Iray Uber Shader Properties

Workshop Reference Guide

© Sabine Hajostek (``esha``) February 2017

Contents

Basic Information

The examples in this reference guide have been rendered in **Daz Studio Build 4.9.3.166**. The following colors were used:

⑤   Dark blue   RGB 20 | 33 | 107 (used as Base Color in all examples)

⑤   Light blue   RGB 147 | 163 | 255

⑤   Hot pink   RGB 255 | 0 | 128

⑤   Pale yellow   RGB 255 | 255 | 128

The properties described in the following section are the properties of the Iray Uber shader in the **PBR Metallicity/Roughness** mode.

For the other modes the properties work in a similar, even identical, mode. The exceptions are mentioned in the last chapter.

The pawn chess figure that is shown in the renders is 4 centimeters tall and 2 centimeters wide at the base.

I tried to present the shader properties in a way that's easily understandable to artists. For a more technical explanation and further details see the official documentation by Daz:

[Click here to go to the Daz web page.](#)

Shader Modes

The Daz Iray Uber shader offers three different modes:

- PBR Metallicity/Roughness
- PBR Specular/Glossiness
- Weighted

PBR Metallicity/Roughness and *PBR Specular/Glossiness* are similar in most areas, but there are significant differences in the way they handle metallicity and glossiness/roughness.

The *Weighted* mode combines the two PBR modes.
It offers an additional slider for Diffuse Weight.

Main differences between *Metallicity/Roughness* and *Specular/Glossiness*

PBR Metallicity/Roughness

Metal color defined by Base Color

Metallicity driven by intensity slider & metallicity map:
    White = metal
    Black = non-metal

Glossy Layered Weight setting doesn't affect Metallicity

Roughness map:
    White = rough
    Black = glossy

Increase Roughness (greater than 0) to get access to anisotropy settings

Roughness settings for Backscatter, Refraction, Metallic Flakes and Top Coat (high values = very rough)

PBR Specular/Glossiness

Metal color defined by Specular Color

Metallicity driven by Glossy Specular color (mappable):
    White/light grey = metal
    Dark grey/black = non-metal

Glossy Layered Weight setting controls Metallicity

Glossiness map:
    White = glossy
    Black = rough

Reduce Glossiness (lesser than 1) to get access to anisotropy settings

Glossiness settings for Backscatter, Refraction, Metallic Flakes and Top Coat (high values = very glossy)

PBR Metallicity/Roughness Properties

It is my personal opinion as an artist that the PBR Metallicity/Roughness mode is the most user-friendly – and artist-friendly – of the Iray shader modes.
It is more intuitive and requires less knowledge of physics.

However, the other modes are just as useful and valuable. Use whatever works for you personally and for your project.

The properties of the other modes are identical to the PBR Metallicity/Roughness properties, except for the differences listed on page 4.

Metallicity

Base Color: Dark blue
Metallicity 1 (= 100%)

Base Color: Dark blue
Metallicity 1 driven by striped map:

Black = no metallicity
White = full metallicity
Grey = intermediate values


Metal color is defined by Base Color.

Metallicity overrides all other settings of the base layer, except Refraction.

Metallicity is not available in the PBR Specular/Glossiness Mode.
In this mode use Glossy Color to define color and set Glossy Specular to White.

Mit Metallicity active, you can use the Glossy Roughness and Glossy Anisotropy settings to create different looks. See pages 8-12.

Diffuse Roughness
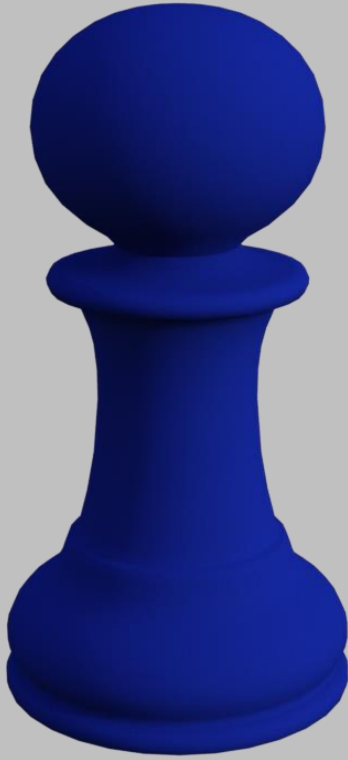
Base Color: Dark blue
Diffuse Roughness 0

Base Color: Dark blue
Diffuse Roughness 1

Use Diffuse Roughness for rough surfaces like unglazed clay or unpolished stone. Makes the material look slightly darker.

Diffuse Overlay

Base Color: Dark blue
Diffuse Overlay Weight 0.5, no map
Diffuse Overlay Color: Light Grey (default)

Base Color: Dark blue
Diff. Overlay Weight 1 driven by map

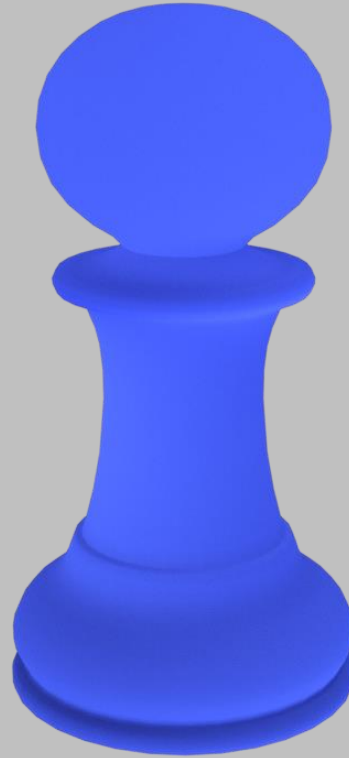Diffuse Overlay Color: Light Grey (default)

Diffuse Overlay adds a layer of color.
This color covers the texture applied in the Base Color slot. Usually looks better at lower values.

Diffuse Overlay is ignored when Metallicity is applied.

Translucency

Base Color: Dark blue
Glossy Layered Weight 0
Translucency 0.5
Translucency Color: Light Blue
Effect: Scatter only

Base Color: Dark blue
Glossy Layered Weight 0
Translucency 0.5
Translucency Color: Light Blue
Effect: Scatter & Transmit

Translucency scatters the light evenly across the surface.
Use at values lower than 1.
Needs to be active to get SSS and Transmission effects.

