



11. MATERIALS: A CLOSER LOOK

11.1 V-RAY MATERIAL PARAMETERS IN DOMUS3D

In DomuS3D, you can create materials using V-Ray render engine parameters. In this section, we'll analyze V-Ray materials' properties window within DomuS3D, and we'll find out what parameters are available and how to set them to get different types of effects.

11.1.1 MAIN PARAMETERS

Diffuse color

Color of raw material, without reflection (rough irregular surfaces). For example, the perceived color of bronze (shiny material) is RGB (170;122;79) , while the raw color (e.g. bronze dust) appears darker RGB (68;56;38) . The latter is the true diffuse color that should be used.

Roughness

Microporosity of surface: visible roughness is assigned with a bump map. By increasing parameter material will appear flatter and shadows less blurred.

Reflection color

For dielectric materials (nonconductive, most materials) a fixed RGB (220;220;220) . For metals, the color should be that which is visually perceived, for example, gold RGB (229; 193; 119) . The color black should be used when there is no reflection; in this case the subsequent parameters will not be used.

Glossiness

Describes the finishing of the surface: 0= rough dull surface; 100= polished mirrored surface. Non-linear value: small changes to the upper range of values have significant effects.

Glossiness quality

Increasing this value slightly improves quality, but considerably slows rendering processing time. It is recommended to leave the default value of 8 (value assigned in powers of two: 8, 16, 32, 64, etc.).

Fresnel reflections

If activated, quantity of light reflected depends on viewing angle: the smaller the angle, the greater the reflection. It is recommended to always keep this activated.

Fresnel IOR

Parameter of specific materials: water= 1,33; plastic = 1,4 / 1,5; glass = 1,5 / 1,6; diamond= 2,4; composite materials (wood, cement, etc.)= 1,3; metals= 3 / 30.

Max Depth

Maximum number of rebounded light beams drawn for simulation. It is recommended to leave the default value of 5. In cases of black areas in rendering or highly reflective mirrors, it may be necessary to increase this value.

Parametri principali	
Colore diffuso	 68; 56; 38
Rugosità	0
Riflessione	
Colore riflessione	 170; 122; 79
Lucentezza	90
Qualità sfocatura	8
Fresnel reflections	<input checked="" type="checkbox"/>
Fresnel IOR	10,00
Max Depth	5

When inserting RGB color values, if two of the three values are greater than zero, it is recommended to avoid inserting 0 for the third value and to instead use 1.

For example, if the desired color is yellow, it is best to use RGB (255;255;1) instead of RGB (255;255;0)



Rifrazione	
Colore rifrazione	<input type="color" value="black"/> 0; 0; 0
Sfocatura rifrazione	100
Qualità sfocatura	8
Indice di rifrazione (IO)	16,00
Fog Color	<input type="color" value="white"/> 255; 255; 255
Fog Multiplier	1,00
Affect Shadows	<input checked="" type="checkbox"/>
Affect All Channels	<input type="checkbox"/>
Traslucency	<input type="checkbox"/>
Traslucency Multiplier	1,00
Dispersion	<input type="checkbox"/>
Abbe Number	50,00
Max Depth	5
Rivestimento superficiale (coating)	
Quantità	0
Colore	<input type="color" value="white"/> 255; 255; 255
Lucentezza	100
Indice di rifrazione (IO)	1,60

Refraction color

Color of a transparent material that is visibly perceived when light passes through it (for example, blueish green for glass, light blue for water). The color black RGB (0;0;0) means that there is no refraction effect; in this case, the subsequent parameters will not be used. The color white RGB (255;255;255) gives maximum transparency.

Refraction Glossiness

Level of microroughness and/or micro-ripples of material's surface when light passes through it. 100 = no glossiness; 0 = maximum glossiness.

Glossiness quality

Increasing this value slightly improves quality, but considerably slows rendering processing time. It is recommended to leave the default value of 8 (value assigned in powers of two: 8, 16, 32, 64, etc.).

Index of Refraction (IOR)

IOR can create artistic effects. In most cases, it is recommended to use the same value inserted for Fresnel IOR for reflection.

