DV15437

Revit to 3ds Max Workflows for Realistic Rendering with NVIDIA Iray

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Gensler

Learning Objectives

- Effectively set up models in Revit for transfer to 3ds Max.
- Set up a direct link between Revit and 3ds Max.
- Manage lighting, cameras, and materials inside of 3ds Max.
- Render "Photo-Realistic" renderings with NVIDIA Iray.

Description

Back by popular demand! Learn how to maximize productivity between designing in Revit software and rendering in 3ds Max software with NVIDIA's Iray rendering engine. Discover all the settings and tricks you can use to properly set up a Revit model to make the transition into 3ds Max software as effective as possible. Once in 3ds Max software, all the work done in Revit software will transfer over, enabling more time for rendering and less time spent worrying about the design. The simplicity, accuracy, and speed of Iray will help the user create believable-looking renderings in the same way that a photographer would photograph a physical space. In the end, users will gain the knowledge of how to set up a seamless pipeline between Revit software and 3ds Max software in order to help streamline the rendering process across any scale of a project. This session features 3ds Max and Revit Architecture.

Your AU Expert(s)

Scott DeWoody has always had an affinity for art and technology. After seeing the animation being done through computers, he knew he could combine the two. In 2007, he graduated from The Art Institute of Houston with a bachelor's degree in media arts and animation. There, he focused on lighting and rendering techniques using 3ds Max software, V-Ray for 3ds Max, and Adobe Photoshop software. A day does not go by when he is not using one of these applications. Image quality and workflow are the top priorities in his work. He is constantly studying color theory, composition, and new ways to produce the most effective possible results. He has worked at M. Arthur Gensler Jr. & Associates (Gensler), for the past 8 years as a visualization artist and manager. He has worked for numerous clients, including NVIDIA Corporation, ExxonMobil, and so many more. Currently, he is exploring the new possibilities of architecture in the interactive space with gaming platforms, augmented reality, and virtual reality.

Chapter 1: The Digital Digital Photographer – An Introduction to GPU Rendering

When NVIDIA designed Iray, their intention was to create a rendering engine that acted like a Digital Camera inside of a 3D application. The end user would just have to place a camera into a scene and hit render, and Iray pretty much does just that. NVIDIA has spent a lot of time researching and programming real-world values for how light and materials interact with each other. Coupled with the power of their GPUs, which take advantage of the parallel processing that Progressive Path-Tracers thrive off of, the speed and accuracy of Iray is phenomenal. There is “Photo-Real”, but now we can safely say a rendering could also be “Photo-Accurate” with Iray.

The best way to achieve Photo-Realistic and Photo-Accurate, renderings out if Iray, is to study the real world. Having a background in Photography will help tremendously, as that now photography settings play an extremely upfront role in how renderings will be generated. How to properly expose an image, along with knowing how materials react in the real-world, will take the renderings to the next level. Introducing known real-world values into a rendering, such as the real-world intensity for the Sun and Sky, will automatically help the renderings start to look Photo-Realistic right from the start of the project. Not to mention that those real-world values will have the light bouncing around the project as it really would, creating the Photo-Accurate effect. The more real-world limits that are introduced through lights (IES Files, and known material values (Energy Conservation Models and MDL Materials), the easier it will be to achieve this look. Thus this starts to make the end-user start to act more like a Photographer when it comes time to render, because everything is the 3D files is now mimicking real life. Even Post-Production methods start to mimic a Photographers workflow. One could make the correlation between a 32-bit EXR file from Iray with that of a RAW photo from a DSLR. Both usually end up getting a series of adjustments after being taken, either being Tone-Mapping, Color Adjustments, or any other special effects that might be required by the art direction. In the end, it can be extremely difficult to tell the difference between a render from Iray and an actual Photograph. **(See Image 1-1)**

Once these real-world limits are in place, it becomes much easier to break them to achieve the desired look for the project, and sometimes this might be necessary. And it is perfectly ok to do so, especially if Photo-Accurate is not a goal of the rendering. But beyond Iray itself, it is important to know what kind of hardware that will be required to get the best performance out of the rendering engine. The usual way of rendering on the CPU will not really work for Iray. NVIDIA has created a technology called CUDA that Iray takes advantage of, and CUDA can only found NVIDIA GPUs. There are many advantages of using the GPU, over the CPU, for creating renderings. One of the biggest advantages besides speed, is the level of interactivity that one can achieve. The possibility of having a rendering being computed while changes are still being made, and having the updates show up in almost real-time, can save hours of work. There is no longer the need to make a change, hit render, wait, not like the change, and do the process over again.

Playing Photographer

Approaching the rendering process the same way as a Photographer approaches taking photographs will result in very believable renderings. This was the mindset that NVIDIA had when developing Iray.

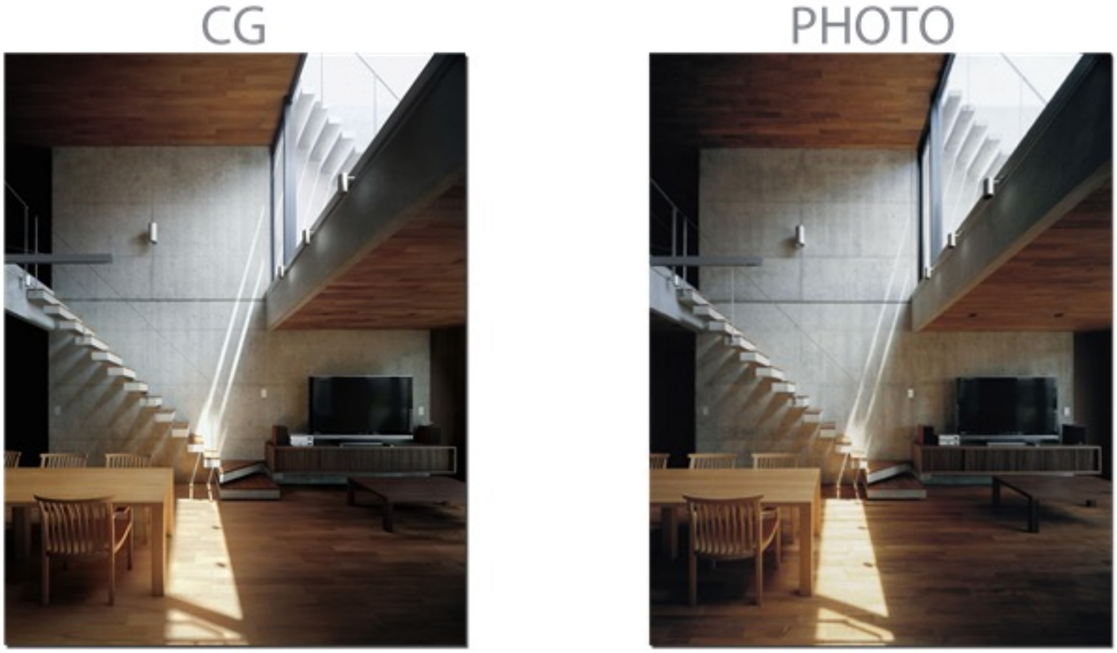


IMAGE 1-1: The image on the left was rendered with Iray, and the image on the left was the Photo taken for reference. It's very hard to tell the two apart! (Images provided by NVIDIA and are not my renderings.)

IMAGE 1-2: This is an example of a rendering from a Iray for 3ds Max. Photography techniques were used through the entire process.

IMAGE 1-3: The lobby of the Gensler LA Office rendered just as if it was being taken with the same settings that would be used with a DSLR in the real world.

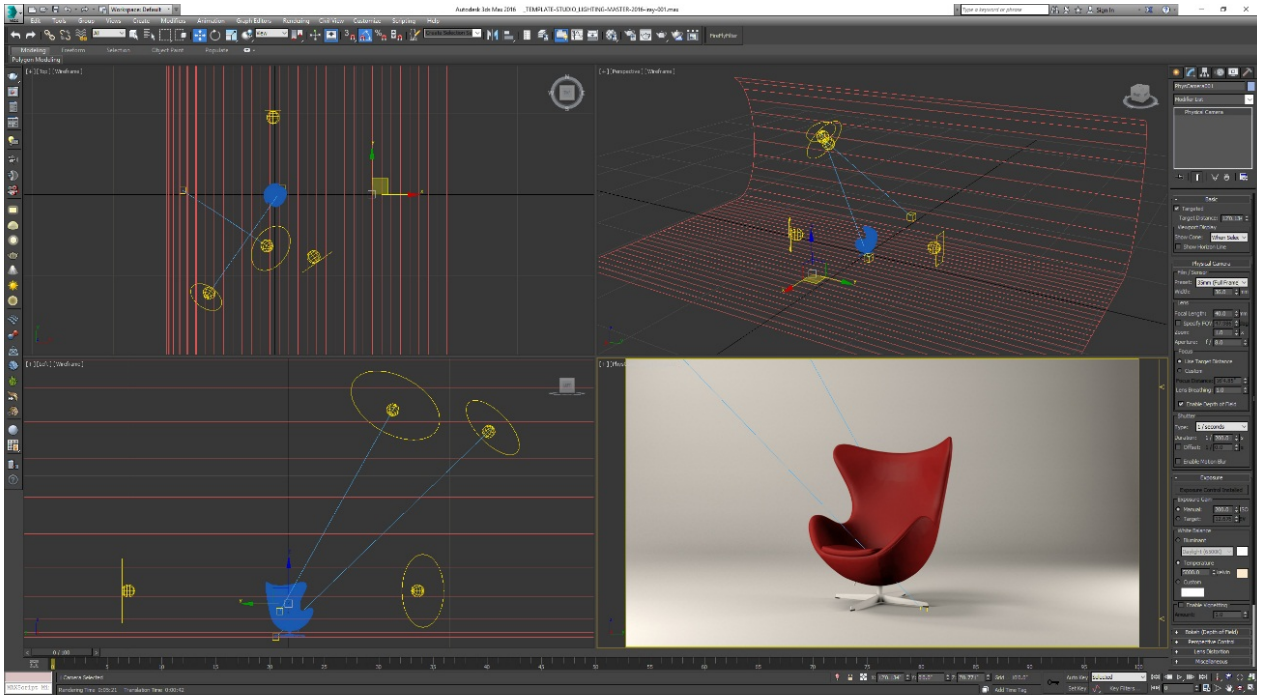


IMAGE 1-4: Real-Word Light placement and settings result in an accurate Studio Lighting setup inside of 3ds Max with NVIDIA Iray!

NVIDIA Iray Overview

- **Photo-Real 3D Render with a strong parallel to Photography.**
- **Progressive Rendering (Develops like a Polaroid)**
- **Physically based (Unbiased)**
- **Interactive**
- **Floating Point (32-bit)**
- **GPU rendering is extremely dependent on RAM.**
    - If you cannot load the entire scene on to the card, it will not render.
    - You are only as good as the weakest card in your system!

GPU Recommendations

- ***GTX 1070 ($)***
    - Entry Level
- ***GTX 1080 ($$)***
    - Best Bang for the Buck
- ***Titan X - Maxwell ($$)***
    - Pretty Fast
- ***Titan X - Pascal ($$$)***
    - Super Fast
- ***Quadro P4000 ($$)***
    - Base Quadro Card
- ***Quadro P5000 ($$$)***
    - Best Cost/Performance Quadro
- ***Quadro P6000 ($$$$$)***
    - Top Card

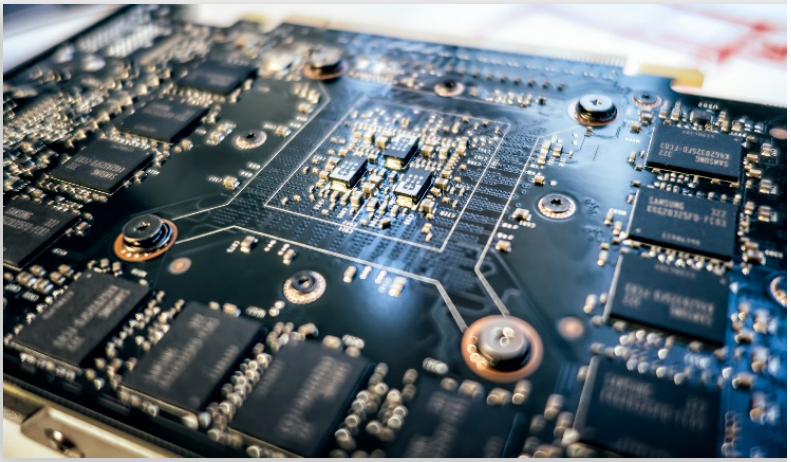


IMAGE 1-5: This is what the GTX Titan chipset looks like!

GTX Vs Quadro

- ***GTX***
    - Built for gaming
    - Run SUPER HOT
    - HIGH Power Consumption
    - Decent Viewport Performance
    - Cheaper than Quadro

- ***Quadro***
    - Built for CAD Applications
    - More Energy Efficient
    - Excels Viewport Performance
    - More dependable than GTX
    - Lots of RAM
    - M6000 @ 12GB

GPU Configurations

- ***It is recommended to have at least 2 GPUs for interactive rendering.***
  - Interactivity will need one GPU set for Windows only.
  - Do NOT put GPUs in SLI Mode for rendering.
- ***Optimal Configuration:***
  - GPU 0 – Windows (Titan X, P4000, P5000, P6000)
  - GPU 1 – Rendering (Titan X, P5000, P6000)
  - GPU 2 – Rendering (Titan X, P5000, P6000)

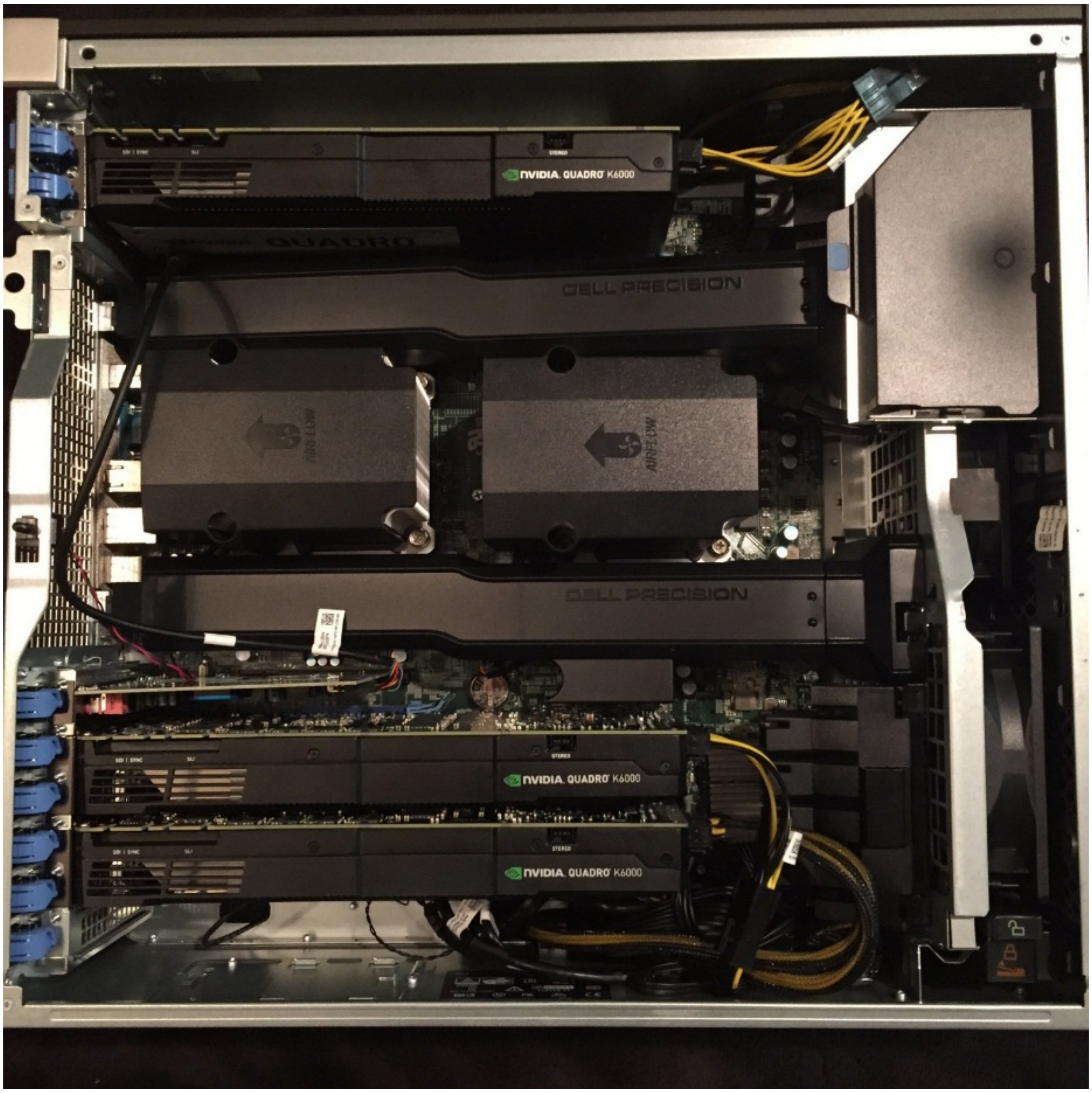


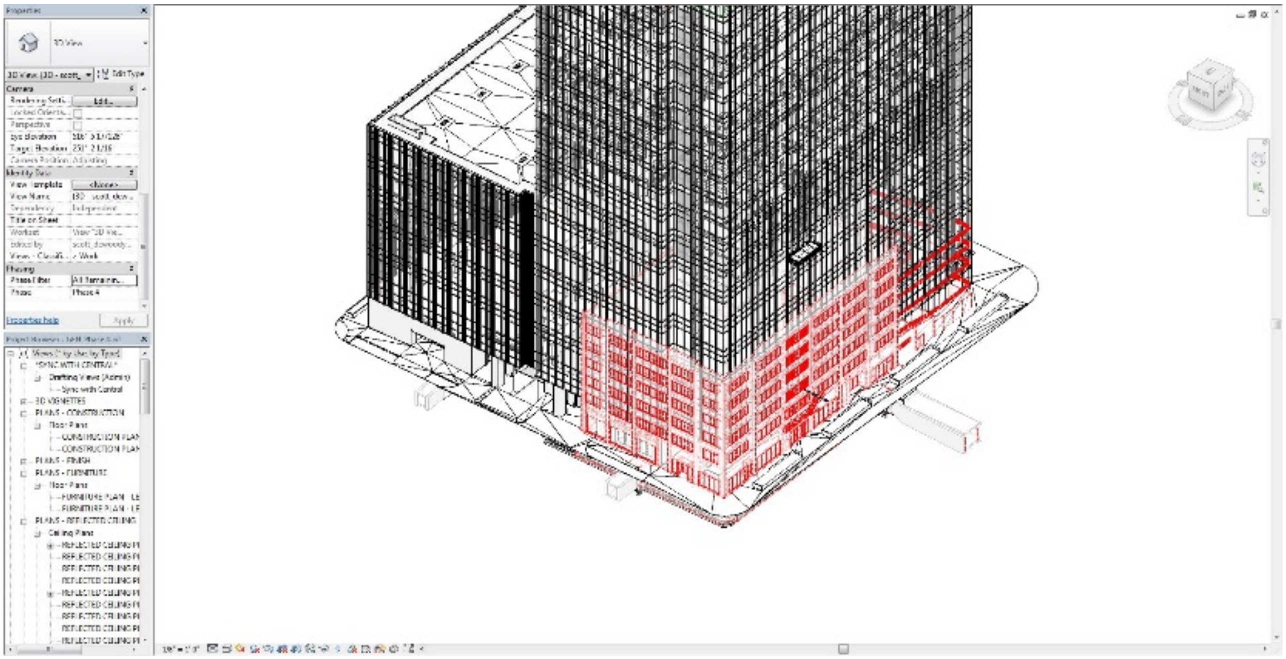
IMAGE 1-6: This is a workstation outfitted with 3 NVIDIA Quadro K6000s

Chapter 2: Revit Setup

View Setup

Setting up your views properly is the first step in getting your Revit model into 3ds Max. The views you set up will drive exactly what content will be exported and rendered inside of 3ds Max. Spending time here to organize your model will pay off in the long run, especially if you will using this process over the course of an entire project's lifespan. Ideally once the views are set, there should be very little reason to tweak them. Depending on how many people have their hands in the model, objects can always shift around in the model. So double checking prior to exporting is always a best practice.

- **View Classifications:**
  - Visualization – Scene (Simple Workflow)
    - This view is one export, and is best for speed. It can be ideal for those who want to do as little work in 3ds Max as possible.
  - Visualization – Export (Advanced Workflow) (Recommended)
    - A little more complex, but offers the most flexibility with the model. Ideal for those who want to work more in 3ds Max, but those who want to work in Revit more can still benefit from this workflow.
- **Hide all objects not seen for workflow and rendering optimization.**
  - Views will only export what is visible.
  - Not everything will be needed. This will be up to the user and what is being render.
  - Reducing information that is not needed, will help optimize RAM and file size.
- **Watch for the "Phase Filter" in the View Properties under the Phasing section.**
  - Exporting a 3D-View with the "Phase Filter" enabled will result in all the objects that are included in the filter to have a material override applied to them. This means when using this workflow, these objects will all be combined in to one massive object.
  - It is recommended to export the phased options in their own FBX files if they are required for rendering. This will give full control over their materials as well.
  - Phases will need to align with the view you are looking to render. If geometry overlaps on top of each other, this will cause rendering issues and will not look correct. The pieces need to fit like a puzzle, which is how the rest of this workflow works.

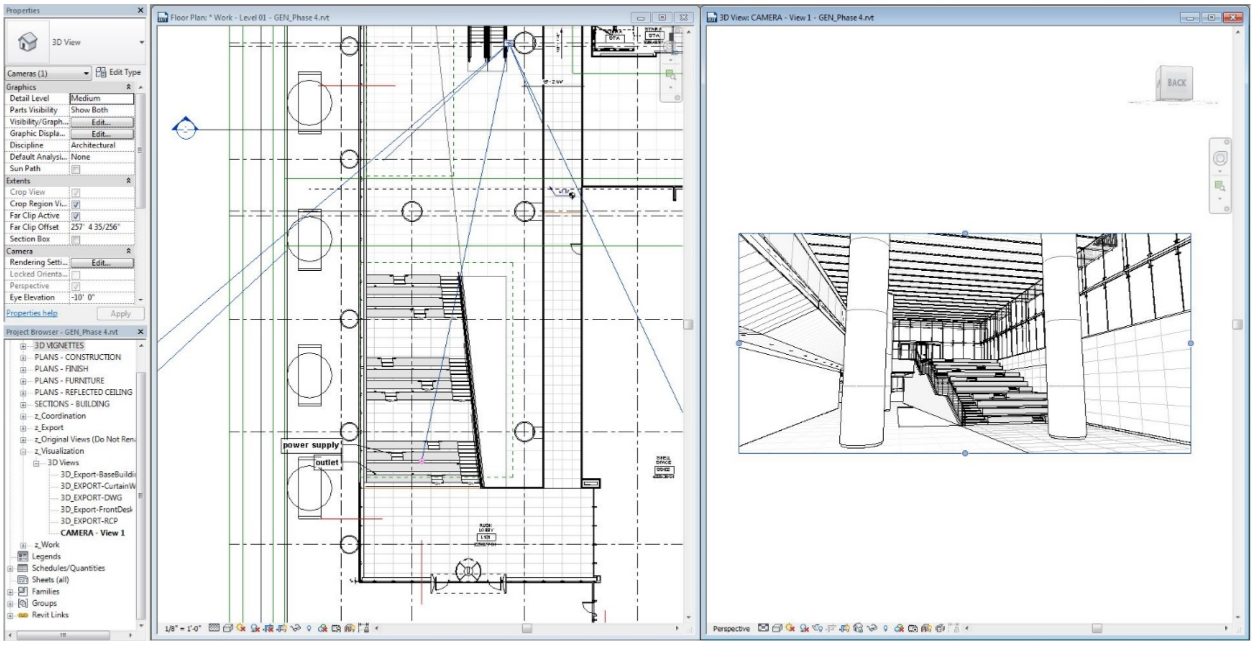


Rendering Setti...	Edit...
Locked Orientatio...	□
Perspective	□
Eye Elevation	516' 5 13/128"
Target Elevation	250' 2 1/16
Camera Position	Adjusting
View Template	<None>
View Name	3D - scott_dow...
Dependency	Independent
Title on Sheet	
Workset	View "3D Vie...
Edited by	scott_dowoody...
Views - Classifi...	z Work
Phase Filter	All Remainin...
Phase	Phase 4

IMAGE 2-1: This demonstrates the issues that can be caused by the Phase Filter. This will clearly cause issues for final renderings, and will need to be set properly or disabled.

Visualization – Scene (Simple Workflow)
This workflow assumes that there will be a single exported view from Revit into 3ds Max. This view could be either a generic 3D View or a placed camera inside of Revit. Either way, the export will take everything that is visible in the view. A single export for small scenes from a generic 3D View is the ideal way to go, as the Advance Workflow can be considered “overkill” for small scenes.

- **View Setup:**
    - Place a Camera for the view you want to render.
    - Make sure lights are visible and turned on.
    - Make sure elements that are not needed are hidden.
        - Use a section box or disable categories in Visibility Graphics.
    - Make a duplicate of the same view, and hide everything but Railings and any additional curved objects.
        - Do this only if the scene has extensive amounts of railings and curved objects.
        - Must export the
        - This view is one export, and is best for speed. It can be ideal for those who want to do as little work in 3ds Max as possible.


Properties

3D View

Cameras (1)

Graphics	
Detail Level	Medium
Parts Visibility	Show Both
Visibility/Graph...	Edit...
Graphic Displa...	Edit...
Discipline	Architectural
Default Analysi...	None
Sun Path	□
Extents	
Crop View	☑
Crop Region Vi...	☑
Far Clip Active	☑
Far Clip Offset	257' 4 35/256"
Section Box	□
Camera	
Rendering Setti...	Edit...
Locked Orienta...	□
Perspective	☑
Eye Elevation	-10' 0"

IMAGE 2-2: This is an example of the Simple Workflow. A camera is placed in a Floor Plan, which generates a 3D View. This is then exported in one single FBX file. It is recommended to export curved objects out in a DWG regardless of the Simple or Advanced Workflow.

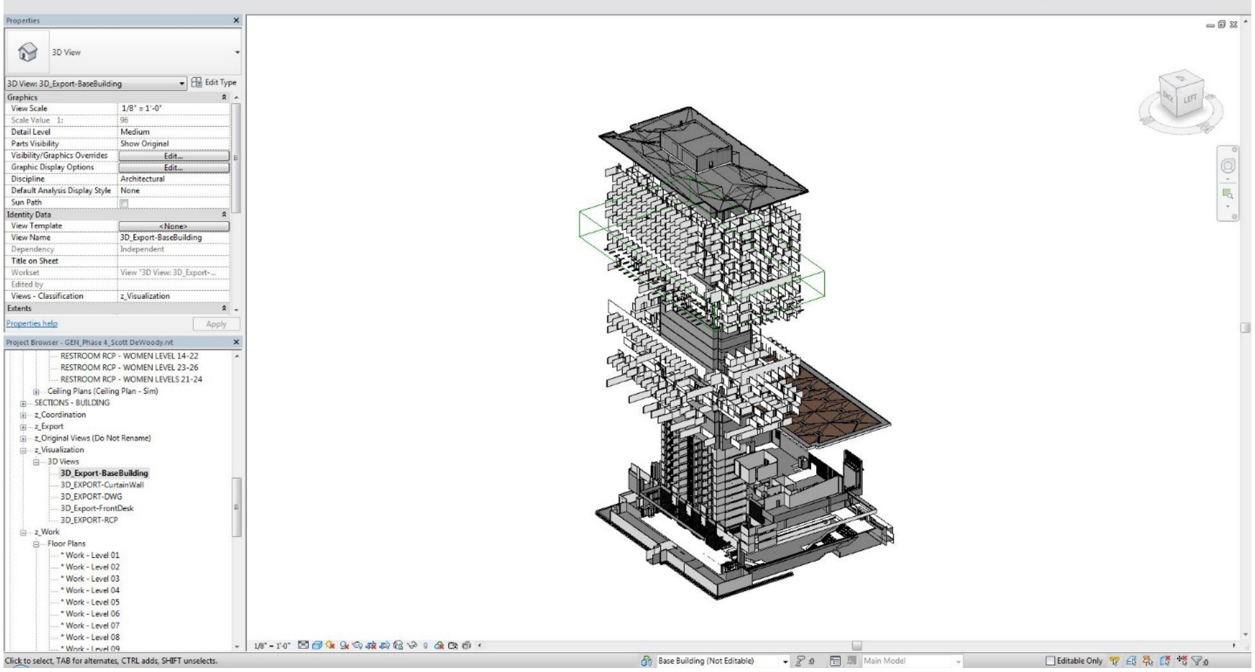
Visualization – Export (Advanced Workflow) (Recommended)

This workflow will break apart the model in to multiple pieces, or exports, and reassemble them in 3ds Max like a puzzle. This workflow is idea for large, or complex, projects. This is the preferred method as it helps greatly with organization, file corruption, and collaboration between multiple artists on the same project.

- **View Setup:**
  - Multiple Views for Export
    - RVT/FBX: Base Building, Interiors, Core, etc
    - RVT/FBX: Curtain Wall and Mullions (Must Filter Out Walls)
    - RVT/FBX: Furniture
    - RVT/FBX: RCP + Lighting Fixtures
    - DWG: Railings and other curved objects
    - RVT/FBX: Site and Entourage
  - Make sure unneeded elements are hidden in all views.
  - Make sure elements are not visible in more than one view.
    - Use a section box, or disable categories in Visibility Graphics.

Why do the Advanced Workflow over Simple?

- **File Organization:**
  - Able to “archive” exported versions of your project.
  - Able to organize large projects inside of 3ds Max easier.
- **Protect against File Corruption**
  - By splitting exports you can reduce losing all your work when 3ds Max decides it doesn’t want to work on a Saturday.
- **Multiple people working on the project at once.**
  - This can be done by loading the multiple exports into their own 3ds Max files, and Xref them into a “Master” 3ds Max file. This is explained later in the document.
- **Best way for 3ds Max to handle large scale projects.**
  - 3ds Max can handle millions of polygons, just not millions of objects. The multiple exports help consolidate the model.



