1.0 - 1.0	Decreases or increases the strength of the specularity on the stripes.

Materials > * > Patterns

All materials share the use of 3 pattern generators that lie outside of the material group. To control how each one of the patterns are displayed, the patterns control offers adjustments for the way that the 3 patterns are fed into the graph. The proper operation is to adjust the pattern generators on the parent level then enable and adjust how it is received by modifying the material patterns.

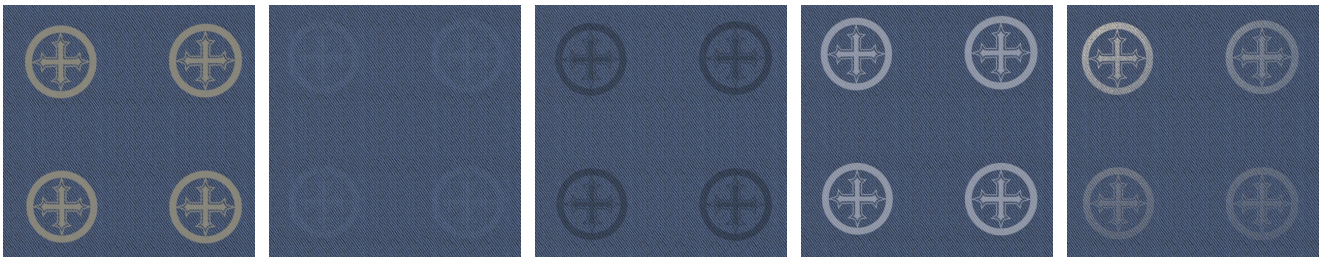
Parameter	Preset	Range	Usage
Pattern 1...	-	-	Control the contribution from **Pattern 1** on a per channel basis.
Pattern 2...	-	-	Control the contribution from **Pattern 2** on a per channel basis.
Pattern 3...	-	-	Control the contribution from **Pattern 3** on a per channel basis.

Materials > * > Patterns > Pattern 1, 2, 3

Material patterns exclusively control the way that pattern groups contribute to the material, thereby the user can mix and match the channels effected on the broader material. Patterns must be enabled before it can receive inputs form the pattern groups. To adjust the patterns themselves, modify them directly under the **Patterns** main group.

Parameter	Preset	Range	Usage
Enable	Off	Boolean	Toggle off or on the pattern layer.
Color Intensity	1.00	0.0 - 1.0	Weaken or strengthen the Diffuse and Color contribution.
Surface Intensity	1.00	0.0 - 1.0	Weaken or strengthen the Normal and AO contribution.
Reflectance Intensity	1.00	0.0 - 1.0	Weaken or strengthen the Specular and Metallic contribution.
Emissive Intensity	1.00	0.0 - 1.0	Weaken or strengthen the Glow contribution.
Microsurface Intensity	1.00	0.0 - 1.0	Weaken or strengthen the Roughness and Glossiness contribution.

Color only | Surface only | Reflectance only | Emissive only | Microsurface only



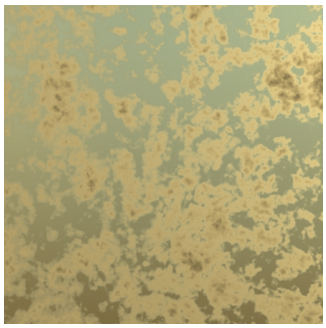
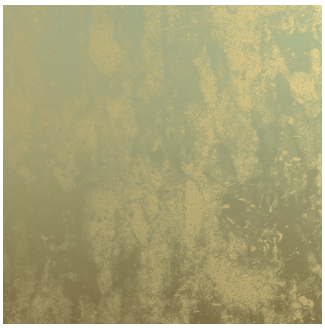
Materials > * > Blemishes

Blemishes is an exclusively physically based rendering effect that gives metallic surfaces its age and character. Metallic surfaces in reality, is rarely perfect, therefore blemishes offer a great way to make natural looking metals. Blemishes are comprised of 3 main components:

Specks: medium to large spots of discoloration caused by impurities in the metal.
Streaks: thin long single directional lines caused by machining and extrusion.
Speckling: tiny spots of discoloration caused by formations of air bubbles from the cooling of the liquid metal.

Parameter	Preset	Range	Usage
Enable	Off	Boolean	Disable or enable the blemishes effect.
Pattern	0	0 - 10	Provides 11 possible variations for the procedural parts of the graph.
Offset	0.00, 0.00	-0.5 - 0.5	Moves the blemishes left or right and down or up.
Scale	100	10 - 100	The overall size of the blemishes pattern.
Base Roughness	0.00	0.0 - 0.5	Make the entire material more shiny or matte.
Specks Intensity	0.80	0.0 - 1.0	Weaken or strengthen the medium sized specks effect.
Specks	0.12	0.0 - 0.5	Decrease or increase the number of speck spots.
Streaks Intensity	0.30	0.0 - 1.0	Weaken or strengthen the directional extrusion lines.
Streaks	0.10	0.0 - 0.5	Decrease or increase the number of streak lines.
Streaks Rotation	0.00	-1.0 - 1.0	Rotate the streak lines counter-clockwise or clockwise capped at one turn.
Speckling	0.04	0.0 - 0.5	Decrease or increase the amount of tiny speckling spots.
Speckling Pattern	0	0 - 10	Provides 11 possible variations for the speckling pattern.
Normal Intensity	0.00	0.0 - 1.0	Flatten or imprint the blemishes pattern on the surfaces of the material.

The 3 components of blemishes:

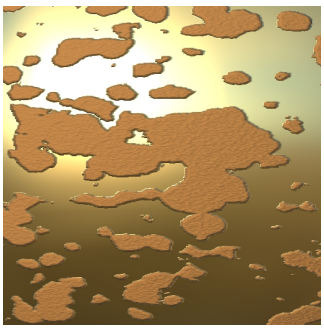
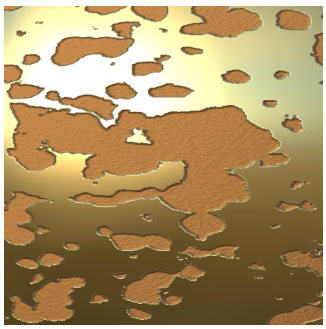
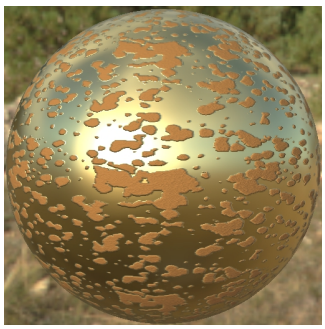
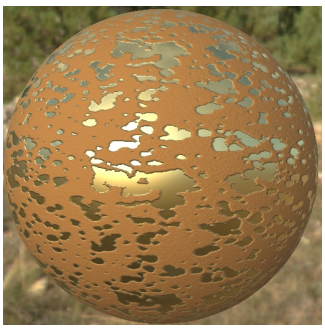
Original	Specks	Streaks	Speckling
			

Blemishes is the only subset graph in **AE Cloth** that is exclusively used for PBR, not accessible under the standard **Traditional** mode. It is designed as such as it is only really suitable for usage with metallic surfaces.