The SSS Reflectance Tint property can be used to correct the SSS color.
See Daz Studio documentation
(http://docs.daz3d.com/doku.php/public/software/dazstudio/4/referenceguide/interface/pa
nes/surfaces/shaders/iray_uber_shader/shader_general_concepts/start)

Glossy Layered Weight & Roughness

Base Color: Dark blue
Glossy Layered Weight 1
Glossy Color: White
Glossy Roughness 0

Base Color: Dark blue
Glossy Layered Weight 1
Glossy Color: White
Glossy Roughness 0.8

Glossy Layered Weight adds gloss and reflections.

Glossy Color is white by default, Glossy Reflectivity is 0.5 by default;
these values usually don't need to be changed but can be changed for special effects.

Glossy Roughness softens the highlights and reflections.

The Roughness setting works also with Metallicity.

Glossy Anisotropy

Base Color: Dark blue
Glossy Layered Weight 1
Glossy Roughness 0.5
Glossy Anisotropy 1
Glossy Anisotropy Rotations 0

Base Color: Dark blue
Glossy Layered Weight 1
Glossy Roughness 0.5
Glossy Anisotropy 1
Glossy Anisotropy Rotations 0.12

Glossy Anisotropy works only when Roughness is active.
It changes the highlights to create a brushed metal effect.
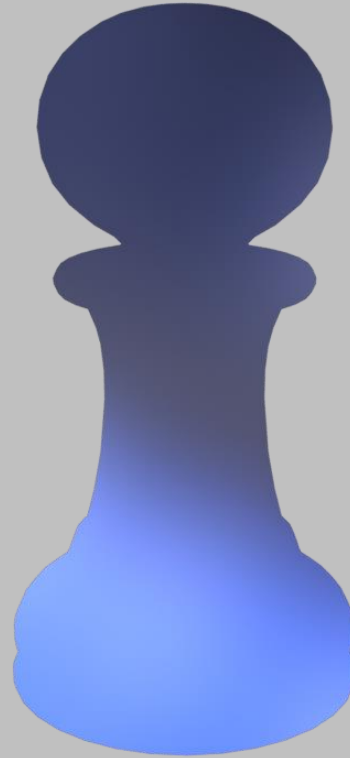*Low Roughness values (but greater than 0) make crisper highlights.*

Glossy Anisotropy Rotations changes the orientation of the highlights (1 = 360°).

Anisotropy and Anisotropy Rotations work also with Metallicity.

Backscattering Weight

Glossy Layered Weight 1
Share Glossy Inputs: On
Glossy Color: Light blue
Glossy Roughness 0.1
Backscattering Weight 0.5

Glossy Layered Weight 1
Share Glossy Inputs: On
Glossy Color: Light blue
Glossy Roughness 0.1
Backscattering Weight 1

*Backscattering reflects light in a different way. Often used for velvety materials.
With Shared Glossy Inputs ON it uses the Glossy Color.*

*At values lower than 1 you can have backscattering and glossiness/reflections, but they will
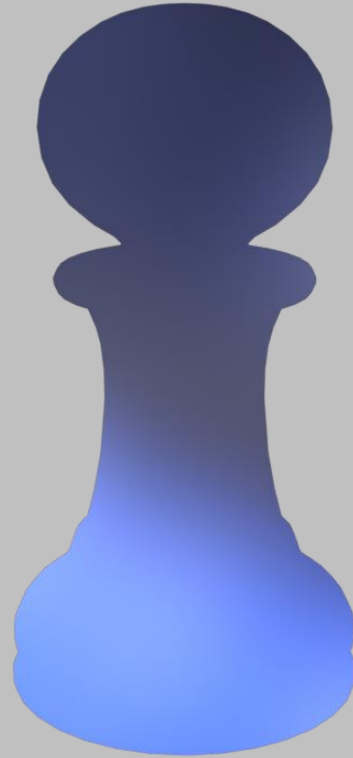use the Glossy Color.*

*Backscattering Weight lower than 1 mixes the scattering with the Base Color.
When set to 1, Backscattering nearly overrides Base Color and there is no
glossiness/reflection.*

Backscattering depends very much on the lighting and the HDRI (if any) !

Backscattering Color

Glossy Layered Weight 1
Share Glossy Inputs: Off
Glossy Color: White
Glossy Roughness 0.01
Backscattering Weight 0.5
Backscattering Color: Light blue

Glossy Layered Weight 1
Share Glossy Inputs: Off
Glossy Color: White
Glossy Roughness 0.01
Backscattering Weight 1
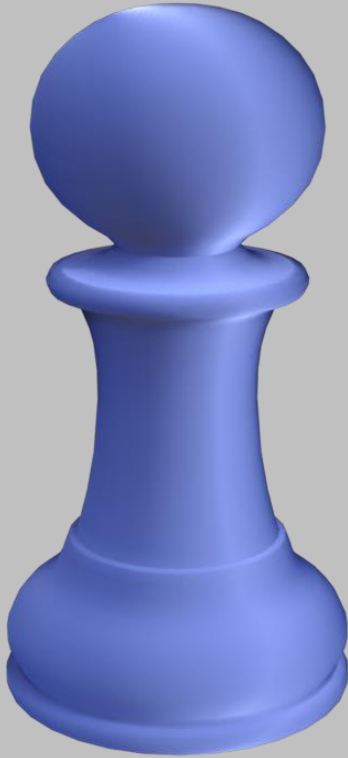Backscattering Color: Light Blue

Turn Share Glossy Inputs OFF to open more settings.
Now you can assign a Backscattering Color and keep the white Glossy Color.
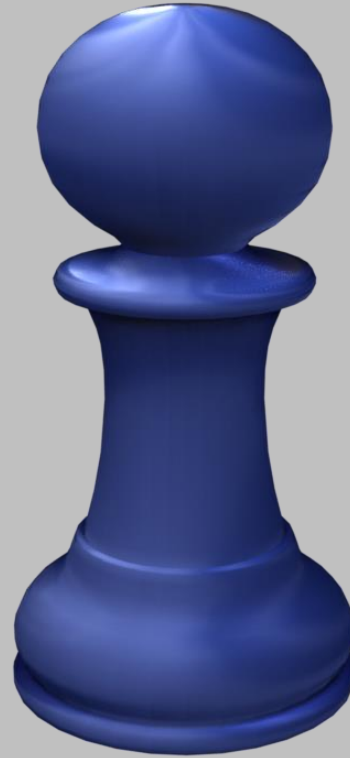
Backscattering Color works only when Glossy Roughness value is greater than 0.

When Backscattering Weight is set to 1, there is no glossiness/reflection.

