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V- ray

[Document subtitle]

USING Import

USING Merge

V- ray Reandring

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USING Import

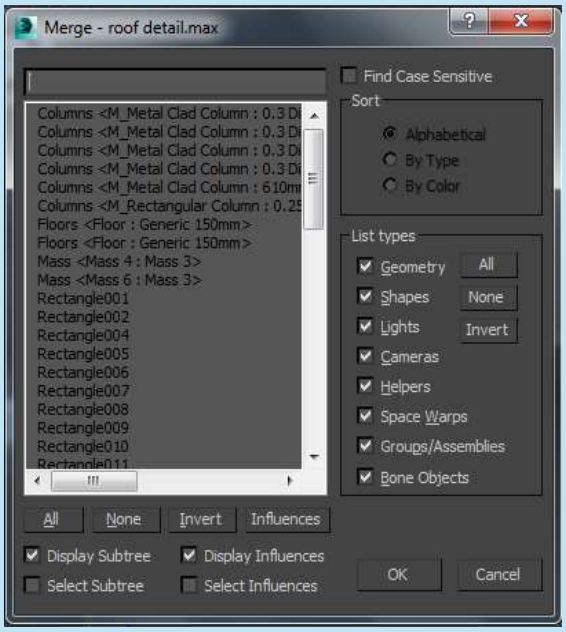
Import

1. Click  ➤  Import ➤ 
   Import ➤ Specify Files of type

   AutoCAD Drawing (DWG , DXF) ➤ Select file .
2. Specify parameters for Import Option dialog .
3. Click OK

USING Merge

1. Click  ➤  Import ➤ 
   Merge ➤ Select file .
2. Specify parameters for Merge dialog
3. Click OK



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USING INFORMATION FROM OTHER SOURCES2

Export Selected

1. Click  ➤  Export ➤  Export .
2. Specify File Name and Save as type .
3. Save .

USING Export Selected

1. Click  ➤  Export ➤  Export Selected
2. Specify File Name and Save as type .
3. Save .

mental ray rendering

V-Ray rendering

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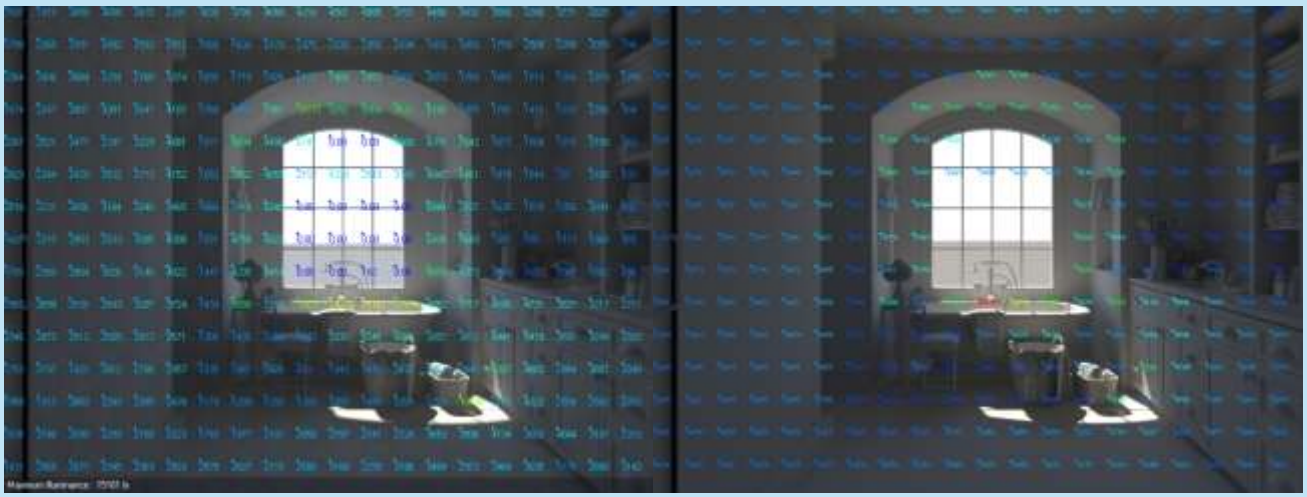
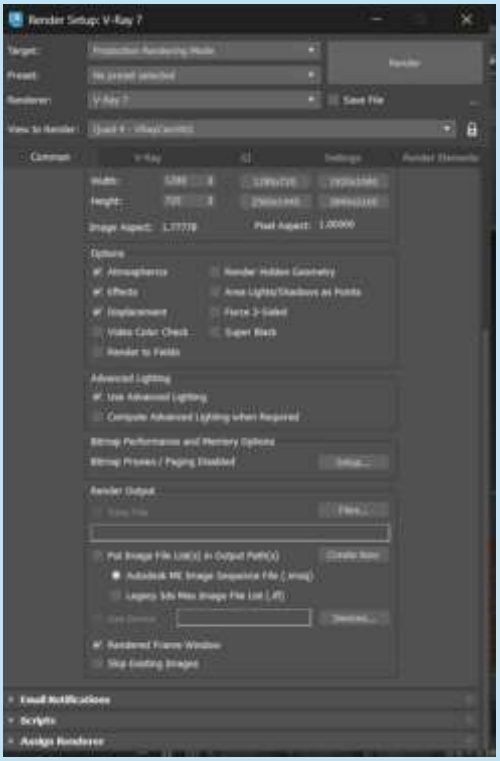


Lighting analysis overlay with mental ray	VRayLightingAnalysis render element

V- ray Reandring

RENDER SETUP



You can open the RENDER SETUP by clicking the icons in the main toolbar

Render Setup , Or press F10 in keyboard , from Render Setup dialog specify Parameters .

||Main Toolbar|| > **Render Setup** button and then set **Renderer** to **V-Ray GPU**

||Rendering menu|| > **Render Setup...** and then

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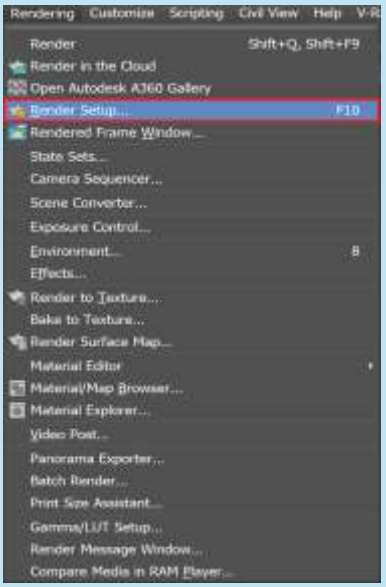
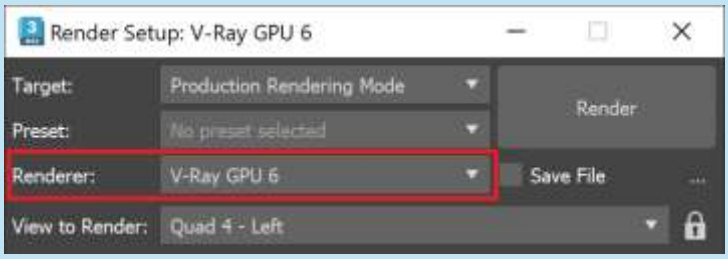
set **Renderer** to **V-Ray GPU or F10**



||Render Setup window|| > **Renderer** > **V-Ray GPU**



Scatter Geometry Overview

or

||Command panel|| > Create tab

> Geometry > Chaos > ChaosScatter button

Chaos Scatter is a powerful instancing and distribution tool that allows you to easily populate scenes with selected objects. This is especially useful for outdoor scenes that need to be filled with greenery, rocks, grass etc.

Chaos Scatter is also available with the Corona renderer

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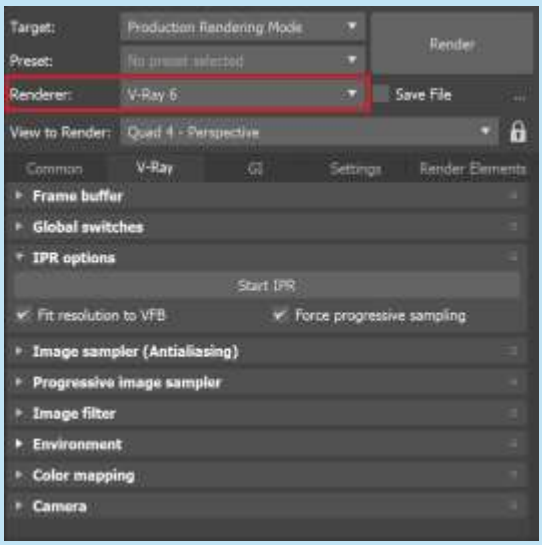
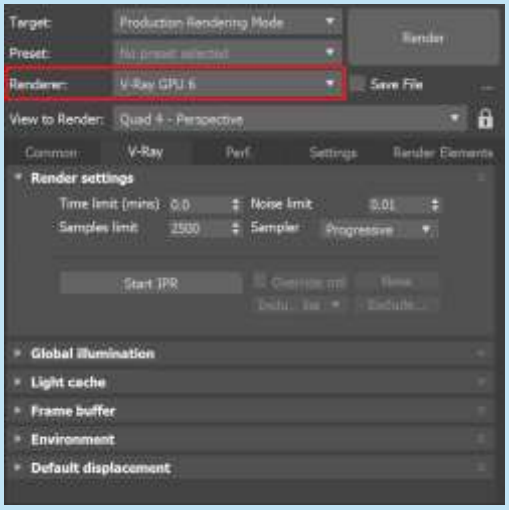


When the Renderer is V-Ray, the IPR options rollout appears under the V-Ray tab.



When the Renderer is V-Ray GPU, the IPR options appear under the Render settings rollout of the V-Ray tab.

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V-Ray Viewport IPR is accessible through the Shading menu of the Viewport

Using V-Ray IPR

The IPR option is accessible from the V-Ray Frame Buffer (VFB).

To use V-Ray IPR:

In the Render Setup window, make sure the render engine is set to V-Ray. To open the VFB, click the Last VFB button on the Toolbar, or go to the respective Render Setup rollout for V-Ray or V-Ray GPU engine.