Properties

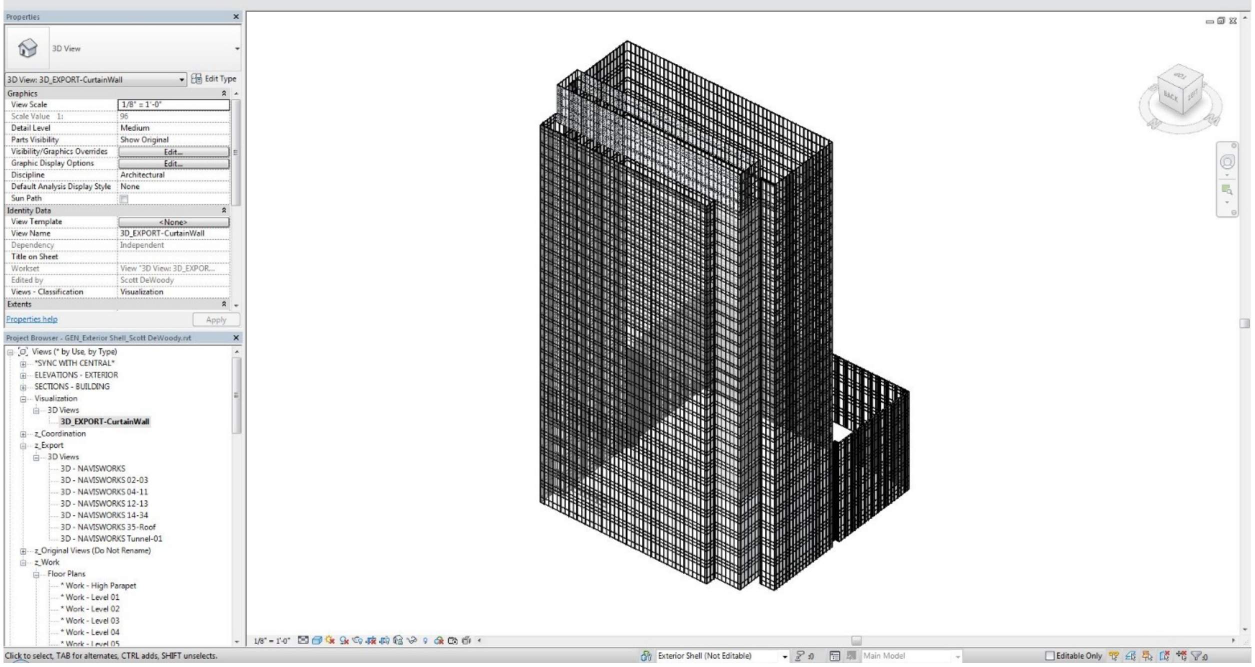
3D View

3D View: 3D_Export-BaseBuilding

Graphics	
View Scale	1/8" = 1'-0"
Scale Value 1:	96
Detail Level	Medium
Parts Visibility	Show Original
Visibility/Graphics Overrides	Edit...
Graphic Display Options	Edit...
Discipline	Architectural
Default Analysis Display Style	None
Sun Path	□
Identity Data	
View Template	<None>
View Name	3D_Export-BaseBuilding
Dependency	Independent
Title on Sheet	
Workset	View "3D View: 3D_Export-...
Edited by	
Views - Classification	z_Visualization
Extents	

Click to select, TAB for alternates, CTRL adds, SHIFT unselects.

IMAGE 2-3: This is an example of what a “Base Building” view would look like.



Properties

3D View

3D View: 3D_EXPORT-CurtainWall

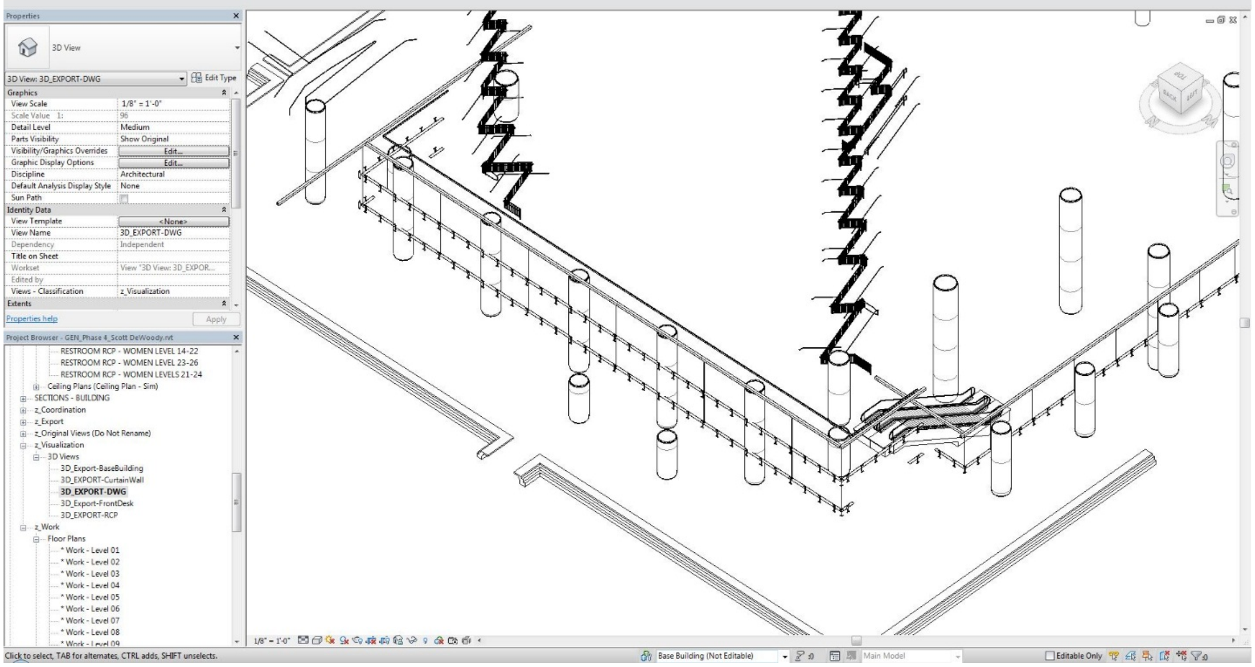
Graphics	
View Scale	1/8" = 1'-0"
Scale Value 1:	96
Detail Level	Medium
Parts Visibility	Show Original
Visibility/Graphics Overrides	Edit...
Graphic Display Options	Edit...
Discipline	Architectural
Default Analysis Display Style	None
Sun Path	□
Identity Data	
View Template	<None>
View Name	3D_EXPORT-CurtainWall
Dependency	Independent
Title on Sheet	
Workset	View "3D View: 3D_EXPOR...
Edited by	Scott DeWoody
Views - Classification	Visualization
Extents	

Project Browser - GEN_Exterior Shell_Scott DeWoody.rvt

- Views (* by Use, by Type)
  - *SYNC WITH CENTRAL*
  - ELEVATIONS - EXTERIOR
  - SECTIONS - BUILDING
  - Visualization
    - 3D Views
      - **3D_EXPORT-CurtainWall**
  - z_Coordination
  - z_Export
    - 3D Views
      - 3D - NAVISWORKS
      - 3D - NAVISWORKS 02-03
      - 3D - NAVISWORKS 04-11
      - 3D - NAVISWORKS 12-13
      - 3D - NAVISWORKS 14-34
      - 3D - NAVISWORKS 35-Roof
      - 3D - NAVISWORKS Tunnel-01
  - z_Original Views (Do Not Rename)
  - z_Work
    - Floor Plans
      - * Work - High Parapet
      - * Work - Level 01
      - * Work - Level 02
      - * Work - Level 03
      - * Work - Level 04
      - * Work - Level 05

Click to select, TAB for alternates, CTRL adds, SHIFT unselects.

IMAGE 2-4: This is an example of what a "Curtain Wall" view would look like.



Properties

3D View

3D View: 3D_EXPORT-DWG

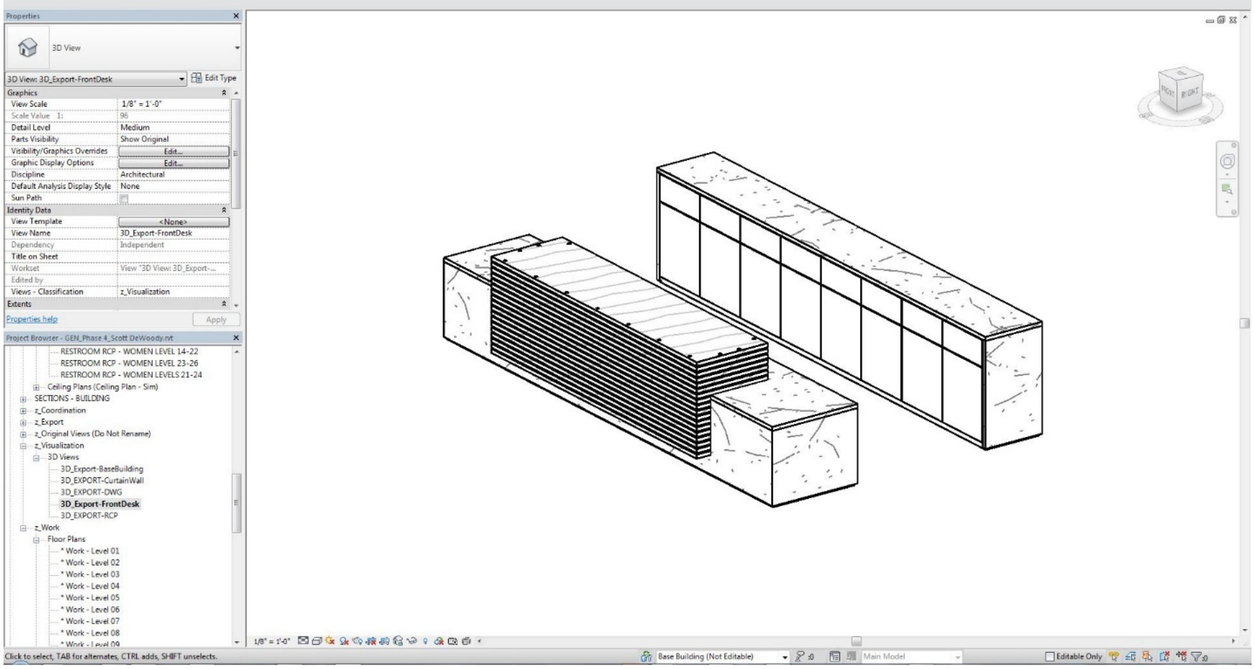
Graphics	
View Scale	1/8" = 1'-0"
Scale Value 1:	96
Detail Level	Medium
Parts Visibility	Show Original
Visibility/Graphics Overrides	Edit...
Graphic Display Options	Edit...
Discipline	Architectural
Default Analysis Display Style	None
Sun Path	□
Identity Data	
View Template	<None>
View Name	3D_EXPORT-DWG
Dependency	Independent
Title on Sheet	
Workset	View "3D View: 3D_EXPOR...
Edited by	
Views - Classification	z_Visualization
Extents	

Project Browser - GEN_Phase 4_Scott DeWoody.rvt

- RESTROOM RCP - WOMEN LEVEL 14-22
- RESTROOM RCP - WOMEN LEVEL 23-26
- RESTROOM RCP - WOMEN LEVELS 21-24
- Ceiling Plans (Ceiling Plan - Sim)
- SECTIONS - BUILDING
- z_Coordination
- z_Export
- z_Original Views (Do Not Rename)
- z_Visualization
  - 3D Views
    - 3D_Export-BaseBuilding
    - 3D_EXPORT-CurtainWall
    - **3D_EXPORT-DWG**
    - 3D_Export-FrontDesk
    - 3D_EXPORT-RCP
- z_Work
  - Floor Plans
    - * Work - Level 01
    - * Work - Level 02
    - * Work - Level 03
    - * Work - Level 04
    - * Work - Level 05
    - * Work - Level 06
    - * Work - Level 07
    - * Work - Level 08
    - * Work - Level 09

Click to select, TAB for alternates, CTRL adds, SHIFT unselects.

IMAGE 2-5: This is an example of what a "Curved Object" view would look like.



Properties

3D View

3D View: 3D_Export-FrontDesk | Edit Type

Graphics	
View Scale	1/8" = 1'-0"
Scale Value 1:	96
Detail Level	Medium
Parts Visibility	Show Original
Visibility/Graphics Overrides	Edit...
Graphic Display Options	Edit...
Discipline	Architectural
Default Analysis Display Style	None
Sun Path	□
Identity Data	
View Template	<None>
View Name	3D_Export-FrontDesk
Dependency	Independent
Title on Sheet	
Workset	View "3D View: 3D_Export-...
Edited by	
Views - Classification	z_Visualization
Extents	

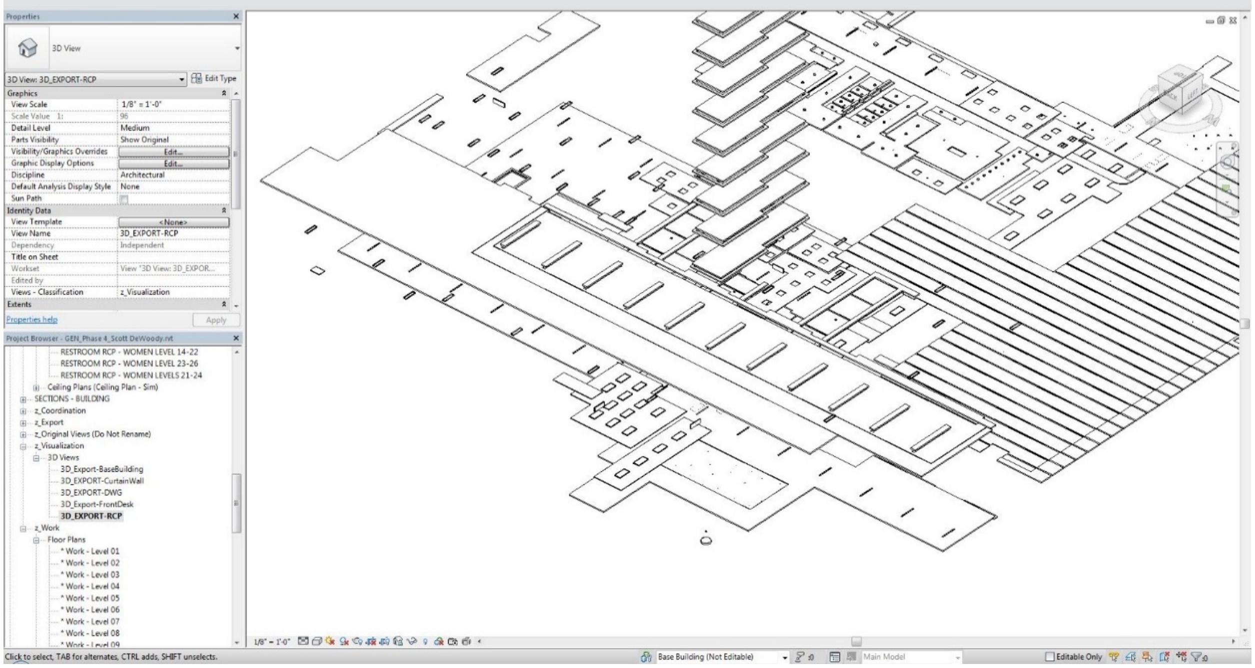
Properties help | Apply

Project Browser - GEN_Phase 4_Scott DeWoody.rvt

```
RESTROOM RCP - WOMEN LEVEL 14-22
RESTROOM RCP - WOMEN LEVEL 23-26
RESTROOM RCP - WOMEN LEVELS 21-24
Ceiling Plans (Ceiling Plan - Sim)
SECTIONS - BUILDING
z_Coordination
z_Export
z_Original Views (Do Not Rename)
z_Visualization
  3D Views
    3D_Export-BaseBuilding
    3D_EXPORT-CurtainWall
    3D_EXPORT-DWG
    3D_Export-FrontDesk
    3D_EXPORT-RCP
z_Work
  Floor Plans
    * Work - Level 01
    * Work - Level 02
    * Work - Level 03
    * Work - Level 04
    * Work - Level 05
    * Work - Level 06
    * Work - Level 07
    * Work - Level 08
    * Work - Level 09
```

Click to select, TAB for alternates, CTRL adds, SHIFT unselects.

IMAGE 2-6: In this view I wanted to export just the front lobby desk.



Properties

3D View

3D View: 3D_EXPORT-RCP | Edit Type

Graphics	
View Scale	1/8" = 1'-0"
Scale Value 1:	96
Detail Level	Medium
Parts Visibility	Show Original
Visibility/Graphics Overrides	Edit...
Graphic Display Options	Edit...
Discipline	Architectural
Default Analysis Display Style	None
Sun Path	□
Identity Data	
View Template	<None>
View Name	3D_EXPORT-RCP
Dependency	Independent
Title on Sheet	
Workset	View "3D View: 3D_EXPOR...
Edited by	
Views - Classification	z_Visualization
Extents	

Properties help | Apply

Project Browser - GEN_Phase 4_Scott DeWoody.rvt

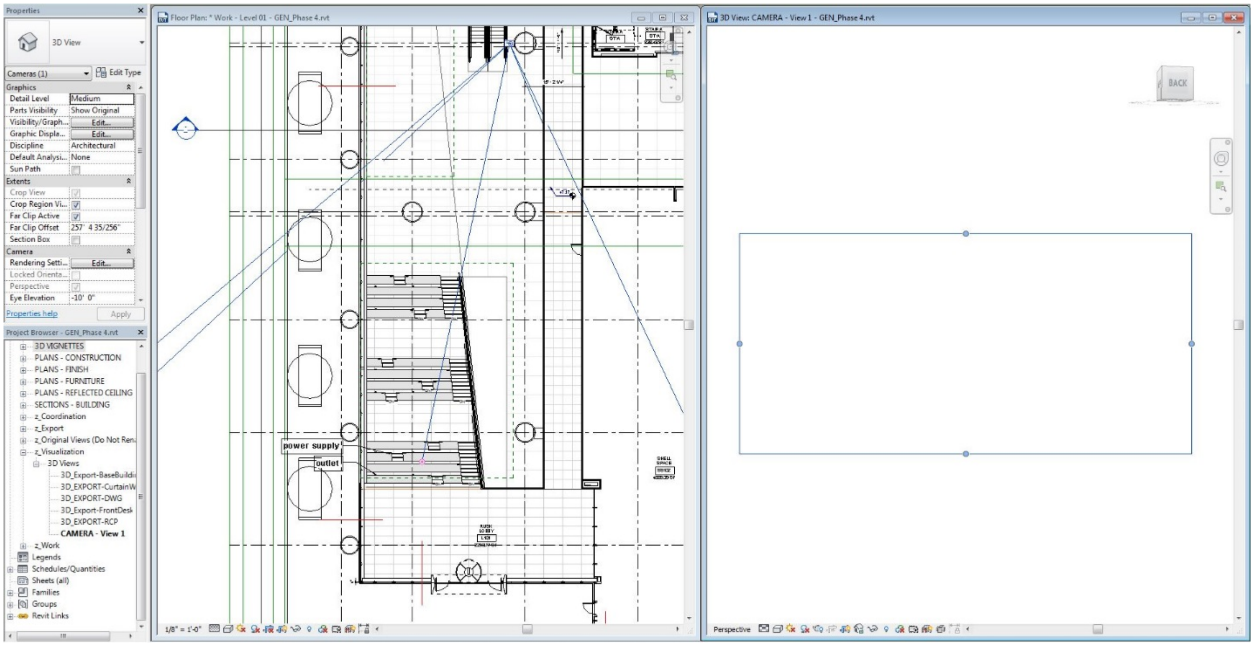
```
RESTROOM RCP - WOMEN LEVEL 14-22
RESTROOM RCP - WOMEN LEVEL 23-26
RESTROOM RCP - WOMEN LEVELS 21-24
Ceiling Plans (Ceiling Plan - Sim)
SECTIONS - BUILDING
z_Coordination
z_Export
z_Original Views (Do Not Rename)
z_Visualization
  3D Views
    3D_Export-BaseBuilding
    3D_EXPORT-CurtainWall
    3D_EXPORT-DWG
    3D_Export-FrontDesk
    3D_EXPORT-RCP
z_Work
  Floor Plans
    * Work - Level 01
    * Work - Level 02
    * Work - Level 03
    * Work - Level 04
    * Work - Level 05
    * Work - Level 06
    * Work - Level 07
    * Work - Level 08
    * Work - Level 09
```

Click to select, TAB for alternates, CTRL adds, SHIFT unselects.

IMAGE 2-7: This is an example of what a "RCP and Lighting" view would look like.

Camera Views (2015 and below + FBX Workflow)
If more than one view is required from Revit, especially when using the Advanced Workflow, extra empty views can be set up with the Revit Camera. These exported views will just contain the camera from Revit when imported into 3ds Max. This is the best way to combine both the Simple and Advanced Workflows. It will allow you to break the model up, and use camera views from Revit at the same time.

- **Set a View for each desired camera to bring into 3ds Max.**
- **If using the Simple Workflow, only one view should have everything visible that is needed to be rendered in 3ds Max.**
- **All Camera views should have everything hidden.**
  - Do this by disabling everything in Visibility Graphics (VG).
- **Each View is then exported via FBX.**
  - Create a naming convention for the view, and name the FBX the same.



Properties

3D View

Cameras (1) — Edit Type

Graphics	
Detail Level	Medium
Parts Visibility	Show Original
Visibility/Graph...	Edit...
Graphic Displa...	Edit...
Discipline	Architectural
Default Analysi...	None
Sun Path	☐
Extents	
Crop View	☑
Crop Region Vi...	☑
Far Clip Active	☑
Far Clip Offset	257' 4 35/256"
Section Box	☐
Camera	
Rendering Setti...	Edit...
Locked Orienta...	☐
Perspective	☑
Eye Elevation	-10' 0"

Properties help — Apply

Project Browser - GEN_Phase 4.rvt

- 3D VIGNETTES
- PLANS - CONSTRUCTION
- PLANS - FINISH
- PLANS - FURNITURE
- PLANS - REFLECTED CEILING
- SECTIONS - BUILDING
- z_Coordination
- z_Export
- z_Original Views (Do Not Ren...
- z_Visualization
  - 3D Views
    - 3D_Export-BaseBuildi...
    - 3D_EXPORT-CurtainW...
    - 3D_EXPORT-DWG
    - 3D_Export-FrontDesk
    - 3D_EXPORT-RCP
    - **CAMERA - View 1**
- z_Work
- Legends
- Schedules/Quantities
- Sheets (all)
- Families
- Groups
- Revit Links

Floor Plan: * Work - Level 01 - GEN_Phase 4.rvt

3D View: CAMERA - View 1 - GEN_Phase 4.rvt

IMAGE 2-8: This view shows how multiple cameras can be imported into either a Simple or Advanced Workflow. Note the camera on the left view is the same in the right view, however everything is hidden in the 3D View (Right). If this view is exported as a FBX file, it will bring just the camera into 3ds Max in the exact position it is located inside of Revit! Do this for as many cameras that need to be imported into 3ds Max.

Camera Views (Revit Link Workflow 2016+)

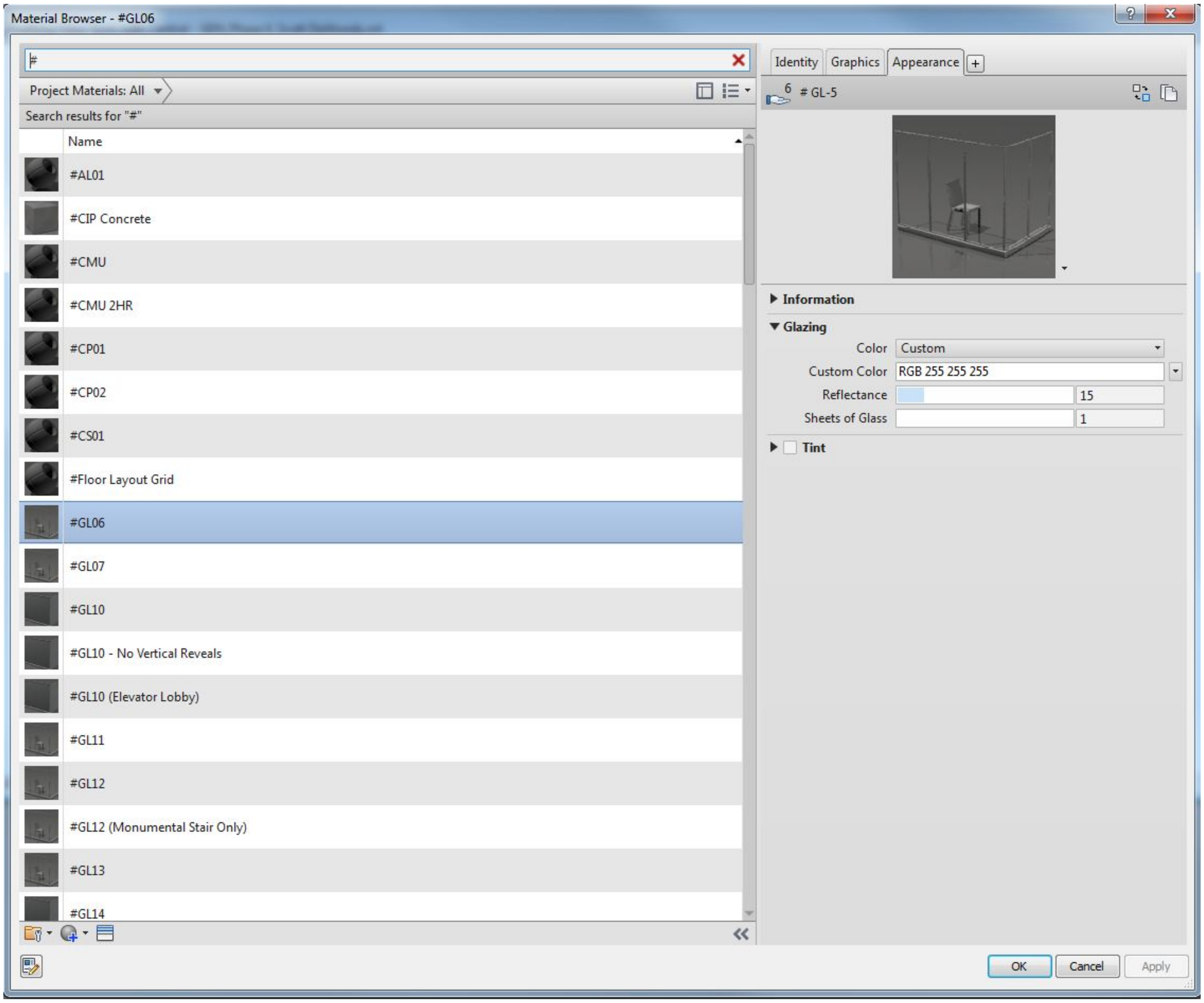
Linking Revit files in 3ds Max 2016 and 3ds Max 2017 will bring in every single camera view that exists in the Revit File. This can be overkill, especially when we start linking in multiple views into 3ds Max. Each linked view will bring in the same cameras right on top of each other, which is something we do not want. It is best to bring only one view in with cameras, and then the rest without using the importing presets. There is a checkbox in the presets that will tell 3ds Max to bring the cameras in, or to ignore them. Creating two presets, one with and one without, is recommended for this workflow.

- **Linking any view into Revit will bring in every camera placed in the Revit file regardless of the view linked.**
- **It is best to create two presets, one with cameras enabled, and the second with cameras disabled.**
- **Please refer to Chapter 3, Image 3-10 and 3-11, for the location for where cameras can be enabled or disabled on import.**

Materials

Organizing and applying materials to everything in Revit is probably more important than setting the export View inside of Revit. If this portion of the workflow is skipped, or half-done, it can cause more work further down the pipeline. It is best to spend the time to get this right first before starting the export process. The name of the Material is the most important part of this process. The look can be changed at any time, but the name is what truly links the material between Revit and 3ds Max.

- **Name your materials!**
  - Consider using a naming convention for all your materials for optimal organization. Try following the drawing codes that the project specifies for materials. This helps greatly when coordinating with other designers on the project. If the code does not work, try something along the lines of: [MATERIAL TYPE]-[SUB-TYPE]-[DESCRIPTION]
  - Just use something that works best for the project, and then stick with it. It can be very painful to change this later.
- **Make sure all objects have materials.**
  - Review imported families from 3rd parties. They can sometimes not have any materials applied, or their own names.
  - Objects without materials can cause rendering artifacts in the render process.
  - All objects without materials will receive a material called Generic inside of 3ds Max.
- **Set material properties in Revit.**
  - Use materials from the Autodesk Physical Asset library as a good place to start!
  - Only needed if you want to edit materials in Revit instead of doing it inside of 3ds Max.
  - Add more detail to materials by adding reflection and bump maps.



Material Browser - #GL06

#

Project Materials: All

Search results for "#"

Name

#AL01

#CIP Concrete

#CMU

#CMU 2HR

#CP01

#CP02

#CS01

#Floor Layout Grid

#GL06

#GL07

#GL10

#GL10 - No Vertical Reveals

#GL10 (Elevator Lobby)

#GL11

#GL12

#GL12 (Monumental Stair Only)

#GL13

#GL14

Identity | Graphics | Appearance

6 # GL-5

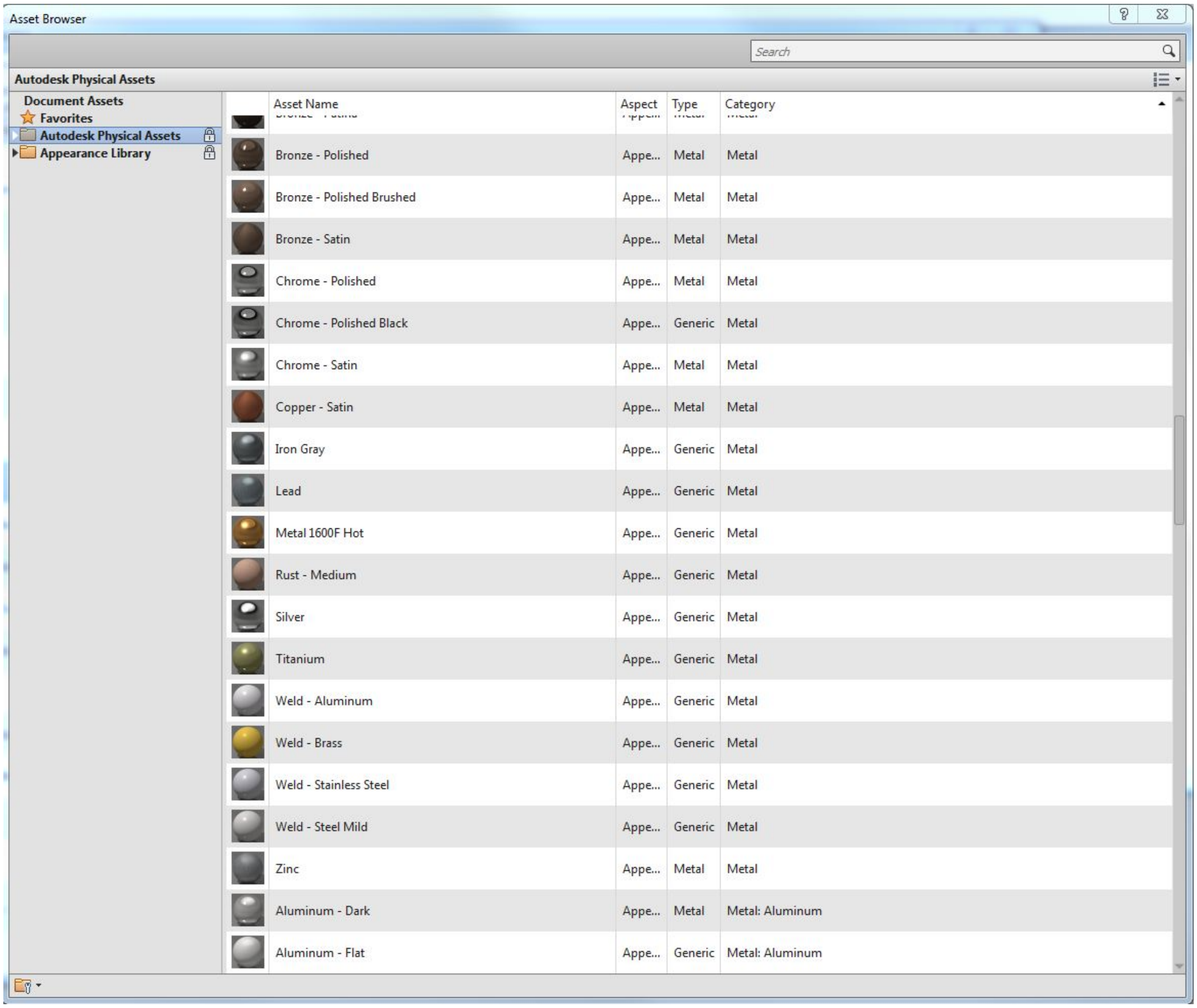
▶ Information

▼ Glazing

Color	Custom
Custom Color	RGB 255 255 255
Reflectance	15
Sheets of Glass	1

▶ □ Tint

IMAGE 2-9: This is an example of what a Material Browser looks like in one of my projects. Notice the # in front of all the names for easy searching and organization!