Materials > * > Paint Peel

Paint peel can be used in a usual way or layering paint on top of the material underneath. Or it can be used to appear as if the material itself is peeling with the material underneath derived from the paint peel.

Parameter	Preset	Range	Usage
Enable	Off	Boolean	Toggle off or on the paint peel effect.
Type	Sponge	List	Switch pattern type to Sponge, Blotches, Stucco, Fibers, Plaster, or Mud-cracks.
Amount	0.50	0.0 - 1.0	Decrease or increase the spread of the cover paint.
Pattern	0	0 - 10	Provides 11 possible variations for the pattern distribution.
Invert	Off	Boolean	Invert the paint and bare parts of the material.
Layer	Over	List	Designate whether the paint layer is on top or below the material layer.
Bevel	0.20	0.0 - 1.0	Shrink or expand the extruded edges of the paint layer.
Material...	-	-	Adjust the material contribution and settings for the paint layer.

Layer: Over	Layer: Under	Invert: Off	Invert: On
			

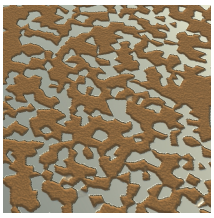
Materials > * > Paint Peel > Material

The paint peel material is rather simplistic as its goal is to mimic coats of wall paint. The range of surface of the paint peel is limited from perfectly smooth to porous.

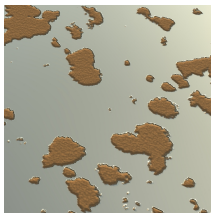
Parameter	Preset	Range	Usage
Color Intensity	1.00	0.0 - 1.0	Weaken or strengthen the Diffuse and Base Color influence.
Color	0.655, 0.453, 0.252	RGB	Select the Diffuse and Base Color of the paint layer.
Normal Intensity	0.50	0.0 - 1.0	Expose or override the Normals underneath the paint layer.
Bumpiness	0.50	0.0 - 1.0	Flatten or roughen the Normals surface for the paint layer.
Roughness Intensity	1.00	0.0 - 1.0	Expose or override the Roughness of the material underneath.
Roughness	0.875	0.0 - 1.0	Make the paint layer shiny or matte.
Metallic Intensity	1.00	0.0 - 1.0	Expose or override the Metallic level of the material underneath.
Metallic	0.00	0.0 - 1.0	Make the paint layer more plastic or more metal.
Specular Intensity	1.00	0.0 - 1.0	Expose or override the Specular level of the material underneath.
Specular	0.173	0.0 - 1.0	Make the painter layer more reflective or matte.

Available paint peel patterns:

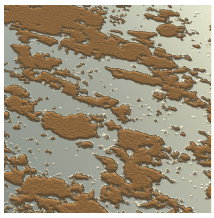
Sponge



Blotches



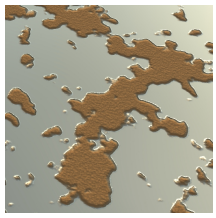
Stucco



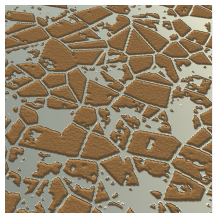
Fibers



Plaster



Mud Cracks



Materials > * > Rust

Material rust can be used to simulate metallic rusting, copper verdigris, or produce effects that deviate widely from its intended usage such as another glorified dirt generator, burn marks, etc. Rust is composed of 3 main components:

Spots: are the result of oxidation with the impurities that lie within the metal, which are tiny in size.
Edges: the edges are the boundaries of the rust that mark regions still in the incomplete process of oxidation.
Ring: the outer boundaries of the rust that mark regions that are undergoing the process of oxidation.

Parameter	Preset	Range	Usage
Enable	Off	Boolean	Disable or enable the rust effect.
Pattern	0.00	0.0 - 100.0	Adjust the gradual variation of the rust pattern.
Invert	Off	Boolean	Swap the rust areas and bare areas.
Amount	0.35	0.0 - 1.0	Decrease or increase the spread of the rust areas.
Color	0.541, 0.28, 0.00	RGB	Select the Diffuse and Base Color for the background of the rust pattern.
Bumpiness	0.50	0.0 - 16.0	Decrease or increase surface irregularities of the rust pattern.
Spots...	-	-	Adjust the material variation of the rust pattern.
Edges...	-	-	Adjust the look of the rust pattern borders.
Ring...	-	-	Adjust the look and feel of the outline beyond the rust pattern borders.

Materials > * > Rust > Spots

Rust spots is ideal adjustment for modifying the look of rust irregularities. Rust spots greatly enhances the natural look of metallic oxidation.

Parameter	Preset	Range	Usage
Amount	0.20	0.0 - 1.0	Decrease or increase the amount of rust material variation.
Hue	0.47	0.0 - 1.0	Deviate hue-wise from the rust **Color** for the rust region.
Saturation	0.49	0.0 - 1.0	Deviate saturation-wise from the rust **Color** for the rust region.
Lightness	0.48	0.0 - 1.0	Deviate value-wise from the rust **Color** for rust regions.

Materials > * > Rust > Edges

Rust edges are the inner boundaries of the rust pattern. It's distance is predetermined for simplicity.

Parameter	Preset	Range	Usage
Hue	0.48	0.0 - 1.0	Deviate hue-wise from the rust **Color** for the rust borders.
Saturation	0.29	0.0 - 1.0	Deviate saturation-wise from the rust **Color** for the rust borders.
Lightness	0.40	0.0 - 1.0	Deviate value-wise from the rust **Color** for rust border.