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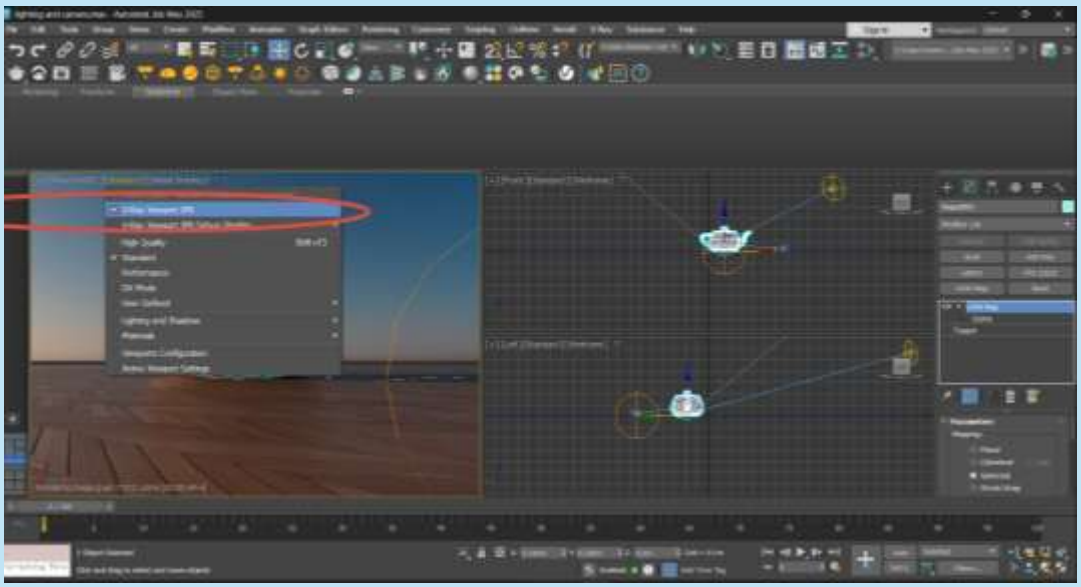

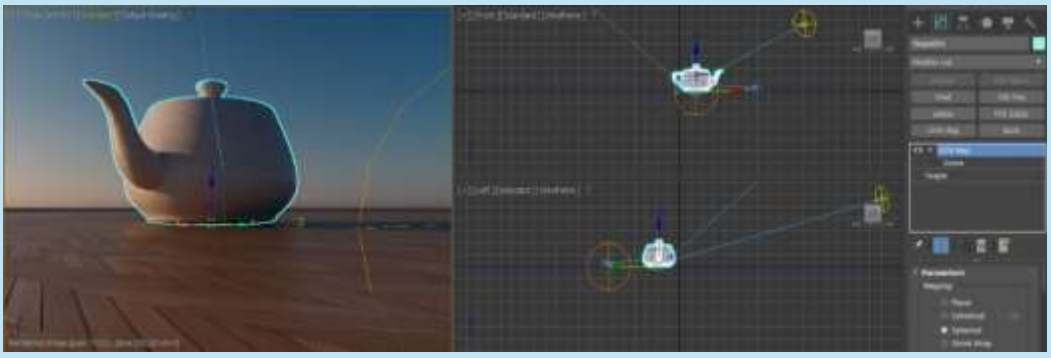

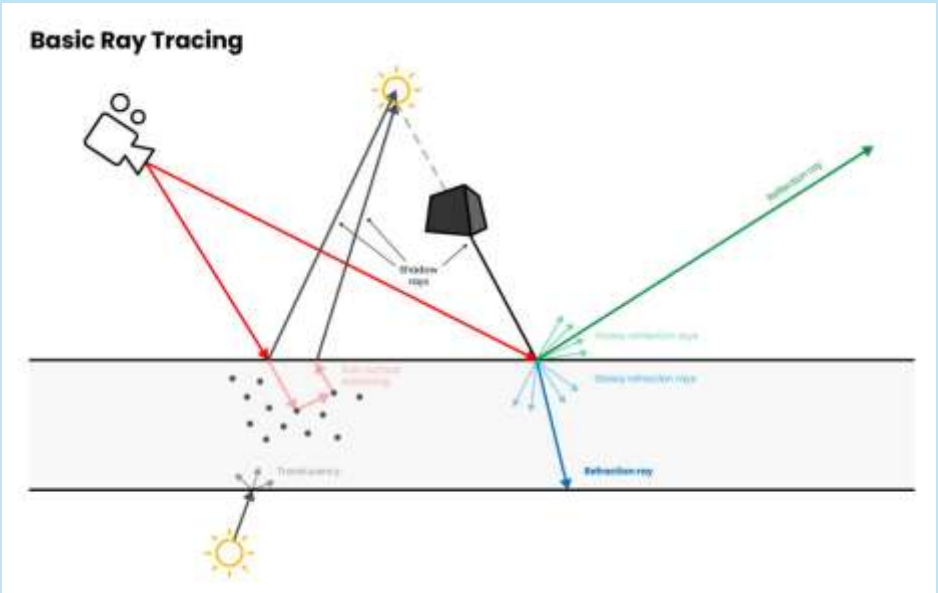

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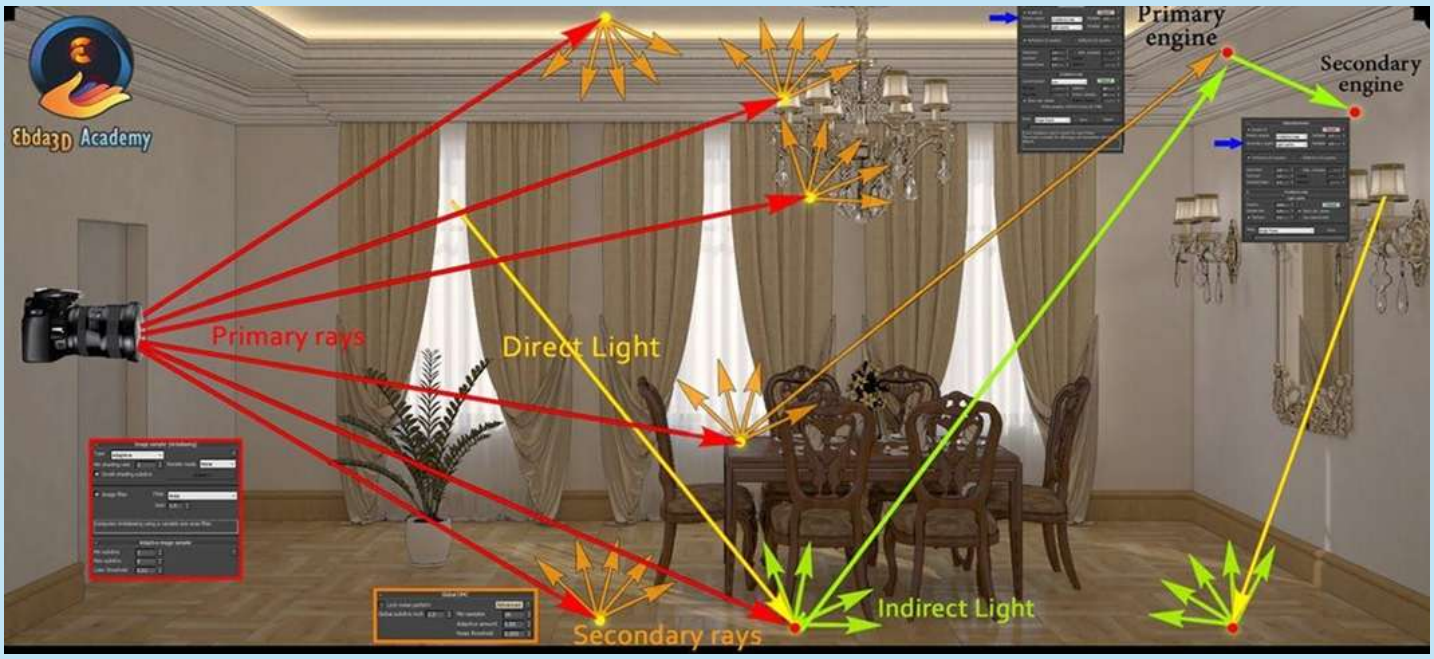

Material Editor

To open Material Editor Using one of the following methods:

- Clicking the icons in the main toolbar's Material Editor
- Press from keyboard (M)
- Open Rendering Menu from Menu Bar ➤ Material Editor

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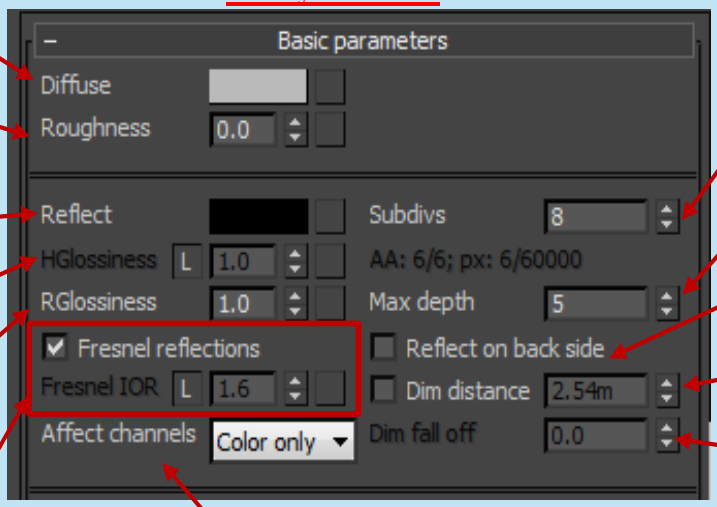
V-Ray Material



اللون المنتشر على سطح الخامة

يستخدم هذا الاختيار مع الاسطح الخشنة او المغطاة بالغبار

لون الاسود يعني عدم وجود انعكاس نهائيا والابيض يعني انعكاس كامل

كل اللمعان على الخامة

تعني 1.0

حدة الانعكاسات القيمة انعكاسات حادة جدا كالمراة والقيم الاقل تنتج انعكاسات اقل حدة

- هذا Fresnel reflections الخيار يجعل قوة الانعكاس معتمدة على الزاوية المنظور اليه منها
- Fresnel IOR معامل انعكاس الخامات وهو مرتب بنظيره في قسم الانكسارات