Fog color - Fog multiplier

Used to create translucency effects. Usually not used.

Affect shadows - Affect all channels

Affect shadows enables shadows with refraction. Keep this activated. **Affect all channels** enable this parameter for transparent materials (e.g. glass)

Traslucency - Traslucency multiplier

Used to create translucency effects. Usually not used.

Dispersion - Abbe number

Dispersion manages the separation of light into multiple colors, such as when light passes through a prism, creating a rainbow effect. **Abbe number** determines the quantity of light dispersed. The smaller this number, the greater the effect of dispersion.

Max Depth

Maximum number of rebounded light beams drawn for simulation. It is recommended to leave the default value of 5. In cases of black areas in rendering or highly reflective mirrors, it may be necessary to increase this value.

Coating

This parameter allows users to adjust reflections of a material's external surfaces, unlike "Reflection" parameter that manages internal surfaces. Coating parameter is used to represent materials such as lacquered wood.

Quantity

Indicates the quantity of superficial reflection and goes from 0 to 100. Values close to 0 represent coatless materials, while higher values represent materials with higher reflection on their superficial layer.

Color

Helps determine the superficial reflection color, such as honey lacquered wood, which will tend to have a honey yellow color.

Glossiness - Index of refraction (IOR)

Glossiness describes the superficial finishing. Values close to 100 represent smooth and regular surfaces, reflecting light and producing a "mirror" effect. The **Index of refraction (IOR)** represents reflection behavior resulting from the coat and it's connected to the type of material we're trying to replicate. If the material is not metallic, the value will be between 1,4 and 1,6. For metallic materials or with similar behavior, IOR will be higher.

11.1.2 MAPS

Maps (image files) are usually used as an alternative to the previously listed parameters when the distribution of these characteristics varies for different points on a surface.

Physical sizing

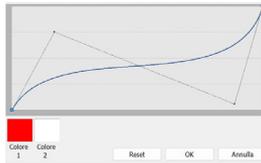
When activating this parameter, you can determine the dimension of the image used to reproduce the material, based on the real dimension. You can modify the map's **Width** and **Height**. When physical sizing is disabled, instead, **Automatic mapping scale parameter** will adjust the image dimension. Using **Physical sizing** parameter is recommended when creating a material using maps and indicating its real measures, for a better and more realistic result.

Diffuse Map

Image that represents raw material without any reflection. Alternative to Diffuse Color. Should be used whenever a material cannot be characterized by a single color (e.g. wood, marble, etc.).

Falloff

Alternative to graphic texture. Indicates the variation of color based on viewing angle of surface. Generally used for cloth and fabric. Two colors are set and adjusted graphically.



Reflection map

Alternative to "Reflection Color", indicates areas varying reflection effects on a surface. If a grayscale image is used, white represents area of maximum reflection and black represents areas of no reflection.

Refraction map

Alternative to "Refraction Color", indicates uneven areas with varying refraction effects on a surface.

Bump map

Grayscale image that indicates varying elevations of different areas on a surface. White represents areas of maximum elevation and black represents areas with no elevation. This is used for small elevations (max 1cm).

Multiplier

Indicates the intensity of elevation; this parameter is used in a range between 0 and 1. If you want to control the three-dimensional effect more precisely you can use the parameter **Multiplier (MM)** that allows you to manage the extrusion effect in mm, for example, setting the value to 3, the blank areas will be represented with an extrusion effect of 3mm.

Displacement map

Grayscale image that indicates varying elevations of different areas on a surface. White represents areas of maximum elevation and black represents area with no elevation. This is used in place of BUMP map when dealing with larger elevations. Elevations in displacement map are geometric deformations of the surface and are defined by two parameters: **Length**, along the normal, and **Offset**, from the lowest point. The absolute height of elevation is given by the length times the percent of black at that point of the map, plus the offset.

Glossiness map

Alternative to "Glossiness" is a grayscale image, where white indicates maximum sheen and black indicates maximum dullness.