Backscattering Roughness & Anisotropy

Glossy Layered Weight 0
Share Glossy Inputs: Off
Glossy Color: White
Glossy Roughness 0.01
Glossy Anisotropy 0.01
Backscattering Weight 1
Backscattering Color: Light Blue
Backscattering Roughness 1
Backscattering Anisotropy 0

Glossy Layered Weight 0
Share Glossy Inputs: Off
Glossy Color: White
Glossy Roughness 0.01
Glossy Anisotropy 0.01
Backscattering Weight 1
Backscattering Color: Light Blue
Backscattering Roughness 0.5
Backscattering Anisotropy 1

Backscattering Anisotropy works only when Glossy Anisotropy value is greater than 0.

With Backscattering Anisotropy active, low Backscattering Roughness values produce crisp highlights, high Backscattering Roughness produce soft highlights.

Anisotropy Rotations have no effect on Backscattering Anisotropy.

Refraction Weight

Glossy Layered Weight 1
Share Glossy Inputs: Off
Glossy Color: White
Refraction Weight 1
Refraction Color: Light blue
Thin Walled: On

Glossy Layered Weight 1
Share Glossy Inputs: Off
Glossy Color: White
Refraction Weight 1
Refraction Color: Light blue
Thin Walled: Off

Use Refraction for materials like glass and liquids.
Index of Refraction is 1.5 by default, makes a good glass material. IOR values for various materials can be found on the web.

If Share Glossy Inputs is ON, the Glossy Color defines the color of the refraction.
Switch Share Glossy Inputs OFF so you can assign a white Glossy Color and a different Refraction Color. The Refraction Color is usually lighter and less saturated than the Base Color.

For a convincing glass material, use together with Glossy Layered Weight active.
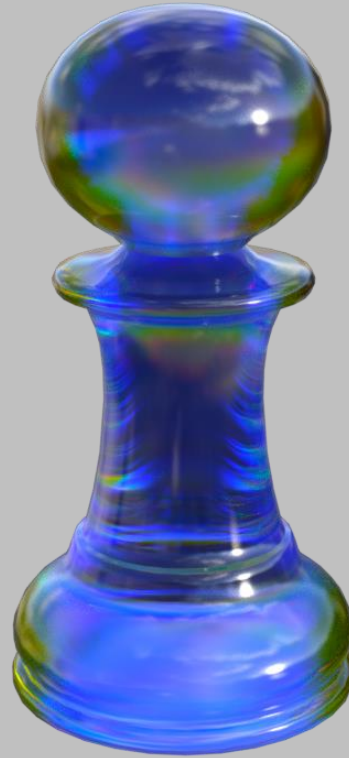
Use Thin Walled ON for hollow items (bubbles) and Thin Walled OFF for solid items.

Refraction Roughness & Abbe

Glossy Layered Weight 1
Share Glossy Inputs: Off
Glossy Color: White
Refraction Weight 1
Refraction Color: Light blue
Refraction Roughness 0.5
Abbe 0
Thin Walled: On

Glossy Layered Weight 1
Share Glossy Inputs: Off
Glossy Color: White
Refraction Weight 1
Refraction Color: Light blue
Refraction Roughness 0
Abbe 1
Thin Walled: Off

Refraction Roughness is available only if Share Glossy Inputs is OFF.
Refraction Roughness makes the glass cloudy. Works for Thin Walled and solid items.

Abbe adds chromatic aberration when value is larger than 0.
0.1 = extreme aberration, 95 = practically no aberration
When Abbe is used, Refraction Roughness is ignored.
Abbe works only on solid items (Thin Walled OFF) that have Refraction Weight applied.

Base Thin Film

Glossy Layered Weight 1
Glossy Roughness 0.25
Base Thin Film 500
IOR 2.1

Glossy Layered Weight 1
Glossy Roughness 0.25
Base Thin Film 100
IOR 5

Base Thin Film adds an extremely thin coating, measured in nanometers.
The effect depends on the settings for Glossy Layered Weight, Glossy Roughness and Glossy Anisotropy.

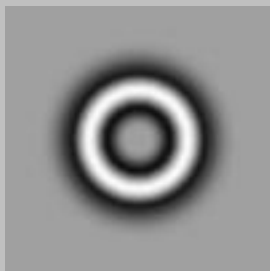The tint of the Thin Film is determined by the combination of Base Thin Film (thickness) and IOR.

If Glossy Layered Weight is 0, the Base Thin Film effect is nearly invisible.

Base Bump & Normal Map

Glossy Layered Weight 0.5
Glossy Roughness 0.25
Base Bump 5
True greyscale map 8bit

Map detail:

Glossy Layered Weight 0.5
Glossy Roughness 0.25
Normal Map 1
Color normal map 16bit

Map detail:

Base Bump needs grayscale maps. White = elevation (bulge), black = depression (dent)
Can use RGB maps, but true grayscale maps give better results.
Can handle 16bit maps but usually 8bit maps are sufficient.

Normal Maps are RGB maps, 8bit or 16bit. For smoother results use 16bit maps.

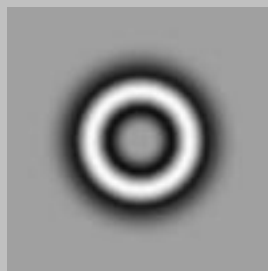*Bump and Normal Maps don't change the geometry!*

Displacement

Glossy Layered Weight 0.5
Glossy Roughness 0.25
Displacement Strength 0.5
Minimum -0.1, Maximum 0.1
SubD Displacement Level 1

Glossy Layered Weight 0.5
Glossy Roughness 0.25
Displacement Strength 0.5
Minimum -0.1, Maximum 0.1
SubD Displacement Level 5

Map detail:

Displacement maps look like bump maps. For best quality use 16bit grayscale maps.

Displacement changes the geometry, it needs enough geometry to work.
Add SubD to the item itself or use the SubD Displacement Level setting in the shader. Use this setting carefully as it can easily overtax your system. Values above 3 usually are not recommended.