جودة لمعان الانعكاسات

عدد مرات الانعكاس

يجعل الانعكاس على وجهين

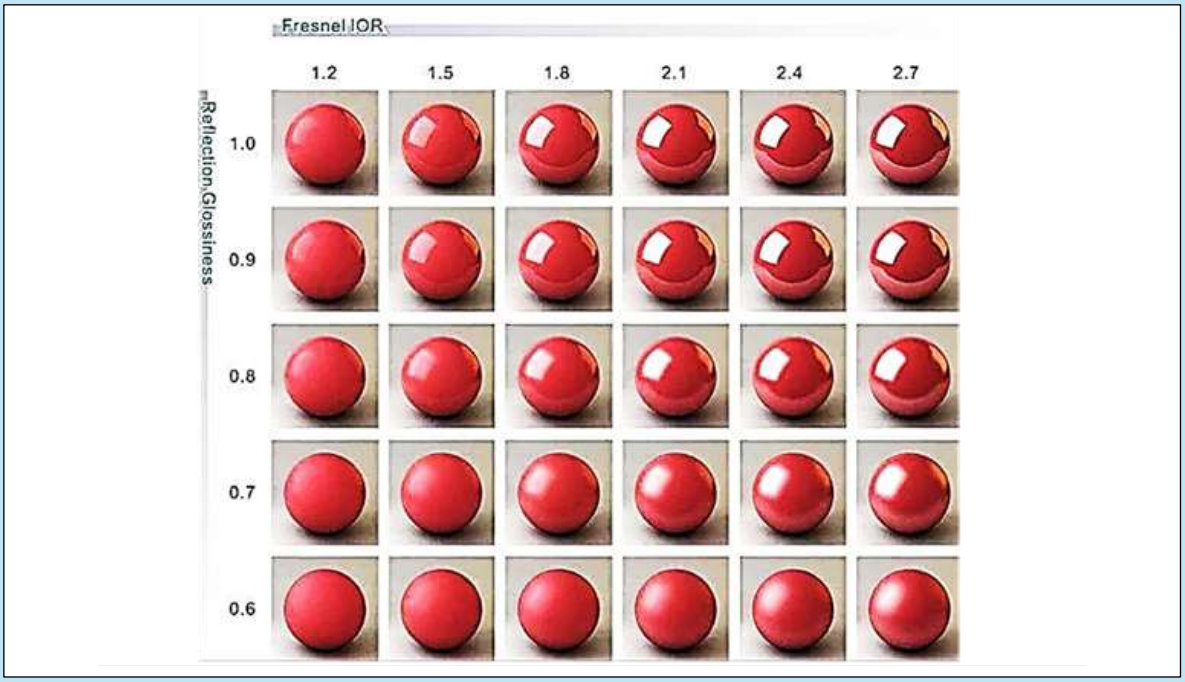
لتحديد المسافة التي لن يتم تتبع

شعاع الانعكاس بعدها

اقل مسافة يمكن تتبع شعاع الانعكاس عندها

لتحديد القنوات التي ستتاثر بالانعكاسات

Fresnel IOR



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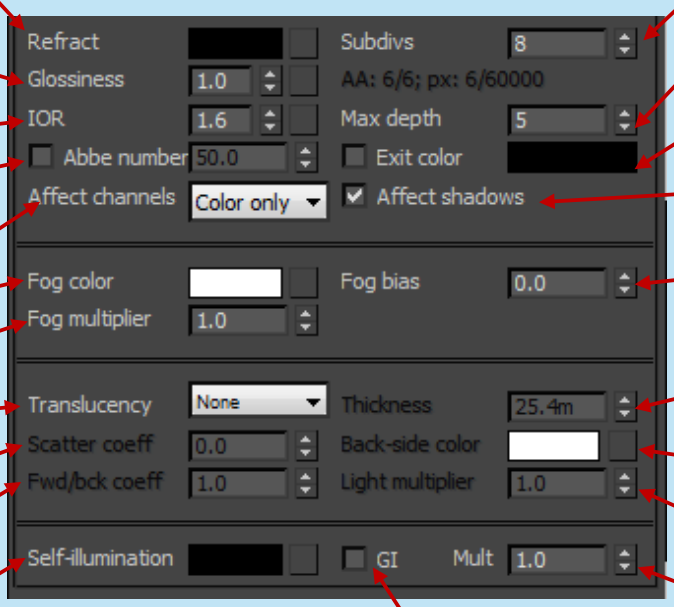


لون الانكسار

حدة الانكسارات , القيمة 1.0 تنتج انكسار كالزجاج والقيم الاقل تنتج انعكاسات مشوشة او لامعة

معامل الانكسار

لحساب تشتت الطول الموجي للضوء بطريقة صحيحة

لتحديد القنوات التي ستتاثر بالانعكاسات لون الخامات

الشفافة كالزجاج

شدة لون الخامات الشفافة لاختيار طريقة

حساب الشفافية

انتشار الشعاع داخل المجسم

اتجاه انتشار الشعاع داخل المجسم وخارجه

لون انبعاث اضاءة ذاتية من المجسمات

جودة الانكسارات

عدد مرات الانكسار

اللون الناتج عند الوصول الى اقصى عمق انكساري

لجعل الظلال تتاثر بشفافية الخامات بتغيير هذه

القيمة يمكننا جعل الاجزاء الرقيقة في المجسمات اكثر شفافية او العكس

لتحديد مدى تعقب الشعاع تحت السطح

لون الوجه الخلفي للخامة وعادة

يؤخذ هذا اللون من Fog color

كمية الضوء المؤثر على الاسطح الشفافة

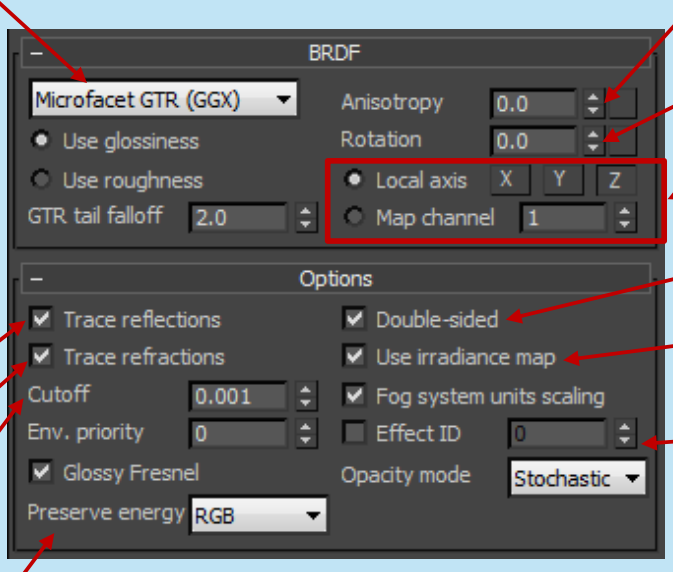
شدة الاضاءة الذاتية المنبعثة من المجسمات

لتفعيل حسابات الاضاءة الغير مباشرة لتلك الاضاءة الذاتية

هذه الانواع تتحدد نمط وشكل اللمعان كما هو موضح بالرسم

Phong Blinn

Ward GTR



بزيادة هذه القيمة يتغير شكل اللمعان الى الشكل الطولي وليس الدائري

لتدوير الجزء اللامع

لاختيار اتجاه الدوران

لوضع الخامات على كلا الوجهين للمجسمات

لاستخدام خرائط اللمعان لتقدير انتشار الاضاءة الغير مباشرة للخامة

لوضع قيم material ID

لتمكين او الغاء تتبع الانعكاسات

لتمكين او الغاء تتبع الانكسارات هذه القيمة

هي العتبة التي عندها سيتوقف تتبع الانعكاسات و الانكسارات

Area Lights

Related terms: Rectangle Light

An area light is a light source that has a discrete size. These types of light sources produce both shadows and speculars accurately, closely matching real-life lights. V-Ray supports rendering of area lights through VRayLight. (See also: Area shadows)

Mesh Light

Mesh Light is a type of area light that turns a mesh object into a light source. It allows the creation of complex-shaped light fixtures.

Light Material

Light Material turns a mesh object into a light source. It is generally used for producing self-illuminated surfaces.

Area shadows

Related terms: Soft Shadows

Area shadows are blurred shadows (or shadows with blurred edges) that are caused by non-point light sources (Area lights). V-Ray is capable of producing the effect of area shadows either through VRayShadow or through area lights. (See also: Area lights)

Bucket

Related terms: Region, Rendering Region

A bucket is a rectangular part of the current frame that is rendered independently from other buckets. The division of a frame into rendering regions allows for optimal resource utilization (CPUs, PCs, memory). It also allows for more efficient distributed rendering. (See also: Distributed Rendering)

Caustics

This is the effect of light refracted by a non-opaque object hitting a (diffuse) surface.

Depth of Field (DOF)

Depth of field is the effect of having a particular plane in the scene to appear focused (sharp) and the rest to appear out of focus (blurry) depending on camera shutter properties and the distance from the camera. This is similar to how real world cameras work. Depth of field settings are usually found under the V-Ray Camera.

Distributed Rendering (DR)

Distributed rendering is a technique for utilizing all available computational resources (usually all machines in a local network). Overall DR assures that V-Ray makes the most out of your equipment when rendering a single frame.
When rendering in 3ds Max, the standard network rendering should be used for rendering animation sequences as it may be more efficient. (See also: Glossary#Network Rendering)

Render Server

A *render server* is one of the computers in the network that does the rendering work. A render server requests render data from the render client, processes it, and sends the result back. In any DR job, there can be many render servers.

Render Client

The render client is the computer from which the rendering is started. V-Ray must be running on this computer in order to start DR. The process initiated by the render client divides the frame into rendering regions and distributes them among the render servers, and later collects the results. In any DR job, there is only one render client.

Embree raycaster

By default, V-Ray uses the Intel Embree raycaster. For more information, see the official Intel Embree site.

G-Buffer

This term describes the collection of various data generated during image rendering. These could be Z-values, material IDs, object IDs, non-clamped colors, etc. This has proven to be very useful for performing post-rendering image processing. (See also: G-Buffer Anti-aliasing, Image Sampler)

G-Buffer Anti-aliasing

V-Ray is capable of anti-aliasing the rendered image based on the differences in one or several G-Buffer channels. (See also: Anti-aliasing)

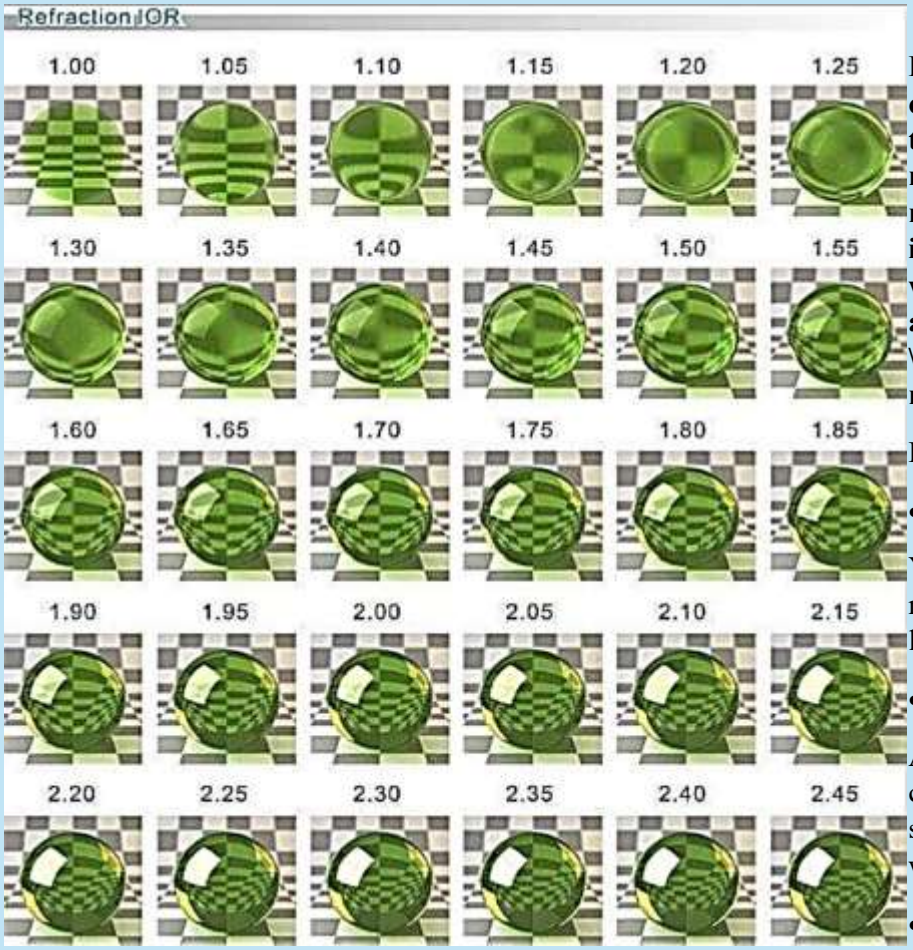
HDRI (High Dynamic Range Image)

A High Dynamic Range Image is an image containing a high-dynamic range of colors (with components exceeding the range 0.0-1.0, or 0-255). This type of image is often used as an environment map to light the scene with natural light.

Importance Sampling

Importance sampling is a technique for basing the number of samples required for evaluating a blurry value on the effect that value has on the final result. For example, dark materials require fewer samples for evaluating GI than

bright materials; dim area lights can do with less samples than bright lights etc. Importance sampling is used throughout V-Ray for all blurry values. (See also: Early termination)



IOR" in 3ds Max refers to the Index of Refraction, a material property that controls how light bends as it passes through a transparent surface and how much it reflects. It is used in creating realistic materials by simulating how light interacts with real-world objects like glass, water, and plastic. Different values of IOR are used for different materials, with \(1.0\) being air and a value like \(1.5\) representing a material like glass.