Asset Name	Aspect	Type	Category
Bronze - Patina	Appe...	Metal	Metal
Bronze - Polished	Appe...	Metal	Metal
Bronze - Polished Brushed	Appe...	Metal	Metal
Bronze - Satin	Appe...	Metal	Metal
Chrome - Polished	Appe...	Metal	Metal
Chrome - Polished Black	Appe...	Generic	Metal
Chrome - Satin	Appe...	Metal	Metal
Copper - Satin	Appe...	Metal	Metal
Iron Gray	Appe...	Generic	Metal
Lead	Appe...	Generic	Metal
Metal 1600F Hot	Appe...	Generic	Metal
Rust - Medium	Appe...	Generic	Metal
Silver	Appe...	Generic	Metal
Titanium	Appe...	Generic	Metal
Weld - Aluminum	Appe...	Generic	Metal
Weld - Brass	Appe...	Generic	Metal
Weld - Stainless Steel	Appe...	Generic	Metal
Weld - Steel Mild	Appe...	Generic	Metal
Zinc	Appe...	Metal	Metal
Aluminum - Dark	Appe...	Metal	Metal: Aluminum
Aluminum - Flat	Appe...	Generic	Metal: Aluminum

IMAGE 2-10: This is a screen shot from the Asset Browser inside of Revit. There are tons of premade materials for you to select from for your project. All of them will transfer 1:1 to 3ds Max and can be used in either Mental Ray, or Iray.

Families

Detail of Family Elements is very important when it comes to creating realistic, and believable, renderings. Making sure elements are modeled the way they would be built in the real world is key, but also knowing how detailed to be is just as important. Heavily detailed elements in Revit can be troublesome for both Revit and 3ds Max. This is mainly in part due to how Revit and 3ds Max handle geometry. If your renderings require highly detailed modeling, it is recommended to do that modeling in 3ds Max, and have a simple version of the model inside of Revit.

- **System Families**
  - Make sure floors, walls, ceilings, are all properly aligned. This will help close any gaps in the model that could introduce light leaks.
    - This includes modeling areas around dropped ceilings and soffits.
  - Be careful of overlapping surfaces. Geometry that is right on top of each other will creating rendering artifacts. Hiding one of the elements from view will eliminate this.
    - This issue is seen a lot with structure slabs and floors, and in some situations certain wall elements.
- **Make sure Families are optimized for Revit**
  - Poorly created families can have bad performance in Revit, and crash 3ds Max during Iray rendering.
- **Keep track of families with lots of curves**
  - Curved objects need to be exported via DWG.
  - This only applies to curved objects that are created natively in Revit.
- **Name Families for organization**
  - Use a naming convention that works for you.
  - Add and Remove any meta-data in the families that you need.
- **Poorly Created Family Example:**

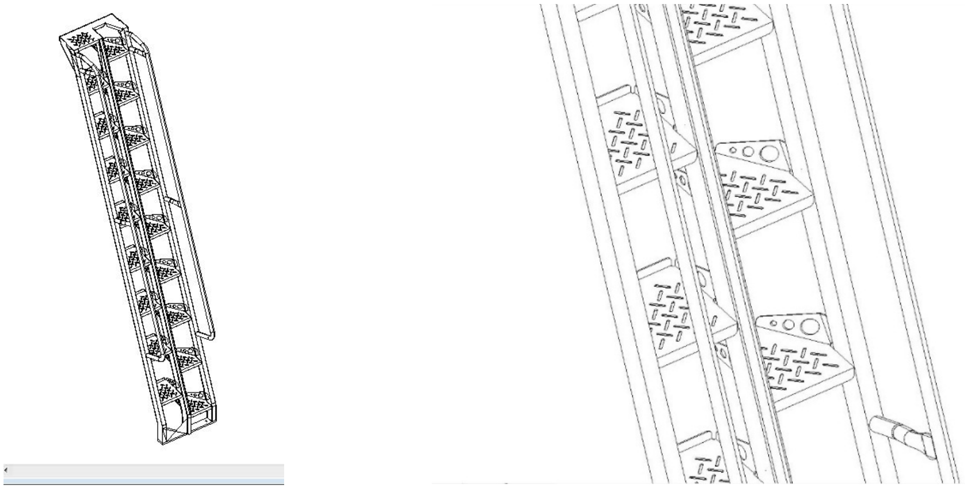
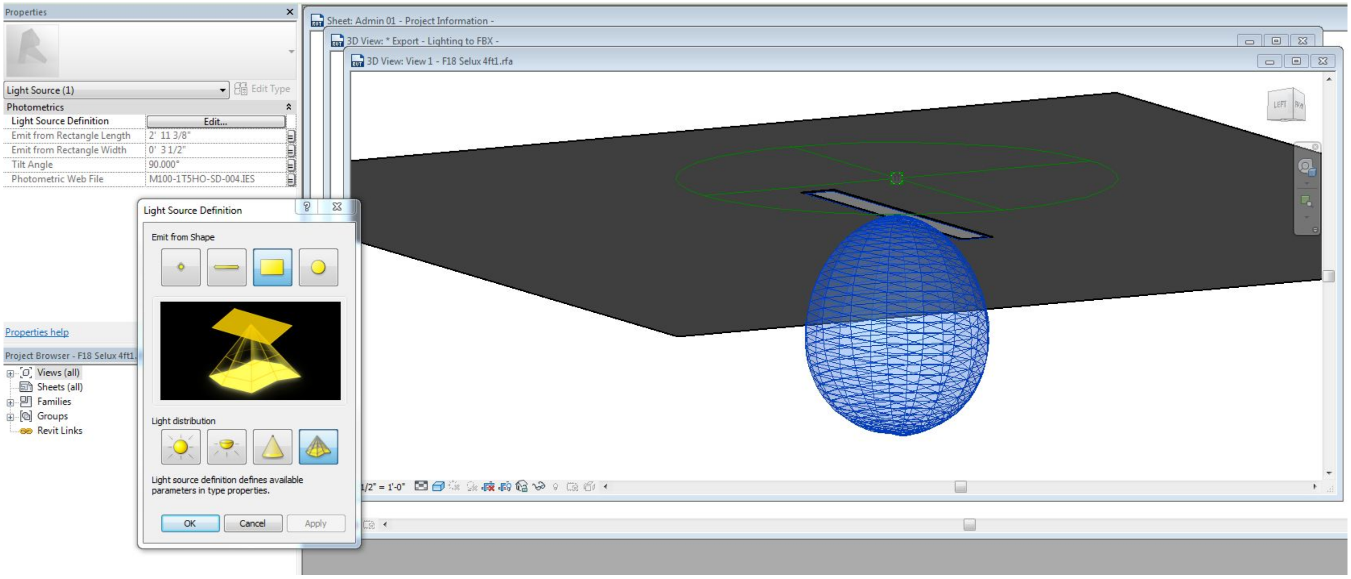


IMAGE 2-11: This is an example of a poorly created family. It has way too much complicated detail for your Revit model, and will slow it down. When this family was exported to 3ds Max, it constantly crashed Iray. If you need a model of this detail, use 3ds Max to create it for optimal performance! Use both pieces of software for their Pros, not their Cons!

Lighting Fixtures

Adding proper lighting fixtures to the model will be extremely important if doing renderings. Revit will give you the ability to include measured lighting data from IES files that lighting manufactures can provide. This will greatly help with achieving a realistic look to the renderings as a majority of the light properties will already be set from the provided information. At this point, the lights just need to be place in the appropriate spot in the project file. If IES data cannot be provided, the appropriate controls to mimic real-world values are available. This includes everything from light intensity to color values set in Kelvin.

- **Add Lighting Objects to Lighting Fixture Families**
  - Make sure not to place Lighting Objects inside of the family
- **Add IES files to the Lighting Objects**
  - This will mimic real-world fixtures, and will add a higher level of realism to your renderings
  - Make sure to set a proper lumens value to the light, if no IES file is available
- **Use a naming convention to organize lights**
  - Add/Remove any meta-data that you might need



Light Source (1)

Photometrics

Light Source Definition	Edit...
Emit from Rectangle Length	2' 11 3/8"
Emit from Rectangle Width	0' 3 1/2"
Tilt Angle	90.000°
Photometric Web File	M100-1T5HO-SD-004.IES

Light source definition defines available parameters in type properties.

IMAGE 2-12: This is an example of what an IES file with a Lighting Fixture Family looks like. Make sure not to play the light source INSIDE of the light. This will not render properly inside of 3ds Max and Iray. Although IES files are not needed, they add that extra bit of detail to the renderings! You can find IES files from all the major lighting manufactures on their websites!

Chapter 3: Export and Link to 3ds Max

File Link Benefits

The direct file link between Revit and 3ds Max is a very strong feature of the two applications, and should be highly considered for the project's workflow. At the very least the workflow should start with the link, and then eventually break if needed. But having the ability to work in your preferred application, and still retain a continuous pipeline is something not found in most application suites. Utilizing both applications for their strengths will create a way to easily generate the images required for your project.

- **All changes done in Revit update to 3ds Max**
    - Super-fast and easy! Just save your files and hit "reload"!
    - Editing geometry in 3ds Max is not advised with linked objects
        - This can cause issues when updating the link
- **Materials can be edited in either Revit or 3ds Max**
    - *Note*: You can only edit materials in either Revit or 3ds Max
    - 3ds Max has more advanced Materials for better realistic looking results.
- **People working in Revit and in 3ds Max can work together almost seamlessly.**
    - Communication between team members is the key!

Export File Formats

There are three main formats that are preferred for bringing the Revit model into 3ds Max: RVT, FBX and DWG. Linking RVT Files performance has drastically improved since 3ds Max 2016, as the Revit engine has been included directly inside of 3ds Max. For 3ds Max 2015 and below, FBX and DWG will allow more flexibility and reliability to the workflow.

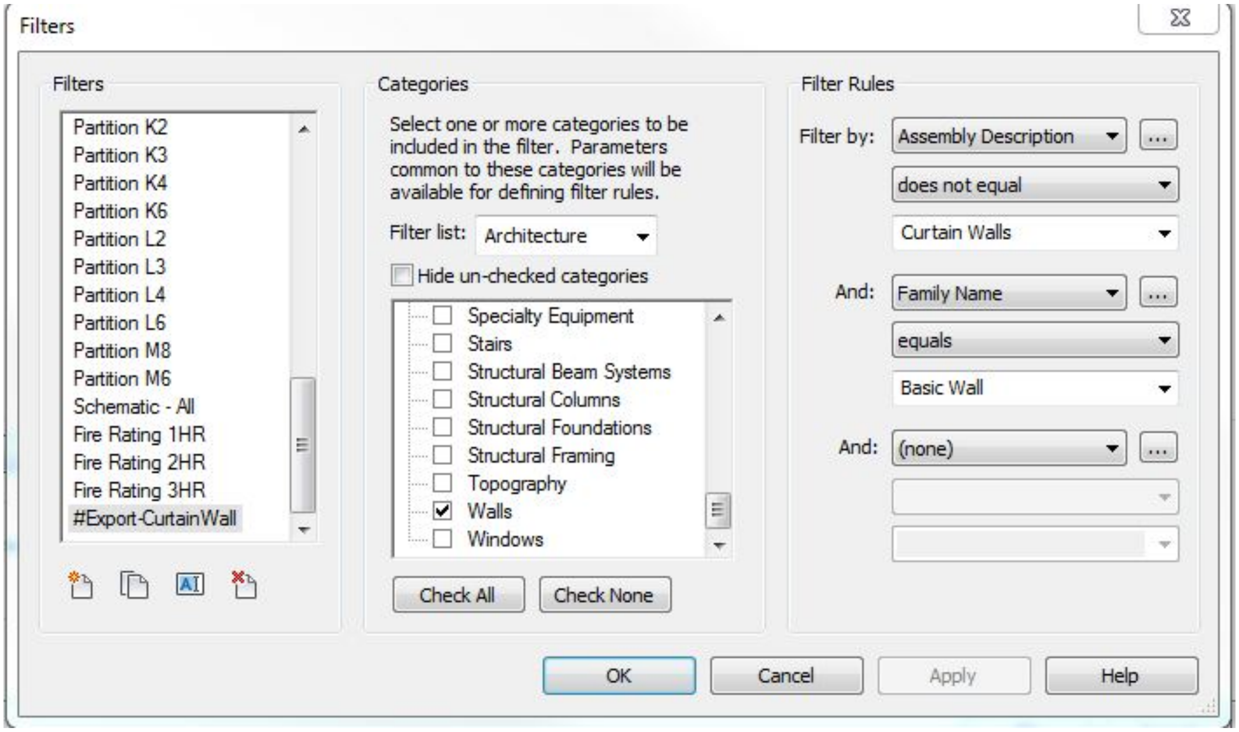
Everything can be exported as FBX, but it is highly recommended to export natively built Curved Objects as DWG Files. This is due to how Revit interpolates the geometry for its own Curved Objects. Revit will add an unnecessarily large amount of polygons and vertices to any Curved Object exported out as a FBX file. This also include any geometry directly imported (not linked) into 3ds Max directly from a Revit File.

- **RVT/FBX**
    - Base Building/Interiors
    - Curtain Wall and Mullions
    - RCP
    - Lighting Fixtures
    - Furniture
    - Site and Entourage

- **DWG**
    - Railings
    - Anything with curved surfaces
        - Example: Cylindrical Columns, Louvers, etc.
        - Objects created outside of Revit will retain their topology

Filter Curtain Wall and Mullions Only
In order to have only Curtain Wall and Mullions visible in their own View, Walls must also be enabled in the Visibility Graphics. However this is not idea, because Walls are also enabled in the Base Building View. This will cause overlapping geometry inside of 3ds Max, which is something that needs to be heavily avoided. In order to create the View without the Walls visible, a Filter must be created in the Visibility Graphics. You do not need to do this in Revit 2013 and below.

- **Steps to create the Filter:**
    - Open Visibility Graphics
    - Click on the Filters Tab
    - Click on Add
    - Click on Edit/New…
    - Click the "New" Icon under Filters
    - Name the Filter "#Export-CurtainWall
    - Under Categories, make sure everything but Walls is Unchecked
    - Under Filter Rules set the following Parameters:
        - Filter by:
            - Assembly Description
            - Does not equal
            - Curtain Walls
        - And:
            - Family Name
            - Equals
            - Basic Wall
    - Back at the Filters Tab, uncheck "Visibility" for the #Export-CurtainWall Filter.



Filters

Filters

- Partition K2
- Partition K3
- Partition K4
- Partition K6
- Partition L2
- Partition L3
- Partition L4
- Partition L6
- Partition M8
- Partition M6
- Schematic - All
- Fire Rating 1HR
- Fire Rating 2HR
- Fire Rating 3HR
- #Export-CurtainWall

Categories

Select one or more categories to be included in the filter. Parameters common to these categories will be available for defining filter rules.

Filter list: Architecture

□ Hide un-checked categories

- □ Specialty Equipment
- □ Stairs
- □ Structural Beam Systems
- □ Structural Columns
- □ Structural Foundations
- □ Structural Framing
- □ Topography
- ☑ Walls
- □ Windows

Check All | Check None

Filter Rules

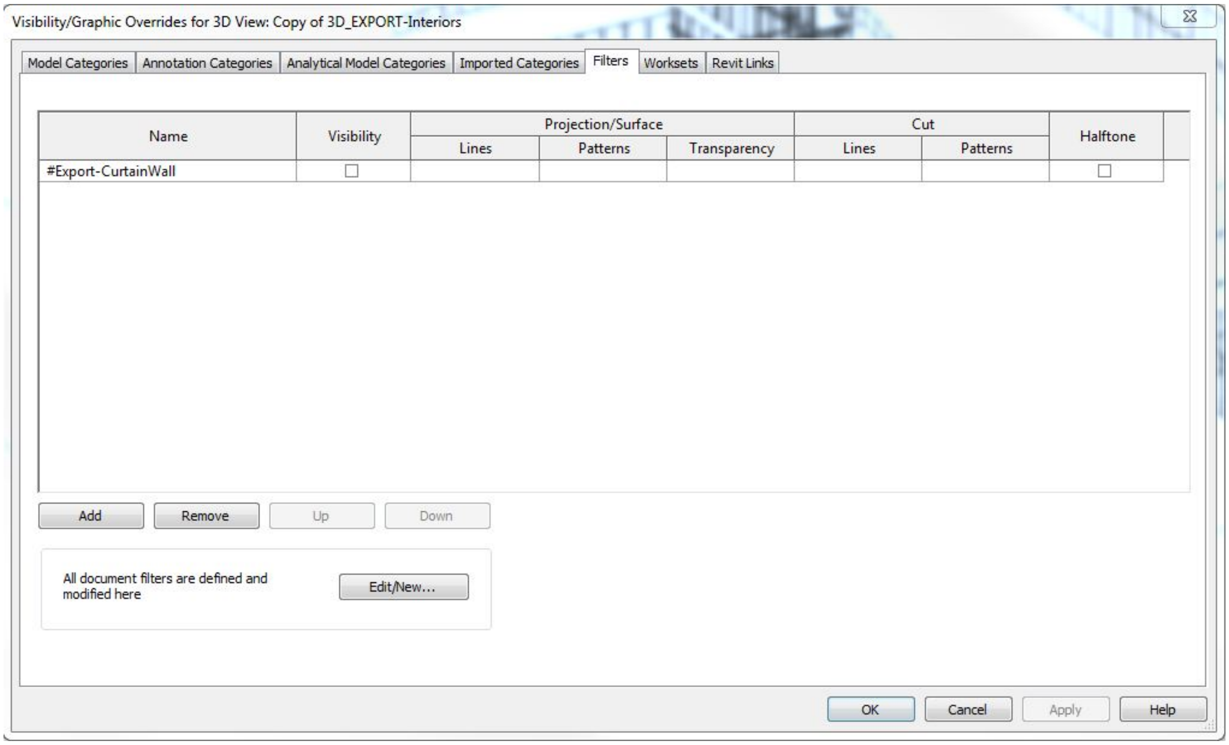
Filter by: Assembly Description | does not equal | Curtain Walls

And: Family Name | equals | Basic Wall

And: (none)

OK | Cancel | Apply | Help

IMAGE 3-1: This is the filter so you can separate the Curtain Wall by itself.



Visibility/Graphic Overrides for 3D View: Copy of 3D_EXPORT-Interiors

Model Categories | Annotation Categories | Analytical Model Categories | Imported Categories | Filters | Worksets | Revit Links

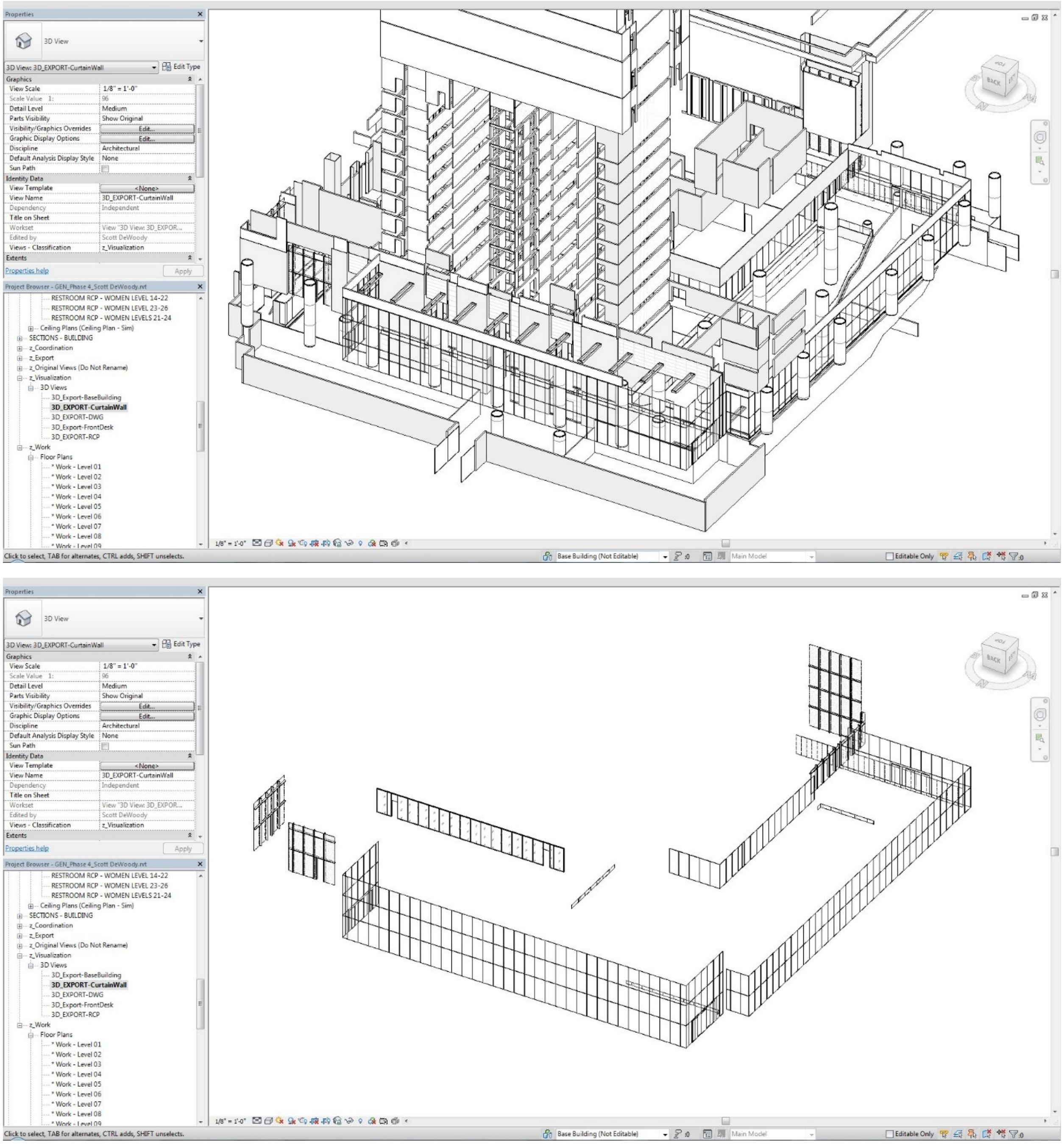
Name	Visibility	Projection/Surface			Cut		Halftone
		Lines	Patterns	Transparency	Lines	Patterns	
#Export-CurtainWall	□						□

Add | Remove | Up | Down

All document filters are defined and modified here — Edit/New...

OK | Cancel | Apply | Help

IMAGE 3-2: Make sure to turn the Visibility off by unchecking the box.



Properties

3D View

3D View: 3D_EXPORT-CurtainWall — Edit Type

Graphics	
View Scale	1/8" = 1'-0"
Scale Value 1:	96
Detail Level	Medium
Parts Visibility	Show Original
Visibility/Graphics Overrides	Edit...
Graphic Display Options	Edit...
Discipline	Architectural
Default Analysis Display Style	None
Sun Path	□
Identity Data	
View Template	<None>
View Name	3D_EXPORT-CurtainWall
Dependency	Independent
Title on Sheet	
Workset	View "3D View: 3D_EXPOR...
Edited by	Scott DeWoody
Views - Classification	z_Visualization
Extents	

Properties help — Apply

Project Browser - GEN_Phase 4_Scott DeWoody.rvt

- RESTROOM RCP - WOMEN LEVEL 14-22
- RESTROOM RCP - WOMEN LEVEL 23-26
- RESTROOM RCP - WOMEN LEVELS 21-24
- Ceiling Plans (Ceiling Plan - Sim)
- SECTIONS - BUILDING
- z_Coordination
- z_Export
- z_Original Views (Do Not Rename)
- z_Visualization
  - 3D Views
    - 3D_Export-BaseBuilding
    - **3D_EXPORT-CurtainWall**
    - 3D_EXPORT-DWG
    - 3D_Export-FrontDesk
    - 3D_EXPORT-RCP
- z_Work
  - Floor Plans
    - * Work - Level 01
    - * Work - Level 02
    - * Work - Level 03
    - * Work - Level 04
    - * Work - Level 05
    - * Work - Level 06
    - * Work - Level 07
    - * Work - Level 08
    - * Work - Level 09

1/8" = 1'-0"

Click to select, TAB for alternates, CTRL adds, SHIFT unselects.

Base Building (Not Editable) — :0 — Main Model — □ Editable Only — :0

Properties

3D View

3D View: 3D_EXPORT-CurtainWall — Edit Type

Graphics: View Scale 1/8" = 1'-0"; Scale Value 1: 96; Detail Level Medium; Parts Visibility Show Original; Visibility/Graphics Overrides Edit...; Graphic Display Options Edit...; Discipline Architectural; Default Analysis Display Style None; Sun Path □

Identity Data: View Template <None>; View Name 3D_EXPORT-CurtainWall; Dependency Independent; Title on Sheet; Workset View "3D View: 3D_EXPOR...; Edited by Scott DeWoody; Views - Classification z_Visualization

Extents

Properties help — Apply

Project Browser - GEN_Phase 4_Scott DeWoody.rvt

RESTROOM RCP - WOMEN LEVEL 14-22; RESTROOM RCP - WOMEN LEVEL 23-26; RESTROOM RCP - WOMEN LEVELS 21-24; Ceiling Plans (Ceiling Plan - Sim); SECTIONS - BUILDING; z_Coordination; z_Export; z_Original Views (Do Not Rename); z_Visualization; 3D Views; 3D_Export-BaseBuilding; 3D_EXPORT-CurtainWall; 3D_EXPORT-DWG; 3D_Export-FrontDesk; 3D_EXPORT-RCP; z_Work; Floor Plans; * Work - Level 01; * Work - Level 02; * Work - Level 03; * Work - Level 04; * Work - Level 05; * Work - Level 06; * Work - Level 07; * Work - Level 08; * Work - Level 09

1/8" = 1'-0"

Click to select, TAB for alternates, CTRL adds, SHIFT unselects.

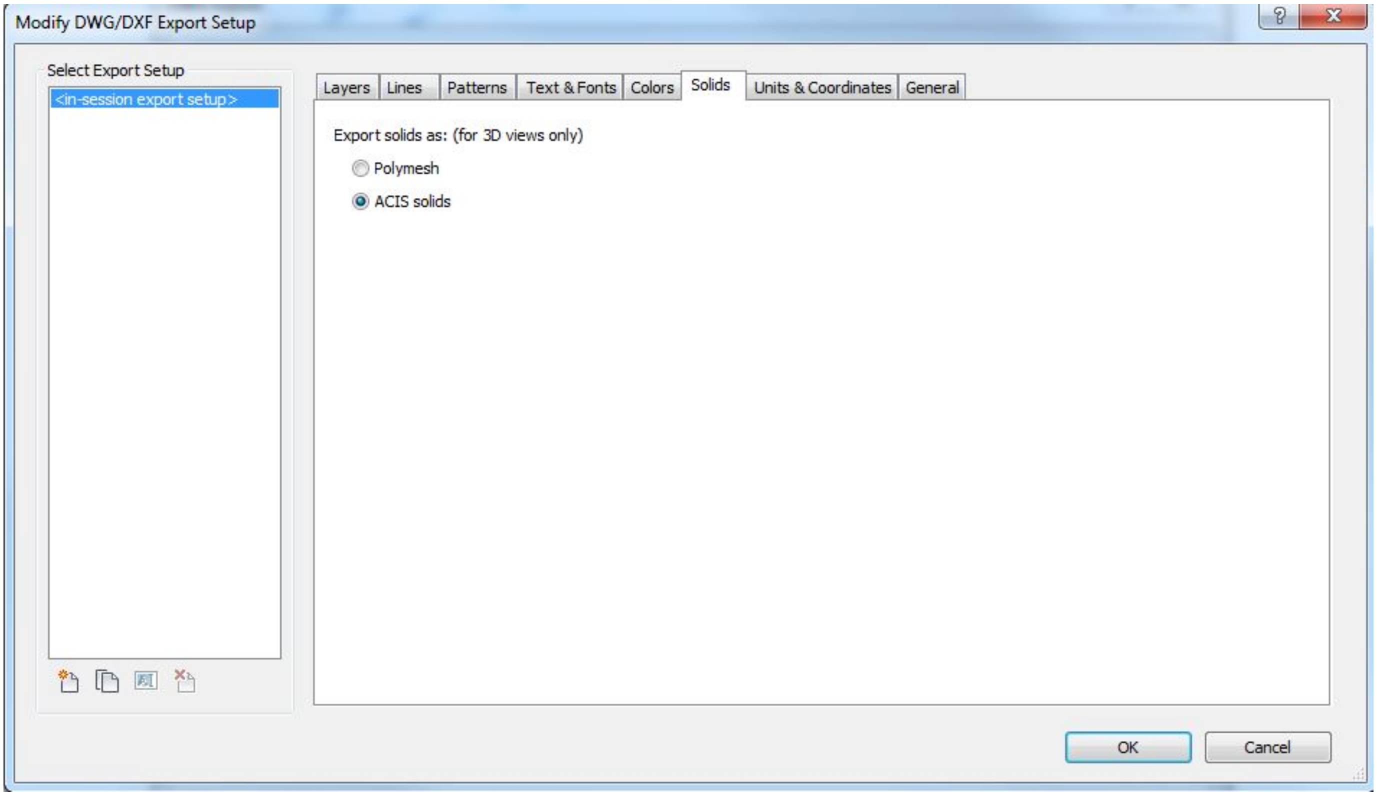
Base Building (Not Editable) — :0 — Main Model — □ Editable Only — :0

IMAGE 3-3: This shows the before and after implementation of the Curtain Wall Filter.

Exporting Railings and Curved Objects

Exporting natively built curved surfaces out of Revit as a DWG (set to ACIS Solid) is extremely important when it comes to optimizing the geometry for export into 3ds Max. Due to how Revit handles the interpolation of curved surfaces into polygon meshes, exporting these objects any other way will result in objects that have an excess of un-needed polygons and vertices. As a result, this will cause issues with viewport performance, extra RAM on the GPU, and other rendering issues. Exporting as a DWG set to ACIS Solid will resolve these issues, and create proper looking geometry for your rendering. Setting the DWG to ACIS Solid can be done in the Modify DWG/DXF Export Setup during the export process. This does not apply to any geometry that was not natively built inside of Revit.

- ***Export DWG as ACIS***
    - This is located in the export DWG settings under the “Solids” tab.