Metallic Flakes Weight & Size

Metallic Flakes Weight 1
Metallic Flakes Color: Light blue
Metallic Flakes Size 0.001

Metallic Flakes Weight 1
Metallic Flakes Color: Light blue
Metallic Flakes Size 0.1

*Metallic Flakes are an additional layer on top of the base material.
Can be combined with all other settings.*

**Metallic Flakes Color Effect:** *Scatter & Transmit interacts more with the Base Color than Scatter only.*

Metallic Flakes Roughness: *Softens gloss and reflections of the Flakes.*

Metallic Flakes Strength: *Controls the Flake intensity. Low values will create a metallic look without the Flake effect.*

Metallic Flakes Density

Metallic Flakes Weight 1
Metallic Flakes Color: Light blue
Metallic Flakes Size 0.01
Metallic Flakes Density 0.1
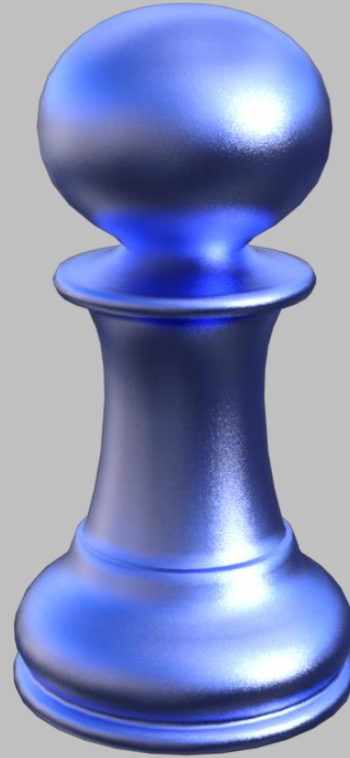
Metallic Flakes Weight 1
Metallic Flakes Color: Light blue
Metallic Flakes Size 0.01
Metallic Flakes Density 5

Use the Density setting to further control the intensity of the effect.

Metallic Flakes Thin Film

<div align="center">

Metallic Flakes Weight 1
Metallic Flakes Color: Light blue
Metallic Flakes Size 0.01
Metallic Flakes Film 300
IOR 2.25

Metallic Flakes Weight 1
Metallic Flakes Color: Light blue
Metallic Flakes Size 0.01
Metallic Flakes Thin Film 400
IOR 2.1

</div>

Metallic Flakes Thin Film adds an extremely thin coating on top of the Metallic Flakes effect. The Metallic Flakes Thin Film setting is measured in nanometers.

The tint of the Thin Film is determined by the combination of Metallic Flakes Thin Film thickness and IOR (follows the same rules as Base Thin Film).

Top Coat Weight & Other Settings

Glossy Layered Weight 0
-
-
Top Coat Weight 1
Top Coat Color: White
Top Coat Roughness 0

Glossy Layered Weight 1
Glossy Color: Hot pink
Glossy Roughness 0.5
Top Coat Weight 1
Top Coat Color: Pale yellow
Top Coat Roughness 0.25

The Top Coat layer adds gloss and reflections. It works like the Glossy settings but adds the gloss on top of all other effects. You can have roughness, anisotropy etc. on the base layer and add a Top Coat layer on top, using totally different settings than for the Base. See example on this page.

Top Coat Color Effect: *Scatter & Transmit interacts more with the material than Scatter only. That is especially visible when Top Coat Color is not white but another color.*

Top Coat Layering Mode: *Each mode applies the Top Coat in a different way.*
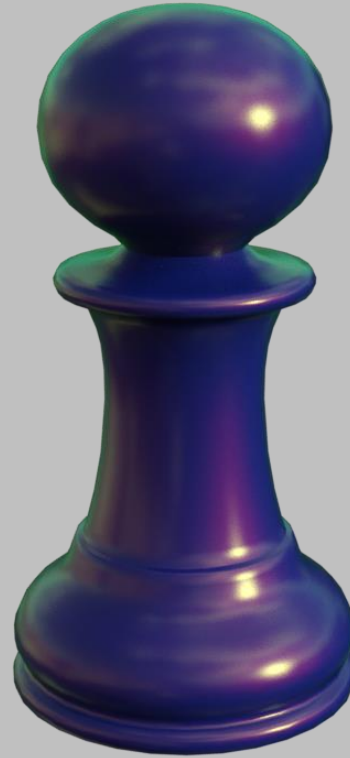
The other Top Coat properties (Roughness, Anisotropy etc.) work just the same way as the corresponding Glossy properties (see pages 8-12).
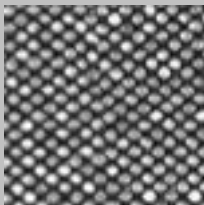
Top Coat Bump & Thin Film

Glossy Layered Weight 1
Glossy Color: Hot pink
Glossy Roughness 0.5
Top Coat Weight 1
Top Coat Color: Pale yellow
Top Coat Roughness 0.25
Top Coat Bump Mode: Height Map
Top Coat Bump 1

Glossy Layered Weight 1
Glossy Color: Hot pink
Glossy Roughness 0.5
Top Coat Weight 1
Top Coat Color: Pale yellow
Top Coat Roughness 0.25
Top Coat Thin Film 300
IOR 1.9

Map Detail:

Top Coat can have its own bump.
In the dropdown choose whether you have a height map or a normal map.

Top Coat Thin Film works just like the other Thin Film settings, but on top of all other settings.

Refraction vs. Transmission

Glossy Layered Weight 1
Glossy Color: White
Refraction Index 1.5
Refraction Weight 1
Refraction Color: Light blue
Thin Walled: Off
Transmitted Color: Black

Glossy Layered Weight 1
Glossy Color: White
Refraction Index 1.5
Refraction Weight 1
Refraction Color: White
Thin Walled: Off
Transmitted Color: Light blue

Turning Thin Walled OFF makes the Volume settings available.
Transmitted Color is another way to add color to a refractive material.
Refraction Color and Transmitted Color can also be combined.

Transmission allows more control over light and color (see next page).

Transmitted Measurement Distance

Glossy Layered Weight 1
Glossy Color: White
Refraction Index 1.5
Refraction Weight 1
Refraction Color: White
Thin Walled: Off
Transmitted Color: Light blue
Transmitted Measurement Distance 0.1

Glossy Layered Weight 1
Glossy Color: White
Refraction Index 1.5
Refraction Weight 1
Refraction Color: White
Thin Walled: Off
Transmitted Color: Light blue
Transmitted Measurement Distance 1

*Transmitted Measurement Distance is measured in centimeters.*
It defines how far the light must travel inside the object before getting the transmitted color.

*A low distance setting on a large objects results in a very intense color.*
A high distance setting on a small object makes the item nearly colorless.