How it works in 3ds Max

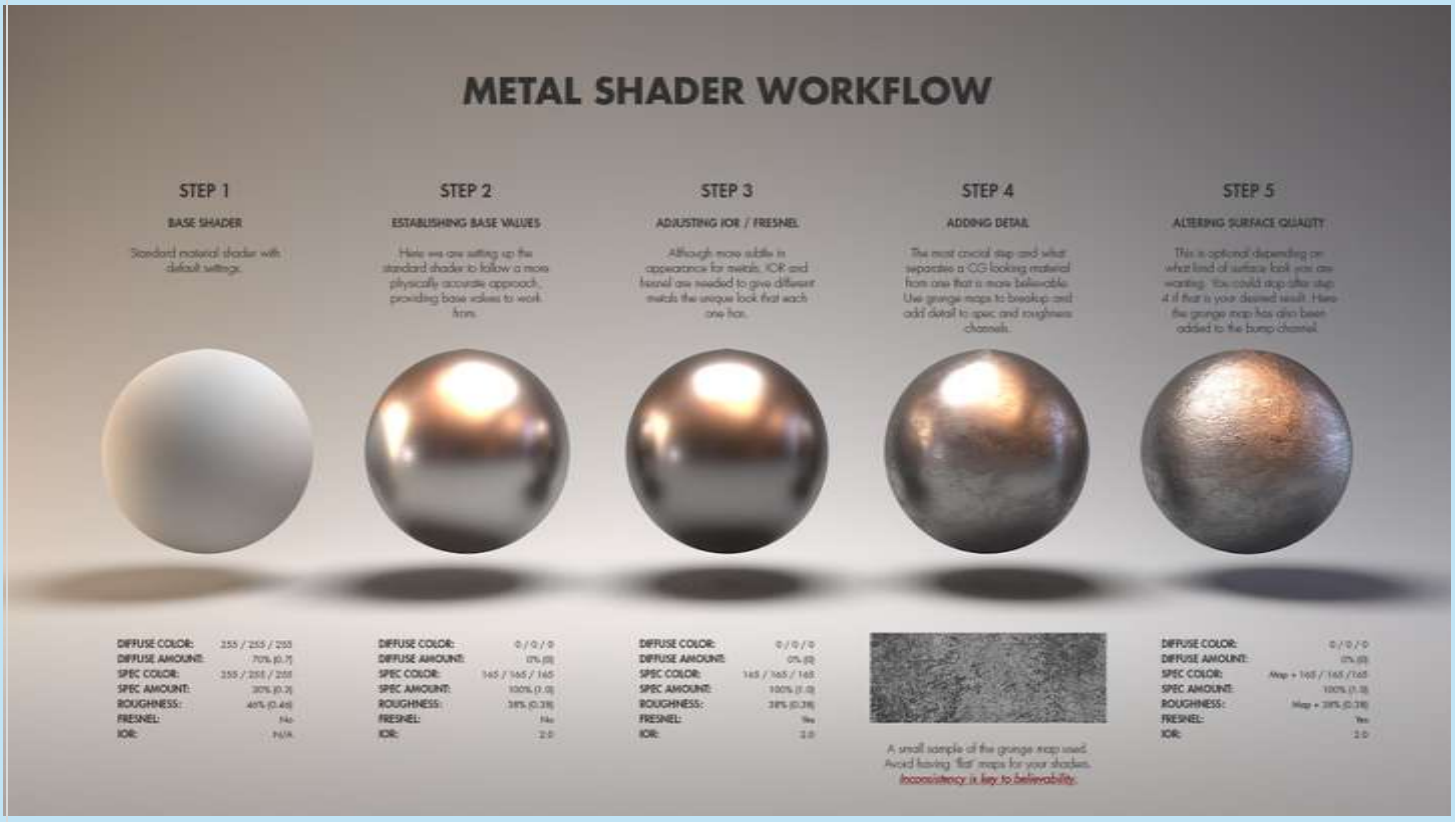
• Material properties:

You can set the IOR value directly in the material's properties to control the amount of light refraction and reflection.

• Realism:

A higher IOR value (e.g., glass at 1. 5) will cause more distortion of objects behind the surface, while a lower value (e.g., air at 1.0) will cause less distortion.

• Presets:



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When you apply a preset material, you can further customize it by changing parameters like the IOR value.

- Physical materials:

In some rendering engines, like Corona for 3ds Max, the IOR value is a key parameter for defining a physical material's properties.

- Advanced options:

For more complex scenarios, 3ds Max offers advanced options like a "Complex IOR" shader in the Arnold renderer for materials that require both real and imaginary parts of the index of refraction (e.g., metals).

Common IOR values

- Air: 1.0
- Glass: Around 1.5
- Water: Around 1.33
- Plastic: Around 1.35 to 1.35, depending on the type
- Metals: Often have high values, but for rendering purposes, specific values like 8−12 are used for certain projects



(Example For V-Ray Material Translucency)

Types of Lighting in V-Ray (Simple & Clear Explanation)

1) Ambient Lighting

Purpose: General background light in the space

Effect: Soft, low-contrast lighting

Where used: Living rooms, bedrooms, wide interior spaces

V-Ray Source Example: V-Ray Environment Light

Short description:

Provides overall illumination with no strong direction.

2) Task Lighting

Purpose: Lighting for a specific activity or function

Effect: Focused, practical, direct

Where used: Desk light, kitchen counter light, reading light

V-Ray Source Example: V-Ray Light (Rectangle) near surfaces

Short description:

Light designed to help perform tasks clearly.

3) Accent Lighting

Purpose: Highlight or emphasize an object / feature

Effect: Strong contrast, shadows, dramatic

Where used: Sculpture, plants, wall textures, architectural details

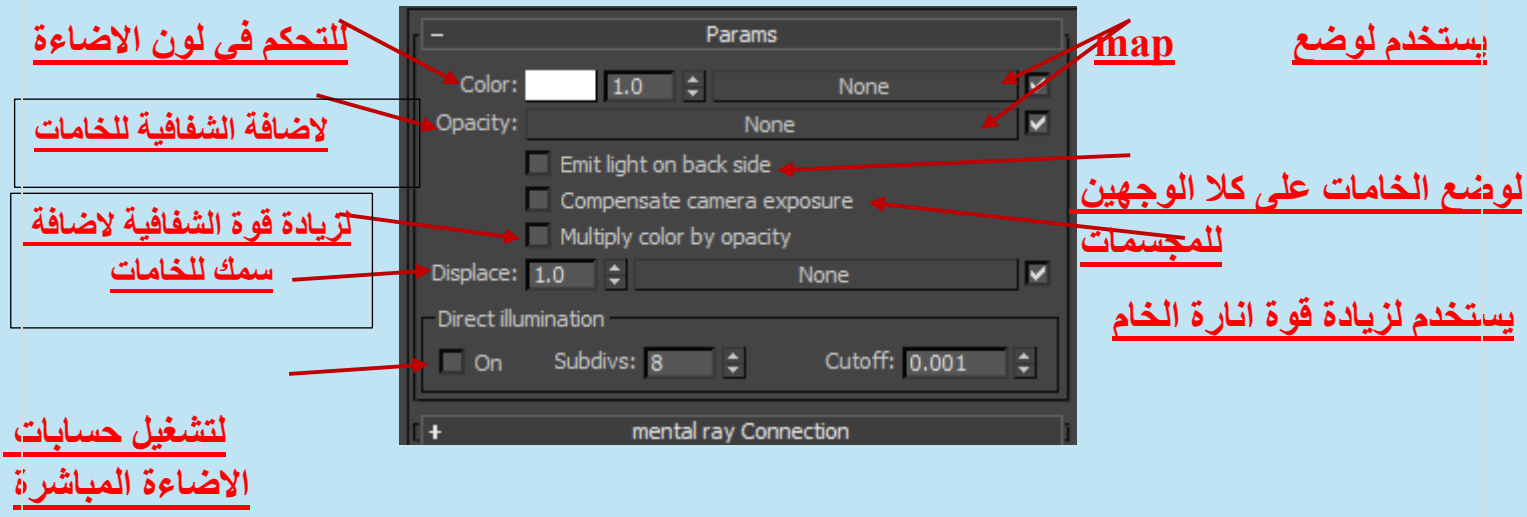
V-Ray Source Example: V-Ray Spot Light / IES Light

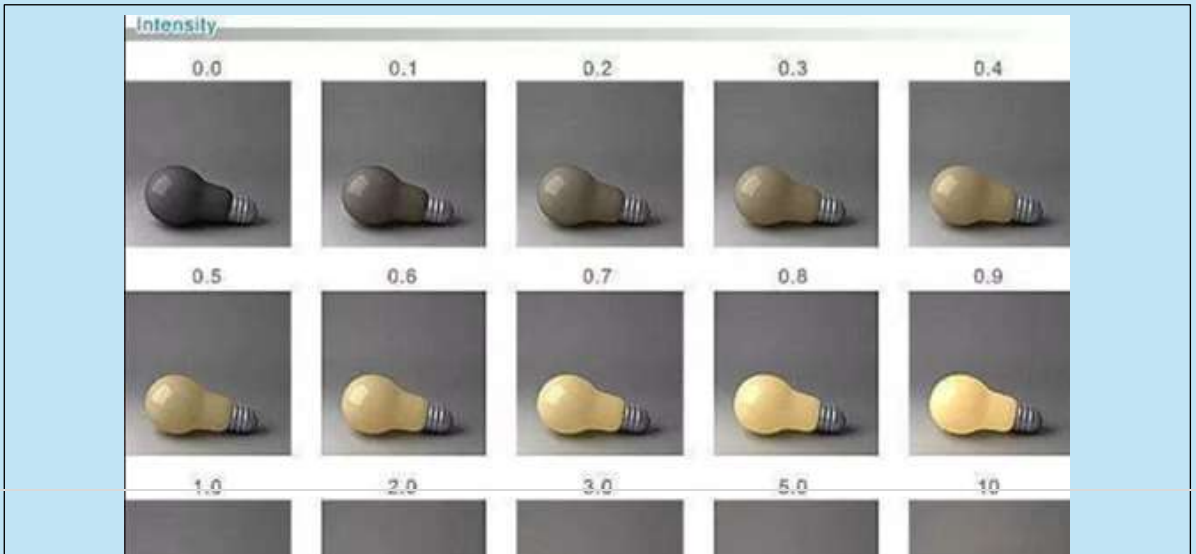
Short description:

Used to draw attention to specific elements.