Modify DWG/DXF Export Setup

Select Export Setup

<in-session export setup>

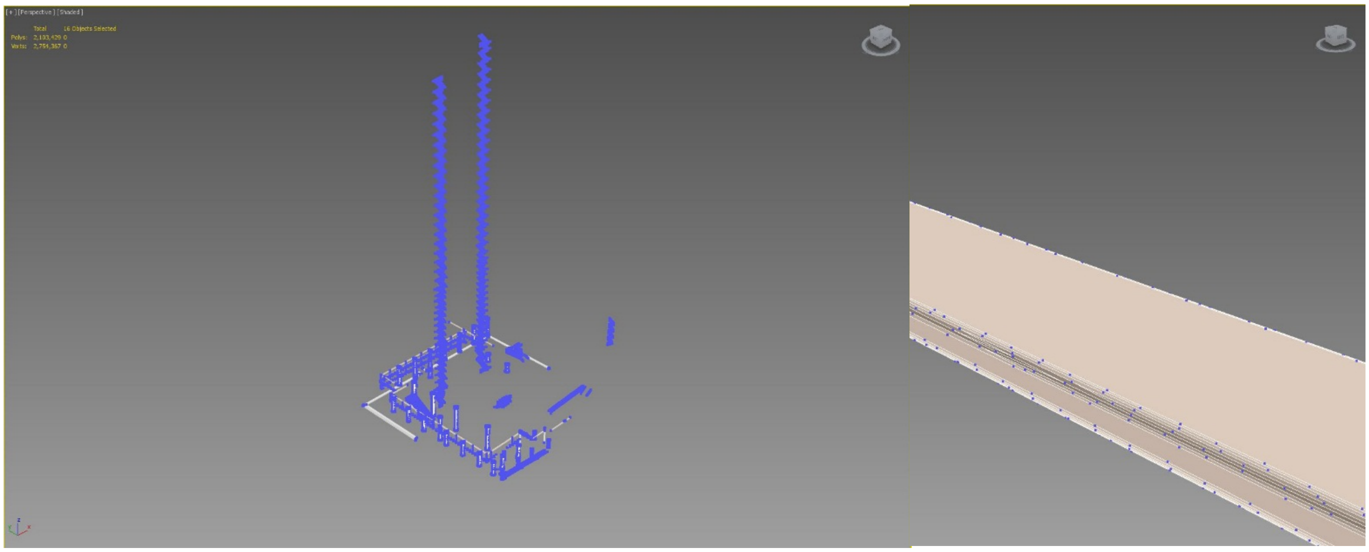
Export solids as: (for 3D views only)

○ Polymesh

● ACIS solids

IMAGE 3-4: Make sure to export your DWG files as ACIS Solids. It is Polymesh by default!

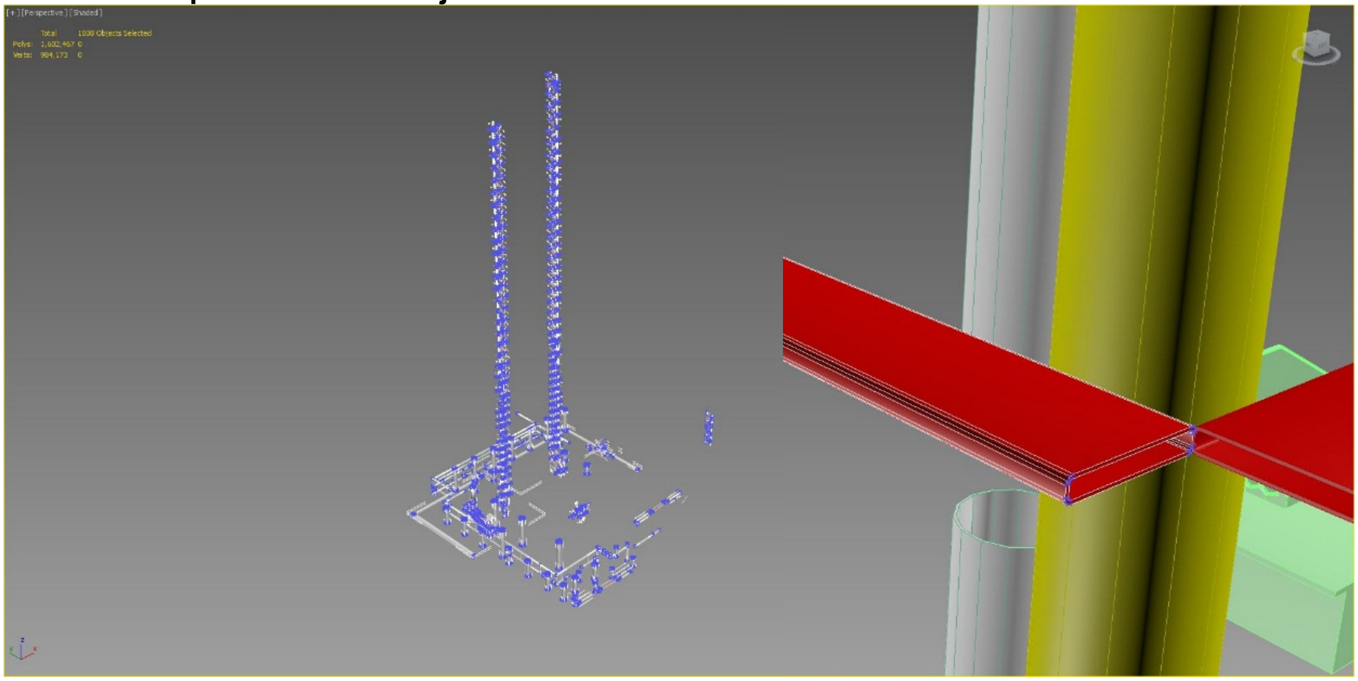
FBX Export of Curved Objects



```
        Total       16 Objects Selected
Polys:  2,103,429 0
Verts:  2,751,367 0
```

IMAGE 3-5: This shows a curved object imported via FBX. It has over 2 million vertices!

DWG ACIS Export of Curved Objects



```
        Total       1008 Objects Selected
Polys:  1,602,467 0
Verts:  984,173   0
```

IMAGE 3-6: This shows a curved object imported as a DWG as ACIS solids. It has less than 1 million vertices!

System Units and Import Tips (3ds 2015 and below)

Making sure System Units stay consistent across the project is something that needs to be considered when recombining objects inside of 3ds Max. Both Revit and 3ds Max talk to each other in Feet, regardless of what the System Units are set to in each application. This means when working in Revit, you can work in any System Unit that is required by the project. But when working in 3ds Max, the System Units must be set to Feet. The Display Units in 3ds Max can then be changed to match the System Units in Revit. This will allow 3ds Max to look like you are working in a different Unit, but really 3ds Max is working with Feet.

- **3ds Max system units need to be set to Feet.**
  - FBX exported from Revit only comes in properly when you use Feet.
    - You will experience issues with modifiers and UVW if you do not.
- **DWG Files export by default in Inches.**
  - This can be changed in the export settings in Revit. If you forget, all you need to do is rescale the DWG on import.
- **If directly importing FBX, use the Entertainment Preset when importing for more import options.**

System Units and Import Tips (3ds 2016 FBX Workflow)

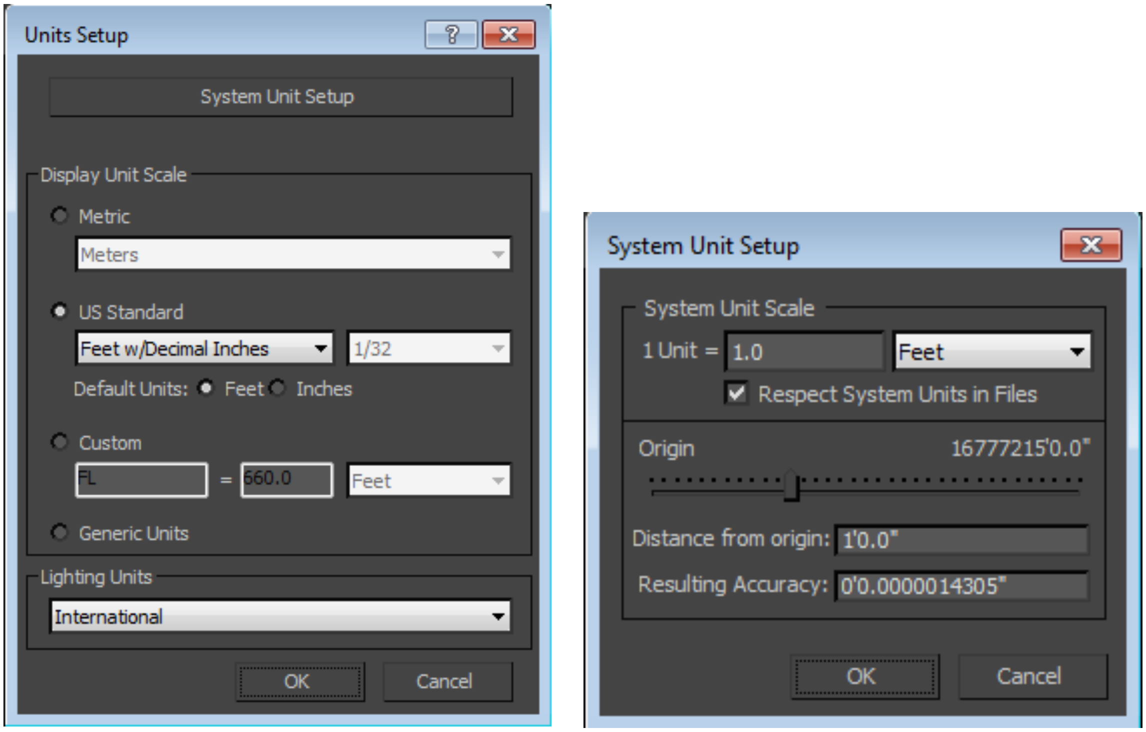
In 3ds Max 2016 something switched with the FBX Link. As noted prior in 3ds Max 2015, FBXs were translated into Feet regardless of the Revit Units. Now in 2016, 3ds Max assumes that Linked FBX files should be Centimeters. But unlike 2015, the actual scale of the model was not converted to centimeters. This causes a massive issue with the actual scale of the model. (An example of this is Image 3-9.) There are only two work-arounds for this.

- **Work-Around #1: Change System Units**
  - Set System Units in 3ds Max to Centimeters.
    - Not Ideal if different units are required for the project.
- **Work-Around #2: The FBX Import Trick**
  1. Set 3ds Max to the System Units required for the project
  2. Go to File > Import
  3. Select the FBX File
  4. In the Import Options go to Advanced Options > Units
     a. If you do not see Advanced Options dropdown, switch the preset at the top to **Autodesk Media & Entertainment**
  5. Uncheck “Automatic”
  6. Pick the Units required for your project from the dropdown list.
  7. Import the FBX.
  8. Delete everything Imported
  9. **DO NOT CLOSE OR RESTART MAX**
  10. Go to File > Import > Link FBX
  11. Link FBX File

System Units and Import Tips (3ds 2017 SP2)

In 3ds Max 2017 SP2, it seems all previous issues with Link FBX have been resolved, and now works as one would expect it too. It is very important to note that this is ONLY with 3ds Max 2017 SP2. Any version of 3ds Max 2017 below SP2 will encounter the same issues that 3ds Max 2016 encountered.

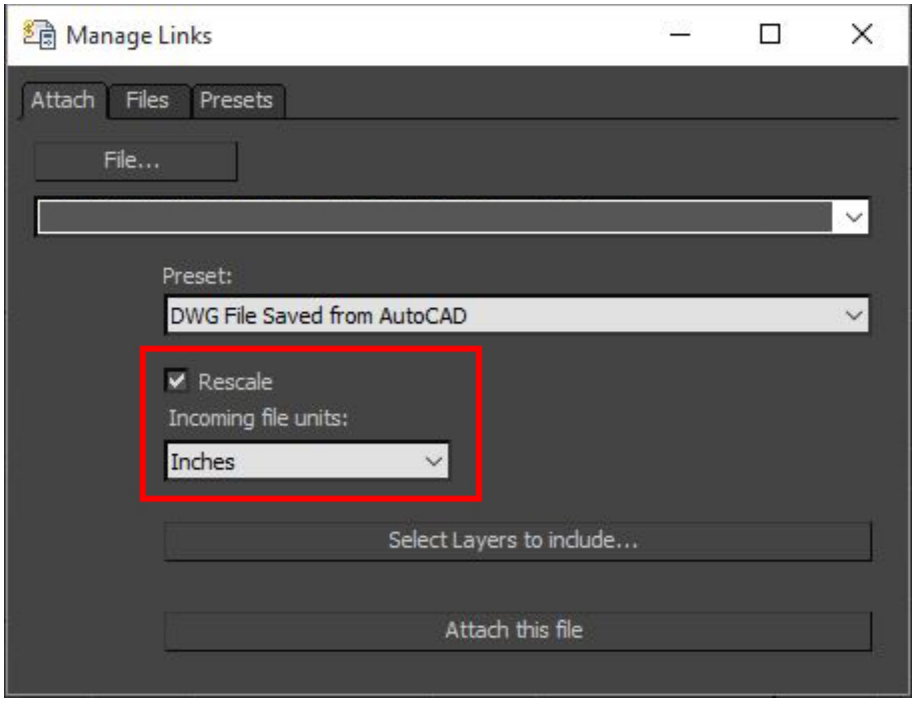
- **3ds Max will now automatically scale the FBX File to the System Units in 3ds Max.**
    - No need to worry about the units matching between Revit and 3ds Max.
        - It is good practice to keep the System Units between the two the same.
- **Make sure 3ds Max 2017 is on Service Pack 2 or above!!!!!**



Display Unit Scale
○ Metric: Meters
● US Standard: Feet w/Decimal Inches, 1/32
Default Units: ● Feet ○ Inches
○ Custom: FL = 660.0 Feet
○ Generic Units
Lighting Units: International

System Unit Scale
1 Unit = 1.0 Feet
☑ Respect System Units in Files
Origin 16777215'0.0"
Distance from origin: 1'0.0"
Resulting Accuracy: 0'0.0000014305"

IMAGE 3-7: This shows the difference between Display Units and System Units. Display Units are the units shown back to the User inside of the working file. Display Units have no effect over the actual file, and are there so Users can easily view different scales. System Units however DO effect the 3ds Max file. Its very important to keep these the same between all 3ds Max project files, as it will control the scale/size of the 3d models that are imported and exported. It is best to keep the 3ds Max System Units the same between other 3D packages as well, including Revit.



Manage Links

Attach | Files | Presets

File...

Preset: DWG File Saved from AutoCAD

☑ Rescale

Incoming file units: Inches

Select Layers to include...

Attach this file

IMAGE 3-8: Make sure to rescale your DWG if you need to! You cannot do this with FBX during a file link. You can rescale a direct import of a FBX file when you select the Media and Entertainment preset.

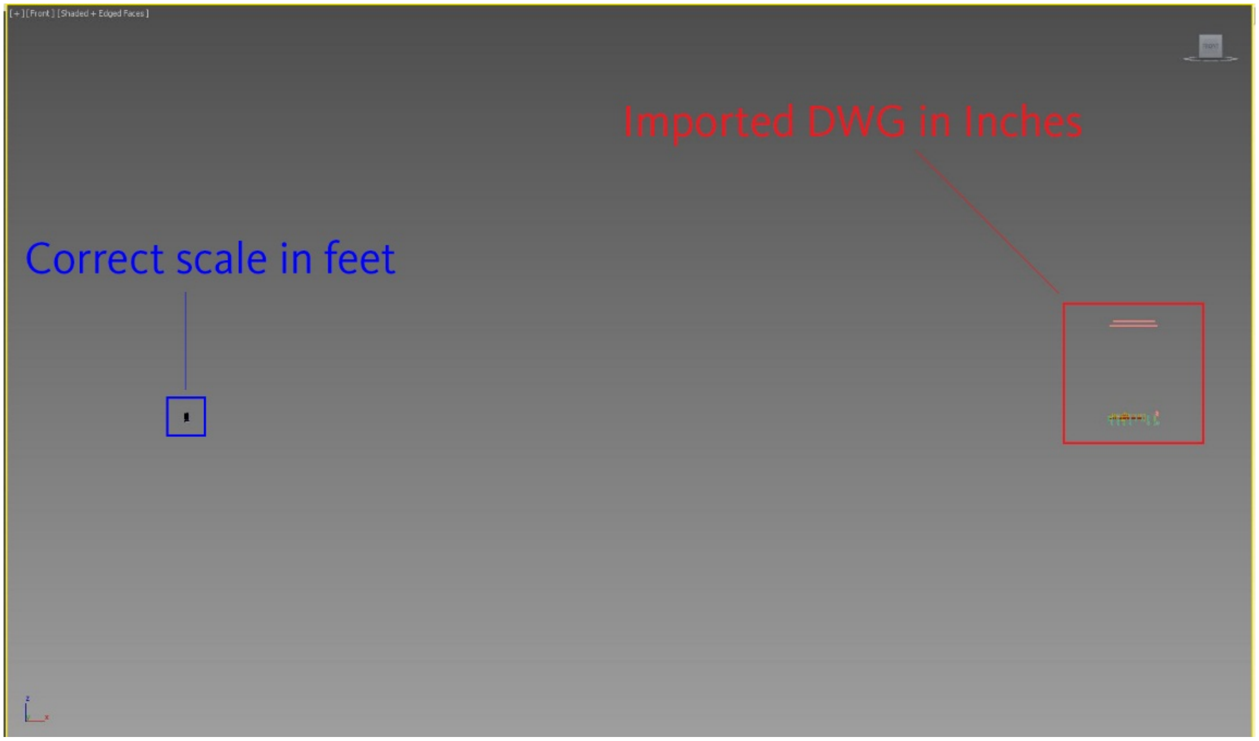
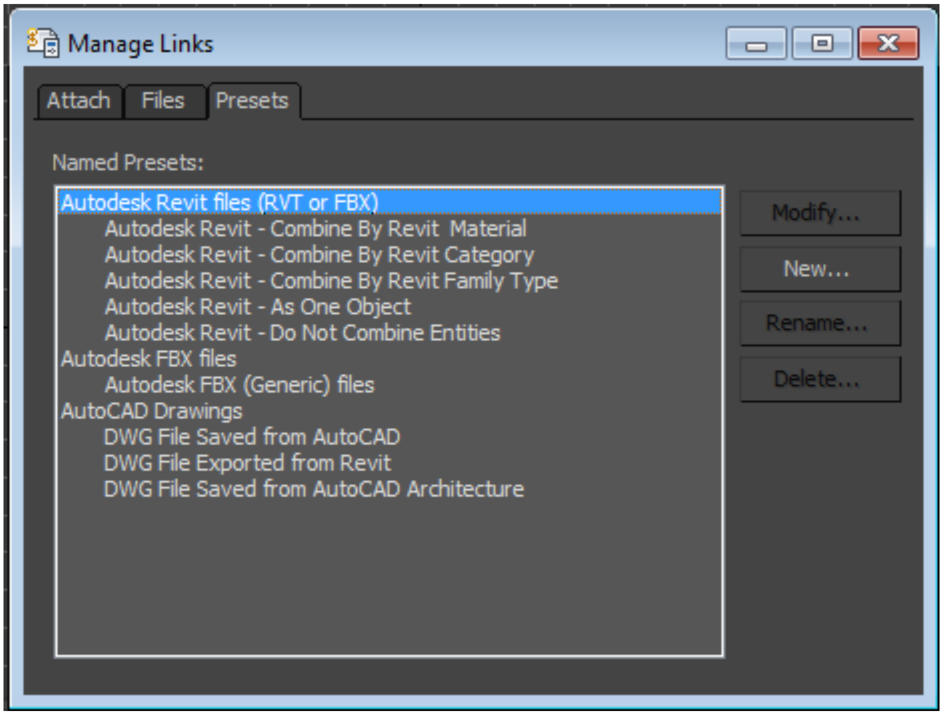


IMAGE 3-9: This is an example of miss-matched units on import. It'll be pretty apparent when units don't align together. Always double check the units of files being imported and the System Units in 3ds Max!

FBX/Revit Link Settings

When linking a FBX/Revit file into 3ds Max, there will be multiple import options presented. The two most commonly used will be Combine By Materials and Do Not Combine. The first will combine all objects with the same material (by the material name) into one object. This will greatly help the performance of large scale models inside of 3ds Max. The latter will import the FBX/Revit Model with every object being unique. Both of these import options have their pros and cons, so certain exports will be ideal for each type. The following information is just a recommendation, but does not need to be followed. In some instances importing as another type might be ideal for the project.

- **Combine By Materials:**
  - Base Building / Interiors
  - Curtain Wall and Mullions
  - RCP
- **Do Not Combine (Optional):**
  - Furniture
  - Site and Entourage
  - Railings and Curved Objects
  - Lighting Fixtures



Manage Links

Named Presets:

Autodesk Revit files (RVT or FBX)
  Autodesk Revit - Combine By Revit Material
  Autodesk Revit - Combine By Revit Category
  Autodesk Revit - Combine By Revit Family Type
  Autodesk Revit - As One Object
  Autodesk Revit - Do Not Combine Entities
Autodesk FBX files
  Autodesk FBX (Generic) files
AutoCAD Drawings
  DWG File Saved from AutoCAD
  DWG File Exported from Revit
  DWG File Saved from AutoCAD Architecture

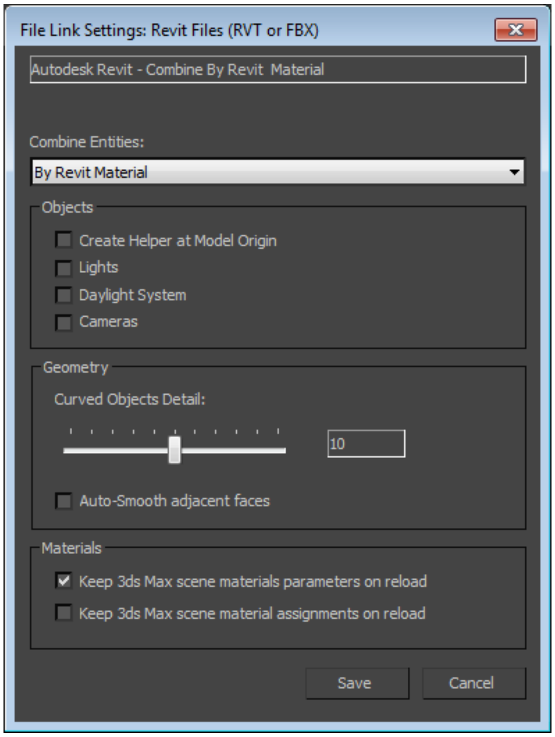
IMAGE 3-10: These are the default presets. You can make your own, or tweak these!

Material Linking

When linking, and reloading, the FBX/Revit or DWG files, there are two important checkboxes to pay attention to under the Materials section. These two checkboxes will determine how 3ds Max handles the incoming linked Materials into the scene file.

- **Keep 3ds Max scene materials parameters on reload.**
    - This is recommended if adjustments to the material properties will happen inside of 3ds Max. If the name of the material stays the same, the material will not be overridden when reloading the file. If left uncheck, the material will be overridden and replaced with the latest version from Revit.
    - Converting materials to another format is ok, as long as the material name stays the same.
- **Keep 3ds Max scene material assignments on reload.**
    - This is recommended if new materials will be created and applied inside of 3ds Max. Since a new material have been created, 3ds Max will not replace the newly created material with the latest version from Revit when this is enabled. This checkbox is highly recommended for DWG imports, as they do not bring in any materials to begin with.

FBX – Preset Settings (Combine By Revit Material)



File Link Settings: Revit Files (RVT or FBX)

Autodesk Revit - Combine By Revit Material

Combine Entities: By Revit Material

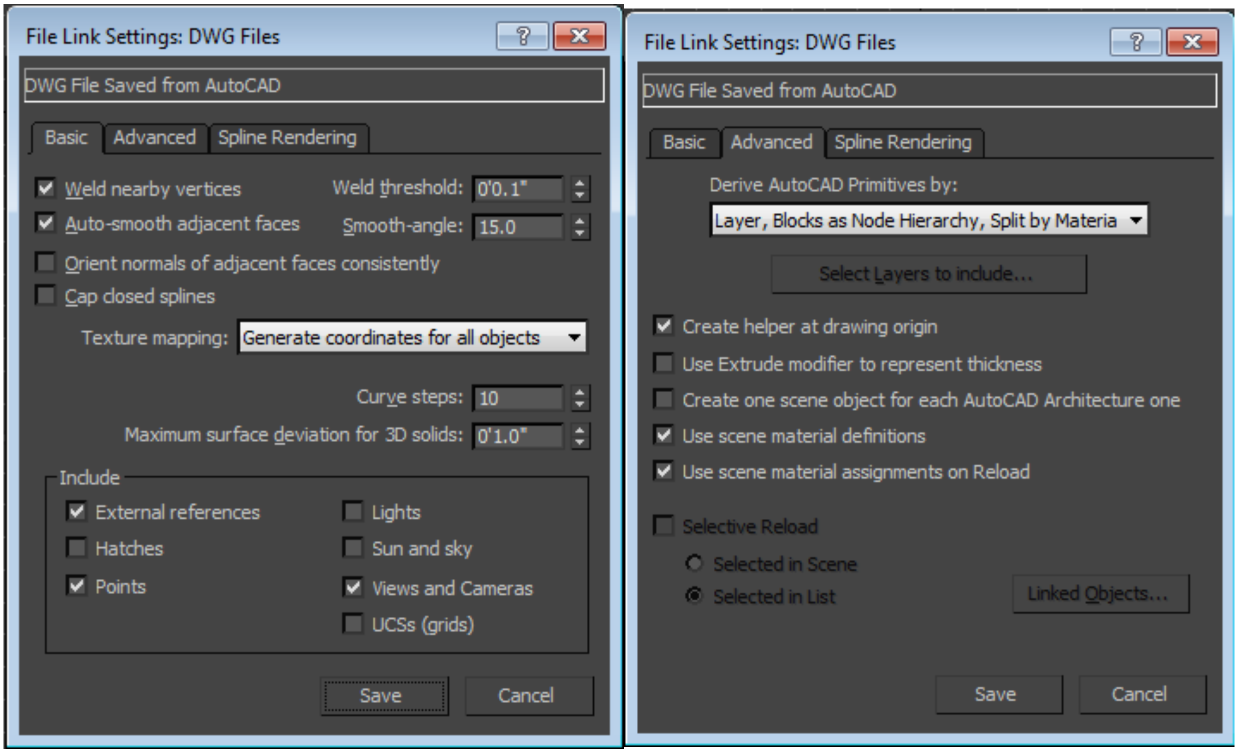
Objects
- □ Create Helper at Model Origin
- □ Lights
- □ Daylight System
- □ Cameras

Geometry
- Curved Objects Detail: 10
- □ Auto-Smooth adjacent faces

Materials
- ☑ Keep 3ds Max scene materials parameters on reload
- □ Keep 3ds Max scene material assignments on reload

IMAGE 3-11: This is how I set my FBX Import Settings. Make sure to check the second option under Materials if you plan on re-assigning materials in 3ds Max! Also this is where Cameras can be enabled or disabled for Linking into 3ds Max.

DWG – Preset Settings (DWG File Saved from AutoCAD)



File Link Settings: DWG Files

DWG File Saved from AutoCAD

Basic | Advanced | Spline Rendering

☑ Weld nearby vertices — Weld threshold: 0'0.1"

☑ Auto-smooth adjacent faces — Smooth-angle: 15.0

□ Orient normals of adjacent faces consistently

□ Cap closed splines

Texture mapping: Generate coordinates for all objects

Curve steps: 10

Maximum surface deviation for 3D solids: 0'1.0"

Include

☑ External references — □ Lights

□ Hatches — □ Sun and sky

☑ Points — ☑ Views and Cameras

□ UCSs (grids)

File Link Settings: DWG Files

DWG File Saved from AutoCAD

Basic | Advanced | Spline Rendering

Derive AutoCAD Primitives by: Layer, Blocks as Node Hierarchy, Split by Materia

☑ Create helper at drawing origin

□ Use Extrude modifier to represent thickness

□ Create one scene object for each AutoCAD Architecture one

☑ Use scene material definitions

☑ Use scene material assignments on Reload

□ Selective Reload

○ Selected in Scene

● Selected in List

IMAGE 3-12: These are my DWG import settings. Note the "Use scene material definitions" and "Use scene material assignments on Reload". These two settings do ethe same as the FBX versions. It is HIGHLY recommended to have both of these enabled for DWG imports as no materials are assigned when linked in. This will ensure when you add materials inside of 3d Max that they will stay applied to the DWG link when it is reloaded.

Xref into a "Master" File

The following information is ideal for large scale projects, or a team working on a set of renderings. The concept is to import each View that was exported out of Revit into its own 3ds Max file. From there, the multiple 3ds Max files are Xref into one Master file. Multiple Master files can be created for different schemes, iterations, lighting options, and studies, all while referencing the base model from Revit. The other added benefit is multiple people can handle different aspects of the project, since everything is not in one single 3ds Max file. For instance on person on the team could be tweaking materials, while another sets lighting and camera views.

- **Import your multiple FBX and DWG files into their own 3ds Max Files**
- **Xref all the files into one main "Master" file**
  - Less chance of losing all your work
  - Easier to swap parts in and out
  - Allows multiple people to work on the same project
  - Multiple "Master" Files can be created for different scenarios
  - "Testing" materials and lighting is a little more tedious
    - Create a test file for faster testing, then apply to the main model

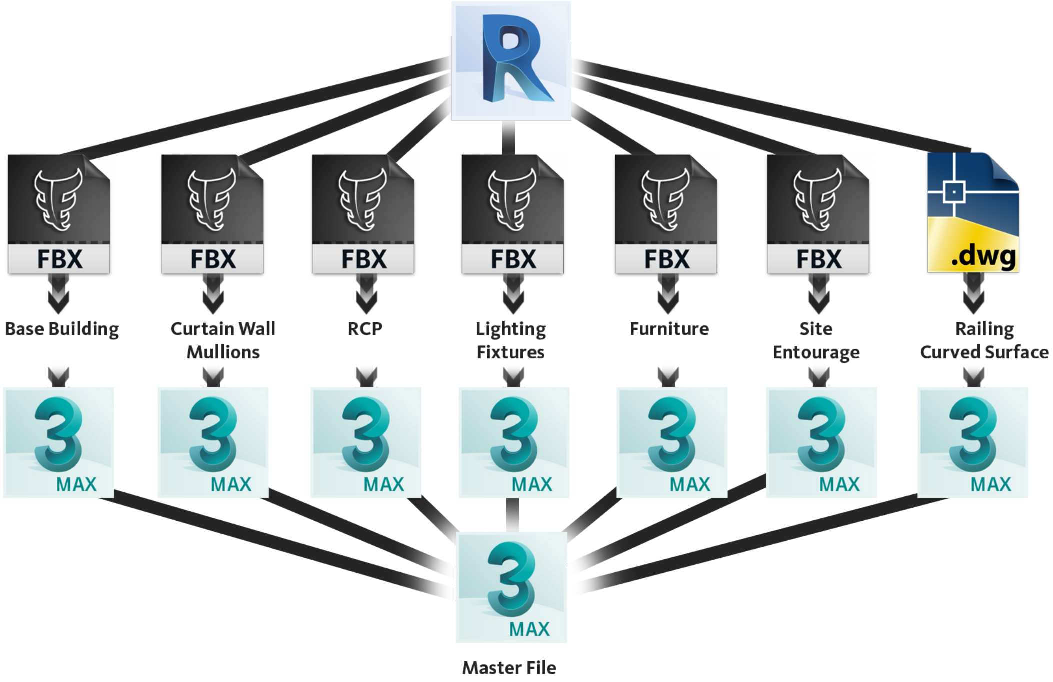


IMAGE 3-13: This is a diagram of my file-link workflow. You can consolidate this if your scene file is small, but I find this to be the best break up. Large project files could require more. A current project of mine has up to 13 different exports, but I only have five 3ds Max files link into the Master.