This setting allows to create materials that react to an object's mass. Such materials will look different on each object, depending on the item's geometry.
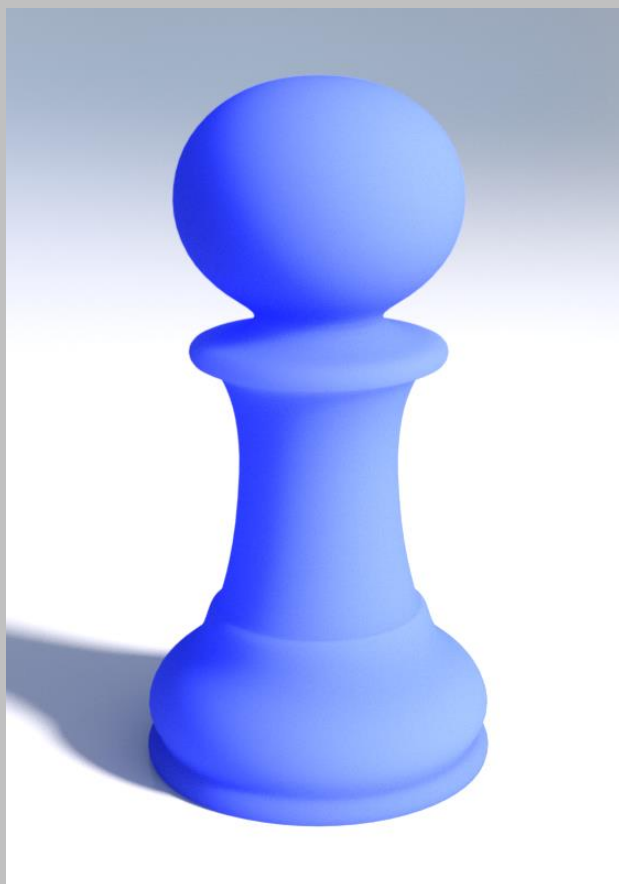
Translucency vs. Scattering
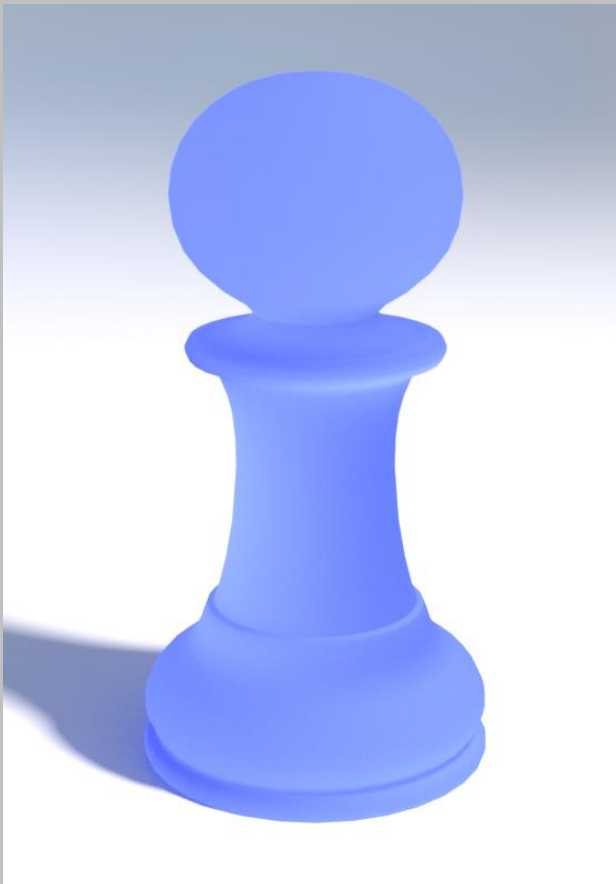
Translucency Weight 0.5
Base Color Effect: Scatter & Transmit
Translucency Color: Light blue
Glossy Layered Weight 0
Thin Walled: Off
Transmitted Color: Black
SSS Amount 0
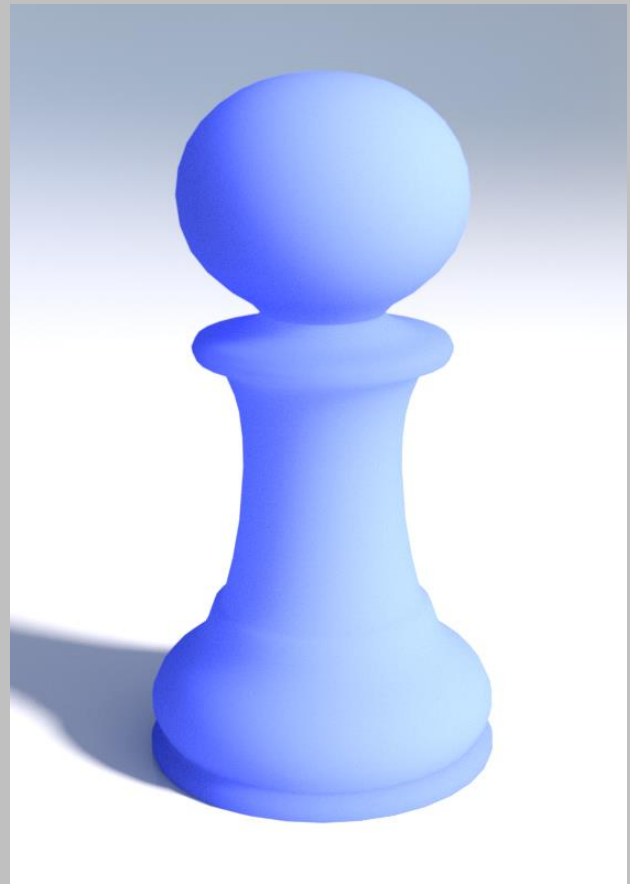
Translucency Weight 0.5
Base Color Effect: Scatter & Transmit
Translucency Color: Light blue
Glossy Layered Weight 0
Thin Walled: Off
Transmitted Color: Black
SSS Amount 1

Turning Thin Walled OFF makes the Volume settings available.

SSS Amount adds Subsurface Scattering to the Translucency.
The SSS settings work only when Translucency is active!

Transmission Measurement Distance

Translucency Weight 0.5
Base Color Effect: Scatter & Transmit
Translucency Color: Light blue
Glossy Layered Weight 0
Thin Walled: Off
Transmitted Color: Light blue
Transmitted Measurement Distance 1
SSS Amount 1

Translucency Weight 0.5
Base Color Effect: Scatter & Transmit
Translucency Color: Light blue
Glossy Layered Weight 0
Thin Walled: Off
Transmitted Color: Light blue
Transmitted Measurement Distance 0.1
SSS Amount 0.5

*Transmitted Measurement Distance is measured in centimeters.
It defines how far the light must travel inside the object before getting the transmitted color.*

When used with SSS, it does not change the intensity of the SSS itself but it controls how much of the Transmitted Color is mixed in.