Type	Purpose	Effect	Example in Scene	V-Ray Light
Ambient	General room lighting	Soft, low contrast	Living room at night	Environment Light / Dome Light
Task	Lighting for work/activity	Focused & Direct	Reading lamp, kitchen counters	Rectangle / Spot Light
Accent	Highlighting objects	High contrast / dramatic	Garden feature, art wall	Spot / IES Light

V-Ray Light Material





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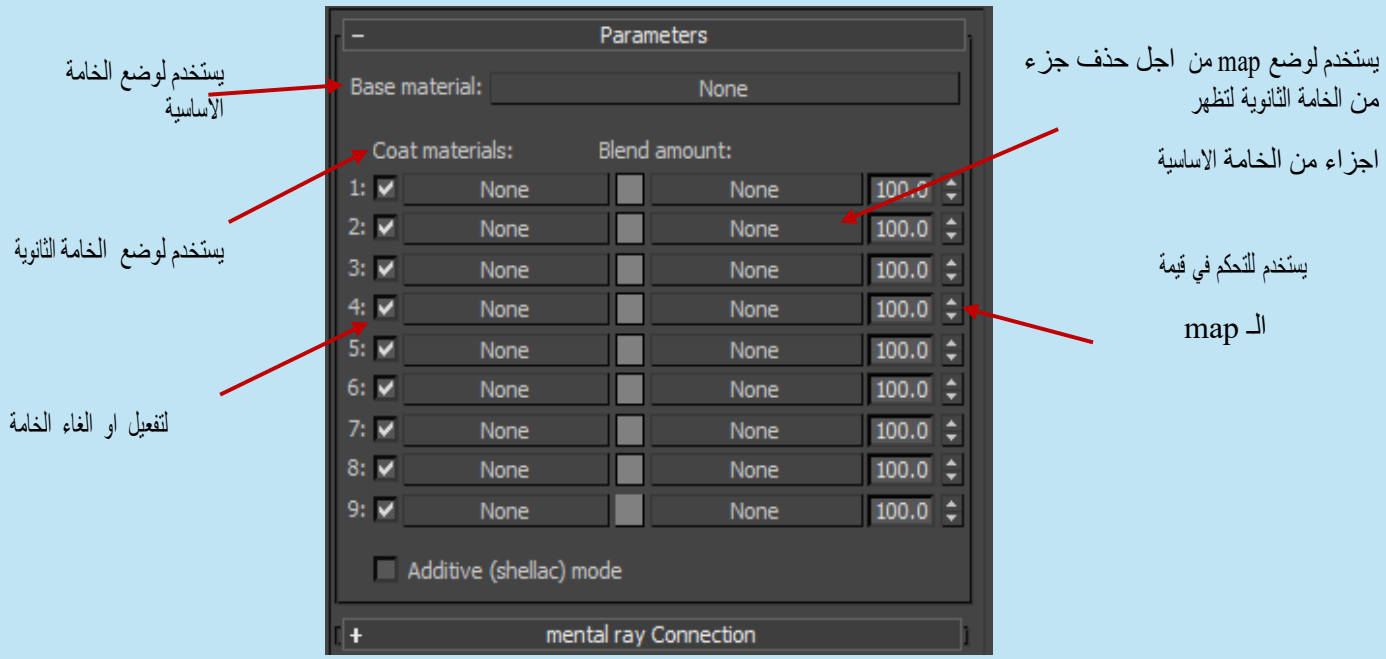
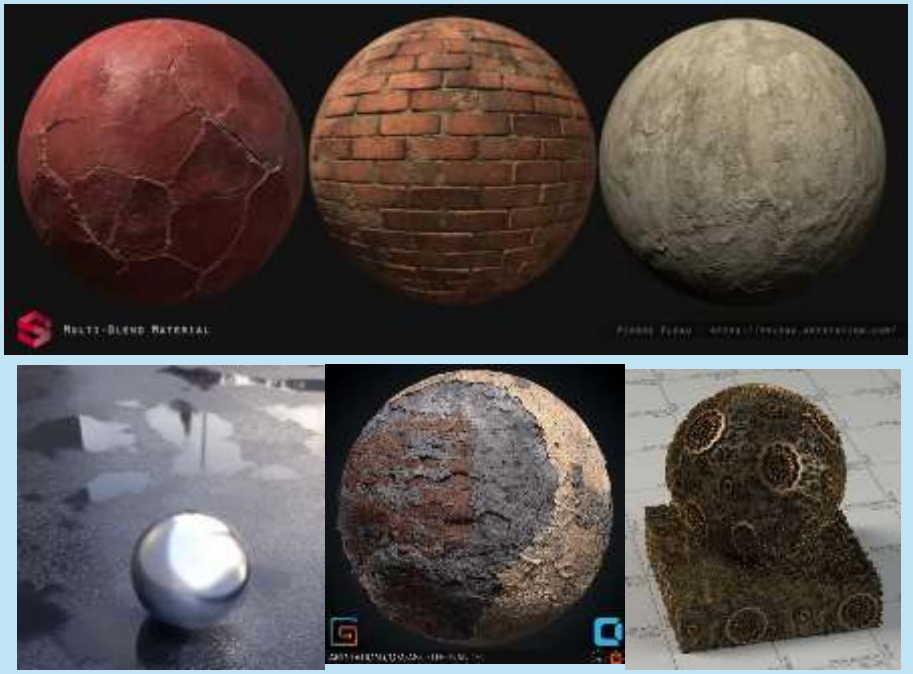
V-Ray Blend Material





(Example For V-Ray Blend Material)

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OTHER TOOLES USED IN RENDER

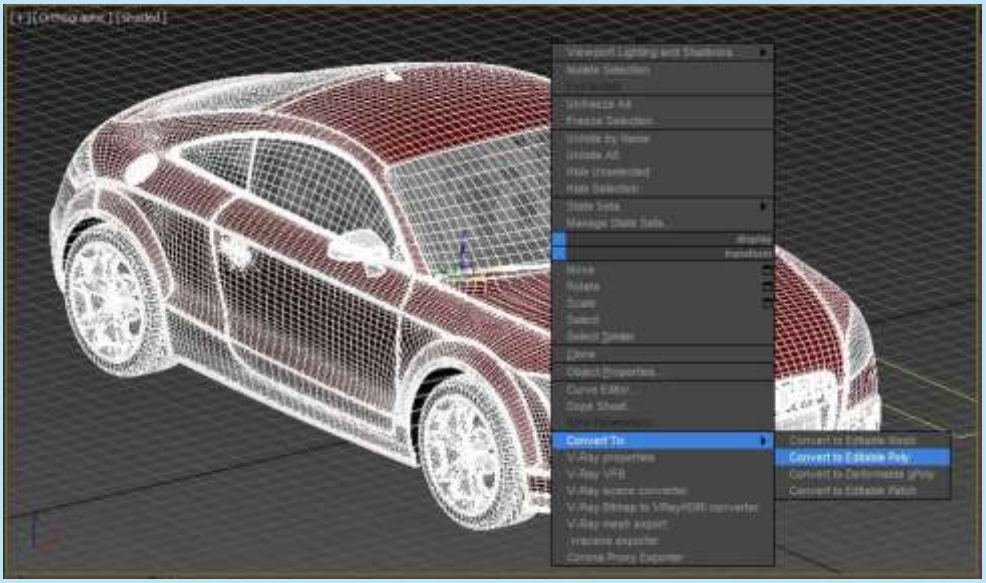
VRayProxy

VRayProxy its mean save object as external file (vrmesh) and then you can import into current file by using (VRayProxy).

VRayProxy used to reduce file size .

Using the following methods to creat VRayProxy :

1- Select objects ➤ Right - click ➤ Convert To ➤ Convert to Editable Poly .



2- Select one object from them and attach other objects to make one object by using Editable poly .

3- Assign material to objects .

4- Select object ➤ Right- click ➤ V-Ray mesh export ➤ from dialog specify parameters ➤ Click Ok .

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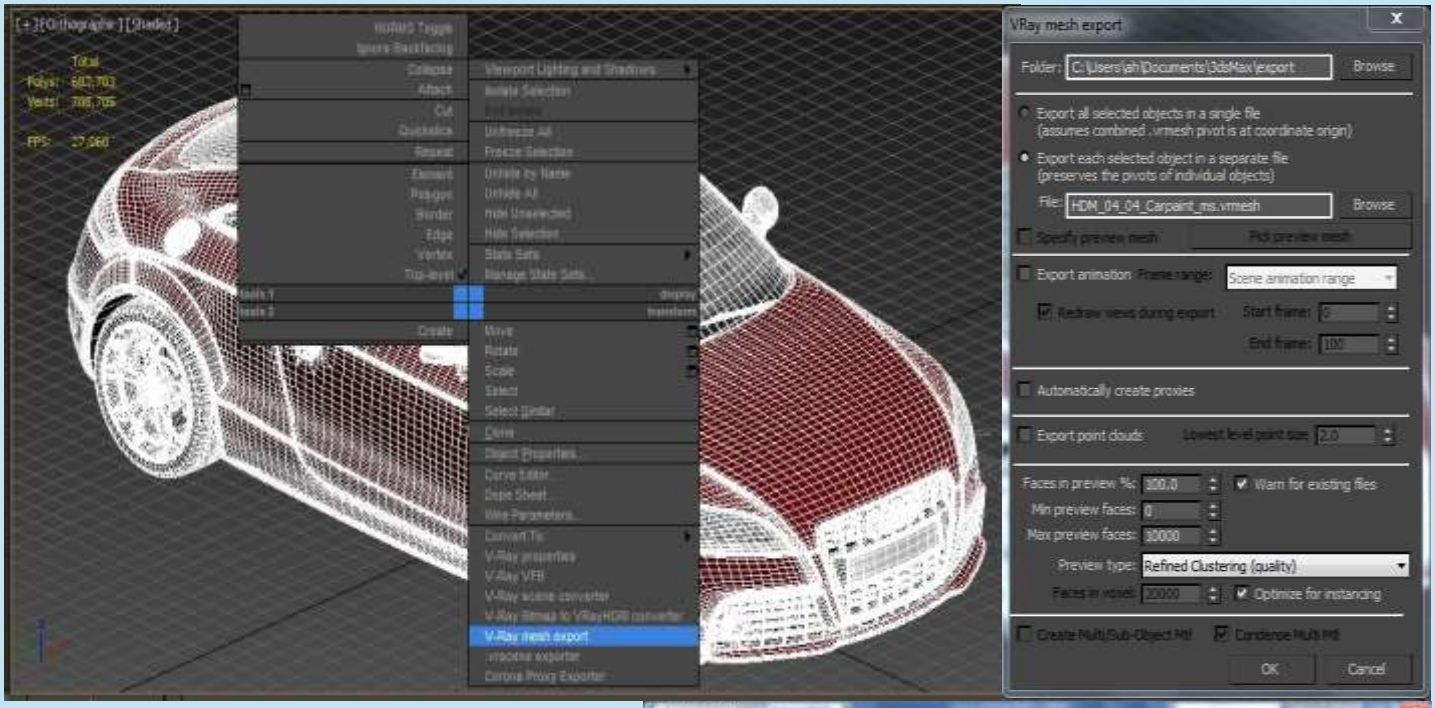
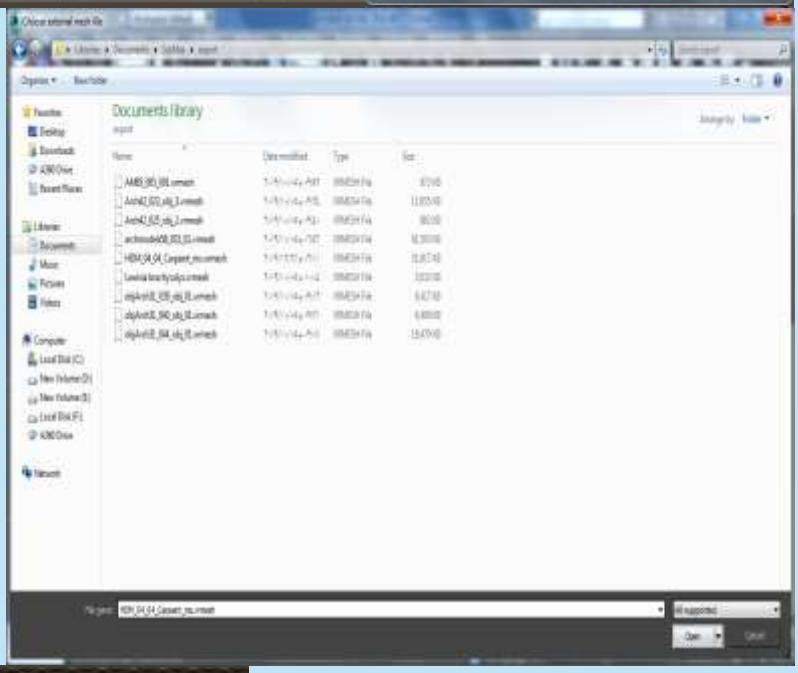
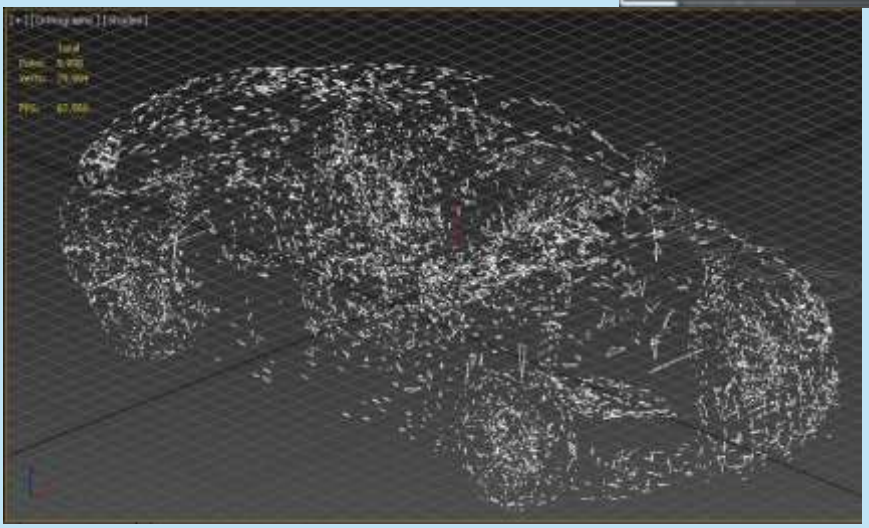


