

User Guide:

Syndicate Sub Surface

Scattering Shader

Version 1.0

Syndicate Entertainment AB
www.syndicate.se

Disclaimer: This document is provided without any guarantees or warranty. Any action taken, based on information in this document, is the sole responsibility of the reader.

Introduction

The Syndicate Sub-Surface Scattering (SSS) Shader is a shader for 3ds Max Standard Material that allows you to create impressive and easily tweakable sub-surface scattering effects with a short rendering time.

This guide gives a quick overview on how to use the full version and what the different parameters do.

Requirements

The shader requires the following:

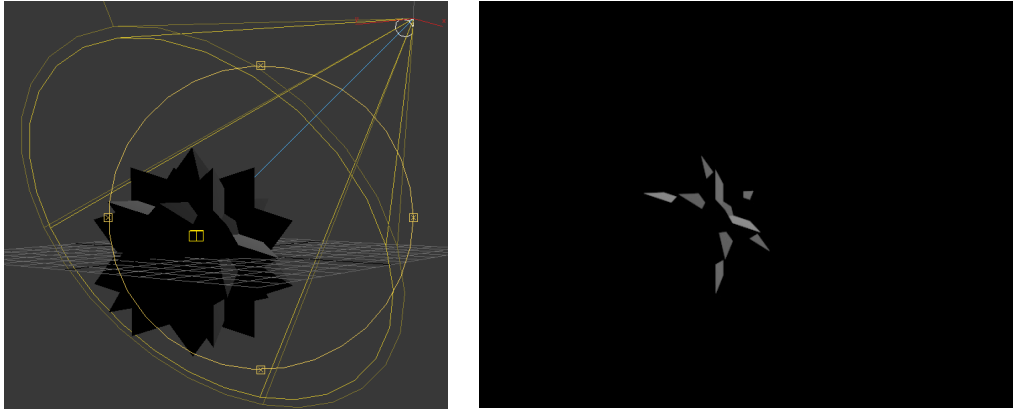
- 3ds Max 2010 32-bit or 64-bit
- Syndicate Sub-Surface Scattering Shader 1.0

Rendering SSS

Setting up the scene

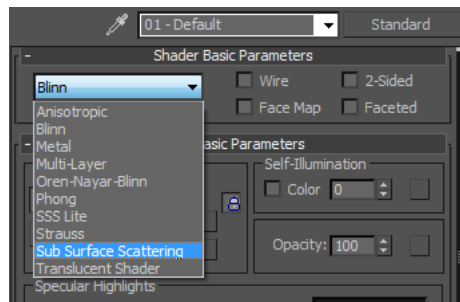
The SSS shader is based upon two components. One is the actual shader, which is selected in the material editor. The other part is an SSS renderer, that creates a memory buffer that is used by the shader. This buffer is similar to a normal shadow map, but with different contents.

So let's start with a basic scene with a star-shaped hedra and a spot light. We're assigning a standard material to it. The rendered output doesn't look very impressive.



Assigning the shader

To give the hedra some sub-surface scattering we need to assign the shader. To do this we simply go to the object's material and select *Sub Surface Scattering* as the shader to use in the standard material's shader drop down. That is all you need to do for now.



Creating the renderer

Rendering the image at this stage will result in a completely black image. Not exactly what we wanted. To remedy this we need to create an SSS renderer. This is an invisible node in the scene. There can be as many renderers as you want with different quality settings for different objects.

To create one go to the create helpers panel and select *SyndicateSSS* in the category drop-down. From there click the *SSSRenderer* button and create a renderer in your scene.

Configuring the renderer

The SSS Renderer has a couple of settings you must do. First, let's look at the interface. As you can see you can turn the renderer off by unchecking the On box. This is a simple way to turn the SSS off if you so desire. You control the resolution of the buffer with the *Map Size* spinner, similar to

how you control shadow maps.

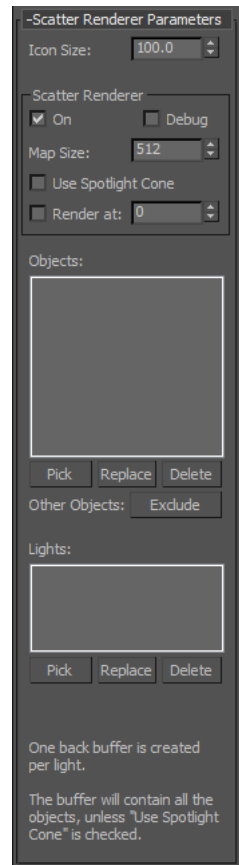
The main important area of the SSS renderer are the two node lists called *Objects* and *Lights*.