If the Transmitted Color is set to Black, the Transmitted Measurement Distance setting will have no effect.

Scattering Measurement Distance

Translucency Weight 0.5
Base Color Effect: Scatter & Transmit
Translucency Color: Light blue
Glossy Layered Weight 0
Thin Walled: Off
Transmitted Color: Light blue
Scattering Measurement Distance 0.01
SSS Amount 1

Translucency Weight 0.5
Base Color Effect: Scatter & Transmit
Translucency Color: Light blue
Glossy Layered Weight 0
Thin Walled: Off
Transmitted Color: Light blue
Scattering Measurement Distance 1
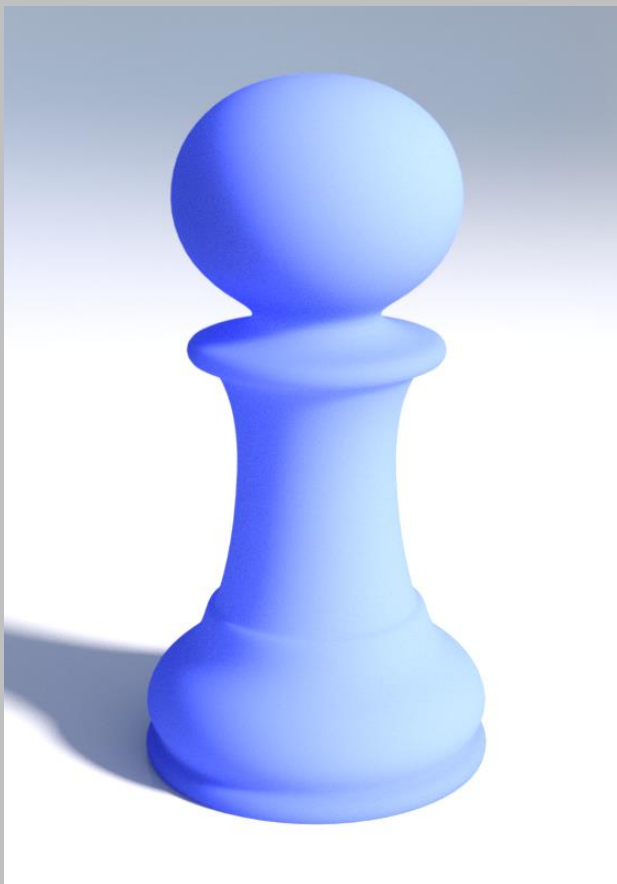SSS Amount 1

Scattering Measurement Distance defines how far the light must travel inside the object before scattering reaches full strength (set by SSS Amount).

A very low distance setting means that scattering will only occur on the surface.
*A high distance setting means that scattering will occur deep inside the object.*

This works with and without Transmitted Color.
High Scattering Measurement Distance values mean more Transmitted Color will be applied.
This setting reacts to the item's geometry; thin areas of the object will get less Transmitted Color, instead the Translucency Color will show in those areas.

SSS Direction

Translucency Weight 0.5
Base Color Effect: Scatter & Transmit
Translucency Color: Light blue
Glossy Layered Weight 0
Thin Walled: Off
Transmitted Color: Black
Scattering Measurement Distance 0.1
SSS Amount 1
SSS Direction -0.8
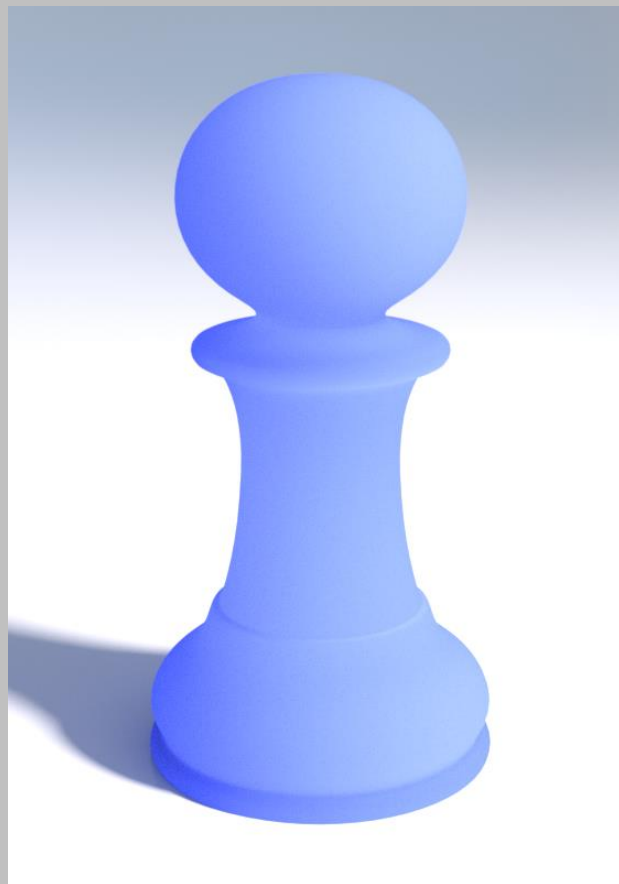
Translucency Weight 0.5
Base Color Effect: Scatter & Transmit
Translucency Color: Light blue
Glossy Layered Weight 0
Thin Walled: Off
Transmitted Color: Black
Scattering Measurement Distance 0.1
SSS Amount 1
SSS Direction 0.8

The SSS Direction determines the direction of the scattering.

0 means scattering in all directions, no preferred direction (isotropic).
Negative values mean scattering back to the light source.
Positive values mean scattering away from the light source.