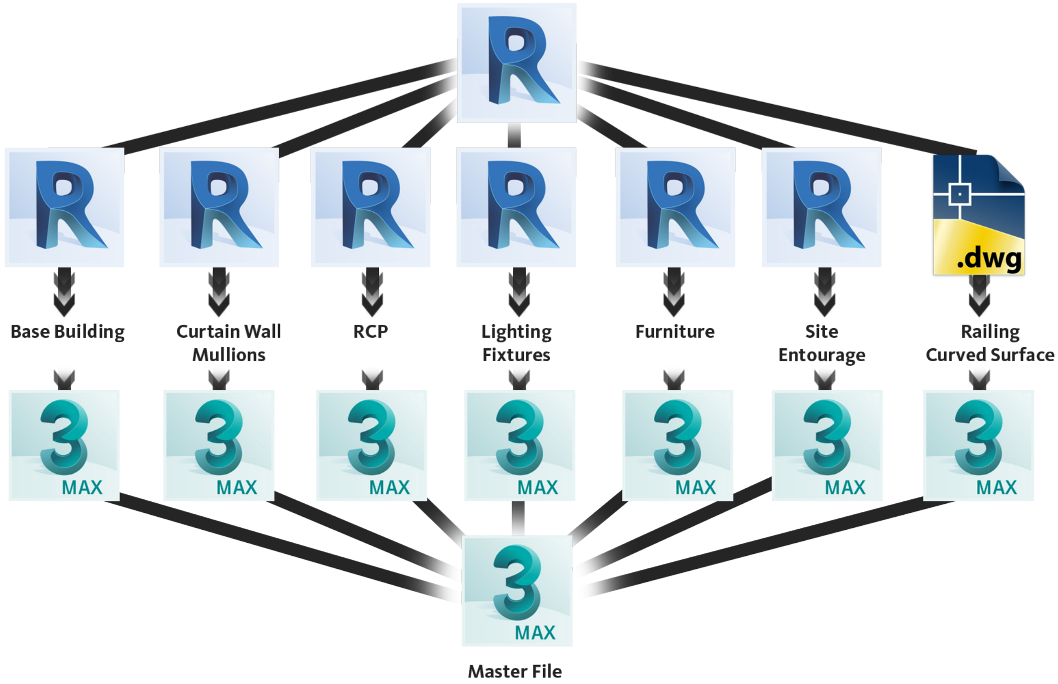


IMAGE 3-14: Since 3ds Max 2016, the Revit Engine was completely incorporated into 3ds Max. This means faster and easier translation of a Revit model into 3ds Max! The FBX Exports can be replaced with just the multiple views in Revit from one single file! The Revit Linking and Importing inside of 2016 and 2017 is SIGNIFICANTLY faster than it is in 2015 and below. However keep in mind that Revit versions need to match with the version of 3ds Max. If a 2016 Revit file is Linked into 3ds Max 2017, Max will internally upgrade the Revit file to 2017. This will increase linking time, so FBX is recommended in this scenario.

Chapter 4: 3ds Max Scene Set-Up

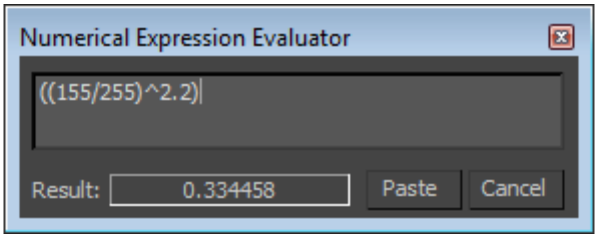
MAKE SURE TO INSTALL NVIDIA Iray and Mental Ray with 3ds Max 2017!

They are now optional during the installation process. Those will need to be installed to move forward with the rest of this course.

Gamma Settings

Having Gamma Enabled is probably the single most important setting when creating renderings. This insures that light, materials, and colors are being properly interpolated inside of 3ds Max and the Render Engine. This is also the first step in setting up a Linear Workflow. Iray is an engine that works completely in linear space, so this setting is pretty much required for created accurate renderings. With Iray also being completely Linear, it does not use RGB Values to define Color and Greyscale. The equation to convert RGB into Linear Space is listed below, and 3ds Max provides a way for it to do the math for you with the Numerical Expression Evaluator.

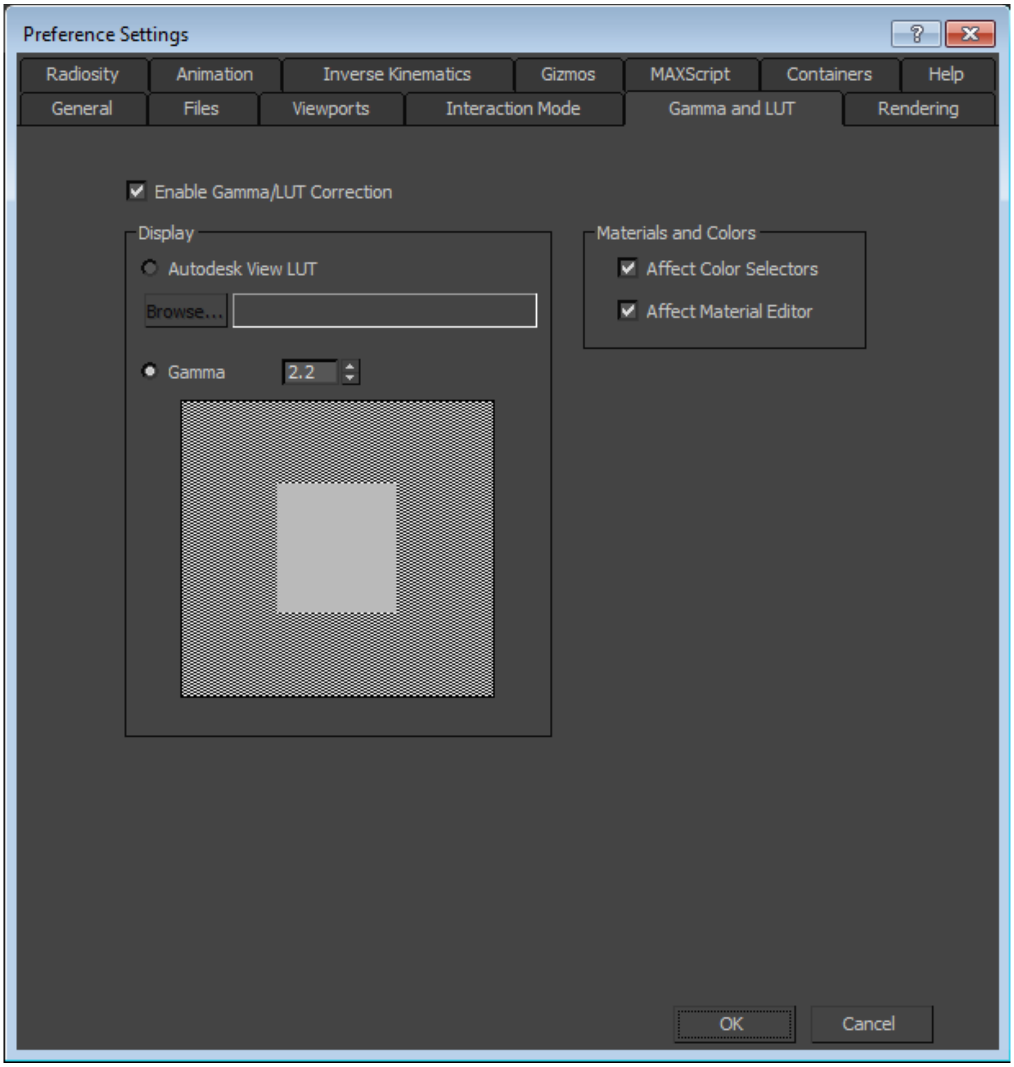
- **Make sure Gamma is enabled and set to 2.2.**
  - This is found under Rendering > GAMMA/LUT Settings.
- **Use the following equation to convert RGB Values into linear values for 3ds Max and Iray.**
  - ((**RGB**/255)^2.2)
  - 255*((**RGB**/255)^2.2) will convert RGB values to gamma corrected values inside of 3ds Max. This equation is used for **Iray for 3ds Max**, and other engines that use RGB Values.
  - When you have a number rollout selected in 3ds Max, hit Ctrl+N to bring up the Numerical Expression Evaluator.


Numerical Expression Evaluator

((155/255)^2.2)

Result: 0.334458

IMAGE 4-1: This is the Numerical Expression Evaluator. To access it, press Ctrl+N in a number dialog box. It'll do all the math for you!



☑ Enable Gamma/LUT Correction

Display

○ Autodesk View LUT

● Gamma 2.2

Materials and Colors

☑ Affect Color Selectors

☑ Affect Material Editor

IMAGE 4-2: Here are what your Gamma/LUT settings should look like.

Shaders

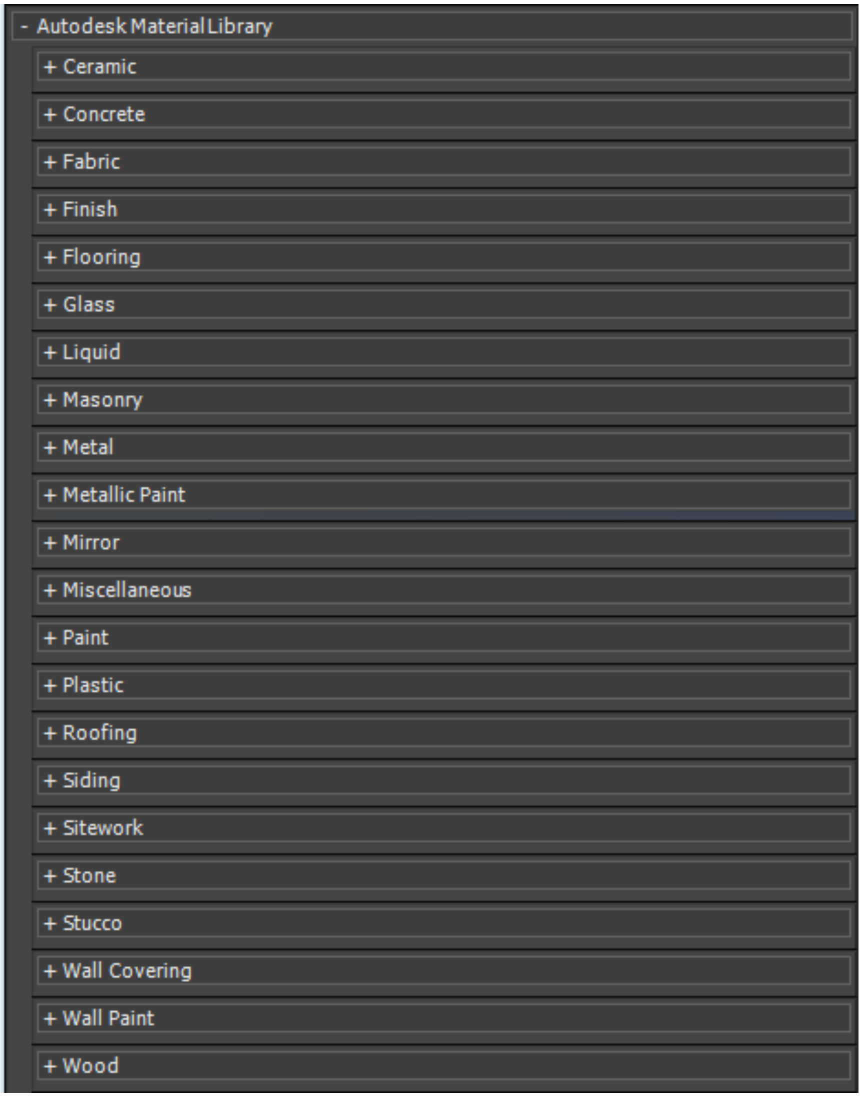
When it comes to setting up materials in 3ds Max, there are a wide range of options inside of 3ds Max to generate realistic looking, and behaving, materials. The following Shaders will be all that is needed to create believable and realistic looking renderings. Some of the Shaders are extremely simple when it comes to settings, but can produce very good results. Then there are some Shaders that will give you all the control over the look and feel of the Shader that you will ever need. It is highly recommended to experiment with all the Shaders, and learn what all of their property values do. There is extremely good documentation of all of these Shaders in the 3ds Max Documentation.

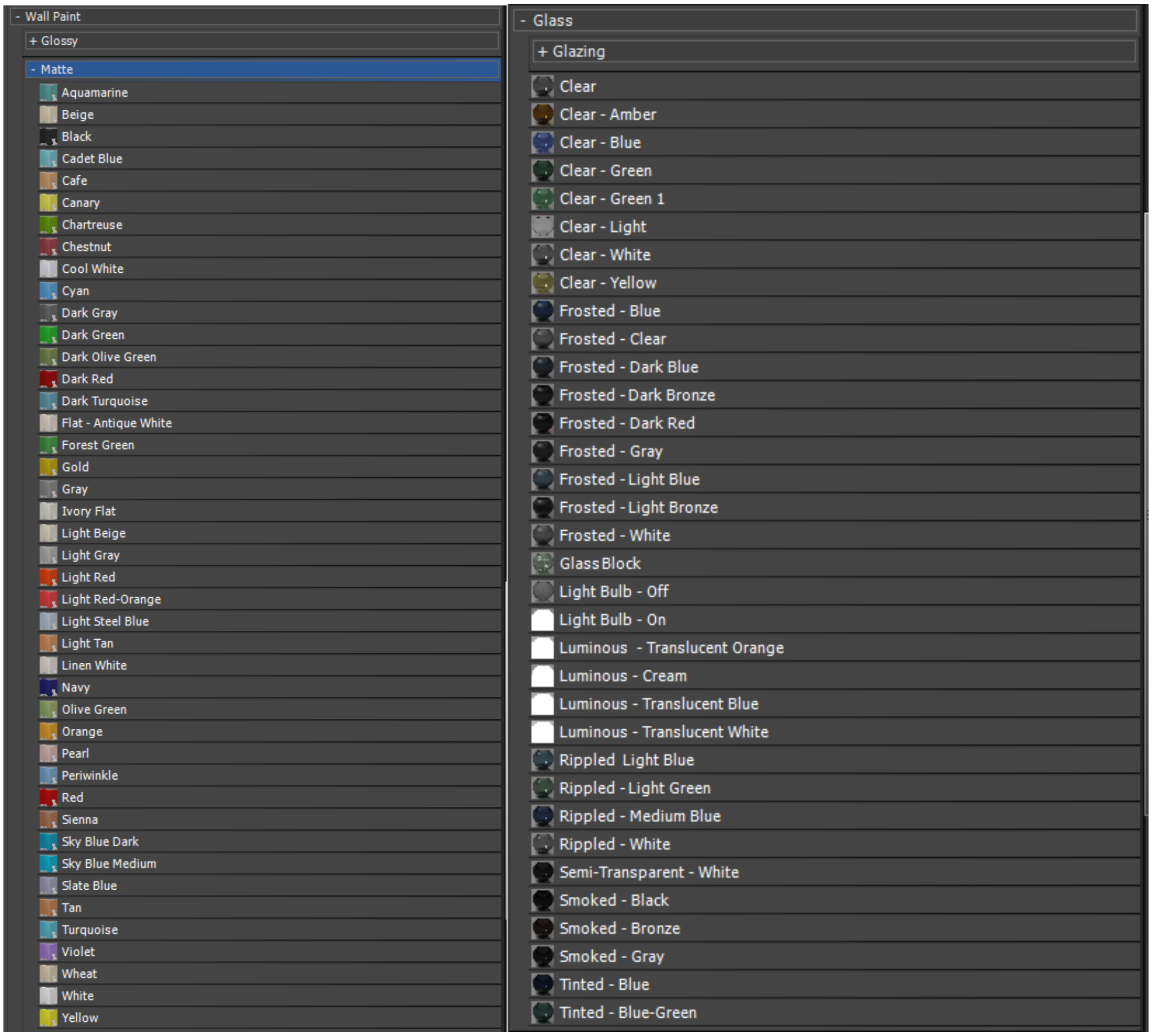
- **Compatible Shaders:**
  - **Autodesk Materials**
  - **Arch & Design**
  - **Iray Shader (3ds Max 2015 and below)**
  - **MDL (3ds Max 2016+)**

Autodesk Materials

These Shaders will be the ones that are imported in directly from Revit. They will look and behave exactly as they do if you were to render directly inside of Revit, or on A360. These shaders are simple, and straight to the point. These are highly recommended with those who do not want to mess with materials inside of 3ds Max too much, or for those who want to keep things simple.

- **If you set your material properties in Revit, these will be good to go**
- **Quick and Easy**
- **Hundreds of presets to mimic a wide range of architectural materials**





- Wall Paint
  + Glossy
  - Matte
    - Aquamarine
    - Beige
    - Black
    - Cadet Blue
    - Cafe
    - Canary
    - Chartreuse
    - Chestnut
    - Cool White
    - Cyan
    - Dark Gray
    - Dark Green
    - Dark Olive Green
    - Dark Red
    - Dark Turquoise
    - Flat - Antique White
    - Forest Green
    - Gold
    - Gray
    - Ivory Flat
    - Light Beige
    - Light Gray
    - Light Red
    - Light Red-Orange
    - Light Steel Blue
    - Light Tan
    - Linen White
    - Navy
    - Olive Green
    - Orange
    - Pearl
    - Periwinkle
    - Red
    - Sienna
    - Sky Blue Dark
    - Sky Blue Medium
    - Slate Blue
    - Tan
    - Turquoise
    - Violet
    - Wheat
    - White
    - Yellow

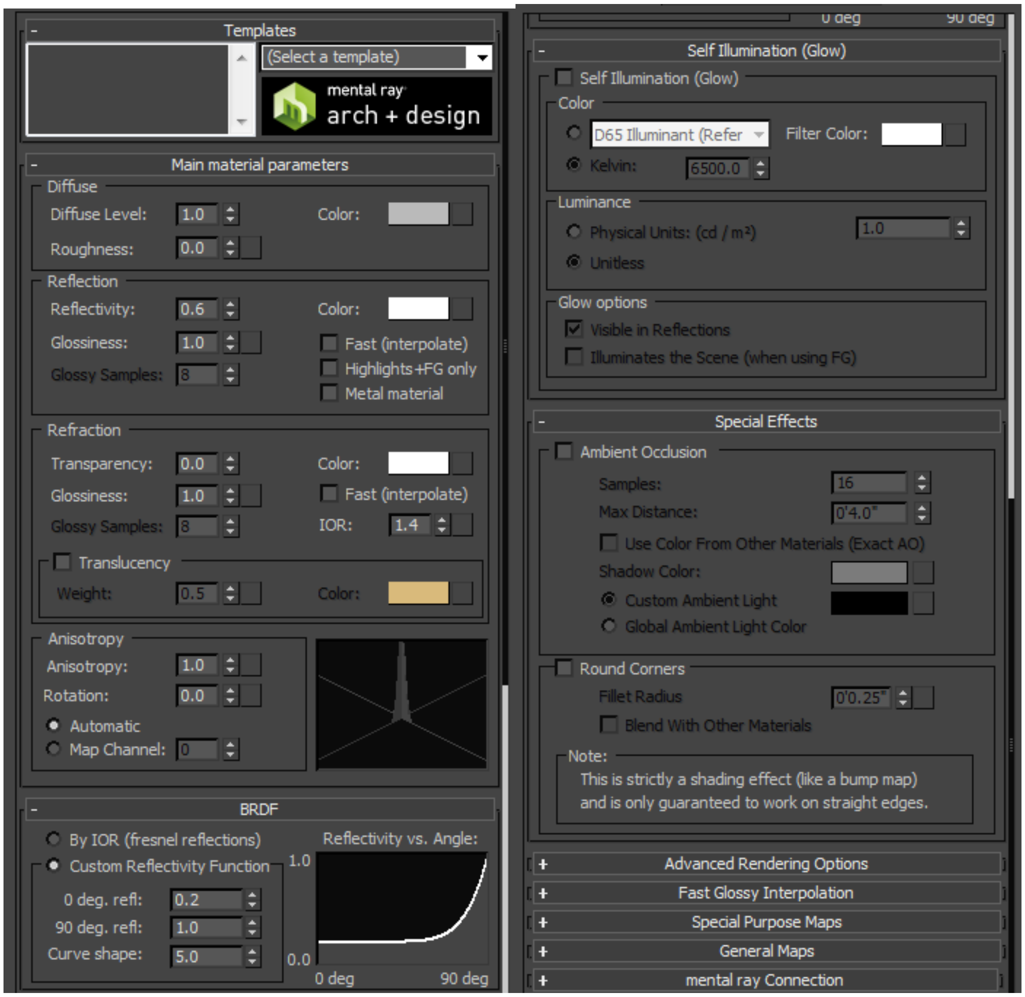
- Glass
  + Glazing
  - Clear
  - Clear - Amber
  - Clear - Blue
  - Clear - Green
  - Clear - Green 1
  - Clear - Light
  - Clear - White
  - Clear - Yellow
  - Frosted - Blue
  - Frosted - Clear
  - Frosted - Dark Blue
  - Frosted - Dark Bronze
  - Frosted - Dark Red
  - Frosted - Gray
  - Frosted - Light Blue
  - Frosted - Light Bronze
  - Frosted - White
  - Glass Block
  - Light Bulb - Off
  - Light Bulb - On
  - Luminous - Translucent Orange
  - Luminous - Cream
  - Luminous - Translucent Blue
  - Luminous - Translucent White
  - Rippled Light Blue
  - Rippled - Light Green
  - Rippled - Medium Blue
  - Rippled - White
  - Semi-Transparent - White
  - Smoked - Black
  - Smoked - Bronze
  - Smoked - Gray
  - Tinted - Blue
  - Tinted - Blue-Green

IMAGE 4-3: Here is the Autodesk Material Library that is installed with 3ds Max. There are plenty of materials to pick from that are compatible with Iray. These materials are the same ones that will be linked from Revit.

Arch & Design

This is the main shader inside of 3ds Max to use with Iray. It has everything required to create the exact material that is required. It takes the law of “Energy Conservation” into consideration, and even has extra controls to fine tune the BRDF Curve of the material. There are a lot of options to learn with this Shader, but it is worth learning them all. Thankfully there is a nice set of presets to pick from to make things a little easier to get going.

- **Extremely Powerful, Flexible, and Customizable.**
- **Lots of Presets**
- **Special Functions**
    - Curved/Beveled Edges



Diffuse
Diffuse Level: 1.0 Color: ⬜
Roughness: 0.0

Reflection
Reflectivity: 0.6 Color: ⬜
Glossiness: 1.0 □ Fast (interpolate)
Glossy Samples: 8 □ Highlights+FG only
□ Metal material

Refraction
Transparency: 0.0 Color: ⬜
Glossiness: 1.0 □ Fast (interpolate)
Glossy Samples: 8 IOR: 1.4
□ Translucency
Weight: 0.5 Color: 🟨

Anisotropy
Anisotropy: 1.0
Rotation: 0.0
● Automatic
○ Map Channel: 0

○ By IOR (fresnel reflections)
● Custom Reflectivity Function
0 deg. refl: 0.2
90 deg. refl: 1.0
Curve shape: 5.0

□ Self Illumination (Glow)
Color
○ D65 Illuminant (Refer Filter Color: ⬜
● Kelvin: 6500.0
Luminance
○ Physical Units: (cd / m²) 1.0
● Unitless
Glow options
☑ Visible in Reflections
□ Illuminates the Scene (when using FG)

□ Ambient Occlusion
Samples: 16
Max Distance: 0'4.0"
□ Use Color From Other Materials (Exact AO)
Shadow Color:
● Custom Ambient Light ⬛
○ Global Ambient Light Color

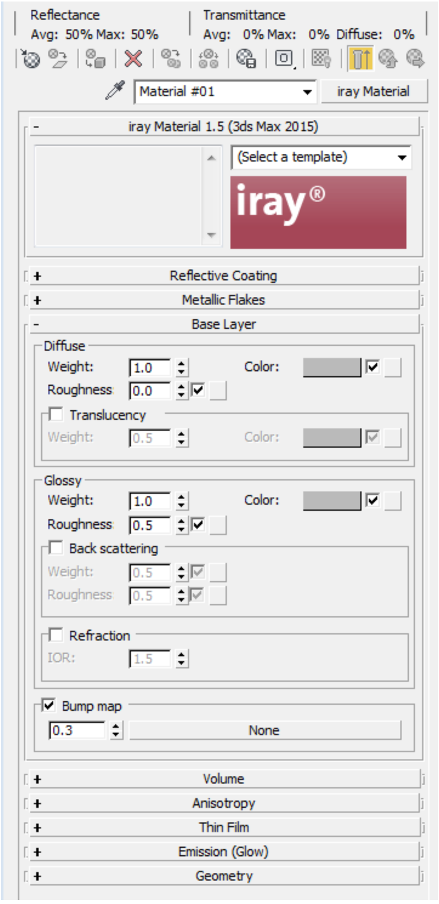
□ Round Corners
Fillet Radius 0'0.25"
□ Blend With Other Materials
Note:
This is strictly a shading effect (like a bump map) and is only guaranteed to work on straight edges.

IMAGE 4-4: The Arch+Design Shader is perfect for tweaking and creating custom materials. There are plenty of options here to create any kind of material needed for the project.

Iray Shader

The Iray Shader is specifically designed by NVIDIA themselves to be used with Iray in 3ds Max. This Shader is an even more advanced shader than the Arch & Design Shader, and is highly recommended for creating super-realistic looking materials. The Iray Shader has the ability to add “Coats” or additional “Layers” to a material, much like how materials are really made in reality. The Shader is also optimized for Iray, so the best performance will be seen by using this Shader. Since it is a “3rd Party Plug-in”, make sure to install this on every machine that will be used in conjunction with the project.

- **Optimized for use in Iray**
- **Must download from NVIDIA directly. Not supported by Autodesk.**
  - Download Free at http://blog.Irayrender.com/
  - You will also have to install this on all of your render nodes.
- **Amazing quality and presets.**
- **Powerful and easy to use.**
- **Multiple “Coats” for complex, reflective, materials.**



Reflectance Avg: 50% Max: 50%

Transmittance Avg: 0% Max: 0% Diffuse: 0%

Diffuse

Weight: 1.0 Color: ☑

Roughness 0.0 ☑

□ Translucency

Weight: 0.5 Color: ☑

Glossy

Weight: 1.0 Color: ☑

Roughness 0.5 ☑

□ Back scattering

Weight: 0.5 ☑

Roughness 0.5 ☑

□ Refraction

IOR: 1.5

☑ Bump map

0.3 None

IMAGE 4-5: These are the main set of settings for the Iray Material.

MDL – Material Definition Language (3ds Max 2016 and 2017)

This is a new standard for the creation of physically based rendering (PBR) of materials, which NVIDIA has specifically developed for Iray and other rendering engines. At the core, MDL uses a layered and modular concept to define a variety of parameters in which artist can edit to create the look they are going for. Due to its own procedural programming language, MDLs can be reused and provide an infinite possibility of control over the creative side of the material. Since MDL is a definition, it tells the renderer "what to compute", and the renderer figures out "how to compute" the definition. This split is the ideal choice when the rendering engine is using path tracing or multiple importance sampling, and allows the material look the same across any supported platform. MDLs even support the use of real-world measured data from actual materials, known as Measured Materials. Measured Materials will give an extremely accurate representation of how light reflects through and across a surface.

1. **Key Features of MDL**
    1. Designed primarily for GPU Rendering with Iray as the main platform.
    2. Can define extremely complex materials through multiple parameters and additional layers and coatings.
    3. Parameters can be added for custom-built material libraries.
        - This allows for a base material to be set, and additional customization of that material for specific instances.
    4. Is designed to be adopted by other render engines.
    5. MDL Libraries be easily packaged and distributed across any series of renderers that support MDL.
        - This allows a single unified look for materials across all platforms! There is only a need for one single material library in a production environment.
    6. Supports traditional rendering techniques that work well with conventional rendering pipelines.
2. **Enable MDL inside of 3ds Max follow the steps at the Mental Ray Blog**
    1. http://blog.mentalray.com/2015/05/08/using-mdl-with-mental-ray-in-3ds-max-2016/
3. **Current Limitations inside of 3ds Max 2017**
    1. Editing MDL materials can only be done on the parameter level inside of 3ds Max after loading external MDL code.
    2. Parameter connections to other MDLs or other Shaders are currently not supported.
    3. Measured Materials are not yet handled by Mental Ray 3.13.
4. **More technical information can be found here**:
    1. **http://www.nvidia-arc.com/products/Iray/mdl-materials.html**
    2. **http://www.mdlhandbook.com/**

Substance Designer 5.5

Substance Designer is a procedural material generator, and is created by a company called Allegorithmic. With Substance Designer 5.3, Allegorithmic has added the ability to export MDLs through their editor. And with the release of Substance Designer 5.5, they have added a full blown visual editor for creating MDLs from scratch! And they have even included Iray inside of the application! The procedural nature of Substance Designer allows a considerable amount of options when generating and customizing materials. Any material generated as an MDL inside of Substance Designer will look exactly the same when rendered with Iray inside of 3ds Max.

- **Procedurally generate an infinite amount of Materials and Variations**
- **Render with Iray directly inside of Substance Designer for a 1:1 Material preview of what would appear inside of 3ds Max**
- **Export MDL files to use directly with Iray and Iray for 3ds Max**

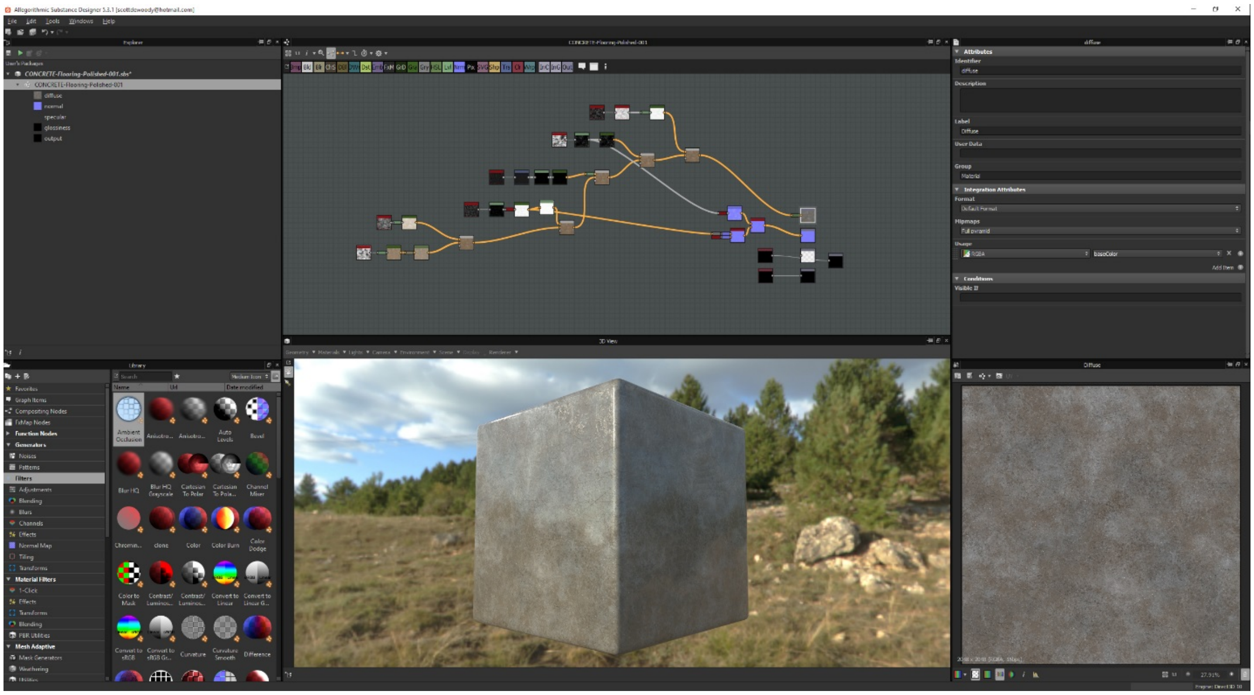


IMAGE 4-6: Here is Substance Designer 5.3.1 running Iray, and a preview of the MDL that will be exported to 3ds Max 2016!