IOR map

Grayscale image that modifies "Fresnel IOR" by the grayscale factor of each area. White=1, Black=0. In the white areas, the full value of the Fresnel IOR is applied while in the gray areas, this value is reduced by the percentage of black present at that point. For example, RGB gray (128;128;128)=50% black and would halve the Fresnel IOR value.

Mappe	
Dimensionamento fisico	<input type="checkbox"/>
Scala mappatura automatica	250,00
Larghezza mappa	1000
Altezza mappa	1000
Mappa diffusa (texture)	
Attiva	<input type="checkbox"/>
File	
Falloff	
Mappa di riflessione	
Attiva	<input type="checkbox"/>
File	
Mappa di rifrazione	
Attiva	<input type="checkbox"/>
File	
Mappa di rugosità (bump)	
Attiva	<input type="checkbox"/>
File	
Moltiplicatore	0,30
Coordinate globali	<input type="checkbox"/>
Moltiplicatore (MM)	3,00

Mappa di displacement	
Attiva	<input type="checkbox"/>
File	
Lunghezza	10
Spostamento	0
Mappa di lucentezza	
Attiva	<input type="checkbox"/>
File	
Mappa di IOR	
Attiva	<input type="checkbox"/>
File	



Mapa di opacità	
Attiva	<input type="checkbox"/>
File	
Falloff	
Mapa di traslucenza	
Attiva	<input type="checkbox"/>
File	

Opacity map

PNG image containing transparency information through ALPHA channel. Defines the transparent and opaque areas of a surface. To be used, for example, with large mesh curtains: light filters through transparent areas of the PNG.

Falloff

Used in a similar way to the case of the Diffuse map.

Traslucency map

Grayscale image used to create double sided materials. The material will be assigned to both sides where the image is black while light will pass through where the image is white. This is used, for example, with thin fabrics (e.g. linen curtains).

Mapa diffusa del rivestimento superficiale	
Attiva	<input type="checkbox"/>
File	
Mapa di rugosità del rivestimento superficiale	
Attiva	<input type="checkbox"/>
File	
Moltiplicatore (MM)	3,00
Mapa diffusa aggiuntiva	
Attiva	<input type="checkbox"/>
File	
Falloff	
Blend mode	Overlay

Diffuse map on superficial coating

This is an alternative option to coating. Using an image to recreate reflections, lets you create uneven superficial reflections.

Bump map on superficial coating

In DomuS3D you can use an image to reproduce uneven surfaces, using a bump map, which can emphasize coating effect.

In this case you can use **Multiplier (MM)** parameter to emphasize the bump effect and get the desired result, as in a bump map.

Additional diffuse map

This parameter lets you overlay an image on the one used as diffuse map. The overlay can be done in many different ways, thanks to Blend mode parameter (for example, you can modify the fabric color keeping its weft, by setting the parameter on Multiply).

Parametri avanzati	
Highlight Glossiness Loc	<input checked="" type="checkbox"/>
Highlight Glossiness	1,00
BRDF type	Blinn
Anisotropy (-1.0,+1.0)	-1,00
Anisotropy rot. (0-360)	0
Don't override	<input type="checkbox"/>
Opacity	1,00

11.1.3 ADVANCED PARAMETERS

Highlight Glossiness

Manages spots of light from reflection. It is recommended to leave the default value.

BRDF type

There are four different algorithms to calculate the shade of overexposed areas of reflection on surfaces.

Phong reflections are used to reproduce plastic, Blinn reflections are used for most materials, Ward reflections are used to reproduce fabrics and grainy materials, GGX reflections are used to reproduce the effect of metal surfaces or metallic paints.

Anisotropy

Parameter only to be used to obtain artistic effects like brushed metal.

Don't override

If selected, characteristics of material are maintained even when rendering in Override material mode (rendering settings).

Displacement	
Filter texmap	<input type="checkbox"/>
Filter blur	0,001
Resolution	256
Precision	8
Tight bounds	<input checked="" type="checkbox"/>
3D mapping	<input type="checkbox"/>
Edge length	4,000
View dependent	<input checked="" type="checkbox"/>
Max subdivs	256
Keep continuity	<input checked="" type="checkbox"/>

Displacement

Parameters that allow for a more accurate management of displacement when using a map. It is not usually necessary to modify these parameters. Selecting **Filter texmap** will apply the subsequent parameters that allow you to soften/smooth elevated areas.