The first is the objects that will be rendered by the renderer. The objects you have assigned the shader to should be in this list. However, if you wish to have a second or third SSS Renderer in your scene you can always have some of them in one renderer and some of them in an other renderer. The *Other Objects* exclude list is available so that you can - in special cases - exclude any light occluders from the rendering.

The second node list is the lights to cause scattering. For each light there will be one buffer created (or six for omni lights) each impacting rendering times.

Each buffer will be created to contain all objects in the object list from the light's point of view in a as tight cone as possible, unless *Use Spotlight Cone* is check.

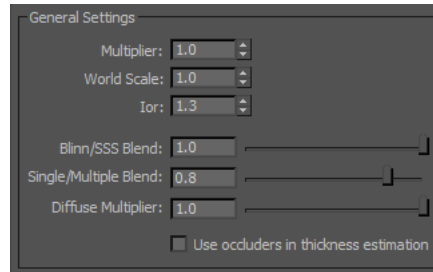
For this scene, add the hedra to the objects list and the spot light to the lights list. Hit render, and your scene will look like this.



Configuring shading

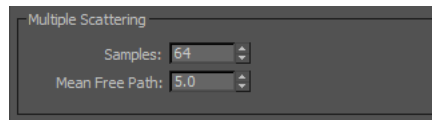
The above sample is just the default settings for sub-surface scattering. There are other settings you can use to control the look of the scattering. Here is a short reference of what the different parameters do. All of these settings are in the shader in the material editor.

General Settings



- **Multiplier**
Simply multiplies the scattering contribution. This is a rough, but sometimes effective, way of controlling the look.
- **World Scale**
This parameter sets the scale of your world. For instance, if you have one set of material settings that works well for a scene where one unit is one centimeter then if you use the same settings in a scene where one unit is one meter then you modify this value to make it match. This value is also a quick way of controlling scattering amount without changing many individual settings.
- **Ior**
Index of refraction for incoming light as it hits the surface of the object.
- **Blinn/SSS Blend**
Slider that controls the blending between Blinn shading and SSS. If set to 1.0 then there will be only SSS and no Blinn. If set to 0.0 there will be no SSS and only Blinn. This is the same as assigning a Blinn shader to the object instead for the Sub Surface Scattering shader. This parameter is also mapable.
- **Single/Multiple Blend**
Controls how much of the scattering contribution comes from single scattering and how much comes from multiple scattering. Setting any of the extreme values will result in better performance since one of the scattering types will not be sampled.
- **Diffuse multiplier**
Determines how much of the diffuse surface color will be multiplied with the scattering output. If set to 1.0 and a checker texture is used then there will be no scattering in the black areas.
- **Use occluders in thickness estimation**
If this box is checked then any light occluders will not be considered as shadow casters but instead be considered to be a part of the object and therefor transfer light through scattering. While this could be considered to be a feature of little use it is actually a quite useful feature for many scenes and can in some instances improve the look considerably.

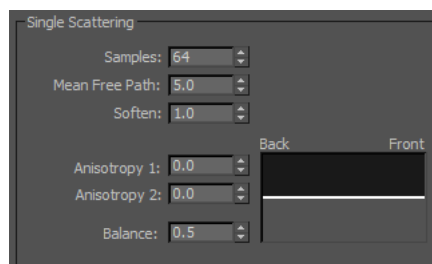
Multiple Scattering



Multiple scattering is the process of light bouncing around inside an object multiple times resulting in a diffuse and soft scattering. In most cases this is the primary form of scattering.

- **Samples**
Sets the quality of the multiple scattering. More samples per pixel means better quality, but results in a longer rendering time.
- **Mean Free Path**
The mean free path determines how far light can travel inside your object before it is fully attenuated. This is the main way you control the look of your scattering. This value is in world units and is affected by the world scale parameter.

Single Scattering



Single scattering is a more direct, contrasty, type of scattering. The samples and the mean free path parameters have the same function as in multiple scattering, however there are some other parameters available to configure the look.

- **Soften**
Sets the softness of the scattering. Basically sets the spread of the samples taken.
- **Anisotropy 1 & 2, Balance**
Control the anisotropy of the scattering contribution using these parameters. The resulting curve determines the strength of the contribution based on the viewpoint's correlation with the light source. The *back* end of the curve sets how strong the contribution is if you are viewing the back of the object from the light source's point of view and the *front* end of the curve sets how strong the contribution is if you are viewing the object from the same direction as the light source.

Depth Coloring



Depth coloring allows you to set different colors of the scattering at different depths of the object. All colors are mapable.

- **Single**
Enables depth coloring for single scattering
- **Multiple**
Enables depth coloring for multiple scattering
- **Shallow, Medium, Deep**

Sets the color for the corresponding depths

- **Depth**

Sets the world unit depth for each color. If any depth is set to lower than the one before then that depth is ignored. For depths from 0.0 up to the shallow depth the diffuse color is used.