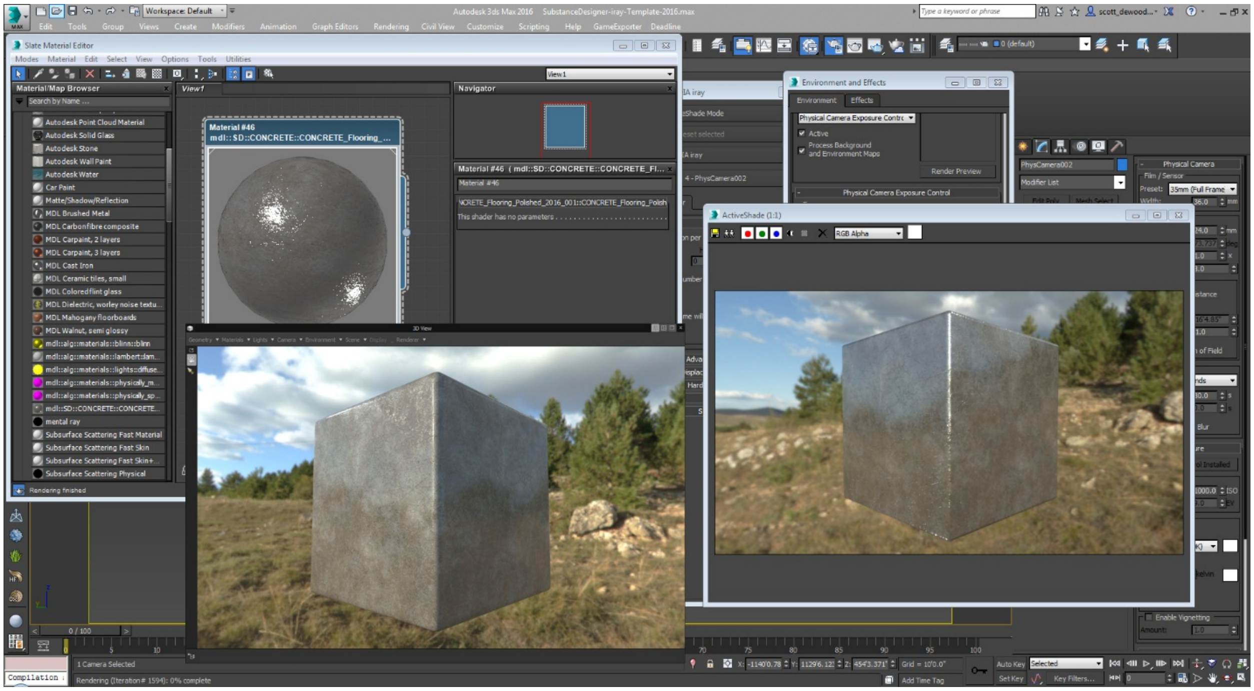


IMAGE 4-7: *This image shows the MDL loaded into 3ds Max 2016 NVIDIA Iray!*

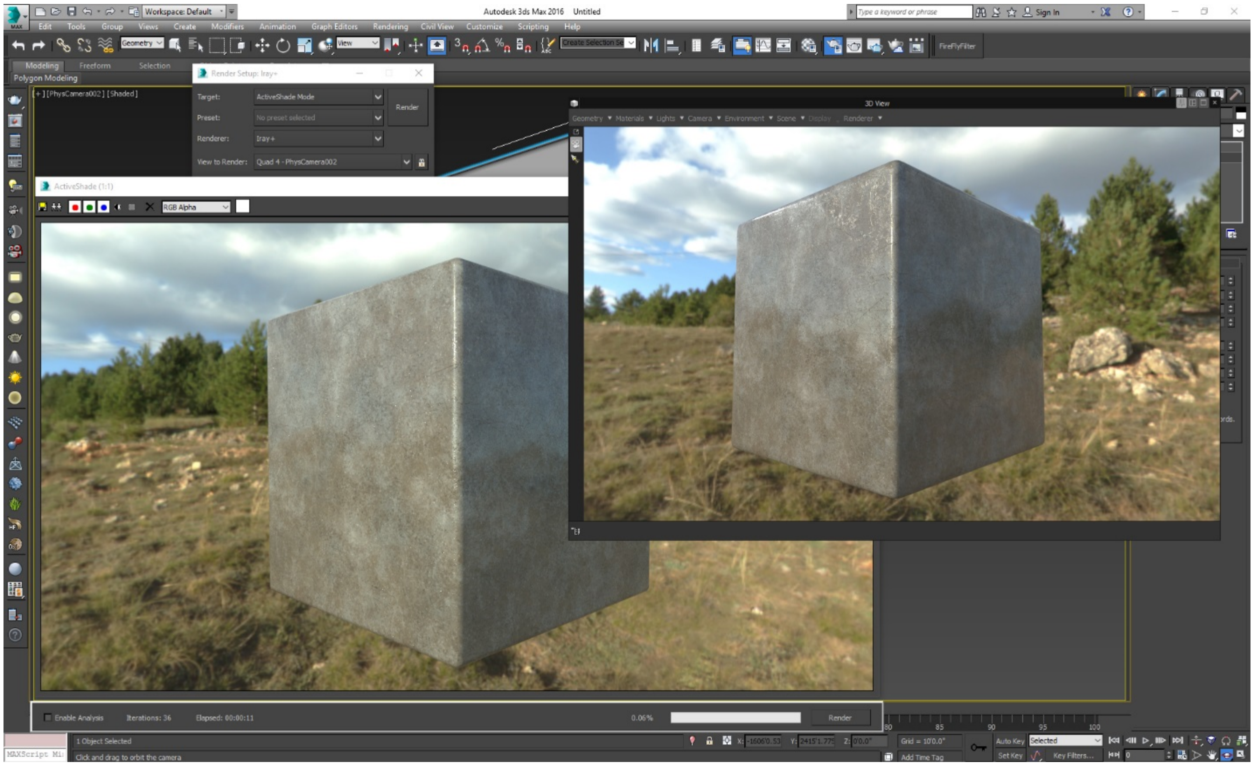


IMAGE 4-8: *This image shows the MDL loaded into Iray for 3ds Max in 3ds Max 2016!*

Importing Substance Designer MDLs into 3ds Max 2016 and 2017

In order to import MDLs generated inside of Substance Designer, there are a few extra steps that are required. 3ds Max 2016 and 2017 needs a few extra support files, and the MDLs must be place in a certain location. These are the steps as of the time this paper was written.

1. Enable MDLs inside of 3ds Max 2016 with the steps on this blog post from NVIDIA: http://blog.mentalray.com/2015/05/08/using-mdl-with-mental-ray-in-3ds-max-2016/
2. Copy the files in the following location:
   C:\Program Files\Allegorithmic\Substance Designer 5\resources\view3d\iray
   To this location:
   C:\Program Files\Autodesk\3ds Max 2016\NVIDIA\shaders_3rdparty\mdl
3. In Substance Designer **enable Iray**
4. Change Material to the Blinn shader in the Viewport by going to:
   Materials > Default > Definitions > mdl::alg::materials > Blinn
5. Design the MDL using the nodes in the editor, and edit the Blinn properties by:
   Materials > Default > Edit
6. Export the MDL by going to:
   Materials > Default > Export Preset…
7. Name the MDL and select a location to export the MDL with its associated bitmaps
   - Don't use the " - " character for separation. For some reason the MDL will not export with that character in the name. Use the " _ " for separation.
8. Open the .MDL file in a text editor and **edit Line 18**. Remove the " ***** " from the material name.
   Example: export material **NAME_OF_MDL(*) –** Remove the * to be: **NAME_OF_MDL()**
9. Copy the MDL and its associated bitmaps to a folder that can organize the MDLs here:
   C:\Program Files\Autodesk\3ds Max 2016\NVIDIA\shaders_3rdparty\mdl
10. Open 3ds Max 2016 and open the Material Editor
11. Open the Mental Ray Shader tab in the Material Browser and select the MDL!
    - If for some reason the MDL Is not listed with **NVIDIA Iray** as the active Render Engine, enable the "Show Incompatible" option in the Material Browser via the drop down menu in the top left corner of the Material Browser. The MDLs are still compatible, there is just a graphics bug in 3ds Max that may not display them.

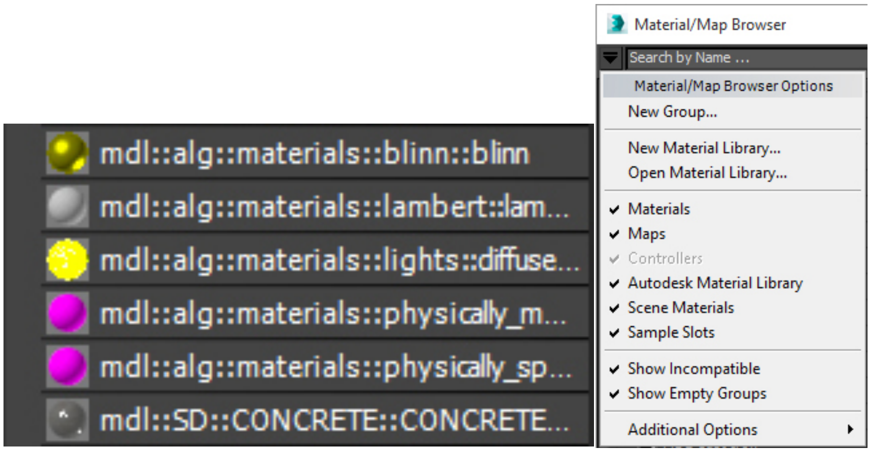

mdl::alg::materials::blinn::blinn
mdl::alg::materials::lambert::lam…
mdl::alg::materials::lights::diffuse…
mdl::alg::materials::physically_m…
mdl::alg::materials::physically_sp…
mdl::SD::CONCRETE::CONCRETE…
Material/Map Browser
Search by Name …
Material/Map Browser Options
New Group…
New Material Library…
Open Material Library…
✓ Materials
✓ Maps
✓ Controllers
✓ Autodesk Material Library
✓ Scene Materials
✓ Sample Slots
✓ Show Incompatible
✓ Show Empty Groups
Additional Options

IMAGE 4-9: This is how the MDLs will be listed, and also how to enable "Show Incompatible" materials in the Material Browser.

Lighting

Thankfully setting up lighting in the project is pretty straight forward. If lights were set up properly inside of Revit, they will transfer 1:1 into 3ds Max. So there should be very little need to do any editing of the lights. However, if the need arises to add lights inside of 3ds Max, the Photometric Lights are the ideal choice. And Iray does not care how many lights that are in the project! So it is best to place a light at every point in the scene where light is actually emitting from. Since the lighting would be set up as it would in the real would, this would produce the most accurate, and realistic looking rendering. When looking to use the Irradiance feature in Iray, having the lights set up in the proper location and intensity will be key to get accurate results. Also using the mrSun and mrSky inside of the Daylight System is ideal for replicating accurate daylight settings. HDR Images can be also used to replicate the environment light, but they cannot be considered 100% accurate due to variables on how they were generated. Yet they can produce very good looking results that might be ideal for the project for "Beauty" renderings.

- **Use the Daylight System for Sunlight and Skylight**
    - Make sure to add mrSky into Environment Map slot
    - Control Sun Location and Time via the Motion Tab
- **Use Photometric Lights for optimal quality and performance**
    - Standard lights not fully supported
    - Lights added in Revit will transfer in as Photometric Lights
- **Use color temperature for a more realistic look**
    - Setting the light's color to "White" will look boring
    - Artificial lights should not go above 5000K in most cases
- **Number of Lights does not affect performance**

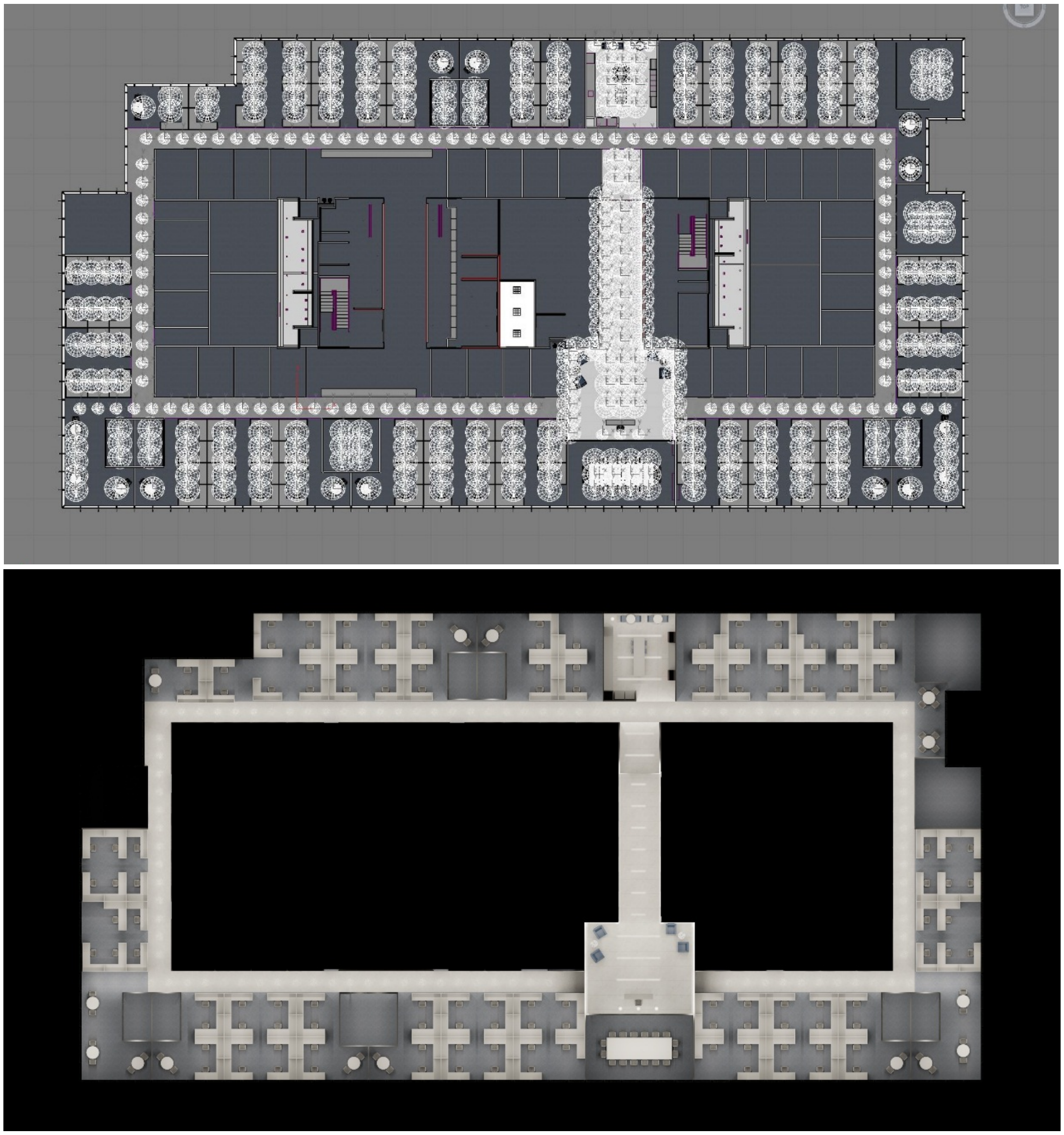
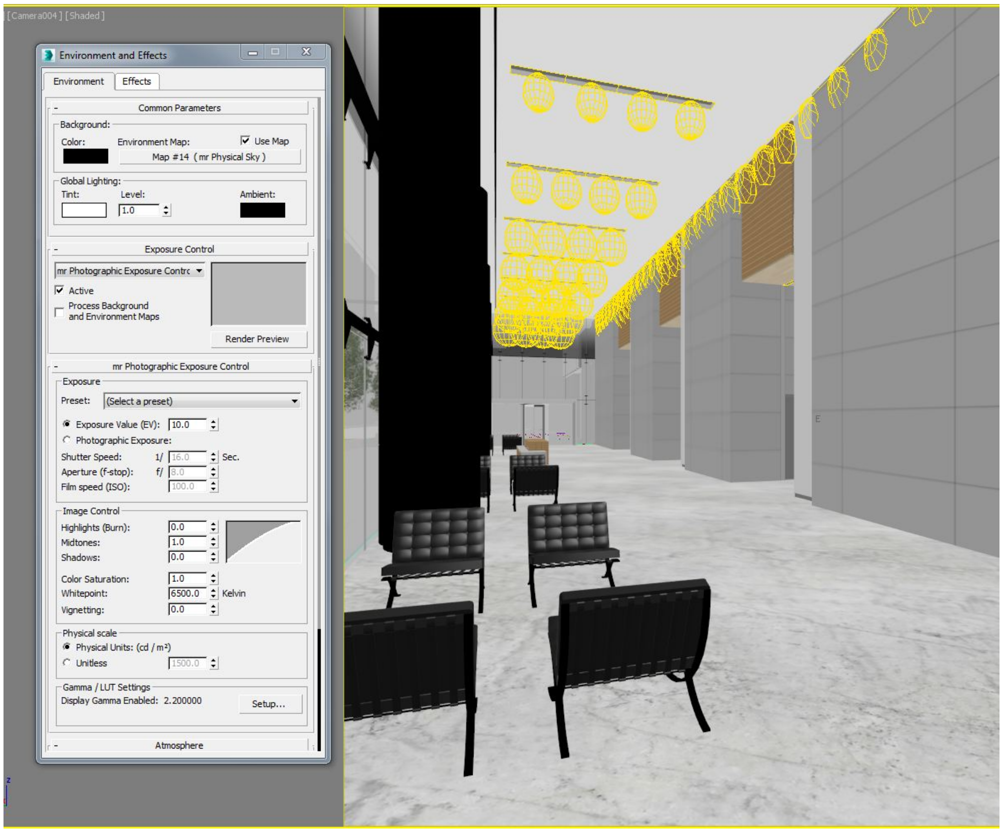


IMAGE 4-10: The top image shows 400+ placed lights from Revit and the bottom image shows all 400+ rendered with Iray with no problem in just a few minutes!

mrPhotographic Exposure Control (3ds Max 2015)

These settings are where everything comes together. The Exposure Settings will give control over how light will be viewed in the rendering in the exact same way as Exposure Settings for a camera would control light in a photograph. Shutter Speed, Aperture, and ISO, also known as the Exposure Triangle, are the three key settings to be used in this area. Though the option to combine all three into an Exposure Value (EV) is also available to simplify things. Additional settings for White Balance, and Tone-Mapping, are included to help refine the color and contrast in the rendering as well.

- **mrPhotographic Exposure Control**
    - Enable this under Environment Settings
    - Use the EV scale for quick and easy settings
    - Use the Camera Settings for more advance control
        - Try to use real world exposure values for more realistic quality
    - Set Highlight and Shadow settings to 0
        - Better to tone-map the render in post-production
    - Make sure to set the White Balance to match your lighting



[Camera004] [Shaded]

Environment and Effects

Environment | Effects

Common Parameters

Background:

Color: Environment Map: ☑ Use Map

Map #14 (mr Physical Sky)

Global Lighting:

Tint: Level: 1.0 Ambient:

Exposure Control

mr Photographic Exposure Contrc

☑ Active

☐ Process Background and Environment Maps

Render Preview

mr Photographic Exposure Control

Exposure

Preset: (Select a preset)

● Exposure Value (EV): 10.0

○ Photographic Exposure:

Shutter Speed: 1/ 16.0 Sec.

Aperture (f-stop): f/ 8.0

Film speed (ISO): 100.0

Image Control

Highlights (Burn): 0.0

Midtones: 1.0

Shadows: 0.0

Color Saturation: 1.0

Whitepoint: 6500.0 Kelvin

Vignetting: 0.0

Physical scale

● Physical Units: (cd / m²)

○ Unitless 1500.0

Gamma / LUT Settings

Display Gamma Enabled: 2.200000 Setup...

Atmosphere

IMAGE 4-11: An Exposure Value of 10 was used, with Highlights and Shadows set to 0.0. The White balance is set to 6500K due to the massive amount of daylight coming into the space.

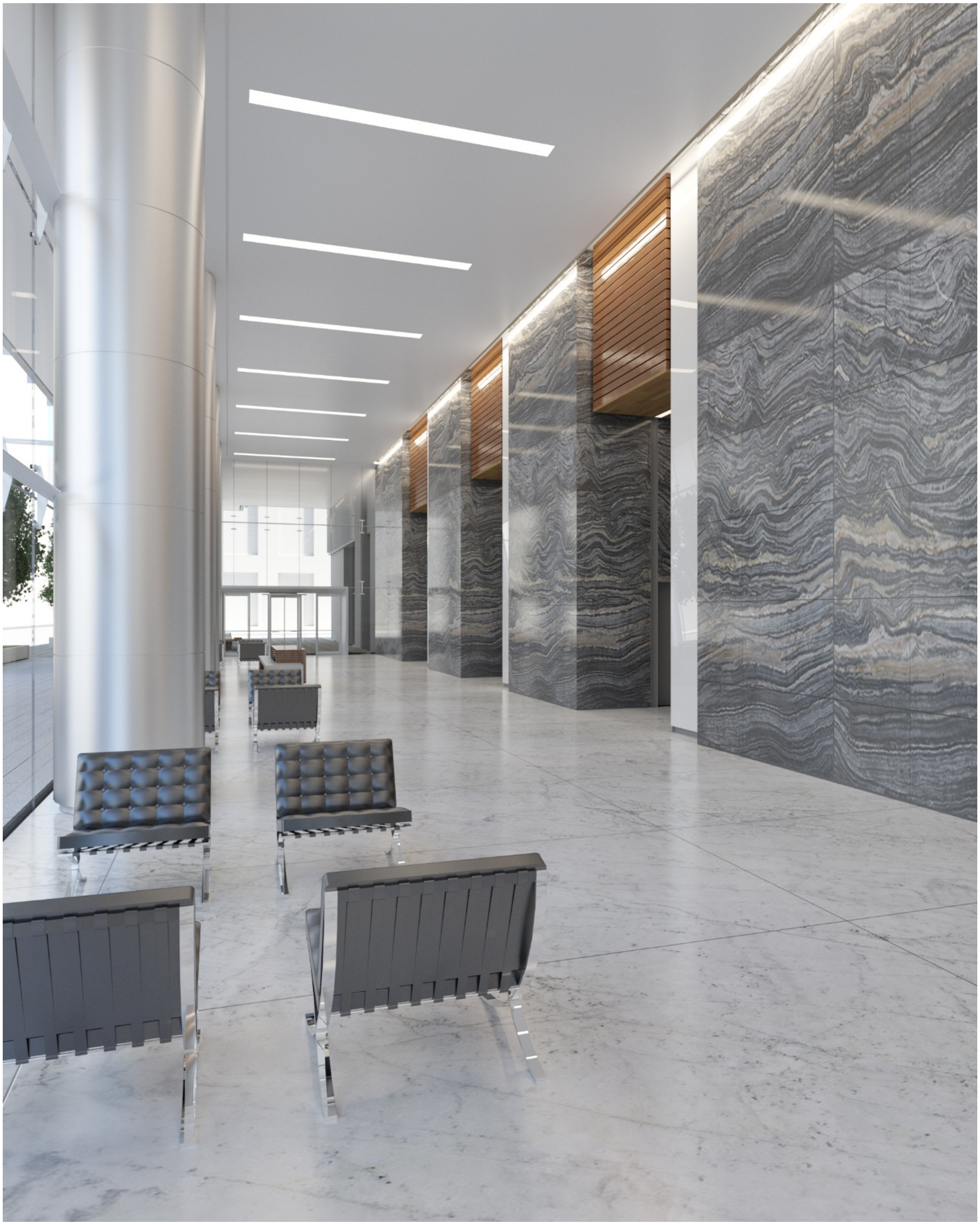
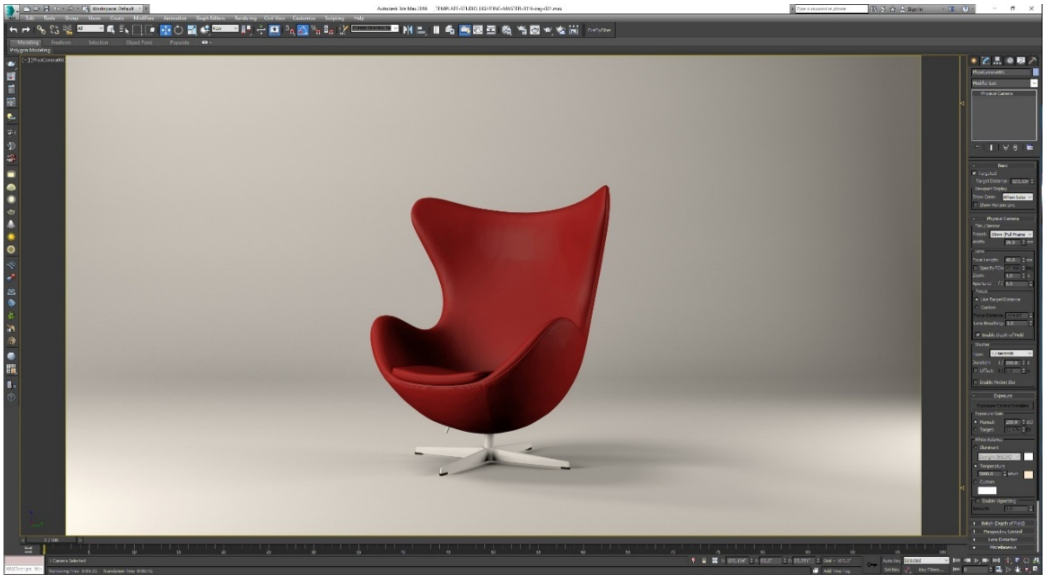


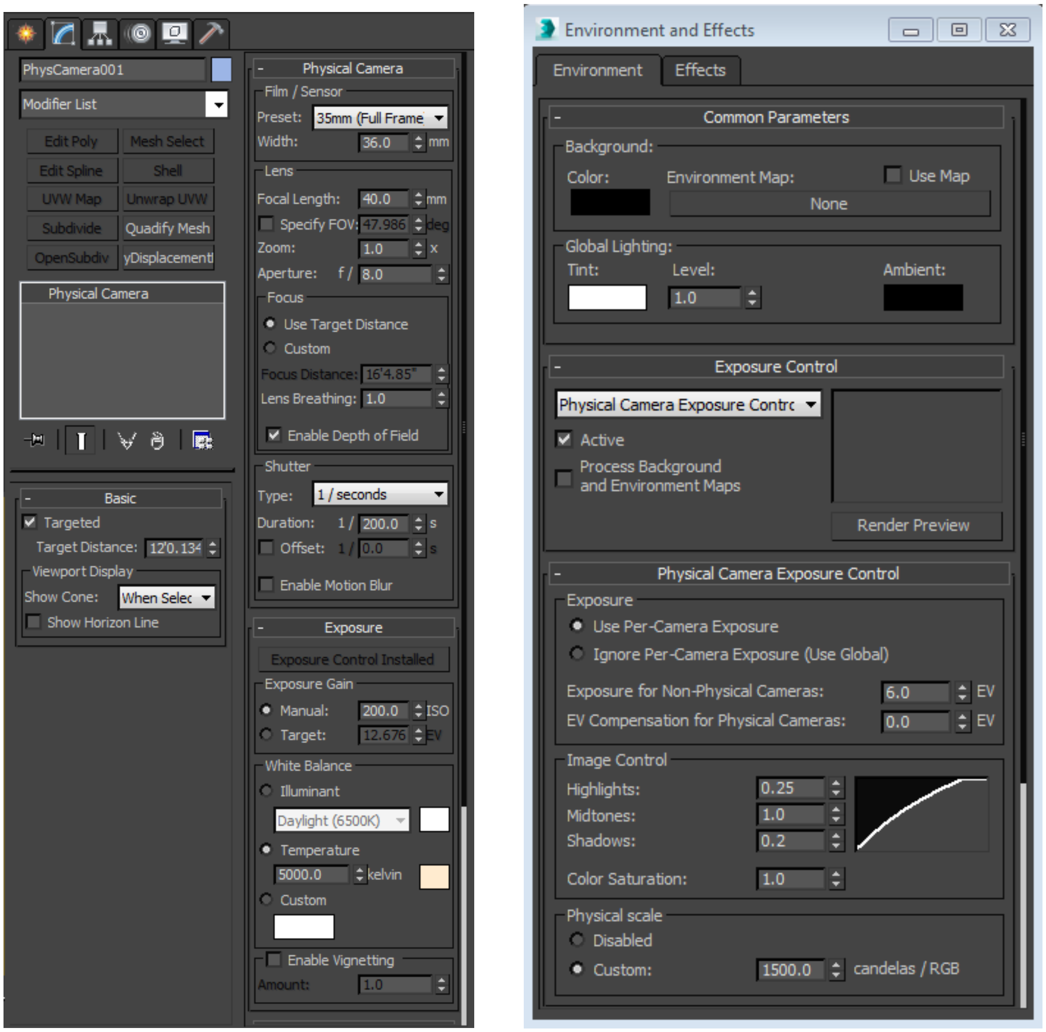
IMAGE 4-12: This is the final output from the previous screenshot done in Iray!

Physical Camera (3ds Max 2016+)

Autodesk teamed up with Chaos Group for a new feature in 3ds Max 2016 called the Physical Camera. This new camera type to 3ds Max completely mimics a real world DSLR camera, which goes to show how rendering is leaning more towards real-world photography. It is highly recommended to use the new Physical Camera, as it is now the default camera inside of 3ds Max. Also unlike the previous way, which is the mrExposureControl, the exposure settings will be unique to the camera. This will make it a lot easier to have different exposures for each camera in the scene, versus having to change the exposure settings over and over again for each camera. Due note that the Physical Camera Exposure Control is required to work with the Physical Camera. Do not use the mrExposureControl as the previous section mentions. The mrExpsoureControl is only for 3ds Max 2015 and below.

- **Physical Camera Features**
  - DSLR Camera Settings for each Physical Camera in the scene
  - Film/Sensor settings that mimic real-world sensors
  - Ability to change Shutter Speed to different types
    - Recommended **1/seconds** to mimic DSLR
  - Enable Motion Blur for each Physical Camera in the scene
  - Can use EV Scale or Specific ISO Value
  - White Balance for each Physical Camera in the scene.
  - Enable Depth Of Field which is controlled by Aperture, Film Width, and Focal Length
    - Settings for Bokeh Effect
  - Physical Camera Exposure Control enables global exposure with exposure for each individual camera in the scene.
  - Under the Physical Camera Exposure Control, leave the setting "User Per Camera Exposure" Enabled.
  - Use "Exposure for Non-Physical Cameras" to properly expose the Perspective and Orthographic views. This value is based on an EV Scale.