Fur

Allows for the simulation of a surface filled with an adjustable density of raised filaments: classic examples include shag rugs and surfaces covered with grass.

Length - Width

Length determines the length of individual filaments; width determines the diameter of individual filaments.

Gravity

Determines the force of gravity of filaments: positive values attract upwards negative values attract downwards.

Curve

Determines how filaments bend due to gravity. The lower the value, the stiffer the filament becomes: values between 1 and 2 give filaments good fluidity and softness.

Tapering

Allows for thinned tips. Possible values range from 0.0 (cylindrical filament, diameter of tip equal to diameter of base) to 1.0 (pointed tip, cone shape).

Density

Allows for the variation of number of filaments on surface. Greater values correspond to a denser distribution of filaments.

Change direction - Fur Bend Direction Map

Change direction parameter determines orientations of individual filaments: a value of 0.0 will position all filaments towards the same direction. Alternatively you can use a map by activating the parameter **Fur Bend Direction Map**. In this case the filaments will be oriented in various directions according to the RGB map used creating a more realistic random motion effect.

Dirt

This parameter is used to reproduce “superficial dirt” effect, for example by showing objects corner in a more realistic way.

Dirt color - Radius

Dirt color parameter refers to the color of the shadow that will appear next to the corner, bump or pile. **Radius** parameter, instead, indicates how wide the corner dirt effect will be, from the starting point.

Falloff

This parameter determines the “Dirt” effect regression: the lower the value, the sharper the effect. Near the corner the effect will be sharper: the higher the value, the more gradual the regression and the result will be a softer shading effect on the corner.

Mode

We recommend setting this parameter on **Inner occlusion** to make sure dirt effect is only visible on protruding corners and not on sunken ones. **Ambient occlusion** mode will emphasize sunken corners. **Ambient + Inner occlusion** mode will combine both effects.

Dirt color map - Dirt radius map

You can use images as maps to make dirt effect uneven. The map used as **Dirt color map** will determine the dirt color, while the **Radius map** will determine its width.

Fur	
Attiva	<input type="checkbox"/>
Lunghezza	0,03
Spessore	0,25
Gravità	-7,00
Curvatura	0,12
Rastremazione	0,40
Densità	10
Varia direzione	0,00
Fur Bend Direction Map	
Attiva	<input type="checkbox"/>
File	

Dirt	
Attiva	<input type="checkbox"/>
Dirt color	<input type="checkbox"/> 0; 0; 0
Radius (MM)	2,00
Distribution	1,00
Falloff	0,00
Subdivs	8
Same object	<input type="checkbox"/>
Thin mode	<input type="checkbox"/>
Environment occlusion	<input type="checkbox"/>
Work with transparency	<input type="checkbox"/>
Affect reflection elements	<input type="checkbox"/>
Screen space radius	<input type="checkbox"/>
Mode	Ambient occlusion
Dirt Color Map	
Attiva	<input type="checkbox"/>
File	
Dirt Radius Map	
Attiva	<input type="checkbox"/>
File	



Self illumination	
Emit light	<input type="checkbox"/>
Auto intensity	<input type="checkbox"/>
Intensity	0,00
Affect GI	<input checked="" type="checkbox"/>
Light group	

Self illumination

This parameter allows to create a self-illuminating material by activating **Emit light** parameter.

Auto intensity

When activating this parameter, the material brightness will be balanced according to the whole scene brightness, balancing it with the other light sources.

Intensity

Brightness effect will be produced according to the value set in this parameter.

In this case the effect will be significantly influenced by other light sources placed in the scene. Should the room be very illuminated, we might just slightly perceive the self-illumination effect. On the contrary, if the room is completely dark, our perception of self-illumination effect will be very intense.

Light group

Light group parameter lets you manage self-illuminating materials in post-production. When renaming the material, as we do with lights, we'll find it on EXR lights settings window, opened in post-production phase.