Materials

Overview

3Delight for Softimage automatically converts *Softimage*'s render trees (including compounds) into *RenderMan* shaders and compiles them on the fly. All textures are converted (if needed) into *3Delight*'s mip-mapped and tiled TIFF format for efficient rendering and filtering. Material clusters, vertex colors, implicit and explicit projections are all supported. The following material slots are recognized:

- Surface
- Volume
- Environment
- Displacement
- Shadow
- Bump Map

Additionally, the conversion system has been designed in such a way that advanced users can convert their in-house shaders to *3Delight* format easily.

This means that *Softimage*, in conjunction with *3Delight for Softimage*, can be used as a *RenderMan* shaders authoring tool.

Library of supported *Softimage* and *Mental Ray* shaders

All the common *Softimage* nodes are supported and a large set of useful *Mental Ray* materials is also supported.

3Delight for Softimage support *Softimage's Render Tree* network; it automatically converts (at the start of the rendering process) *Render Tree* n etworks into *RenderMan* shaders and that are used by *3Delight* to render the image.

Follows a list of all these supported nodes, in alphabetical order.

Illumination					
Anisotropic	Architectural	Blinn	Constant	Cook-Torrance	Lambert
Phong	Strauss	FastSimple (misss)	FastSkin (misss)	Ambient Occlusion	Flat Light
Flat Light Shading	Incidence	Shadow	Simple Shadow	Hair Shading	Architectural (Multi-out)
Car Paint	Card Opacity (mip)				
Texture					
Image	Scalar Image	Sprite	Cell	Cell Scalar	Checkerboard
Cloud	Fabric	Flagstone	Fractal	Fractal Scalar	Gradient
Grid	Marble	Ripple	Rock	Snow	Terrain
Vein	Wood				
Particle					
Particle Volume Cloud					
Toon					
Toon Host	Toon Paint	Toon Paint Ambient	Toon Paint and Host	Toon Paint Highlight	Toon Paint Rimlight
Toon Paint Rounded					
Bump					
Bump Generator	Bump Map	XSINormalMap3			
Environment					
Cubic Mapping 1	Cubic Mapping 6	Environment			
Light					
Slide Projector	Soft Light				
Switch					

Front-Back Switch	Ray Type Switch	Color Switch	Scalar Switch	Vector Switch	Scalar Multi-Switch
Vector Multi-Switch					
Math					
Color Average	Color Basic	Color Exponent	Color Logic	Color Smooth Range	Color Unary
Scalar Basic	Scalar Change Range	Scalar Exponent	Scalar Logic	Scala Multi-Math	Scalar Smooth Range
Scalar Unary	Linear Falloff	Boolean Invert	Boolean Logic	Vector-Scalar	Vector-Vector
Share					
Boolean Passthrough	Color4 Passthrough	Integer Passthrough	Scalar Passthrough	Vector3 Passthrough	
Conversion					
Boolean To Color	Color To Scalar	Color To Scalars	Color To Vector	HSV To RGB	RGB To HSV
Integer To Scalar	Scalar To Color	Scalar To Integer	Scalars To Vector	Vector Coordinate Convertor	Vector To Color
Vector To Scalar	Vector To Scalars				
Image Processing					
Color Balance	Color Correction	HLS Adjust	Intensity	Invert	Scalar Invert
Color Channels					
Picker	RGBA Split	Color Matte	HLSA Combine	HSVA Combine	RGBA Combine
Color to Alpha					
Mixers					
Gradient	Mix 2 Colors	Mix 8 Colors			
Raytracing					
Reflection	Reflection Diffuse	Refraction	Refraction Diffuse	Transparency	
Attribute					
Color Attribute	Integer Attribute	Scalar Attribute	Vector Attribute		
Map Lookup					
Color Map Lookup	Scalar Map Lookup	Vector Map Lookup	Vertex Color		
Shading State					
Scalar State	Vector State	Color Save State	Scalar Save State	Vector Save State	
Render Channel					
Store Color in Channel	Store Integer in Channel	Store Scalar in Channel	Store Vector in Channel		
Texture Space Controllers					
3DWarp UV	Edit UV	Kaleidoscopic UV Remap			
Texture Generators					
Checkerboard	Fabric	Grid	Image Implicit	Ripple	Terrain
Cloud	Fractal	Marble	Rock	Snow	Vein
Wood					
Texture Space Generators					
Projection Lookup	Texture Space Generator				
Mental Ray (Texture)					
mi bump flakes	mib bump map	mib color alpha	mib color average	mib color intensity	mib color interpolate
mib reflect	mib texture checkerboard	mib texture lookup	mib texture remap	mib texture vector	mib twosided
misss lambert gamma					
Mental Ray (Material)					

mi car paint phen	mi metallic paint	mia material	mia material x	mib glossy reflection	mib glossy refraction
mib illum blinn	mib illum cooktorr	mib illum lambert	mib illum phong	mip card opacity	mip rayswitch
misss fast shader	misss skin specular				
Mental Ray (Shadow)					
Edge Shadow					

3Delight's Material Library

In addition to standard *Softimage* nodes and materials, *3Delight for Softimage* comes with easy to use and physically plausible materials.

3Delight Material – A highly versatile shader to simulate a large variety of surfaces.
Skin – For rendering human skin.
Glass – For rendering glass.

About Physical Plausibility

"Physically plausible" terminology has been first introduced in the computer graphics literature to described a certain category of BRDFs [1]. In technical terms, a physically plausible BRDF is a BRDF that:

1. Is energy conservative (e.g. doesn't emit energy that it doesn't receive).
2. Is reciprocal (respects the Helmholtz reciprocity principle).
3. Doesn't return negative values (this last point is not always mentioned in literature).

In simpler terms, it just means that the BRDF acts as a real life surface would act.

The expression "physically plausible material" is used in the VFX industry, somewhat loosely, to indicate that the material is based on such BRDFs. In reality, it is very difficult to design materials that are physically plausible since many useful BRDFs are not even energy conservative [2]. So it is often more accurate to talk about *visually plausible materials*.

Physical Plausibility vs. Realism

It's possible to design physically plausible BRDF, respecting the three rules sited above, but still produce images that do not render real life phenomena. In a sense, physical plausibility is not a guarantee of a realistic material.

Realism in look development is achieved by a mix of sound science, intelligent parameter design and a clear understanding of what is being simulated. As an example, many available materials provide a choice of BRDFs and an extended choice of parameters. These materials are not suited to render some of the most common real-life objects such as a table or a car. These types of materials are usually coated and it takes a two-layer material and special care to properly render them. Our 3Delight Material provides this possibility.

[1] Robert R. Lewis. 1993. *Making Shaders More Physically Plausible*. Technical Report. University of British Columbia, Vancouver, BC, Canada, Canada.

[2] This is the case because many of the BRDFs rely on lobe-shaped distributions that could go under the horizon for grazing view angles. Most implementation simply ignore this limitation — but strictly speaking, this is an energy conservation problem.