1- Delete object .

2- To import object In the Command panel click Create ( ) ➤ Geometry ( )➤ from the drop-down menu select VRay ➤ from Object Type select VRayProxy ➤ click in viewports .

3- From dialog select file ➤ click Open .

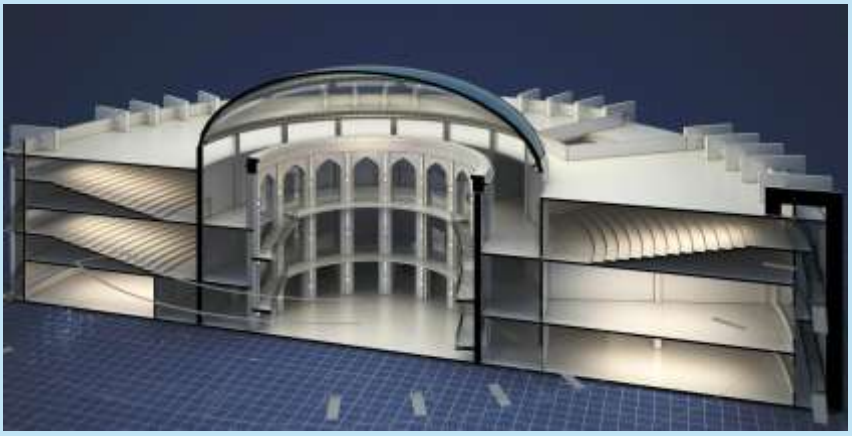




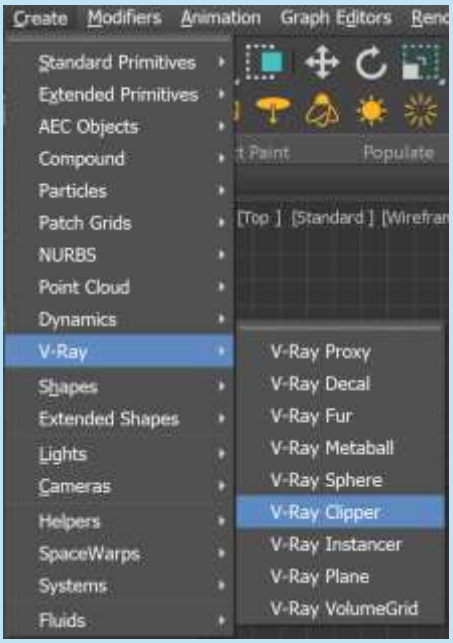
VrayClipper

In the Command panel click Create ( ) ➤ Geometry ( )➤ from the drop- down menu select VRay ➤ from Object Type select VrayClipper ➤ click in viewports .

(Effect VrayCliper)



Enabled – Turns the clipper effect on and off.
Affect lights – When enabled, the clipper affects area lighting as well.
Camera rays only – The clipper affects objects as they are directly seen by the camera, but they appear unchanged to reflection/refraction/GI rays.
Clip lights geometry – Enables or disables the clipping of lights geometry (for example a mesh light).
Use object material – When enabled, the clipper uses the material of each clipped object to fill in the resulting holes. When disabled, the material applied to the clipper object itself is used.
Set material ID – When enabled, you can specify a face material ID for the clipper object. This ID can then be used inside a Multi/Sub-object material to specify a different filler material for different objects. This option is available only when **Use object material is enabled**.
Material ID – Specifies the face material ID for the clipped surfaces when **Set material ID** is enabled.
Icon text – Shows/hides the V-Ray clipper icon text from the viewports.
Mesh mode - Enables the clipper to clip against an arbitrary mesh object rather than an infinite plane.



Operation - Determines how to use the mesh when **Mesh mode** is enabled:

Intersection - Clips away anything that is outside the specified mesh; only renders objects and parts of objects inside the specified mesh;

Subtraction - Clips away anything inside the specified mesh; only renders objects and parts of objects outside of the specified mesh.

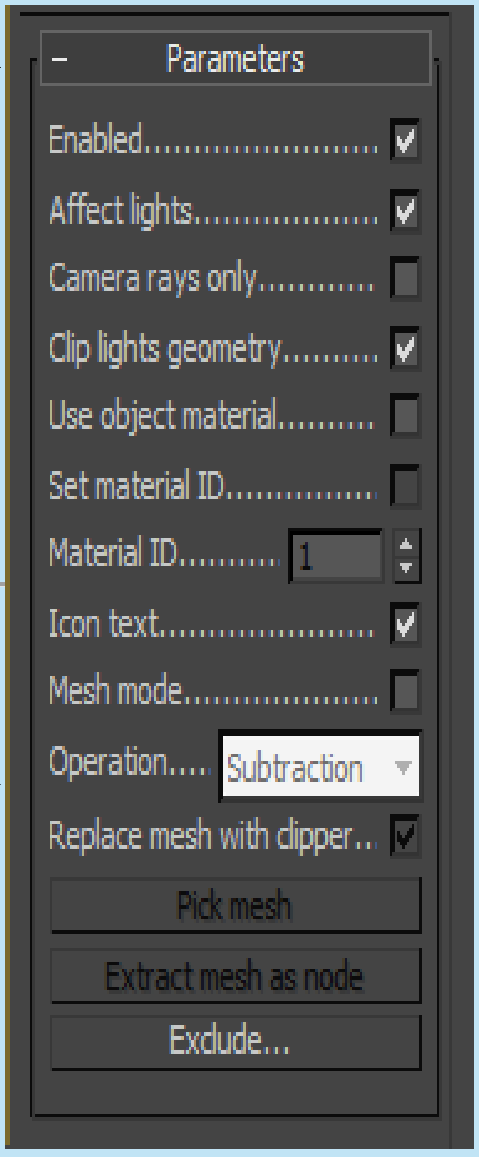
Replace mesh with clipper – Specifies what to do with the mesh that is picked through the **Pick mesh** button. When enabled, the mesh is moved as a sub-object under the VRayClipper object and the clipper takes the place of the mesh. If disabled, the clipper just references the picked mesh.

Icon Size – Specifies the size of the viewport gizmo in world units. This allows the gizmo to be static, regardless of its distance from the camera, or to be removed altogether.

Pick mesh – Allows you to pick a mesh object against which to clip when **Mesh mode** is enabled. This button is only active in the Modify tab of the 3ds Max Command Panel, and not in its Create tab.

Extract mesh as node – Extracts an instance geometry of the clipper mesh when **Mesh mode** is active.

Exclude – Opens an include/exclude list that allows you to select which scene objects to be clipped.



Notes

- VRayClipper works best with "closed" objects that have a corresponding back face. The results on open objects (without a corresponding back face) are not well defined.
- Currently the VRayClipper may produce artifacts if there are overlapping triangles in the scene, regardless of whether they are part of the same object or not.
- Note that **Set material ID** must be used for Multi/Sub-object, it does not act like Mtl ID in MultiMatteElemen

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General user interface

Open file	***CTRL+O (LETTER "O")***
Save file	***CTRL+S***
Redo scene operation	***CTRL+Y***
Undo scene operation	***CTRL+Z***
Delete objects	***DELETE***
Top view	***T***
Bottom view	***B***
Left view	***L***
Front view	***F***
Camera view	***C***
Isometric user view	***U***
List view	***V***
Snaps	***S***
Angle snap	***A***
Maximize viewport toggle	***ALT+W***
Shade selected faces	*F2*
Wireframe / smooth toggle	***F3***
Activate edged faces view mod	***F4***
Material editor	***M***
Expert mode	***CTRL+X***
Show tab panel toggle	***Y***
Hide cameras toggle	***SHIFT+C***
Hide lights toggle	***SHIFT+L***
Hide grids toggle	***G***

Go to end frame	***END***
Go to start frame	***HOME***
Forward time one unit	***. (PERIOD)***
Back time one unit	***, (COMMA)***
Play animation	***/ (FORWARD SLASH)***
Auto key toggle	***N***
Render last	***F9***
Show cordient	***X***
Render scene	***F10***
Select all	***CTRL+A***
Select invert	***CTRL+I (LETTER ???I???)***
Select none	***CTRL+D***

Show safe frames	*SHIFT+F*
Create camera from view	*CTRL+C*
Select-by-name dialog	***H***
Select	***Q***
Move	***W***
Rotate	***E***
Scale	***R***
Transform gizmo toggle	***X***
Transform type-in dialog	***F12***
Align	***ALT+A***
Zoom extents selected all	***Z***
Zoom region mode	***CTRL+W***
Maximise viewport	*Alt+W*

Editable Poly

1	**Vertex level**
2	Edge level
3	Border level
4	Poly level
5	Element level
Shift+E	Extrude mode
Ctrl+Shift+B	Bevel mode
Ctrl+Shift+C	Chamfer mode

Ctrl+Shift+E	Connect
Shift+X	Edge constaint
Ctrl+Shift+W	Target weld
Alt+C	Cut
Ctrl+Shift+Q	Quickslice
Alt+H	Hide
Alt+I	Hide unselected
Alt+U	Unhide all

Material Editor

 **(Go to Parent**

 **(Show End Result).)**

 **Show Shaded Material in Viewport**

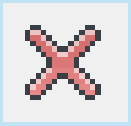
 **(Assign Material to Selection)**

 **(Get Material**

 **(Select By Material)**

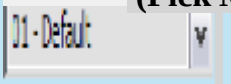
 **(Material Editor Options)**

 **(Put Material to Scene)**

 **(Reset Map/Mtl to Default Settings)**

 **(Make Material Copy)**

 **(Pick Material From Object)**



Material Name field

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V-Ray Frame Buffer

||V-Ray Toolbar|| > Last VFB button

Max2024_VRay6.2_VFB_UI_toolbar

||Render Setup window|| > V-Ray tab > Frame buffer rollout > Show last VFB button

Overview

The lighting analysis workflows with V-Ray are based around two components: the VRayLightMeter helper object, and the VRayLightingAnalysis Render Element. While the VRayLightMeter object has been included in V-Ray since version 2.0, it is updated and improved for V-Ray Next and later to ensure better precision of the results. The VRayLightingAnalysis Render Element is newer than the VRayLightMeter workflow in V-Ray.