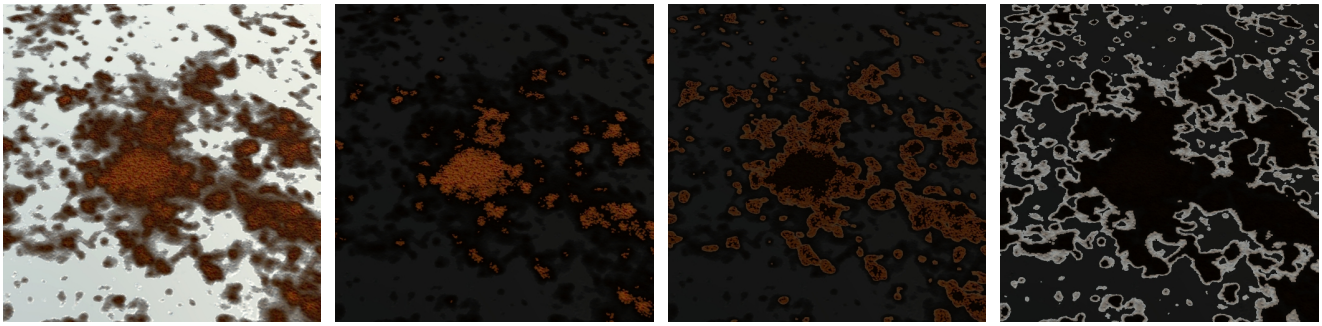
Materials > * > Rust > Ring

Rust rings are the outer boundaries of the rust pattern. It's distance can be adjusted to eat into the material underneath it. Rust ring is the effect of oxidation effects that is taking place but not yet complete.

Parameter	Preset	Range	Usage
Range	0.40	0.0 - 0.5	Compress or widen the rust outline regions.
Color Hue	0.50	0.0 - 1.0	Deviate hue-wise from the rust **Color** for the rust outlines.
Color Saturation	0.35	0.0 - 1.0	Deviate saturation-wise from the rust **Color** for the rust outlines.
Color Lightness	0.44	0.0 - 1.0	Deviate value-wise from the rust **Color** for rust outlines.
Bumpiness	0.50	0.0 - 1.0	Smooth or roughen the surfaces of the rust outline regions.
Specularity	-0.40	-1.0 - 1.0	Deviate from the Specular value of the material underneath.
Roughness	0.70	-1.0 - 1.0	Deviate from the Roughness value of the material underneath.
Metalness	-0.24	-1.0 - 1.0	Deviate from the Metalness value of the material underneath.

Rust regions:

Default	Spots	Edges	Ring



Materials > * > Edge Wear

Edge wear is the effect of an object rubbing against other rough surfaces and in turn having it's protruding edges being scraped off. It relies on the world space normal map in the **Mesh Data** set, without it, the edge wear effect will not appear when turned on.

Parameter	Preset	Range	Usage
Enable	Off	Boolean	Disable or enable the edge wear effect.
Amount	0.50	0.0 - 1.0	Shrink or spread the edge wear effect.
Thickness	0.20	0.0 - 1.0	Thin or thicken the edge wear effect.
Spread	0.20	0.0 - 1.0	Spread the wear effect beyond the edges of the object.
Noise Type	Scratches	List	Change the edge wear pattern type between scratches, blotches, or powder.
Noise Density	1.00	1.0 - 32.0	Zoom out or into the edge wear noise type.
Noise Warp	0.20	0.0 - 1.0	Make the edge wear noise more uniform or distorted.
Material...	-	-	Adjust the material exposed by the edge wear.

Materials > * > Edge Wear > Material

Edge wear material can be adjusted to achieve the desired look of the exposed surface.

Parameter	Preset	Range	Usage
Color	■ 0.00, 0.00, 0.00	RGB	Adjust the Diffuse and Base Color of the edge wear.
Bumpiness	1.00	0.0 - 3.0	Smooth or roughen the surface of the edge wear.
Roughness	0.498	0.0 - 1.0	Dull or buff the shininess of the edge wear.
Metallic	0.00	0.0 - 1.0	Make the edge wear material more plastic or metallic.
Specular	0.498	0.0 - 1.0	Decrease or increase the reflectivity of the edge wear.

Materials > * > Abrasion

Abrasion is the result of the protruding parts of an object becoming chafed by being in contact with other surfaces. Abrasion regions are calculated from **Mesh Data** height and normal map. Or it can be customized with an input gray-scale texture map.

Parameter	Preset	Range	Usage
Enable	Off	Boolean	Disable or enable the abrasion effect.
Derive From	Height	List	Derive the edges mask from height, normal, or input map.
Sharpness	0.00	-1.0 - 1.0	Decrease or increase the contrast level of the edges map.
Area	0.00	-1.0 - 1.0	Shrink or expand the regions of the edges map.
Spread	0.50	0.0 - 1.0	Keep or expand the outer regions of the edges map.
Spread Softness	1.00	0.0 - 5.0	Sharpen or smooth the outer regions of the edges map.
Color	0.20, 0.55, 0.50, 0.40	0.0 - 1.0	Deviate away from the diffuse and base color underneath
Normal Intensity	1.00	0.0 - 1.0	Flatten or agitate the surface of the abrasion material.
Surface Intensity	0.10	0.0 - 1.0	Expose or override the Normals and AO underneath.
Specular Adjustment	0.20	0.0 - 1.0	Deviate away from the shininess underneath.
Roughness Adjustment	-0.75	-1.0 - 1.0	Deviate away from the roughness underneath.
Metallic Adjustment	0.00	-1.0 - 1.0	Deviate away from the metallic level underneath.

Materials > * > Gashes 1, 2

Gashes simulate the look of surface damage by providing some common surface level damage types. Every one of the seven materials support up to 2 gashes.

Parameter	Preset	Range	Usage
Enable	Off	Boolean	Disable or enable the gashes effect.
Pattern...	-	-	Adjust pattern and shape related parameters for the gashes effect.
Material...	-	-	Adjust material related parameters for the gashes effect.

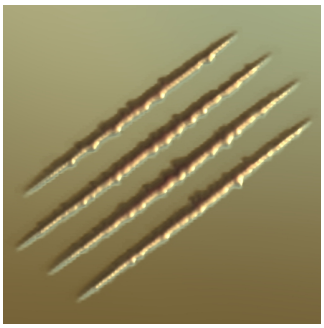
Materials > * > Gashes 1, 2 > Pattern

Pattern controls the creation, placement, and distribution of the gashes.

