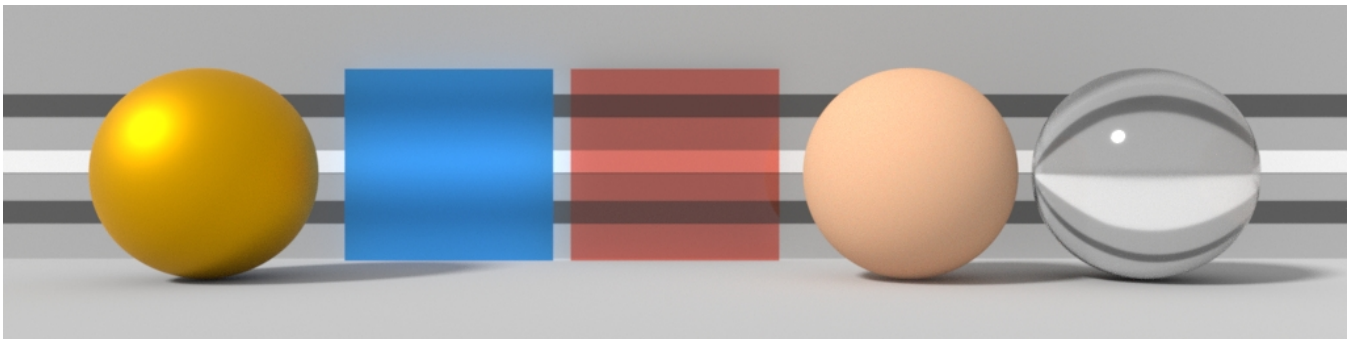# PxrDisneyBsdf



This Bxdf is based on Brent Burley's extended material model, introduced in "Extending the Disney BRDF to a BSDF with Integrated Subsurface Scattering" at SIGGRAPH 2015.

The PxrDisneyBsdf is a nice and straightforward physically-based model with a concise number of parameters, allowing for a wide range of photoreal and artistic materials, including diffuse and specular reflection and transmission, clearcoat, sheen, and subsurface scattering.

All CG animations made at Walt Disney Animation Studios use this material model and the source code for the Pixar version of this material, PxrDisneyBsdf, is available among the bxdf code examples.



Examples of different material parameter settings for PxrDisneyBsdf: metallic reflection, thin diffuse transmission, thin specular transmission, subsurface scattering, and glass refraction and reflection.  Image inspired by Figure 1 of the Burley Bsdf paper.

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## Basic

**Base Color**

The main surface color, usually supplied by texture maps.

**Emit Color**

The emission energy. Non-black values represent glow. Use this parameter with care. Only use for low emission objects and materials. For brighter objects, always use a PxrMeshLight.

## Specular Reflection

### Metallic

Defines the metallic-ness of your material. 0 is a dielectric, whereas a value of 1 is fully metallic. A PBR Metalness map can be used as the input. This is a linear blend between two different models. The metallic model has no diffuse component and also has a tinted incident specular equal to the base color.

### Specular Tint

A concession for artistic control that tints incident specular towards the base color. Grazing specular is still achromatic (i.e. it doesn't tint incoming light).

### Roughness

Defines the surface roughness between the diffuse and specular responses. Again, usually, a PBR Roughness map would be used as the input to add roughness variation.

### Anisotropic

The degree of anisotropy controls the aspect ratio of the specular highlight. 0: isotropic, 1: maximally anisotropic.

### Index of Refraction

The index of refraction of the material, controlling refraction, and also the amount of specular reflection. (It also influences subsurface scattering.)

### Specular Reflection Scale

Controls the intensity of specular reflection; 0 removes it and 1 maintains the full specular reflection response. This parameter is usually not needed as the specular response is determined by the incident angle of light and the roughness and IOR parameters in a physically correct way, but this parameter can override that.

### Clearcoat

A second, special-purpose specular lobe, useful for adding varnish or clear coat layer to your materials.

### Clearcoat Gloss

Controls clearcoat glossiness. 0 produces blurry highlights, 1 produces tight highlights. Note: this parameter has the inverse sense of roughness.

## Sheen

### Sheen

An additional grazing angle / forward scatter diffuse component, primarily intended for cloth

### Sheen Tint

Amount of tint sheen toward base color. At 0, the sheen is achromatic (i.e. doesn't tint incoming light).

## Transmission

### Diffuse Transmission

The amount of diffuse light that is transmitted rather than reflected. 0 means 0% transmitted, 100% reflected; 1 means 50% transmitted, 50% reflected; 2 means 100% transmitted, 0% reflected.

### Specular Transmission

Incident (maximum) specular transmission amount.

### Thin Surface

Whether the surface should be considered thin or that it forms the interface to thick material. When set to Thin, the index of refraction is 1.

### Transmission Color

The color of transmitted light for volumetric absorption (Beer's exponential extinction law).

### Transmittance Distance

The distance at which absorption yields the specified transmittance color. Sometimes also labeled as "atDistance." The smaller the distance, the more saturated the transmittance color.

## Subsurface Scatter

**Subsurface**

Controls the amount of subsurface scattering.

**Subsurface Color**

The color to mix with diffuse response according to the subsurface parameter.

**Scattering Distances**

The mean distances at which red, green, and blue scatter for subsurface. If 0, reverts to the diffuse BRDF.

**Subsurface Anisotropy**

Subsurface volume anisotropy (mean cosine for scattering) in path-traced subsurface scattering.  0 means isotropic scattering, values between 0 and 1 means mainly forward scattering, values between -1 and 0 means mainly backscattering.

## Other parameters

**Transmission Behavior**

Select a transmission behavior for shadow rays: opaque or use baseColor.

**Presence**

Connect a mask function here to apply a cutout pattern to your object. Presence is defined as a binary (0 or 1) function that can take on continuous values to antialias the shape. Useful for modeling leaves and other thin, complex shapes.

IMPORTANT NOTE: This value should be either 0 or 1. A value between 0 and 1 will produce unwanted noise !!!

**Bump Normal**

An optional connection point for bumped normals.

**Shadow Bump Terminator**

Hide the abrupt shadow terminator line when strong bump or normal maps are used.

**Input AOV**

Plug a MatteID node here.

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## PxrDisney Fridge

You can download this PxrDisney example here

Fridge was created by artist Fabio Sciedlarczyk.