Emission & Luminance

Glossy Layered Weight 0
Emission Color: White
Luminance 1500 cd/m²

Glossy Layered Weight 0
Emission Color: White
Luminance 55000 cd/m²

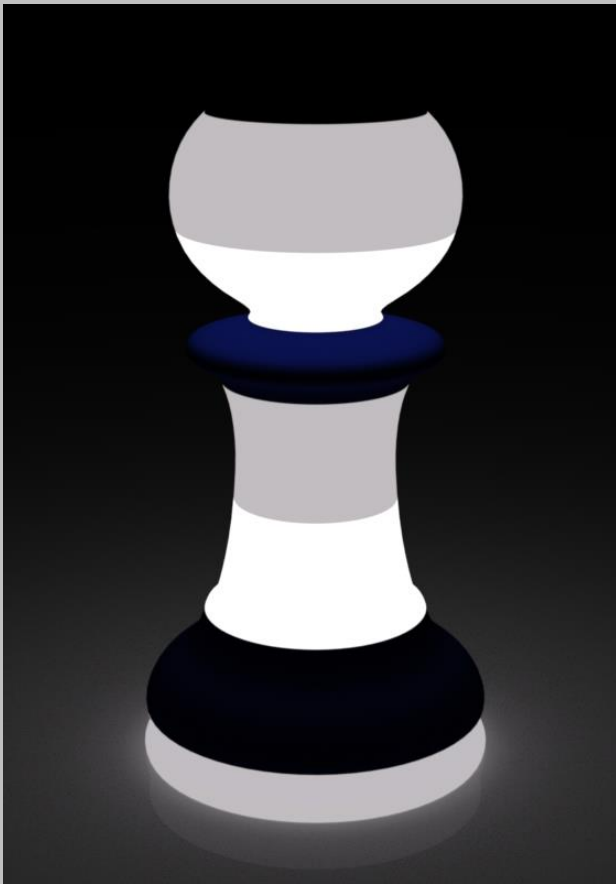*Emission Color Black means no emission. Any other color "turns on the light".*

Luminance is the intensity setting.
Default unit is cd/m².
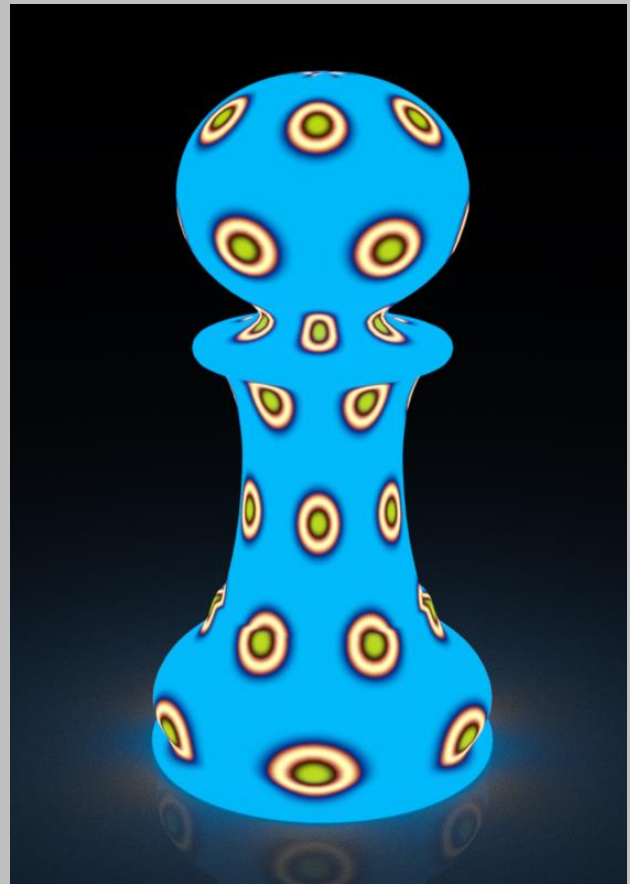*You can select a different unit (e.g. Watt) but the Luminance value will not be converted automatically.*
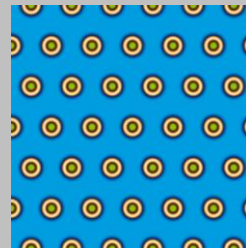
Emission Color

Glossy Layered Weight 0
Emission Color: White with **grayscale map**
Luminance 1500 cd/m^2

Map:

Glossy Layered Weight 0
Emission Color: White with **color map**
Luminance 1500 cd/m^2

Map:

Loading a grayscale map into the Emission channel controls which areas will emit light.
White = light, black = no light.
The non-emitting areas will show the other material properties.

Loading a color map creates colored light.

Emission Temperature

Glossy Layered Weight 0
Emission Color: White
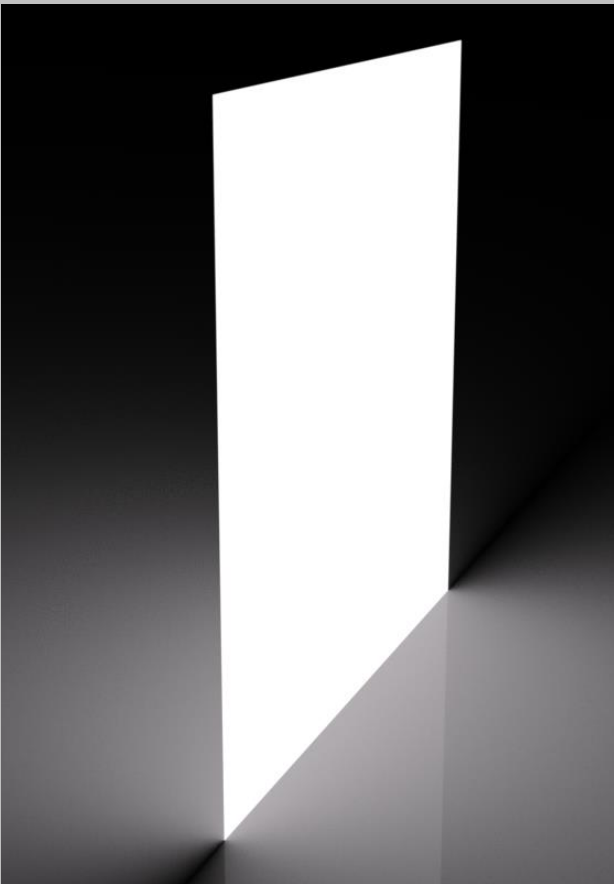Luminance 15000 cd/m^2
Emission Temperature 10000

Glossy Layered Weight 0
Emission Color: White
Luminance 15000 cd/m^2
Emission Temperature 3000