Parameter	Preset	Range	Usage
Type	Claw Marks	List	Switch between different types of **Gashes** patterns.
Randomize	0	0 - 10	Provides 11 kinds of randomization for the **Gashes** pattern.
Tiling	4	0 - 8	Decrease or increase the number of iterations for repeating the pattern.
Size	0.50	0.0 - 1.0	Shrink or enlarge the global scale for all of the gashes.
Size Variation	200.00	0.0 - 300.0	Make the sizes of every gash uniform or widely varied.
Angle Variation	300.00	0.0 - 360.0	Make the rotations of every gash uniform or widely varied.
Intensity Variation	0.50	0.0 - 1.0	Make the opacity of every gash uniform or widely varied.

7 different types of gashes patterns:

Claw Marks



Curved Claw Marks



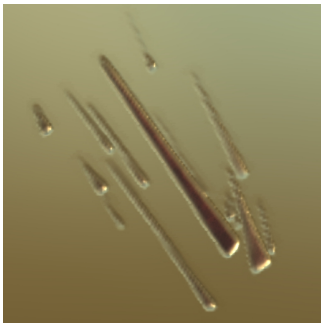
Curved Scratches



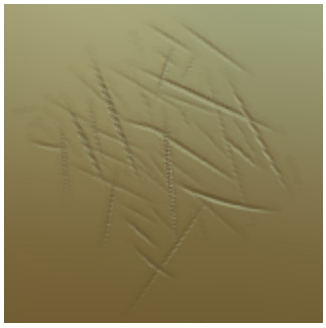
Cuts



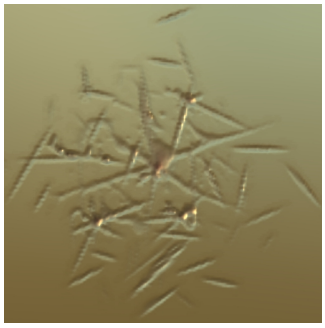
Scrapes



Scratches



Shatters



Materials > * > Gashes 1, 2 > Material

Material controls the look and feel of the substance revealed by the gash patterns.

Parameter	Preset	Range	Usage
Color	0.392, 0.118, 0.118	RGB	The diffuse and base color of the exposed material.
Color Intensity	1.00	0.0 - 1.0	Expose or override the diffuse and base color of the original material.
Normal Intensity	1.00	0.0 - 2.0	Expose or override the surface detail of the original material.
Roughness	0.843	0.0 - 1.0	Make the exposed material more matte or shinny.
Metallic	0.00	0.0 - 1.0	Make the exposed material more plastic or metallic.
Cavity	0.10	0.0 - 1.0	Weaken or intensify the cavity of the gashes.

Materials > * > Dirtiness

Dirtiness resembles that of stains rather than dirt due to its flat nature. Dirtiness placement is generated randomly and has a tendency to gather around the dark areas of the ambient occlusion output. The ambient occlusion output is derived from adding the current material AO with the adjustable contribution from the **Mesh Data** AO.

Parameter	Preset	Range	Usage
Enable	Off	Boolean	Disable or enable the dirtiness effect.
Type	Default	List	Choose between default, sparse, or dense patterns.
Amount	0.50	0.0 - 1.0	Shrink or expand the dirtiness regions.
Mesh Level	1.00	0.0 - 1.0	The amount of dirtiness placement that is derived from the **Mesh Data** AO.
Spread	0.75	0.0 - 1.0	Decrease or increase the amount of dirtiness.
Normal Intensity	0.50	0.0 - 2.0	Smooth or disturb the dirtiness layer.
Disorder	0.00	0.0 - 100.0	Variate the placement of the dirtiness pattern.
Material...	-	-	Adjust the material of the dirtiness layer.

Types of dirtiness:

Original Cloth	Default Dirtiness	Sparse Dirtiness	Dense Dirtiness
			

Materials > * > Dirtiness > Material

Dirtiness material provides parameters to modify the look and feel of the dirtiness layer. One can use the material adjustments to change to a different type of staining such as blood, water, irradiated material, and so forth.

Parameter	Preset	Range	Usage
Color	■ 0.02, 0.02, 0.02	RGB	The diffuse and base color of the dirt material.
Specular	0.498	0.0 - 1.0	The reflectivity of the dirt material.
Roughness	0.941	0.0 - 1.0	How shiny or matte is the dirt material.
Metallic	0.00	0.0 - 1.0	How plastic or metallic is the dirt material.
Emissive	■ 0.00, 0.00, 0.00	RGB	The level of glow emitted from the dirt material.

The dirtiness effect may not be evident when the Ambient Occlusion map is not provided for under **Mesh Data**.

Materials > * > Seams

Seams is not available for the base material, but is an option for all the other materials.

Parameter	Preset	Range	Usage
Enable	Off	Boolean	Remove or add seams around the material region.
Thickness	1.00	1.0 - 5.0	Thin or thicken the width of the seams.
Blur	0.497	0.0 - 1.0	Sharpen or smooth out the seams.
Color	■ 0.00, 0.00, 0.00	RGB	Adjust the diffuse and base color of the seams material.
Color Intensity	0.25	0.0 - 1.0	Expose or override the Diffuse and Base Color underneath.
Normal Intensity	0.50	0.0 - 3.0	Expose or override the Normals underneath.
Specular Intensity	1.00	0.0 - 1.0	Expose or override the reflectivity underneath.
Emissive Color	■ 0.00, 0.00, 0.00	RGB	Lets the seam glow in different colors.
Roughness Value	1.00	0.0 - 1.0	Make the seams material shiny or matte.
Metallic Value	0.00	0.0 - 1.0	Make the material plastic or metal like.
Height Intensity	0.10	0.0 - 1.0	Expose or override the Height level underneath.
AO Intensity	0.25	0.0 - 1.0	Expose or override the Ambient Occlusion underneath.

Patterns x3

All seven materials of the **AE Cloth** share the use of 3 pattern generators which must be enabled on each material on an independent basis. The blending controls are also available under each material controls group.

Patterns

The patterns superset group is a container for the 3 pattern groups. In order to control the way each material interacts with the patterns set, adjust the parameters under **Materials > * > Patterns** individually.

Parameter	Preset	Range	Usage
Pattern 1...	-	-	Provides parameters for the pattern used for Materials > * > Patterns > Pattern 1.
Pattern 2...	-	-	Provides parameters for the pattern used for Materials > * > Patterns > Pattern 2.
Pattern 3...	-	-	Provides parameters for the pattern used for Materials > * > Patterns > Pattern 3.