PhysCamera001

Basic
- ☑ Targeted
- Target Distance: 12'0.134
- Viewport Display
  - Show Cone: When Selec
  - □ Show Horizon Line

Physical Camera
- Film / Sensor
  - Preset: 35mm (Full Frame
  - Width: 36.0 mm
- Lens
  - Focal Length: 40.0 mm
  - □ Specify FOV: 47.986 deg
  - Zoom: 1.0 x
  - Aperture: f / 8.0
- Focus
  - ● Use Target Distance
  - ○ Custom
  - Focus Distance: 16'4.85"
  - Lens Breathing: 1.0
  - ☑ Enable Depth of Field
- Shutter
  - Type: 1 / seconds
  - Duration: 1 / 200.0 s
  - □ Offset: 1 / 0.0 s
  - □ Enable Motion Blur

Exposure
- Exposure Control Installed
- Exposure Gain
  - ● Manual: 200.0 ISO
  - ○ Target: 12.676 EV
- White Balance
  - ○ Illuminant
  - Daylight (6500K)
  - ● Temperature
  - 5000.0 kelvin
  - ○ Custom
- □ Enable Vignetting
  - Amount: 1.0

Common Parameters
- Background:
  - Color:
  - Environment Map: □ Use Map
- Global Lighting:
  - Tint:
  - Level: 1.0
  - Ambient:

Exposure Control
- Physical Camera Exposure Contrc
- ☑ Active
- □ Process Background and Environment Maps

Physical Camera Exposure Control
- Exposure
  - ● Use Per-Camera Exposure
  - ○ Ignore Per-Camera Exposure (Use Global)
  - Exposure for Non-Physical Cameras: 6.0 EV
  - EV Compensation for Physical Cameras: 0.0 EV
- Image Control
  - Highlights: 0.25
  - Midtones: 1.0
  - Shadows: 0.2
  - Color Saturation: 1.0
- Physical scale
  - ○ Disabled
  - ● Custom: 1500.0 candelas / RGB

IMAGE 4-13: These are the settings for the new Physical Camera and Physical Camera Exposure Control. Individual settings will be based on the scene file.

Real-World Camera Settings

If the settings on a DSLR are uncommon to those working in the project, the following is a breakdown of the key settings that will affect the exposure of the renderings with the Physical Camera, and the mrPhotographic Exposure Control.

- **Aperture (f-stop)**
  This setting will control Depth Of Field (DOF) in the camera.
  - Usually f/8.0 – f/11.0 is the sweet spot for most cameras, and is the ideal setting for shooting Architecture and Landscapes. This is due to how sharp the images come out, and results in very little DOF
  - Decreasing the Aperture will increase the brightness, and increase the DOF effect
  - Increasing the Aperture will decrease the brightness, and decrease the DOF effect
  - Depth of Field needs to be enabled to take effect

- **Shutter Speed (1/seconds)**
  This setting will control Motion Blur in the camera. The Shutter Speed will determine how fast the shutter of the camera closes.
  - The higher this setting, the faster the shutter will shut. This results in freezing objects in motion, and will also decrease the brightness of the image
  - Lowering the Shutter Speed will allow objects in motion to become blurry, and will increase the brightness of the image.
  - Motion Blur needs to be enabled to take effect.
- **ISO (Film Speed)**
  This setting controls how much light hits the sensor in the camera. In the Real World, this would also control how much noise would be visible in the photograph.
  - Decreasing the ISO value will darken the image, but create less noise in the photograph.
  - Increasing the ISO value will brighten the image, but create more noise in the photograph.
  - **Note:** Since the renderings are completely digital, the ISO setting will not create any noise in the rendering. However, it is recommended to add some noise back in Post Production to help mimic the effect. This will help the renderings look more like a photograph when it is finished.
- **Exposure Value (EV)**
  This is a value that combines the **Exposure Triangle** of **Aperture (F-Stop)**, **Shutter Speed**, and **ISO** into one **single value**. All the various combinations will always yield the same level of exposure for the set **Exposure Value**. This can be a **quick** way to set the **Exposure** for the scene, especially if **Depth of Field** and **Motion Blur** are **not required**.

  The following settings are **recommendations** for certain scenarios. They are good starting points for reference, and the settings may need to be adjusted based on other variables in the project. These also assume **real-world values** are being used for the lighting in the project. **Unrealistic** values will result in these values being **in-accurate**.

Daylight Settings	
Full Sunlight	**EV 13-14**
Hazy Sunlight	**EV 12**
Cloudy Bright	**EV 12**
Overcast	**EV 11**
Open Shade with Clear Sunlight	**EV 11-12**
Interior Lighting	
Galleries	**EV 7-10**
Office and Work Areas	**EV 6-8**
Home Interiors	**EV 5-7**

- **White Balance**
  This value is based off of the Kelvin Temperature Scale, and will determine what color value will be considered white by the camera. For instance, if the temperature of a light is 5000k, and the White Balance is set to 5000k, the light will appear white in the rendering.
  - The higher the number, which results in a cool temperature, the warmer the rendering will look.
  - The lower the number, which results in a warm temperature, the cooler the rendering will look.
  - A value of 6500K is perfect for exterior daytime renderings.
  - A value of 4500-5000K is a good starting point for interior renderings.
  - This is a chart to help as a starting point with setting the White Balance.

Color Temperature	Light Source
6500K	Daytime / Cloudy
5500K – 6500K	Daytime
5000K	Camera Flash or LED
4000K – 5000K	Fluorescent Light
3000K – 4000K	Sunrise / Sunset
25000 – 3000K	Incandescent Lighting
2000 – 3000K	Tungsten Bulbs

- **Image Control**
  These settings will apply tone-mapping adjustments to the rendering, and can be found under the Physical Camera Exposure Control That will help with the contrast of the Highlights and the Shadows of the rendering.
  - Leave these settings at default. It will give really good results from the start.
  - Set Highlights and Shadows to 0 to remove any tone-mapping.
    - Leave Mid-tones set to 1.0.
    - Doing this will allow Tone Mapping to be applied in Post Production.
    - Save the output in 32-bit EXR for best Dynamic Range.

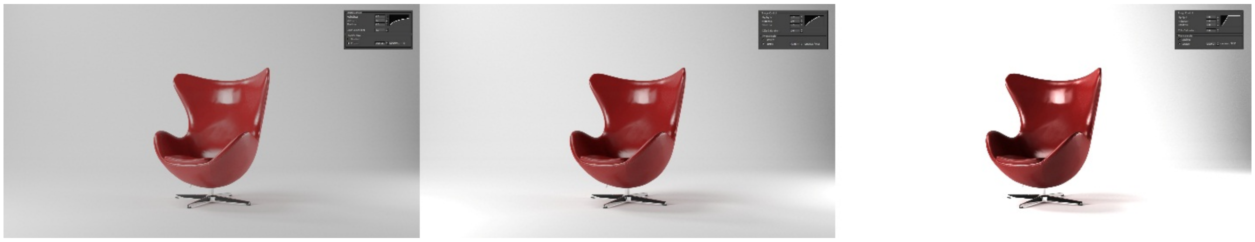


IMAGE 14: These renderings illustrate the differences in the Image Control. The center rendering is with the default settings. The left rendering is completely set to 0, and the right is set to 1.0.

Aperture (F-Stop) Examples:

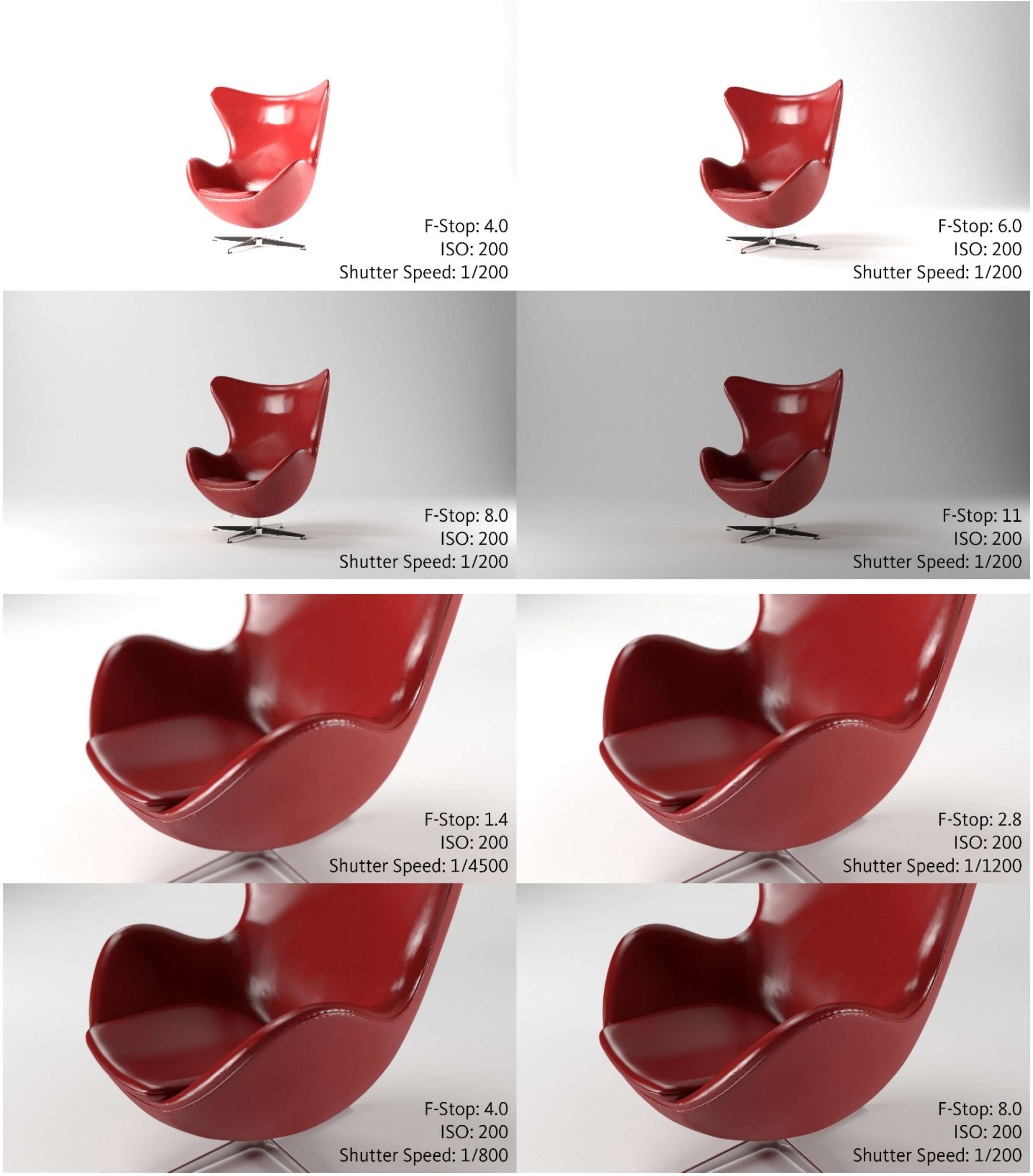


IMAGE 4-15: These renderings show the differences that the Aperture can make on a rendering. The first set just shows the difference in exposure, and the second set shows the difference in the Depth of Field effect when it is enabled. Note how the other settings have to adjust to keep the exposure the same during the Depth of Field effect.

Shutter Speed Examples:

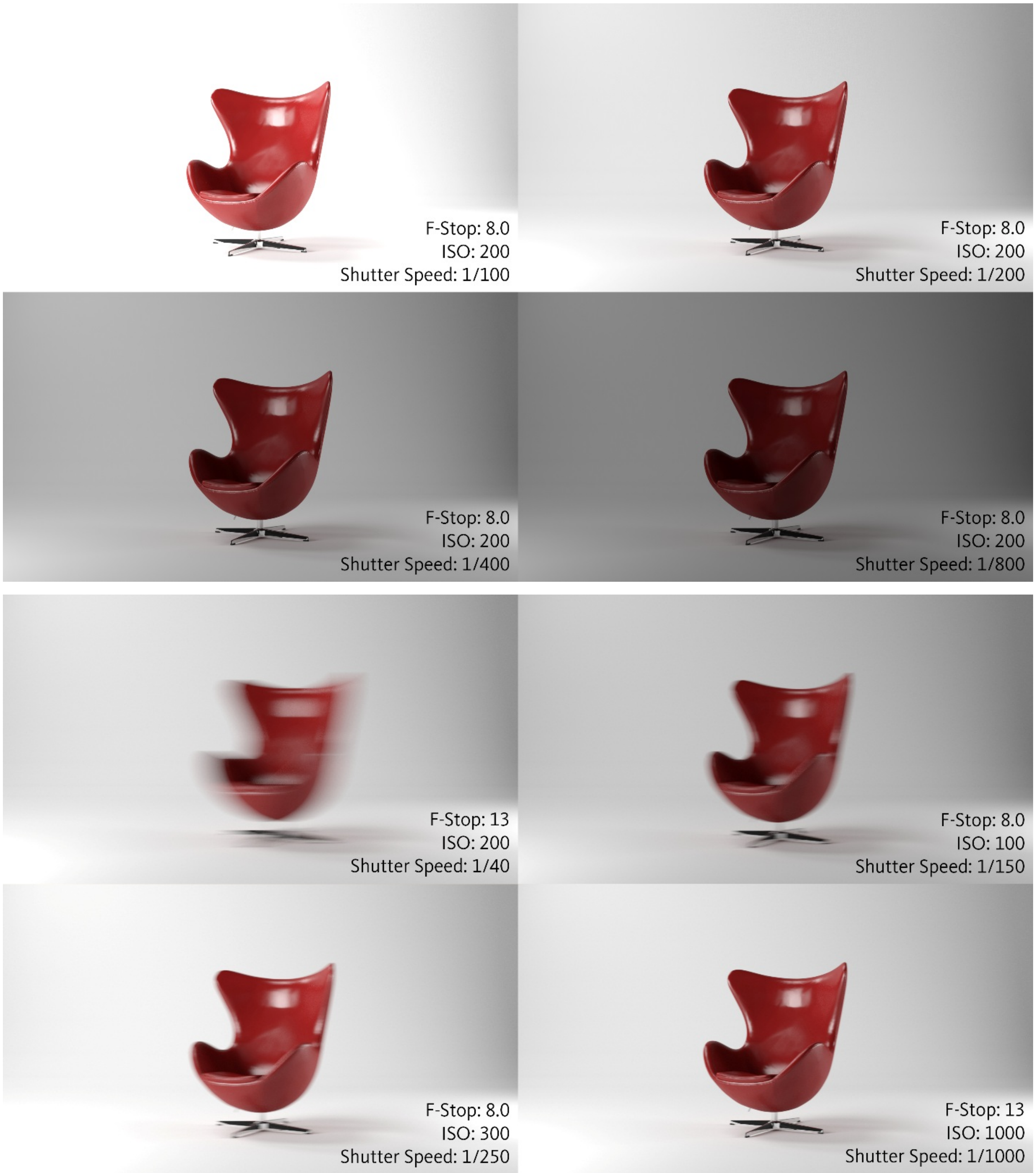


IMAGE 4-16: This set of renderings show the differences in how the shutter speed effects the renderings. The second set of renderings illustrates the effect of Motion Blur on moving objects. Note that the chair has been animated to move left to right in these renderings. Also note the differences in the F-Stop and ISO settings to keep the exposure the same.

ISO Examples:

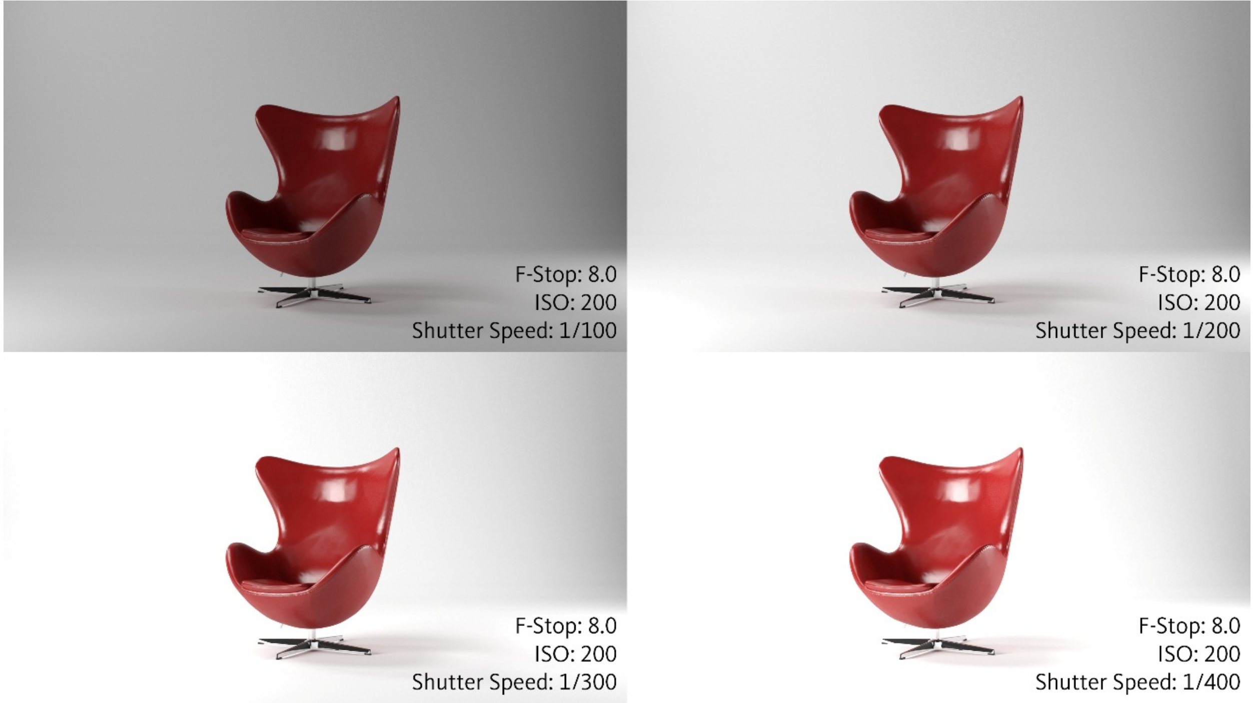


IMAGE 4-17: These renderings show the effect ISO can have on the exposure of a rendering.

White Balance Examples:

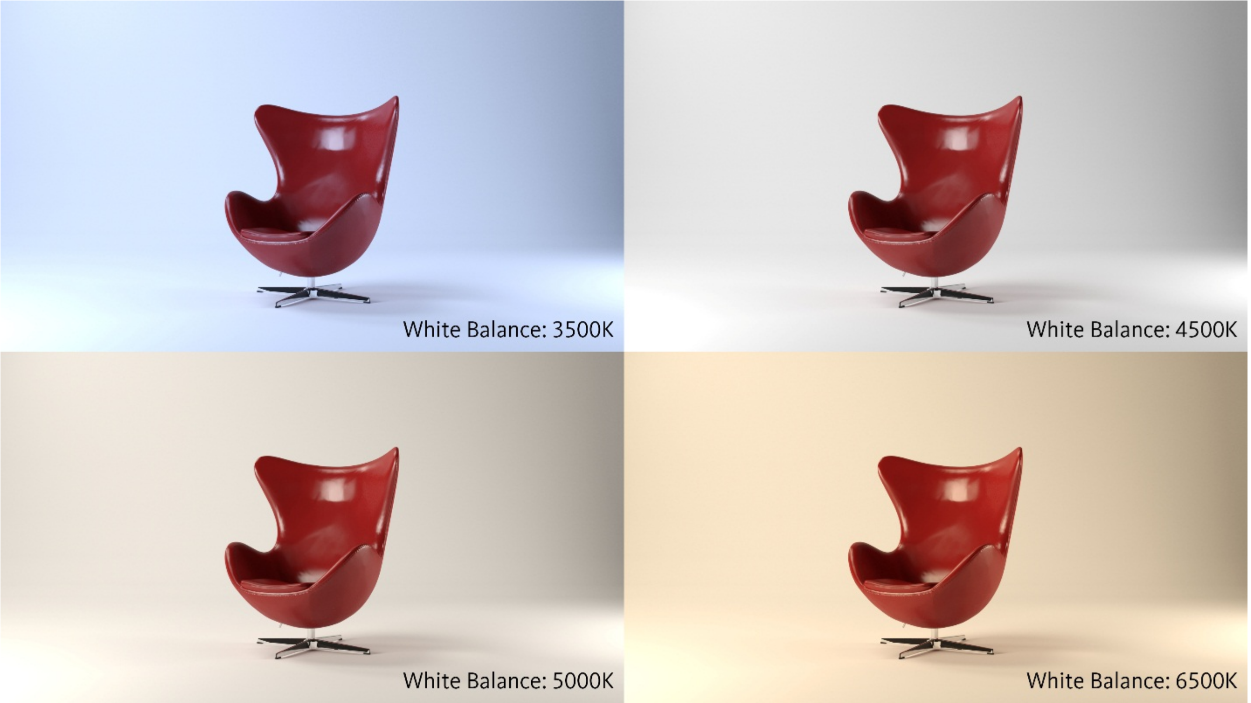


IMAGE 4-18: These renderings show the difference White Balance can have on the rendering. Note that the lights are set to 4500K, this is why the rendering with a White Balance of 4500K appears to have "White" light.

Exposure Value Examples:

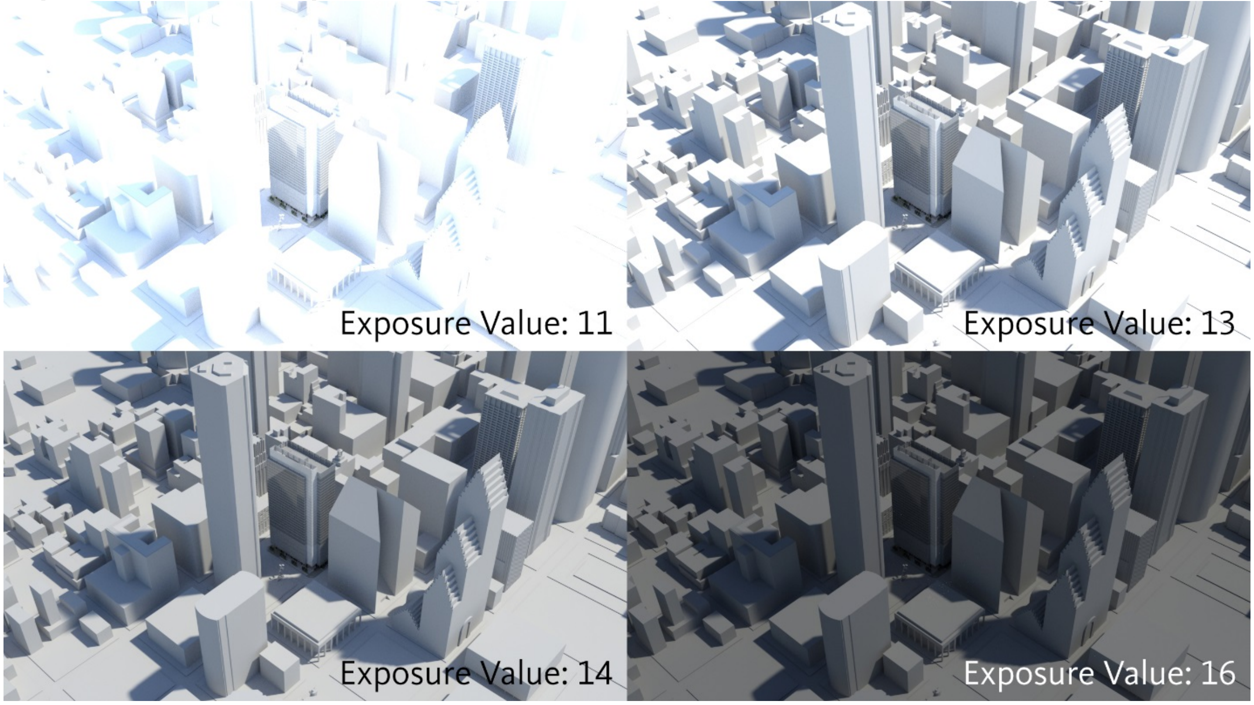


IMAGE 4-19: These renderings show how the Exposure Value effects an exterior Daytime scene.

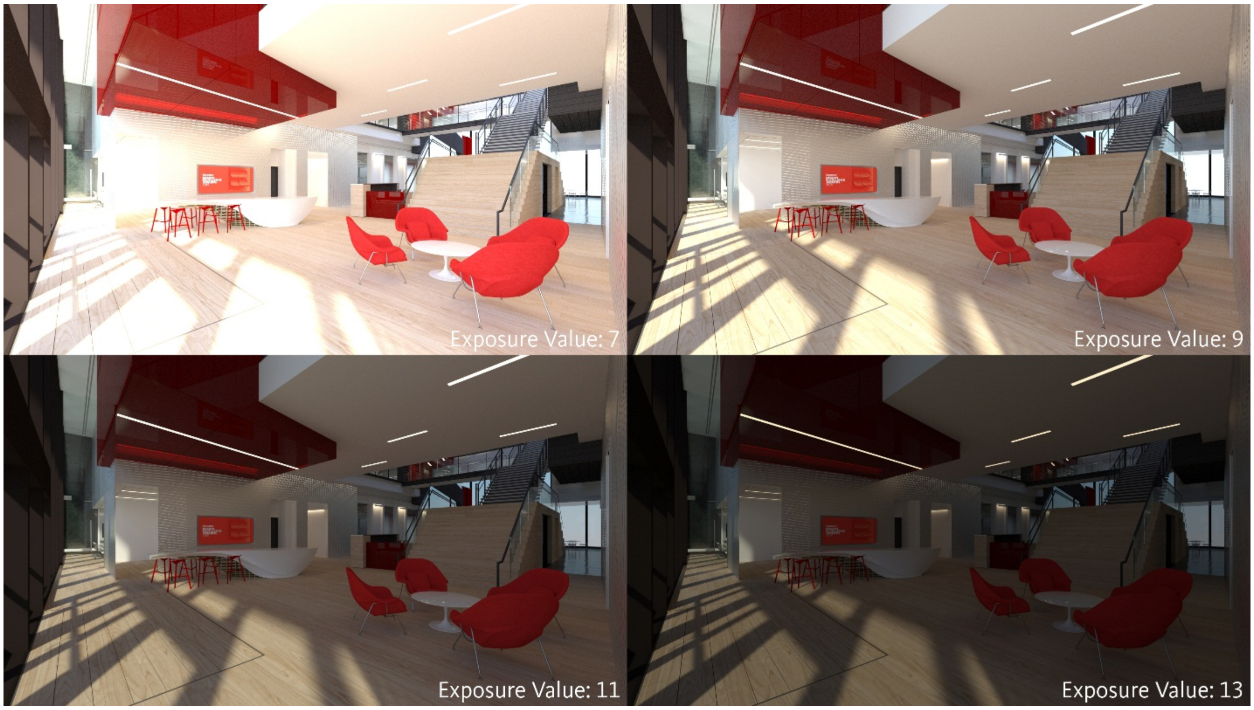


IMAGE 4-20: These renderings show how the Exposure Value effects and Interior Scene, with some Daylight entering the space through windows.

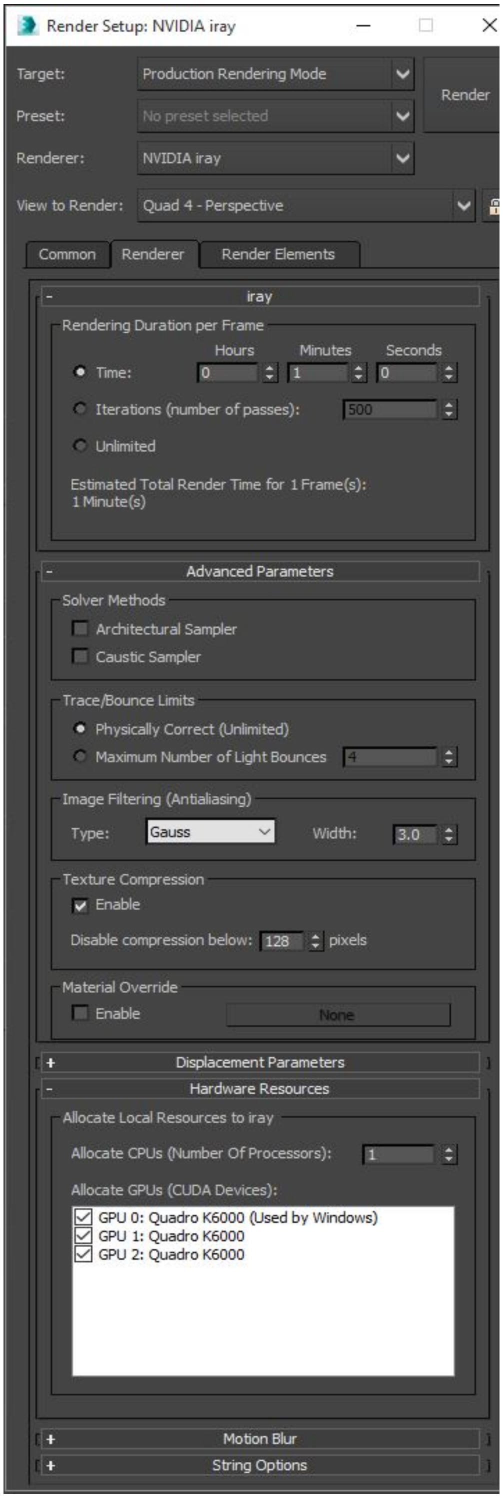
Chapter 5: NVIDIA Iray Settings

The settings for Iray are pretty straight forward, and was designed this way on purpose by NVIDIA. Since Iray uses a direct approach to calculating everything in the render, there are no settings for quality other than telling Iray how long it should render. The rest of the settings are there to enable a few other effects such as Caustics, Displacement, and Motion Blur. The Depth of Field effect can be enabled on the 3ds Max camera itself.

- **Enable Iray in both Production and Active Shade**
- **Setting Rendering Calculations:**
  - Time – How long to render (Best to control time)
  - Iterations – How many calculations (Best for consistent quality)
  - Unlimited – Go until I say stop. (Best in Active Shade)
- **Set Hardware Resources:**
  - Set the number of CPU Cores to render with
  - Set which GPUs will do the rendering
    - Disable GPU-0 (Windows) in ActiveShade for better performance

Iray Production Mode

- **Enable all CPUs and GPUs.**
- **LPEs are only available during Production Rendering.**
- **Best for rendering animations.**
- **Optimal Iterations for quality:**
  - Exterior: 3,000 – 5,000 Iterations
  - Interior: 10,000 – 15,000+ Iterations



Render Setup: NVIDIA iray

Target: Production Rendering Mode

Preset: No preset selected

Renderer: NVIDIA iray

View to Render: Quad 4 - Perspective

iray

Rendering Duration per Frame

● Time: Hours 0 Minutes 1 Seconds 0

○ Iterations (number of passes): 500

○ Unlimited

Estimated Total Render Time for 1 Frame(s):
1 Minute(s)

Advanced Parameters

Solver Methods

□ Architectural Sampler

□ Caustic Sampler

Trace/Bounce Limits

● Physically Correct (Unlimited)

○ Maximum Number of Light Bounces 4

Image Filtering (Antialiasing)

Type: Gauss Width: 3.0

Texture Compression

☑ Enable

Disable compression below: 128 pixels

Material Override

□ Enable None

Hardware Resources

Allocate Local Resources to iray

Allocate CPUs (Number Of Processors): 1

Allocate GPUs (CUDA Devices):

☑ GPU 0: Quadro K6000 (Used by Windows)

☑ GPU 1: Quadro K6000

☑ GPU 2: Quadro K6000

IMAGE 5-1: These are all the settings for Iray! It's not that much!

Iray Active Shade

When using Active Shade for rendering, it enables a majority of the interactive features if Iray. It is recommended to have at minimum two GPUs in your machine for optimal interactive performance, because the GPU dedicated to Windows should be disabled. This will allow 3ds Max to operate normally while rendering the project.