VRayLightMeter Helper

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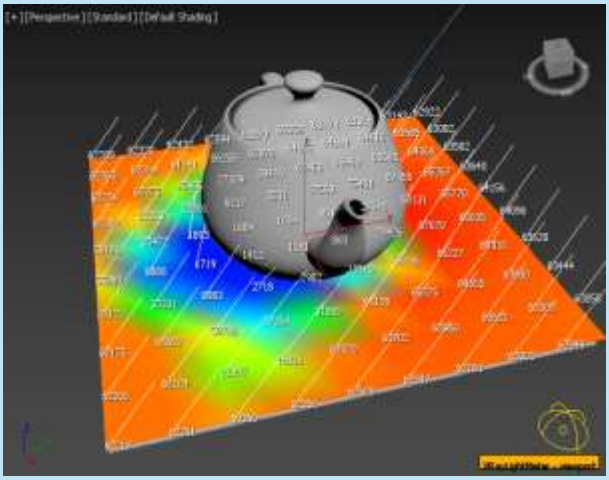
The VRayLightMeter helper is a rectangular grid that can be added to the scene to show illuminance values at the vertices of the grid. It enables showing total illuminance, direct illuminance, indirect illuminance and daylight factor. The predominant direction from which the respective lighting component comes can also be shown.

The VRayLightMeter in the 3ds Max viewport, with pseudo colors, orientation and textual illuminance values displayed.



The interface of the VRayLightMeter in the 3ds Max command panel.

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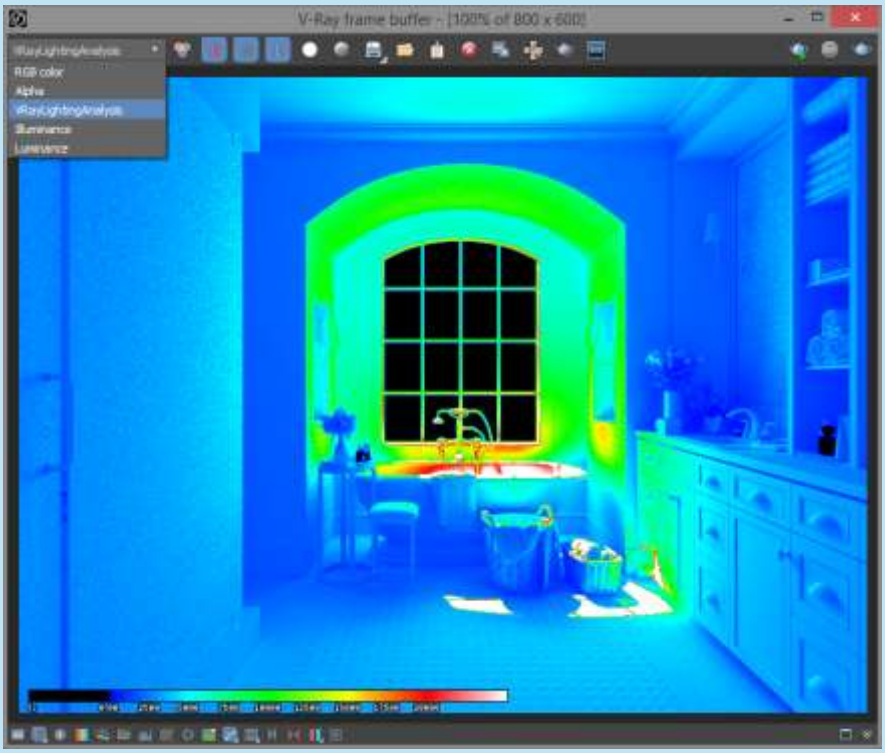

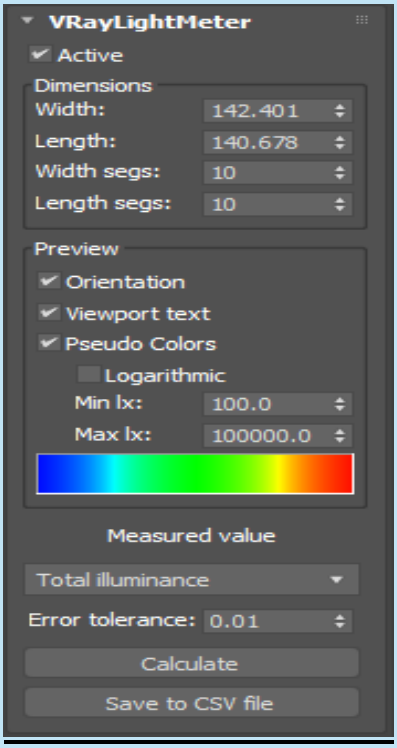

VRayLightingAnalysis Render Element

The VRayLightingAnalysis Render Element is a special element that can be added from the Render Settings.
Adding this render element internally adds two other render elements to the V-Ray frame buffer called Illuminance and Luminance which are filled with the absolute unscaled lux and candela values for the respective quantity.

The V-Ray frame buffer showing the VRayLightingAnalysis render element in “false colors” mode after a render is complete. The additional Illuminance and Luminance render elements can be seen in the VFB as well.

The interface of the VRayLightingAnalysis Render Element.

VRayPhysicalCamera

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Overview

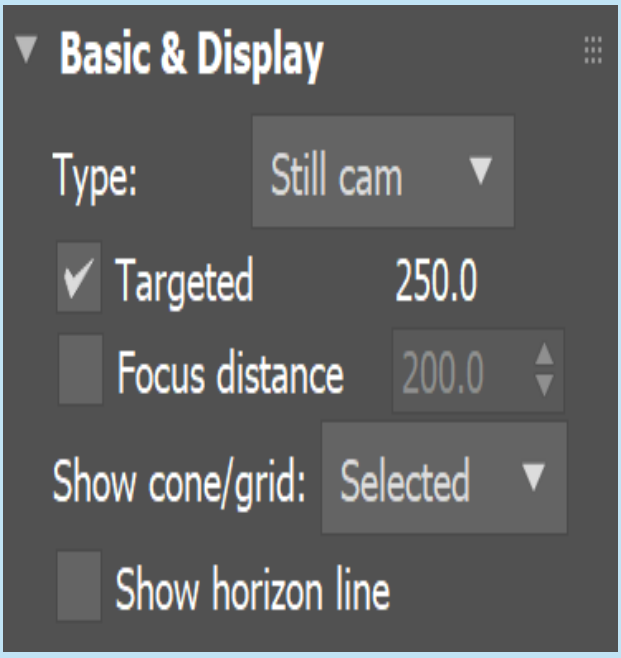
The VRayPhysicalCamera uses real-world camera settings such as f-stop, focal length, and shutter speed to set up the virtual CG camera. It also makes it easier to use light sources with real-world illumination, such as VRayLight with physical units or VRaySun and VRaySky.
UI Path: ||Create Menu|| > Cameras > V-Ray > VRayPhysicalCamera

||Create menu|| > Cameras > V-Ray > VRayPhysicalCamera

||V-Ray menu|| > Create > Cameras > V-Ray Physical Camera
Script Access

||V-Ray Toolbar|| > Physical Camera button

Basic & Display



Type – Specifies whether the camera has a target in the 3ds Max scene or not. This helps to determinate the type of the camera. This mostly has an effect on the motion blur effect produced by the camera.
Still cam – Simulates a still photo camera with a regular shutter.
Movie cam – Simulates a motion-picture camera with a circular shutter.
Video cam – Simulates a shutterless video camera with a CCD matrix.
Targeted – Shows the distance from the camera to the camera target, when Targeted is enabled.
Focus distance – If enabled, specifies the distance at which objects are in focus.

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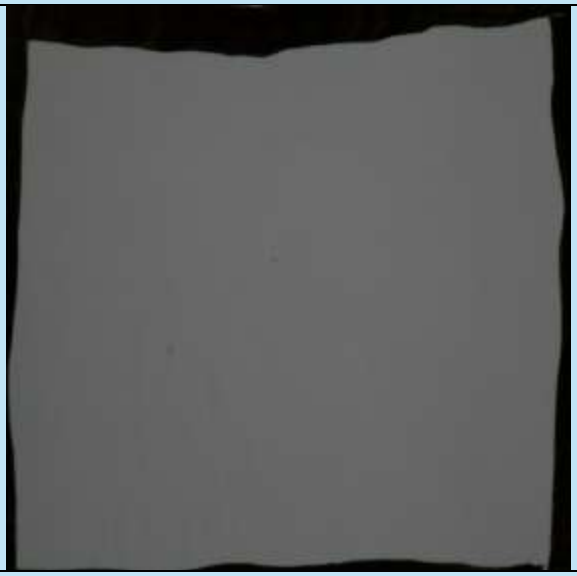
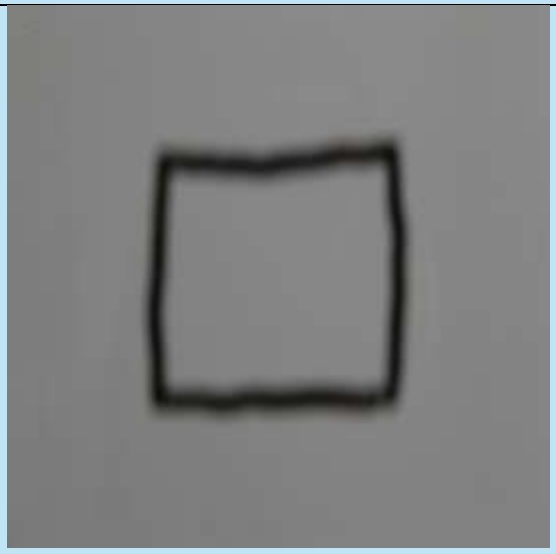
Show cone/grid – Controls whether and when to show a preview of the camera field of view and focus plane.
Selected – Only shows the preview when the camera is selected.
Always – Constantly enables the preview.
Never – Constantly disables the preview.
Cone only – Displays the cone in the viewport but removes the grid for the camera view.
Show horizon line – When enabled, displays the camera horizon line in the viewport.

Example: Exposure, Field of View and Focus Distance

The focus distance of the physical camera (as specified by either the Target distance or the Focus distance parameter) affects the exposure of the image and the field of view for the camera, especially if the focus distance is close to the camera. This is an effect that can be observed with real-world cameras as demonstrated in the images below.
The set up is a white board with a small black rectangle and a camera in front of it. Notice how changing the focus distance produces images with different brightness even though the illumination and all other camera parameters are the same in both cases. Also notice the change in the field of view.