Patterns > Pattern 1, 2, 3

The pattern graph provides ways to manipulate the patterns itself and modify the material they share.

Parameter	Preset	Range	Usage
Mask	None […]	Input	Input channel for customized pattern mask.
Type	Input	List	Switch between the different types of input or embedded pattern masks.
Use Inputs	Off	Boolean	Either use the embedded channel values or use customized maps.
Octave	4	0 - 8	Divide or multiply the number of patterns by a factor of 2.
Offset	0.00, 0.00, 0.00, 0.00	0.0 - 1.0	Move or variate the entire pattern in UV space, horizontally and vertically.
Rotation	0.00, 0.00	0.0 - 1.0	Rotate each and every pattern uniformly or sporadically.
Size	0.50, 1.00, 0.00	0.0 - 3.0	Scale, elongate, or variate each and every pattern.
Variation	0	0 - 10	Provides 11 possible random variations for the **Pattern** graph.
Tweak...	-	-	Changes the material characteristics of the pattern.

Octave works by taking the taking the previous value and factoring it by four. When octave is increased, the previous value and multiplied by four. When octave is decreased, the previous value is divided by four.

Octave 0 = 1 Pattern



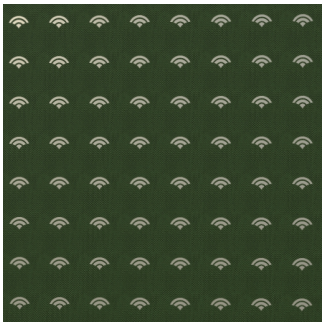
Octave 1 = 4 Patterns



Octave 2 = 16 Patterns



Octave 3 = 64 Patterns



Patterns > Pattern 1, 2, 3 > Tweak

Pattern tweaks provide a way to adjust the material settings for the pattern texture. Pattern textures have starting channel values as explained below.

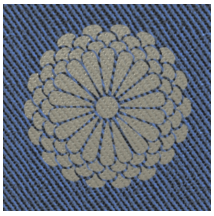
Parameter	Preset	Range	Usage
Enable	Off	Boolean	Disable or enable the pattern tweak effect.
Color	0.50, 0.50, 0.50, 0.50	0.0 - 1.0	Contrast, luminosity, hue, saturation controls for Diffuse and Base Color.
Specular	0.50, 0.50	0.0 - 1.0	Contrast and luminosity controls for the reflectivity of the patterns.
Emissive	0.50, 0.50, 0.50, 0.50	0.0 - 1.0	Contrast, Luminosity controls for the Glow map.
Roughness	0.50, 0.50	0.0 - 1.0	Contrast, Luminosity controls for PBR micro-surface parameter.
Metallic	0.50, 0.50	0.0 - 1.0	Contrast, Luminosity controls for PBR parameter.

The default channel values of the pattern material are all flat colors. Currently **AE Cloth** does nothing with Glossiness and Specular Level. **AE Cloth's** Specular implementation is gray-scale, incompatible with specular / glossiness PBR workflow.

Channel	Value	Channel	Value
Diffuse	RGB 127, 127, 127	Color	RGB 127, 127, 127
Normal	RGB 127, 127, 255	Specular	Gray-scale 127
Emissive	RGB 0, 0, 0	Glossiness	Gray-scale 192
Roughness	Gray-scale 64	Metallic	Gray-scale 0
Specular Level	Gray-scale 127	Ambient Occlusion	Gray-scale 255
Height	Gray-scale 127	Opacity	Gray-scale 255

11 available types of embedded pattern masks:

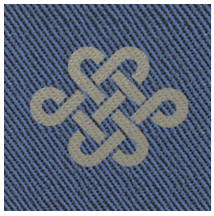
Chrysanthemum



Cross Fleury



Endless Knot



Fleur-de-lis



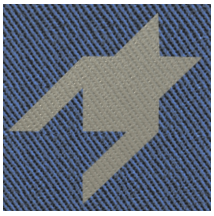
Hanbok



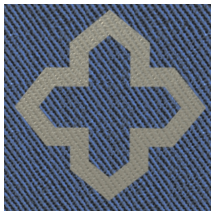
Hibiscus



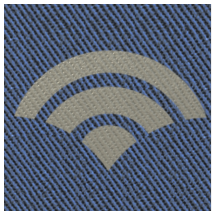
Hounds-tooth



Passion Cross



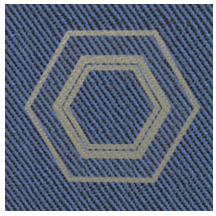
Seigaiha



Tibetan Clouds



Tortuous Shell



Decals x3

AE Cloth provides 3 entirely customizable decals that covers all of the 7 materials. Although decals are meant to be layered on top of the materials, it can also be used to completely cover them thus changing the entire look of the apparel or accessories to how you see fit.

Decals

The decals superset group is a container for the 3 decal groups.

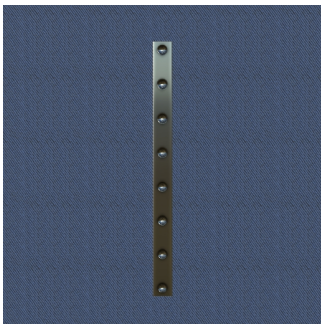
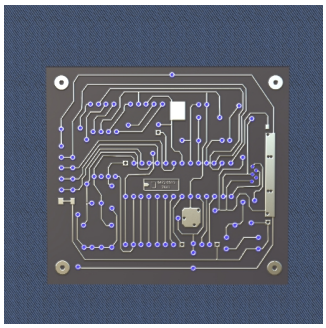
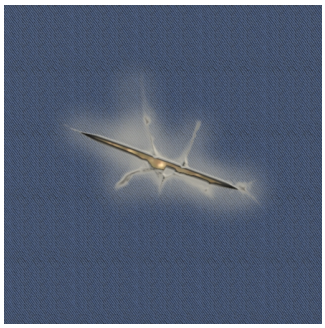
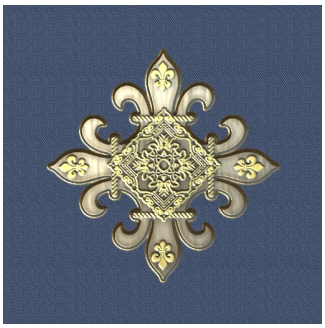
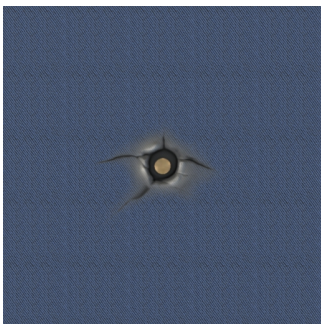
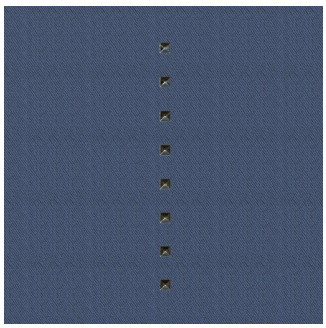
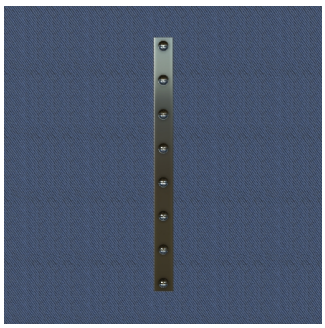
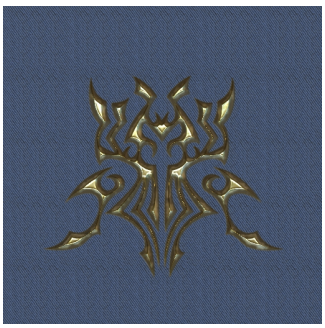
Parameter	Preset	Range	Usage
Decal 1...	-	-	Add and modify the first of the three available decal effects.
Decal 2...	-	-	Add and modify the second of the three available decal effects.
Decal 3...	-	-	Add and modify the third of the three available decal effects.