Emission Temperature is measured in Kelvin (K).
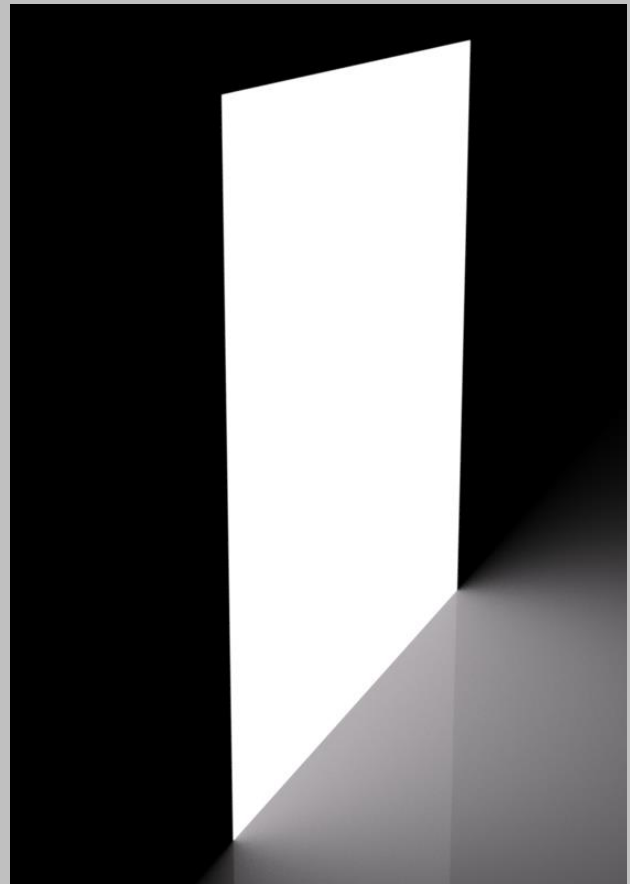*It's another way to control the light color.*

High values for the Emission Temperature create blueish light, low values create reddish light.
Emission Temperature 0 reverts to the default value in the render.

Two Sided Light

Glossy Layered Weight 0
Emission Color: White
Luminance 55000 cd/m^2
Thin Walled: On
Two Sided Light: On

Glossy Layered Weight 0
Emission Color: White
Luminance 55000 cd/m^2
Thin Walled: On
Two Sided Light: Off

Two Sided Light is intended for objects without thickness.
When Two Sided Light is ON, light will emit from both sides.
When Two Sided Light is OFF, light will emit only from the front side.
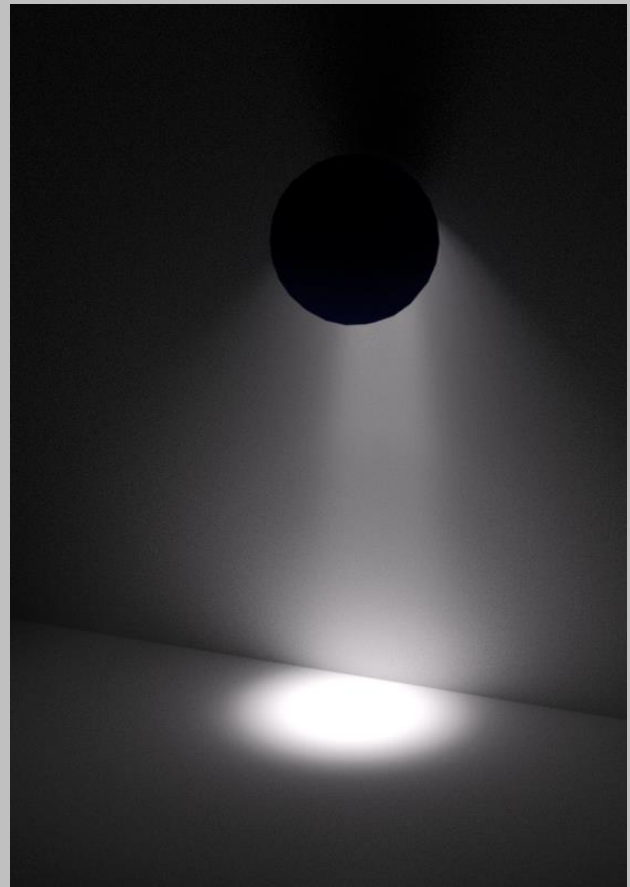
To make this work Thin Walled must be ON.

It will have no effect for objects that have a thickness.

Emission Profile

Glossy Layered Weight 0
Emission Color: White
Luminance 55000 cd/m^2
Emission Profile: None

Glossy Layered Weight 0
Emission Color: White
Luminance 55000 cd/m^2
Emission Profile: - ies File -

In the Emission Profile slot you can load an IES file (can be found on the Web – search for "ies download" or "ies photometric files").

These files are used to simulate the behavior of real-world light sources.

NOTE:
The IES file loads in horizontal orientation, it emits light along the –Z axis (towards the back of the scene).
To create a ceiling spot that casts the light down to the floor (as in the example above), rotate the mesh -90° on the X axis

Cutout Opacity

Glossy Layered Weight 1
Glossy Color: White
Cutout Opacity driven by map
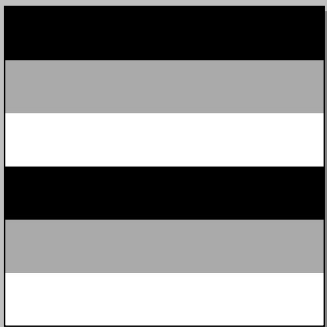
Glossy Layered Weight 1
Glossy Color: White
Cutout Opacity 0.5 (no map)

Cutout Opacity is used to make parts of the mesh invisible.
Can be used with an opacity map: Black = invisible, white = fully visible.

Invisible parts are completely gone, they have no gloss or reflection.
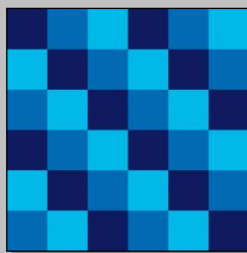
Tiling & UV Maps

Base Color: White with map
Glossy Layered Weight 0.25
Glossy Color: White
Tiling 1

Base Color: White with map
Glossy Layered Weight 0.25
Glossy Color: White
Tiling 4

Map used for both examples:

The **Tiling** value defines how many times the map fits into the UVs.

Values lesser than 1 make the texture larger, values greater than one make it smaller.
You can use different tiling values for width (horizontal tiling) and height (vertical tiling).
Keep in mind that using different values will make the texture look stretched.

Offset moves the map to the left/right (horizontal offset) or up down (vertical offset).

Smoothing

Glossy Layered Weight 0.25
Glossy Color: White
Smooth: On

Glossy Layered Weight 1
Glossy Color: White
Smooth: Off

Smooth softens the edges between the single polygons.
The Smoothing Angle determines the limit of that smoothing (sharper angles are not smoothed).

And now go and

Have Fun With Your Shaders!

Happy rendering,

esha