	
The camera is focused on the white board; the grey color is approximately RGB 104, 104, 104.	**The camera is focused at infinity; the grey color is approximately RGB 135, 135, 135.**

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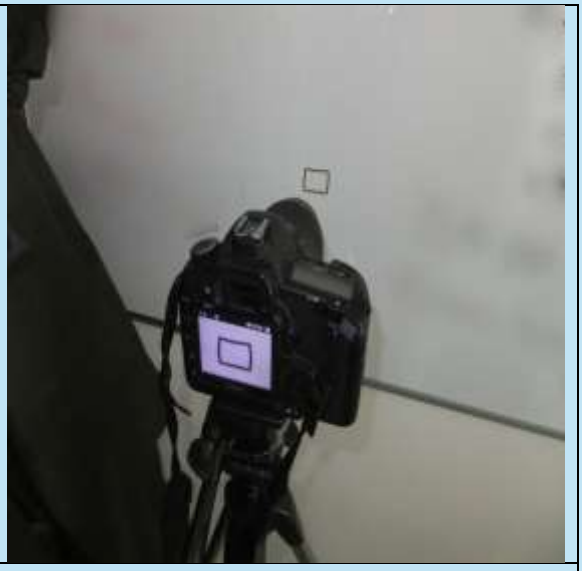
	
Side view of the camera focused at infinity.	**Side view of the camera focused on the white board**

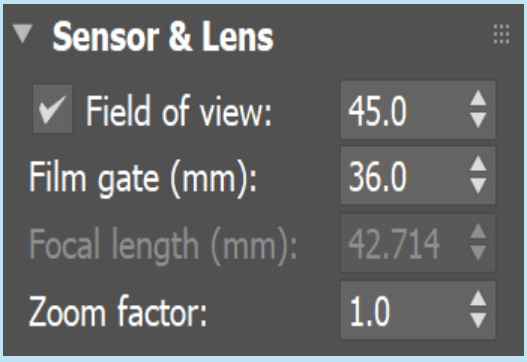
Sensor & Lens

Field of view – When enabled, sets the field of view directly without having to set up the Film gate and Focal length.

Film gate (mm) – Specifies the horizontal size of the film gate in millimeters. Note that this setting takes into account the system units configuration to produce the correct result. Vertical film gate size is calculated by accounting image aspect ratio (vertical film size = horizontal film size / aspect ratio).

Focal length (mm) – Specifies the equivalent focal length of the camera lens. This setting takes into account the system units configuration to produce the correct result.

Zoom factor – Specifies a zoom factor. Values greater than 1.0 zoom into the image; values smaller than 1.0 zoom out. This is similar to a blow-up rendering of the image.



Example: Zoom Factor

This parameter determines the zooming (in and out) of the final image. It doesn't move the camera forward nor backwards.

The following constant settings were used for some parameters: Exposure is set to Physical Exposure mode, F-Number is 4.0, Shutter speed is 8.0, Film speed (ISO) is 100, Vignetting is

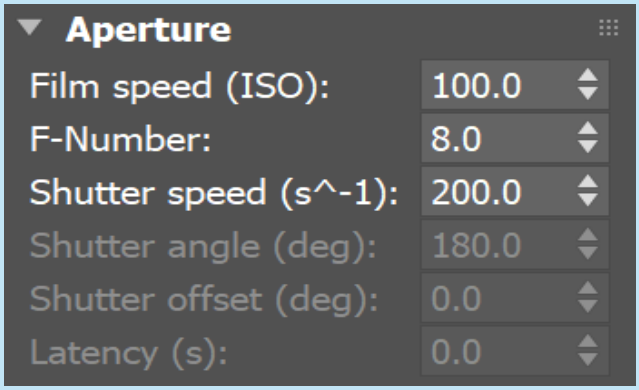
on, White balance is white.

Aperture

Film speed (ISO) – Determines the film power (i.e. sensitivity). Smaller values make the image darker, while larger values make it brighter. *For more information, see the Film Speed (ISO) example below.*

F-Number – Determines the width of the camera aperture and, indirectly, exposure. If the Exposure option is checked, changing the F-number will affect the image brightness. For more information, see the F-number (s-top) example below.



Shutter speed (s^-1) – Specifies the shutter speed, in inverse seconds, for the still photographic camera. For example, shutter speed of 1/30 s corresponds to a value of 30 for this parameter. For more information, see the Shutter Speed example below.

Shutter angle (deg) – Specifies the shutter angle (in degrees) for the movie camera.

Shutter offset (deg) – Specifies the shutter offset (in degrees) for the movie camera.

Latency (s) – Specifies the CCD matrix latency (in seconds) when the camera mode is set to Video cam.

Aperture F-number vs Shutter Speed vs ISO Cheat Sheet

The main options that control the brightness of a V-Ray Physical camera are Aperture F-number, Shutter Speed and ISO. They affect each other and you need to balance their values according to your scene. Keep in mind that these settings do not correspond to those of a real-life camera. They apply only to the V-Ray Physical camera.

- **F-number determines the size of the opening in the camera lens. The number refers to the**

ratio between the aperture's focal length and the actual diameter of the aperture. A smaller F-number means a larger aperture. The larger the Aperture, the brighter the scene becomes but that also introduces more Depth of field.

- **Shutter Speed determines how long the lens stays open when taking the photo. The numbers refer to fractions of a second. The slower the Shutter Speed, the brighter the scene becomes but that also introduces Motion Blur.**

- **ISO determines the camera's sensitivity to light. Lowering the ISO means that more light is needed to achieve good lighting. Increasing the ISO means that less light is needed to achieve good lighting. A day scene, lit with a V-Ray Sun, for instance, looks best when captured with around 100 ISO.**

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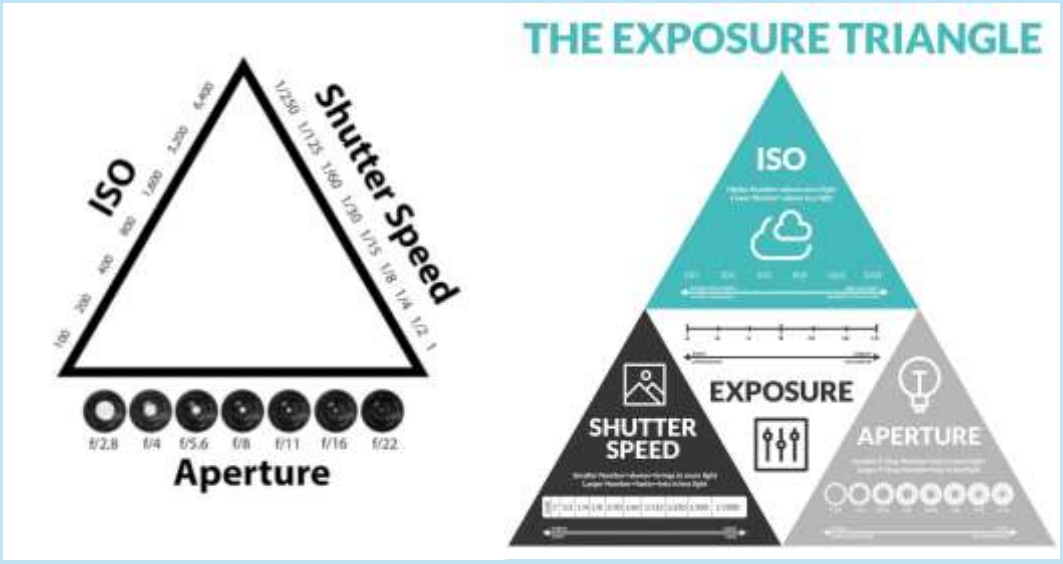

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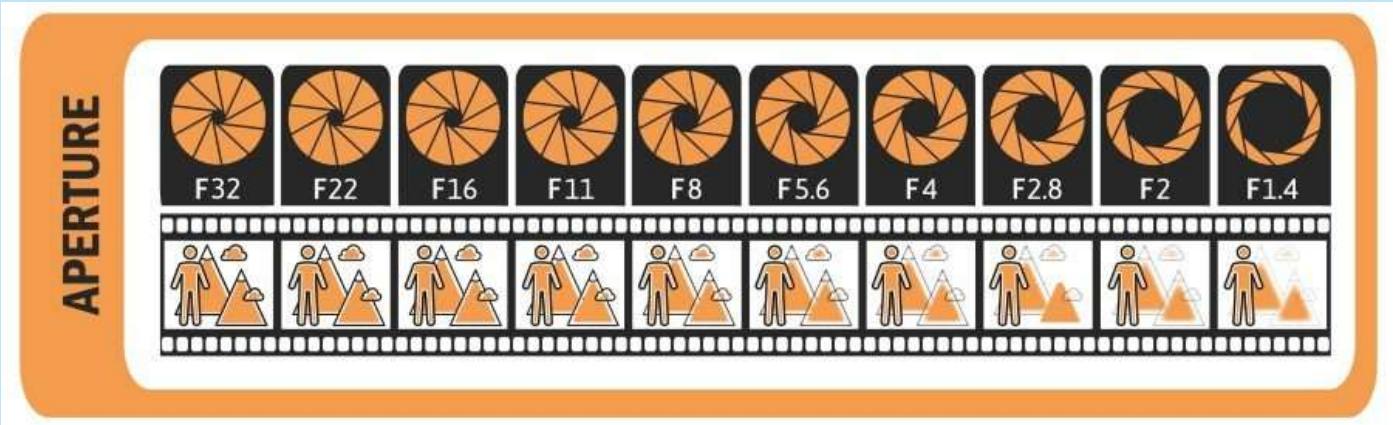

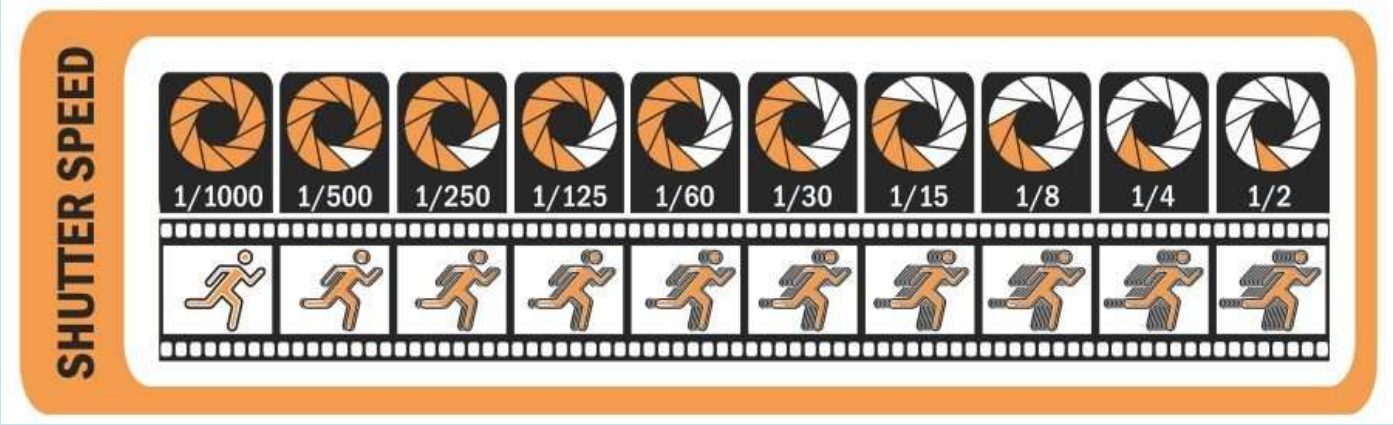

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Weather condition	Clear & sunny	Slightly overcast	Overcast	Heavy overcast	Sunset
Shadow details	Distinct	Soft around edges	Barely	No shadows	No shadows
Aperture	f/16	f/11	f/8	f/5.6	f/4
Shutter speed At ISO 100	1/100	1/200	1/400	1/800	1/1600
Shutter speed At ISO 200	1/200	1/400	1/800	1/1600	1/3200
Shutter speed At ISO 400	1/400	1/800	1/1600	1/3200	1/6400