Decals > Decal 1, 2, 3

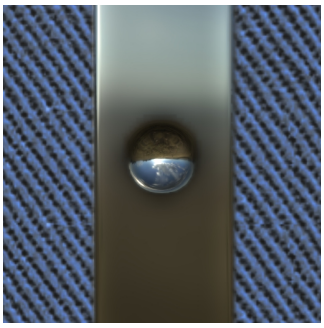
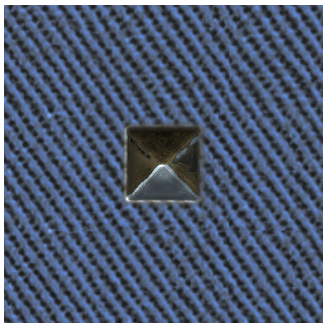
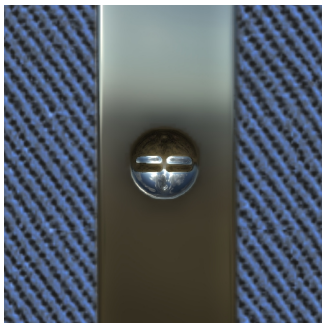
Decals provides a way to input customized textures as well as 8 different embedded texture sets.

Parameter	Preset	Range	Usage
Diffuse	None [...]	Input	Input channel available when decal type is set to **Input**.
Normal	None [...]	Input	Input channel available when decal type is set to **Input**.
Specular	None [...]	Input	Input channel available when decal type is set to **Input**.
Emissive	None [...]	Input	Input channel available when decal type is set to **Input**.
Roughness	None [...]	Input	Input channel available when decal type is set to **Input**.
Metallic	None [...]	Input	Input channel available when decal type is set to **Input**.
AO	None [...]	Input	Input channel available when decal type is set to **Input**.
Height	None [...]	Input	Input channel available when decal type is set to **Input**.
Opacity	None [...]	Input	Input channel available when decal type is set to **Input**.
Mask	None […]	Input	Input channel available when decal type is set to **Input**.
Type	None	List	Switch between different types of decals.
Transform...	-	-	Manipulates the placement of the material textures.
Blend...	-	-	Changes the way in which the decal interacts with the material underneath.
Emboss...	-	-	Controls the way in which the decal layers on top of the material underneath.
Tweak...	-	-	Changes the material characteristics of the decal.

Eight available embedded decals:

Bolt Strip	Circuit Board	Cut	Medieval Pattern
			
Puncture	**Rivets**	**Screw Strip**	**Totem Pattern**
			

Embedded decal details:

Bolt Strip	Rivets	Screw Strip	Totem Pattern
			

Decals > Decal 1, 2, 3 > Transform

Decal transform is a superset modifier that manipulates the UV dimensions of the input channels.

Parameter	Preset	Range	Usage
Horizontal	0.00	-1.0 - 1.0	Move the wrapped textures toward the left or right of the UV space.
Vertical	0.00	-1.0 - 1.0	Move the wrapped textures toward the bottom or top of the UV space.
Rotate	0.00	-1.0 - 1.0	Spin the wrapped textures counter-clockwise or clockwise.
Scale	0.50	0.01 - 0.5	Integer control for increasing or decreasing the density of the texture space.
Width	1.00	0.01 - 0.5	Decrease or increase the width and height of the textures.

Decals > Decal 1, 2, 3 > Blend

Decals blend provides a way to change the way each decal interacts with the material underneath. Decal blend is always enabled by default.

Parameter	Preset	Range	Usage
Diffuse Intensity	1.00	0.0 - 1.0	Expose the Diffuse underneath or override it with the decal's own.
Base Color Intensity	1.00	0.0 - 1.0	Expose the Base Color underneath or override it with the decal's own.
Normal Intensity	1.00	0.0 - 1.0	Expose the Normals underneath or override it with the decal's own.
Specular Intensity	1.00	0.0 - 1.0	Expose the Specular underneath or override it with the decal's own.
Emissive Intensity	1.00	0.0 - 1.0	Expose the Emissive underneath or override it with the decal's own.
Roughness Intensity	1.00	0.0 - 1.0	Expose the Roughness underneath or override it with the decal's own.
Metallic Intensity	1.00	0.0 - 1.0	Expose the Metallic underneath or override it with the decal's own.
AO Intensity	1.00	0.0 - 1.0	Expose the Ambient Occlusion underneath or override it with the decal's own.
Height Intensity	1.00	0.0 - 1.0	Expose the Height underneath or override it with the decal's own.
Opacity Intensity	1.00	0.0 - 1.0	Expose the Opacity underneath or override it with the decal's own.

Decals > Decal 1, 2, 3 > Emboss

Decal emboss provides a way for the decal to pop out from or sink into the material underneath. Emboss only works if the decal has a mask pattern.

Parameter	Preset	Range	Usage
Enable	Off	Boolean	Disable or enable the emboss effect on the decal.
Invert	Off	Boolean	Whether to emboss out or embed in the decal pattern.
Intensity	5.00	0.0 - 50.0	Flatten or extrude the decal pattern from the surface of the underlying material.
Distance	0.01	-1.0 - 1.0	Let the emboss effect cut into or offset from the edges of the decal shape.
Smoothing	1.00	0.0 - 5.0	Sharpen or smooth out the emboss edges.
Height Intensity	0.10	0.0 - 1.0	Decrease or increase the influence emboss has on the height channel.

Decals > Decal 1, 2, 3 > Tweak

Decals tweak provides a way to deviate from the decal channel textures.

Parameter	Preset	Range	Usage
Enable	Off	Boolean	Disable or enable the tweaking the channels of the material.
Color	0.50, 0.50, 0.50, 0.50	0.0 - 1.0	Contrast, luminosity, hue, saturation for Diffuse and Base Color.
Normal Intensity	0.50	0.0 - 1.0	Changes Normal from neutral flat to exaggerated.
Specular	0.50	0.0 - 1.0	Contrast, luminosity controls for traditional shininess parameter.
Emissive	0.50	0.0 - 1.0	Contrast, luminosity controls for the Glow map.
Roughness	0.50	0.0 - 1.0	Contrast, luminosity controls for PBR micro-surface parameter.
Metallic	0.50	0.0 - 1.0	Contrast, luminosity controls for PBR parameter.
Ambient Occlusion	0.50	0.0 - 1.0	Contrast, luminosity controls for the occlusion factor.
Height	0.50	0.0 - 1.0	Contrast, luminosity controls for the mesh displacement.
Opacity	0.50	0.0 - 1.0	Contrast, luminosity controls for the visibility of the decal.

Global FX

Global FX are universally overriding texture effects that are dependent on the various inputs of the **Mesh Data**. **Global FX** serves a crucial function of having mesh related effects that layer over the entire geometry regardless of how it is compartmentalized by **Color ID**. As for effects, **Global FX** stands at the end of the graph flow and can also be referred to as post-effects.

Global FX

Global FX is a superset group that houses all of the available post-effect groups.

Parameter	Preset	Range	Usage
Rips...	-	-	Create and control the global rips effect.
Tweaks...	-	-	Create and control the global tweaks effect.
Dust...	-	-	Create and control the global dust effect.
Dirt...	-	-	Create and control the global dirt effect.
Fabric Holes...	-	-	Create and control the global fabric holes effect.

Global FX > Rips

Global FX rips requires an input mask to work. This input mask should be a black and white texture map that marks the area of the rips and holes with black and areas of visible material with white.

Parameter	Preset	Range	Usage
Mask	None [...]	Input	This map is required for rips to work properly.
Enable	Off	Boolean	Disable or enable the global rips effect.
Distance	0.10	0.0 - 1.0	Preserve or extend the rip border beyond the edges of the rip mask.
Bleed Color	0.267, 0.169, 0.098	RGB	Discoloration that occurs near the edges of the rips.
Bleed Distance	2.00	0.0 - 5.0	The range of the discoloration that occurs near the rip edges.
Fray	0.50	0.0 - 2.0	The breakup of the fabric that occurs near the rip edges.

Make sure to fulfill the mask input request in order to use the rips effect properly. The rips mask should be a high contrast black and white texture map.

Global FX > Tweaks

Global FX allows you to change the values of the resultant material channels up to three times. This may seem redundant but do consider that each tweak supports its own customized gray-scale mask to parse and modulate the tweak effect. This has several uses for the overall material, such as staining, bleaching, dirtying, and so forth.

Parameter	Preset	Range	Usage
Tweak 1...	-	-	First layer of the material channel modifier.
Tweak 2...	-	-	Second layer of the material channel modifier.
Tweak 3...	-	-	Third layer of the material channel modifier.

Global FX > Tweaks > Tweak 1, 2, 3

Each tweak allows for channel value deviation from the material underneath along with an input of an optional mask texture. Global FX > Tweaks provide great options for material variation.

Parameter	Preset	Range	Usage
Mask (Optional)	None [...]	Input	Optional distribution map for the tweak effect.
Enable	Off	Boolean	Disable or enable the tweaking the channels of the material.
Color	0.50, 0.50, 0.50, 0.50	0.0 - 1.0	Contrast, luminosity, hue, saturation for Diffuse, Base Color.
Normal Intensity	0.50	0.0 - 1.0	Changes Normal from neutral flat to exaggerated.
Specular	0.50	0.0 - 1.0	Contrast, luminosity controls for traditional shininess parameter.
Emissive	0.50, 0.50	0.0 - 1.0	Contrast, luminosity controls for the Glow map.
Roughness	0.50, 0.50	0.0 - 1.0	Contrast, luminosity controls for PBR micro-surface parameter.
Metallic	0.50, 0.50	0.0 - 1.0	Contrast, luminosity controls for PBR parameter.
Height	0.5, 0.5	0.0 - 1.0	Contrast, luminosity controls for the mesh displacement.
Opacity	0.5, 0.5	0.0 - 1.0	Contrast, luminosity controls for the visibility of the object.

Unlike Materials > * > Tweak, Global FX > Tweaks will effect the entire mesh material. You can control the tweak areas with gray-scale masks.

Global FX > Dust

Dust requires the World Space Normals and Ambient Occlusion maps to be present in **Mesh Data**. World Space Normals controls the direction by which dust falls on the mesh, usually from the top. Ambient Occlusion is required for the **Occlusion** parameter to work correctly.

Parameter	Preset	Range	Usage
Enable	Off	Boolean	Disable or enable the dust effect.
Level	0.50	0.0 - 1.0	Decrease or increase the dust formation.
Contrast	0.50	0.0 - 1.0	Spread or tidy the dust formation.
Occlusion	0.50	0.0 - 1.0	Decrease or increase the formation of dust in the mesh crevices.
Noise Opacity	0.00	0.0 - 1.0	Concentrate or disperse the dust particles.
Color	■ 0.00, 0.00, 0.00	RGB	Set the Diffuse and Base Color of the dust material.
Roughness	1.00	0.0 - 1.0	Make the dust material more shiny or matte.
Specular	0.11, 0.11, 0.11	0.0 - 1.0	Make the dust material more matte or reflective.

Without the World Space Normal map in **Mesh Data**, the dust effect will blanket the entire mesh rather then gather in appropriate areas.

Global FX > Dirt

Dirt can be used to layer a thin to thick layer of mud on the entire mesh. Dirt is different from dust in that it is non-directional and can be made to possess more volume. Dirt's Diffuse and Base Color output is formulated by randomly mixing **Color A** and **Color B** then taking the result through hue, saturation, lightness, and contrast modifications.

Parameter	Preset	Range	Usage
Enable	Off	Boolean	Disable or enable the dirt effect.
Amount	0.10	0.0 - 1.0	Decrease or increase the spread of the dirt.
Pattern	0	0 - 10	Provides 11 variations for the dirt pattern.
Color A	0.302, 0.247, 0.160	RGB	Diffuse and Base Color for the primary blending of the dirt material.
Color B	0.204, 0.141, 0.089	RGB	Diffuse and Base Color for the secondary blending of the dirt material.
HSLC	0.00, 0.50, 0.50, 0.50	0.0 - 1.0	Hue, saturation, lightness, and contrast controls for **Color A** and **B**.

Global FX > Fabric Holes

Fabric holes is like a procedural version of global **Rips** effect.

Parameter	Preset	Range	Usage
Enable	Off	Boolean	Disable or enable the fabric holes effect.
Pattern	0	0 - 10	Provides 11 variations for the distribution of fabric holes.
Ratio	50	0 - 64	Shrink or expand the numerical ratio of the holes.
Spread	0.150	0.0 - 1.0	Close or expand all of the holes.
Bleed Distance	0.250	0.0 - 1.0	Shrink or expand the discoloration around the holes.
Bleed Color	0.737, 0.590, 0.408	RGB	Adjust the color value of the discoloration around the holes.

Global FX > Fabric Holes > Influence Material

Fabric holes has retrospect regional controls that can change where the holes propagate. In order for these settings to work, the **Color ID** map must be loaded into its **Mesh Data** input slot.

Parameter	Preset	Range	Usage
Black	On	Boolean	Disable or enable the fabric holes effect on the black areas of the **Color ID** map.
Red	On	Boolean	Disable or enable the fabric holes effect on the red areas of the **Color ID** map.
Green	On	Boolean	Disable or enable the fabric holes effect on the green areas of the **Color ID** map.
Blue	On	Boolean	Disable or enable the fabric holes effect on the blue areas of the **Color ID** map.
Cyan	On	Boolean	Disable or enable the fabric holes effect on the cyan areas of the **Color ID** map.
Yellow	On	Boolean	Disable or enable the fabric holes effect on the yellow areas of the **Color ID** map.
Magenta	On	Boolean	Disable or enable the fabric holes effect on the magenta areas of the **Color ID** map.

Retrospect regional visibility toggling can be counter-intuitive. For more information on this delineation, read the Closing Remarks.

Diagnostics

Diagnostics provides a way to test out parts of the graph by displaying the relevant map data in the view-port. In this fashion, diagnostics is very much like a viewing mode, and should be disabled when it's not being used. There are two sets of map information:

Mesh Data: the mesh data utilized by the graph on a per channel basis:

- Ambient Occlusion (AO)
- Height
- Normal
- Color ID
- World Space Normal (WS Normal)

Material Textures: the final **AE Graph** output on a per channel basis.

- Diffuse
- Base Color
- Normal
- Specular
- Emissive
- Roughness
- Metallic
- Ambient Occlusion (AO)
- Height
- Opacity

Diagnostics

Diagnostics reroutes the specified material channels into the Diffuse and Base Color output while filling the rest with default values.

Parameter	Preset	Range	Usage
Enable	Off	Boolean	Disable or enable the diagnostics mode.
Map Set	Mesh Data	List	Switch between Mesh Data or Material Texture map sets.
Mesh Data	AO	List	Select the viewing channel for the mesh data set.
Material Textures	Diffuse	List	Select the viewing channel for the material textures set.

Diagnostics does not obey the shading system settings, therefore its selections are not effected by whether the rendering model is using **Traditional** or **PBR**.

Closing Remarks

Shortcomings

An ideal balance between flexibility, practicality, and power is usually difficult to achieve. Although AE Cloth does fall short of the ultimate dream of unlocking the full potential of procedural creation of custom textures, we feel that it does make up for it by ease of use and functionality. The following are some of the shortcomings we're aware of:

Even though we have provided a series of disabling and enabling switches for each branching group of the graph, this still constrains us to expand on a heavy monolithic graph. The ideal solution would be to have some form of graph based system built into Character Creator whereby a user can just plug and play specific subset graphs to create a custom superset graph.

Originally, the goal for **AE Cloth** was to be Shader agnostic, whereby the graph would simply output all manners of texture channels and let the receiving end consume the output in it's own way. Unfortunately, in the end we had put restrictions on the graph by not supporting colored Specular, Specular Level, and Glossiness channels. It was decided by the technical artists, that a multi-state PBR solution would lead to difficulty in usage and support. On the bright side, these concessions have slimmed the graph down somewhat.

There are several paradoxes in the design philosophy in the current state of **AE Cloth**. One of the philosophies was that regional based effects would be relegated to individual materials while mesh wide effects would be housed under **Global FX**. This was broken with the introduction of retrospect regional visibility toggling for the fabric holes effect. This was the result of a late design request and technical constraint of the graph in which the material based effects were reaching a saturation point. **AE Cloth** is currently pushing well beyond the technical boundaries in size and calculation overhead due to the burden of its monolithic design. Time, usage, and technical limitations have led to several contradictions in the overall design philosophy of the graph.

The Future for Appearance Editor

A drastic change from monolithic graph to a more modular nodal design is eagerly anticipated. A re-architecture of this sort would require the careful coordination of Character Creator nodal graph implementation and modular graph design. It would also require intensive education on the part of the users, as such system would naturally lead to greater complexity. Again, the balance between usability and expressiveness would need to be confronted. A change in implementation would also lead to a change in the dogma of the user.

Moving on to the next evolution of **AE** would also require the consolidation of design philosophy and elimination of the current contradictions that confront the graph in its current state. Stricter technical guidelines would need to be drawn up and followed. Breaks from the core values of ease of use and power to the user should not be compromised. This would mean ironing out the technical difficulties and circumvention of technical barriers.

All in all, the future for **AE** is one of evolution rather then a destination. As visual technology is changing ever so rapidly, we will need to re-evaluate and adapt to the circumstances and visions of tomorrow. We hope that you can see beyond the quirks of **AE Cloth** and enjoy its benefits.

- Chuck