- **Interactive Features:**
  - Material Changes
  - Camera/Perspective Changes
  - Exposure Changes
  - White Balance Changes
- **Non-interactive Features:**
  - Creating Lights
  - Changing Light Intensity
  - Moving Lights

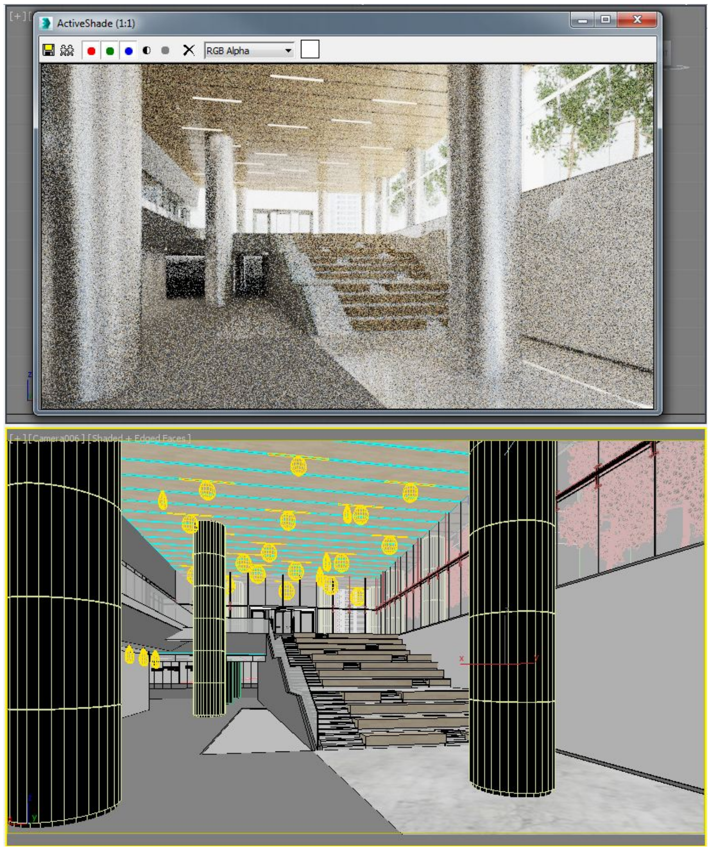


IMAGE 5-2: This is an example of what ActiveShade rendering with Iray can look like. You can do ActiveShade in its own window (Recommend) or you can turn a viewport into ActiveShade.

Chapter 6: Irradiance Mode (3ds Max 2016+)

This is a major new feature to come to Iray in 3ds Max 2016. The Irradiance Mode is a Render Element that will allow you to view accurate light levels in your project. This Render Element will be extremely helpful when looking to see if the lighting design of the project is contributing enough to specification. When rendering this element, it will render the camera view with a white material that overrides all of the other materials in the project. Once the rendering is completed, the Irradiance Render Element will appear. This Render Element will appear as a Heat Map, which is a color coded rendering that relates to certain data. In this case, the data is displaying the value of light across the rendering in Lux. The color Dark Blue will correspond to the darkest part the rendering, and Bright Red will correspond with the brightest light in the rendering. A color graph will be included to show the relationship to the data and the colors.

- **Enable Irradiance under the Render Elements**
  - This is found only in the Production Rendering Mode for Iray
  - The main rendering will be completely white. The Irradiance will show up after the rendering fully completes.
- **For best accuracy use the following**
  - IES files that are the correct specification to the lighting fixtures in the project.
  - Use the 3ds Max Daylight System for the mrSun and mrSky.
- **The following will reduce the accuracy of the Irradiance Render:**
  - Photometric Lights without IES files
  - IBL (HDRI) used for the environment light and sunlight.

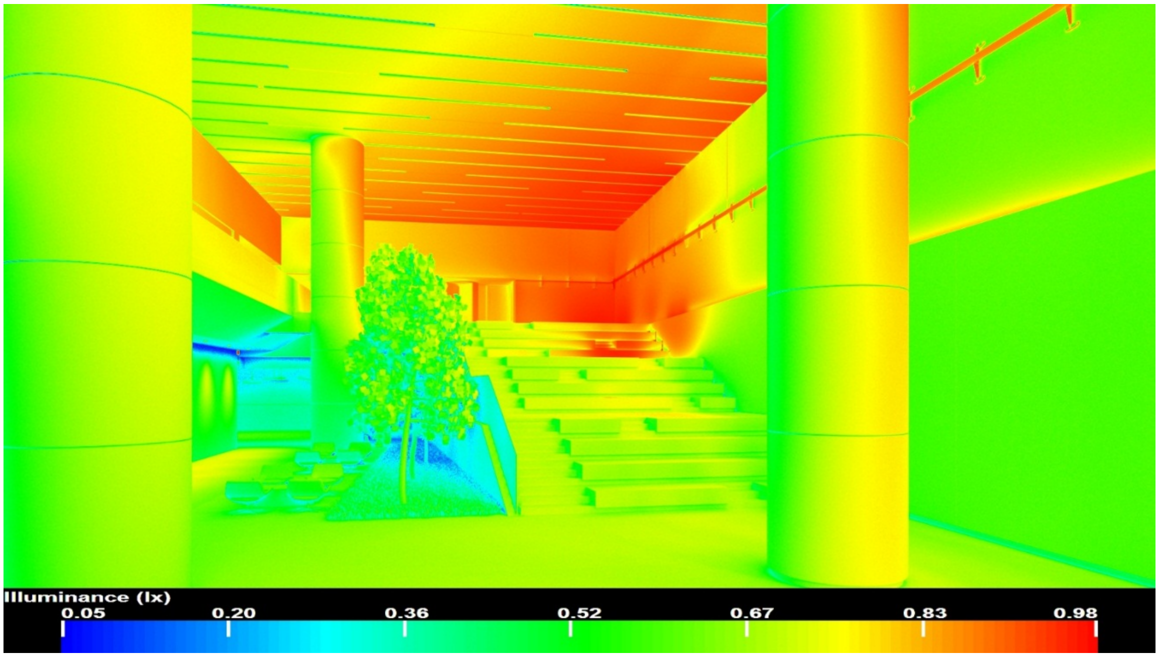


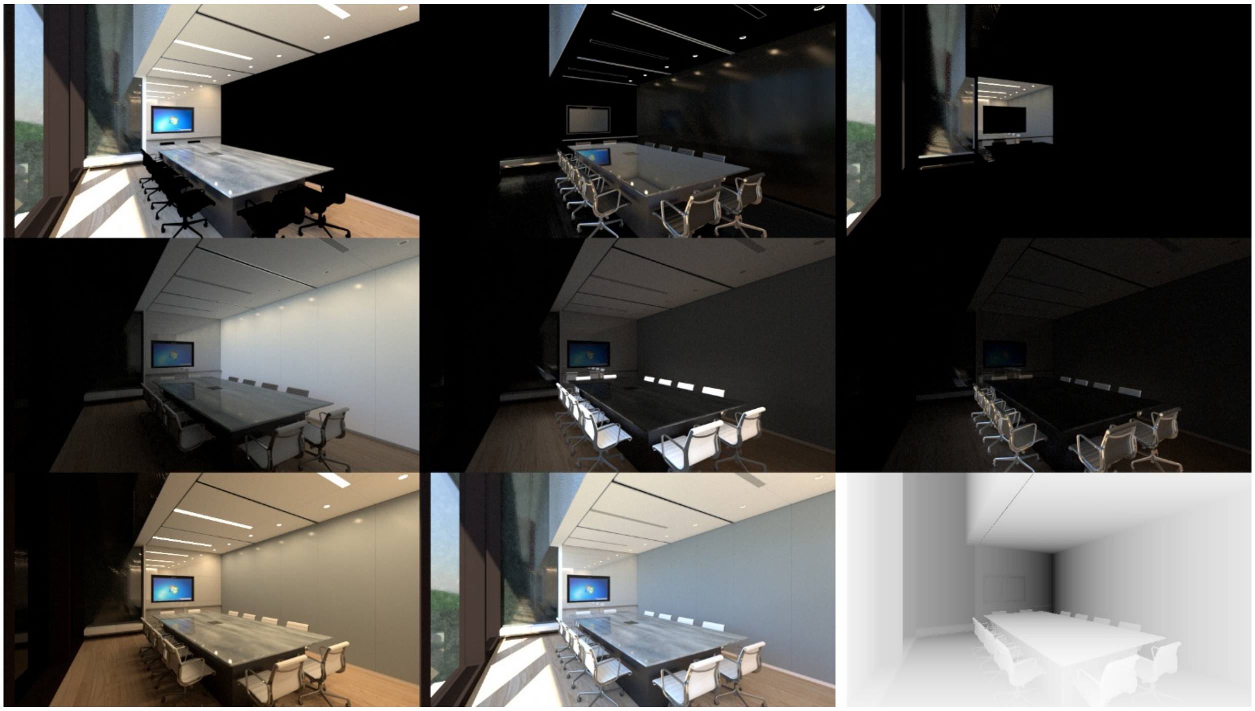
IMAGE 6-1: This is the Irradiance Render Element output. This can only be enabled in Production Rendering.

Chapter 7: LPE and Post Production

Light Path Expressions (LPE) can be considered as Render Elements on steroids. LPE's are actual equations that can pull out just about any kind of information that is specified into its own channel. For instance, if you want to just see what just the Environment Rays looks like, or if you wanted to see all the rays that hit a particular object, a simple equation would be able to pull that information for you when the render completes. This becomes extremely powerful in post-production, because this allows the editing of those individual elements in Post. LPE's give extreme flexibility with the rendering, and in some cases the rendering might not need to be re-rendered! All adjustments could be made in any Post Production application! Saving all of the renders and LPE's as EXR files is HIGHLY RECOMMENDED, and will give the most flexibility in Post due to EXRs being Full-Float 32-bit images. This means each pixel in the rendering is storing additional light and color data that can be adjusted. Normal 8-bit and 16-bit images are clamped to 0-255 colors, and do not have any lighting information stored within the pixel. The EXR file format needs to be saved with a Gamma of 1.0, and by default 3ds Max 2016 is supposed to save EXR files with a Gamma of 1.0. If for some reason 3ds Max is not saving the EXR as 1.0, this can be set when saving the output in the Override Gamma Settings in the output window.

LPE (Light Path Expressions)

- **Mathematical Equations that can pull specific elements out of the buffer for compositing in post.**
- **Known as A Regular Expression Language (REGEX)**
  - More info on REGEX can be found here: http://www.regular-expressions.info/
- **You can write your own LPEs!**
- **Visit NVIDIA's Iray blog to follow and discuss more on LPEs**
  - **http://blog.Irayrender.com**

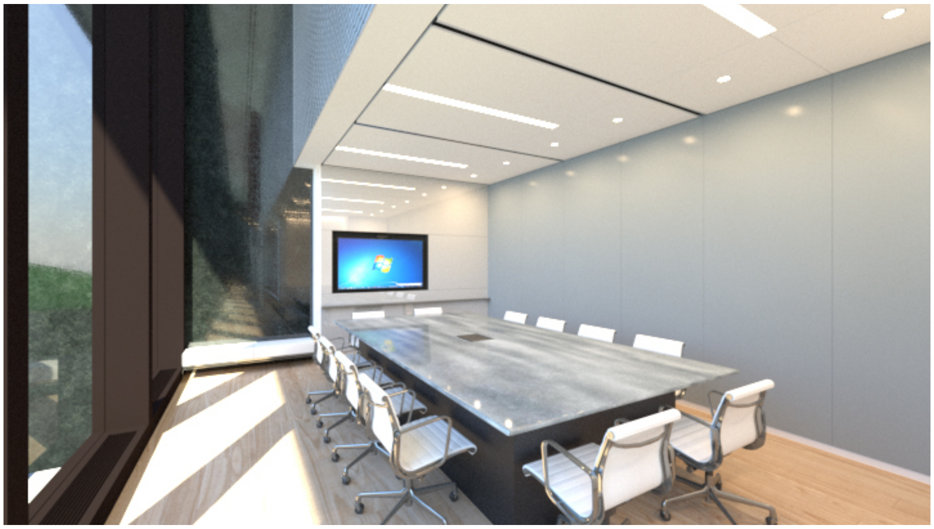


LPE Examples

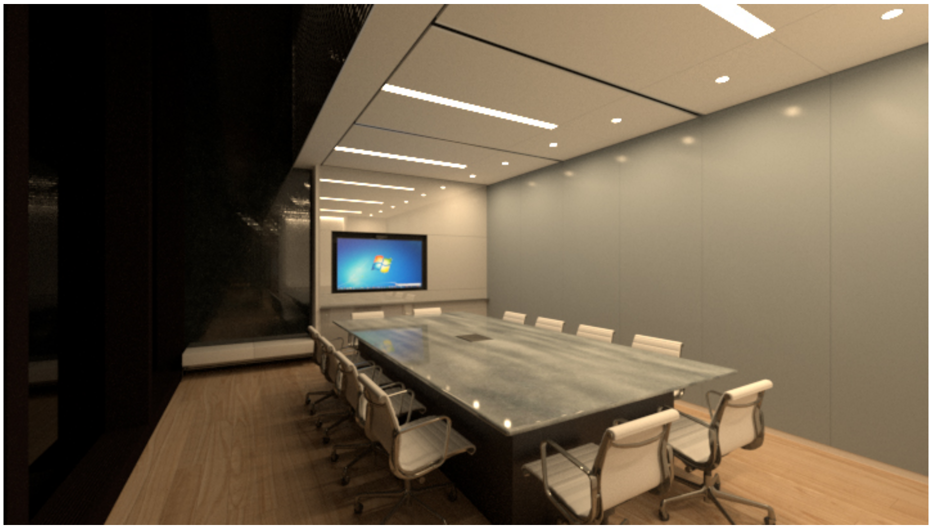
The following are examples of what LPEs look like. Some LPEs are preset as Render Elements inside of 3ds Max 2016, but there is the ability to add custom LPEs.

> **NOTE:** To save the LPE Render Elements, Iray must be set as the Primary Renderer. Also Iray must complete the rendering to generate the LPEs. If the rendering is canceled before it competes, the LPEs will not be generated.

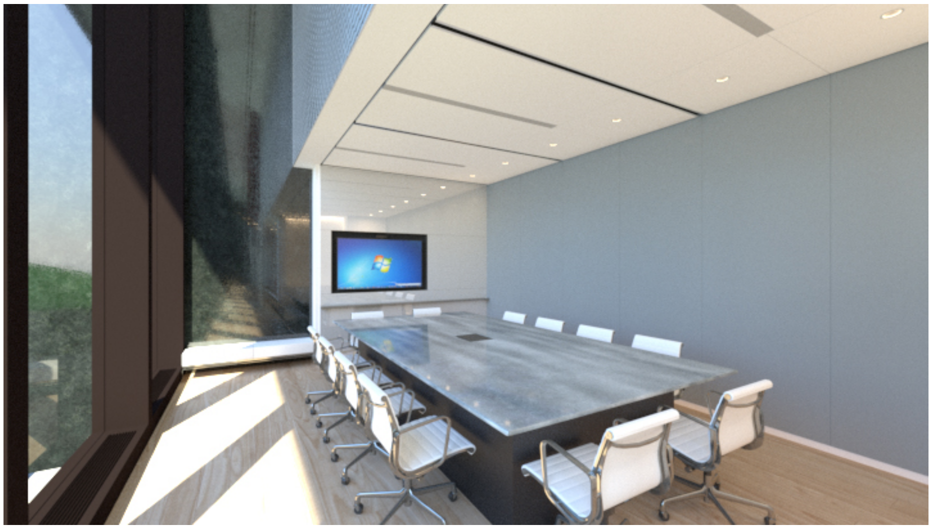
- ***I want the whole "beauty pass":***
    - *Beauty Pass = L.*E*



- ***I want to see only area light rays:***
  - *Area Lights= La.*E*

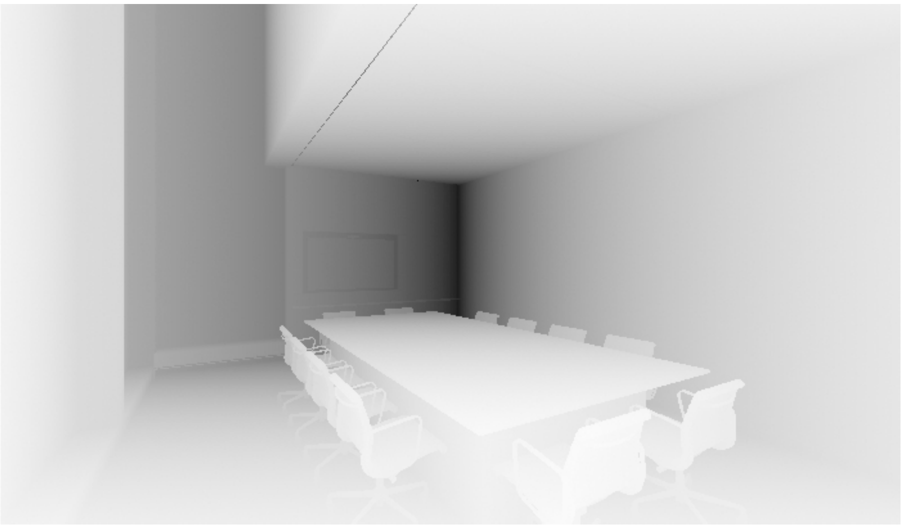


- ***I want only indirect illumination (two+ bounces):***
  - *Indirect Illumination = L{2, }E*



Note: The sunlight is considered Indirect Lighting with this LPE as it is bouncing through the glass, which is double sided. So the sunlight is already bouncing twice, or more, before entering the interior space.

- **Inside of Photoshop, adding the Area Light Ray LPE and Indirect Illumination LPE together (In this case) will result in the Beauty Pass LPE. If the renders are in 32-bit use Linear Dodge blending mode. If the images are 16-bit or 8-bit use the Screen blending mode. Using 32-Bit will allow the ability to readjust the exposure for each element.**
- **Standard render elements, such as the Z-Depth, can be generated as well:**



The Elements of LPEs

LPEs consist of the following: A Light Source, an Event, and the Eye. A light source is defined by the type of light that will be considered for the LPE. An Event is the interaction of the light hitting an object and material in the render. And the Eye is pretty much the rendered view or camera. These three elements in the expression will drive the result into a new buffer channel for use in post-production. The grammar that drives the expression is pretty straight forward, and is natively designed to be abbreviated to make the expression simpler to specify.

- **Eye**
    - **E** – Eye/Camera/View

- **Light Event**
    - **L** – All Light
    - **Lp** – Point Light
    - **La** – Area Light
    - **Le** – Environment or Background Light
    - **<L 'handle'> -** Light Source defined by a handle.

- **Light Interaction Events**
  Each event of a path of light that interacts with an object in the scene is described by its three specifications: **TYPE**, **MODE**, and **HANDLE(optional)**. It is contained by < >, and these three specifications for a Light Interaction Events look like: < t m h >
    - **Type (t)**
        - **R** - Reflection
        - **T** - Transmission
        - **V** - Volume
    - **Mode (m)**
        - **D** - Diffuse
        - **G** - Glossy
        - **S** – Specular
    - **Handle (h)**
        - **'insert *name here'* –** the inserted name refers to a grouping designated by a layer name in 3ds Max. The Event will be specified on this handle. If there is no handle, this specification can be ignored. (The ' ' are required around the handle name.)

- **Symbols**
  These are required to define, exclude, and abbreviate specifications for the LPE.
    - .
        - Defined as a "Wild Card". This will accept any valid input in any Light Interaction Event position.
    - *
        - Defines any number of set Light Source Events.
    - < >

        - Defines the interaction between light and a material, which creates a Light Interaction Event
    - [ ]
        - Defines a "Set" within a Light Interaction Event for each specifier within the event.
    - ^
        - Excludes, or inverts, an element from a Light Interaction Event.

- **Operands**
  These Operands can be used to create sub-expressions. Both **A** and **B** represent the sub-expression, and **m** and **n** represent integer values for the expression, with **m >= n**. Parentheses (( )) can be used to group sub-expressions and change the order of evaluation. Operands will be evaluated in the following order: **Quantifiers**, **Concatenation**, and **Alternatives**. Sub-expressions in parentheses (( )) will be evaluated before anything else.
        - **Quantifiers**
            - **?**
            - *****
            - **+**
            - **{ }**
        - **Concatenation**
            - **A – First Event or First LPE**
            - **B – Second Event or Second LPE**
        - **Alternatives**
            - **| - Shows one or the other**

    - **List of Operands**
        - **AB**
            - Sets A first, then B.
        - **A|B**
            - Sets A or B**.**
        - **A?**
            - Might set A, if A is present. It might not be.
        - **A***
            - Sets any occurrences of A in sequential order, including zero times.
        - **A+**
            - Sets any non-empty sequence of A's.
        - **A{n}**
            - Sets exactly n consecutive occurrences of A.
        - **A{n,m}**
            - Sets from n to m, inclusively, occurrences of A.
        - **A{n,}**
            - Sets n or more occurrences of A
        - **name: expression**
            - Sets a name for the expression to be referenced in another expression

- **$name**
    - References another named expression

- **^expression**
    - Creates the inverse of the expression.
        - Cannot be applied to sub-expressions
- **RED Means not supported in 2016.**

Deconstructing LPE's
After defining all of the elements that make up a LPE in the previous section, this will give a more comprehensive breakdown of each of the three parts that make up a LPE. The Light Event, the Light Interaction Event, and the Eye can have multiple combination of elements that can determine the output of the buffer that is trying to be rendered. And then there is the consolidation of the elements into each other to create more of a "short-hand" in writing the LPE. The ability to consolidate elements makes it easier to write LPEs, as they become shorter in the end.

- **Light Event**
  A LPE must either start or end with a Light Event. This is essentially the "ray" that is being casted through the scene and will define what is rendered in the buffer. One could look as this as the start of the LPE, as a ray is shot into the scene from a designated light source, or sources, and ends up at the eye.

  For example, by starting the LPE with "L", we are stating that we want to see rays from every light in the scene. If we wanted to see the rays from the environment light, we would use "Le" in place of "L". The next character in the equation is usually a " . ", which is the wild card for anything in the Light Event. If left blank, the LPE will assume the wild card is wanted.

    - This is a prime example of the consolidations in the equation that LPEs take advantage of. By not placing a variable in the equation, it will assume that you want it in the equation. Only when something is declared specifically, will it be taken into consideration.

  The third part in the Light Event is for a Quantifier. Most equations use the " * ", which means to show all the events/interactions/bounces of the ray. So a LPE that reads "L.* E" states: Show every light hitting everything, with all Light Interaction Events present, and send it to the Eye. This is what the LPE for a "Beauty" Pass, or "Final Render" looks like. (We will cover Light Interaction Events next, but note that they are not in the LPE due to the consolidation of the equation. Not including the Light Interaction Event in the LPE assumes everything about the Light Interaction event is to show true. Which means to render everything from the Light Interaction Event into the buffer.) However adding in alternative Quantifiers will give different results.

- A LPE that reads “ L .? E” would show every Light Interaction Event from every light source, but only show the direct lighting with no bounce light.
  - The “?” says “Show A, if A is present, but it might not be”. In this case with L, we are asking to see only the direct lighting if visible. This is because in the previous “Beauty Pass” LPE, the “?” was replaced with “*”. Since the “?” is present now, it will not show any additional events/interactions/bounces of the Light Source. That was the “*” symbols job.
- If indirect illumination is desired, the equation would read “L .{2,} E”. The {n,} in this equation defines “N” number of occurrences of A or more. So with this in the Light Event, we are looking at “N” number of bounces of every Light (L) or more. In this case we are looking at 2 or more bounces, which is what indirect lighting is considered to be.
  - “Le . {2,} E” could be only the indirect lighting from the Environment Light (Le).
  - **Note:** In an interior rendering, if sunlight is coming through glass, it will be considered Indirect Illumination as it is bouncing through the glass before entering the interior.

The last part for Light Events is if a specific light, or group of lights, needs to be specifically called out. This can be done with a Handle. If we have a set of lights called “wallwash” (which is defined as the name of a layer in the Layer Manger), we would call this in the LPE as “<L ‘wallwash’>.* E”. This LPE would show everything that was interacting with the lights on the “wallwash” layer.

- **Light Interaction Event**
  The middle portion of the LPE will always be the Light Interaction Event, which in itself consists of three different parts and is designated by the < >. The three parts go in order of: TYPE, MODE, and HANDLE. This can also look like < t m h> in the LPE. TYPE will define the type of interaction event to show. MODE will define the look of the event. HANDLE is optional, as it defines any specific Object in the scene to specify the event to. (Just like HANDLE in the Light Event.)
  - **“L .*<RS> E”** would display the highlights for every light, or the entire scene. The R TYPE shows reflected light, and the S would display specular. Together this equals Specular Reflections.
  - **“L .* R E”** would display everything for reflections.
    - This goes back to the consolidation feature of LPEs. The Light Interaction Event could be defined as <R . .>, which states Reflections TYPE, Wild Card for MODE (so show everything), Wild Card for HANDLE (so apply to every object). But typing R over <R . .> is easier.

Inside of Light Interaction Events, there is the possibility to define more than one TYPE, MODE, or HANDLE in the LPE. This can be achieved using the [ ], which will define a Set.

- **“ ”** will display what is known as “Reflection Pass” for all lights. However the set for MODE [GS] only defines Glossy and Specular, so no Diffuse (D) reflections will be shown in this LPE. A Wild Card “ . “ cannot be placed inside of a Set. Therefor since Diffuse (D) is not defined, the LPE assumes that Diffuse Reflections are not wanted.

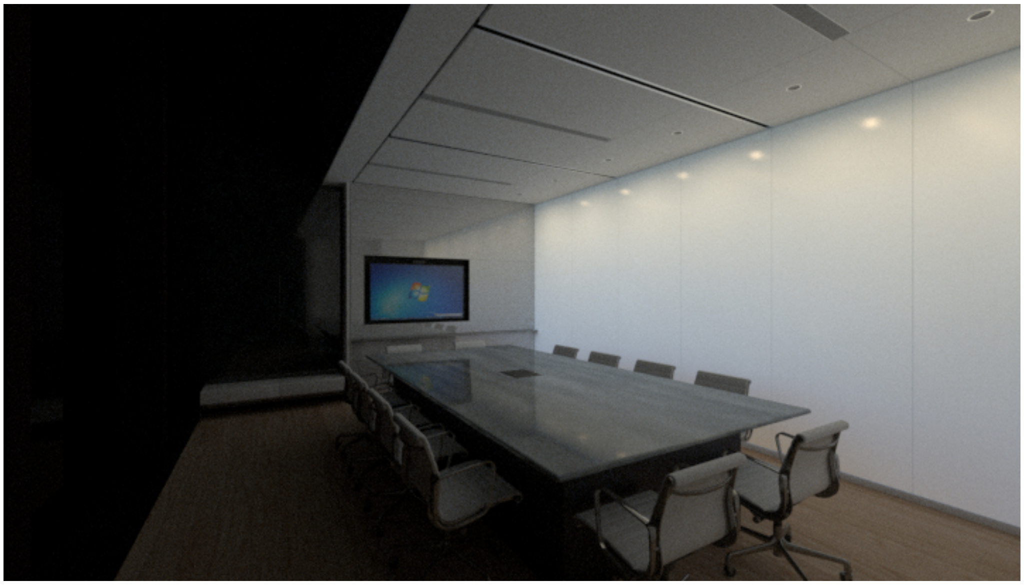
Note: Be careful when abbreviating a Light Interaction Event. Reading the event as <RS> and RS are two completely different equations. The first is looking for a specular reflection, the latter is looking at a Reflection Event followed by a Specular Event. The latter can be considered two different Lighting Interaction Events in this case. The < > are key in keeping the two in one event.)

Note: HANDLES are only supported in 3ds Max 2016 and Iray for 3ds Max
Note: In 3ds Max 2016, HANDLE is defined by the name of the Layer in the Layer Explorer. Any objects, or lights, included in the Layer will be effected in the LPE.
Note: In Iray for 3ds Max, the HANDLE is defined by the name of the object or light.

- **Eye Event**
  This is the easiest event of the entire LPE. This is designated as “E” and should either be at the start, or end, of the expression.

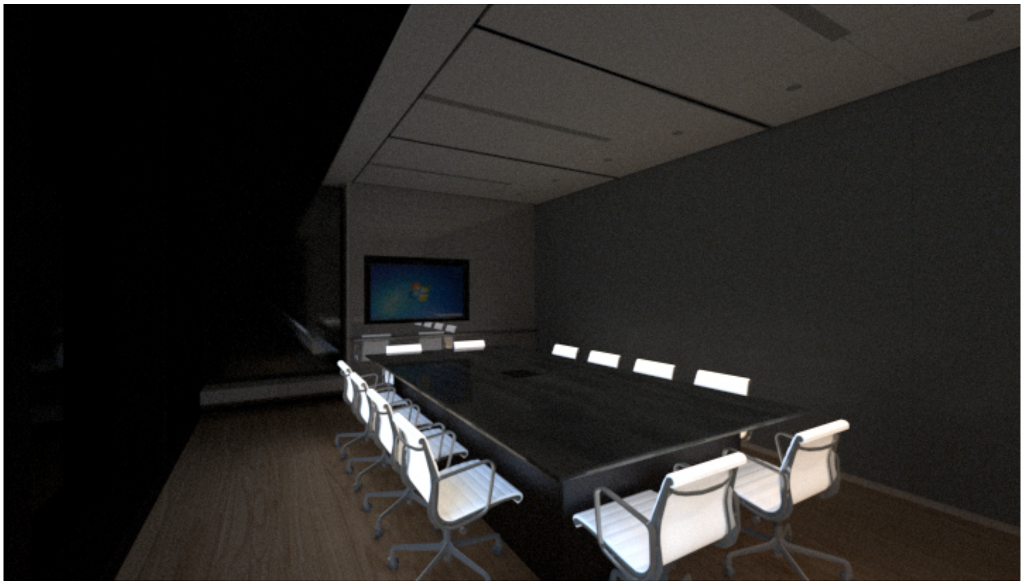
LPE’s in Post Production
One good use-case scenario for LPEs is with the need to change the color of an object without having to re-render the entire application. This example will show the process of setting up a rendering with LPEs so the Fabric Wrap Panels (FWP) and Chairs can change color in Photoshop!

FWP



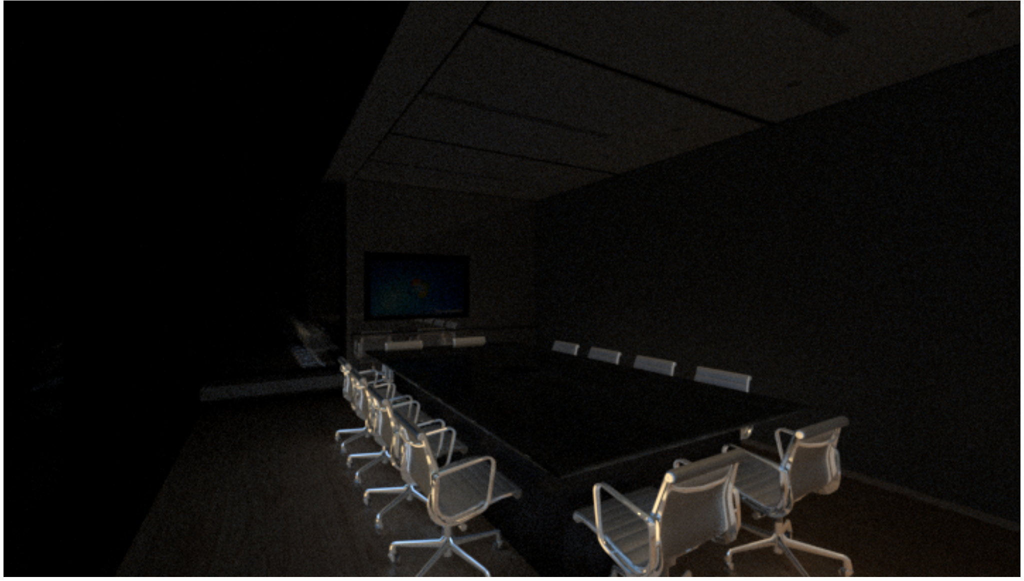
L.* 'fwp' .*E

Chairs – Diffuse



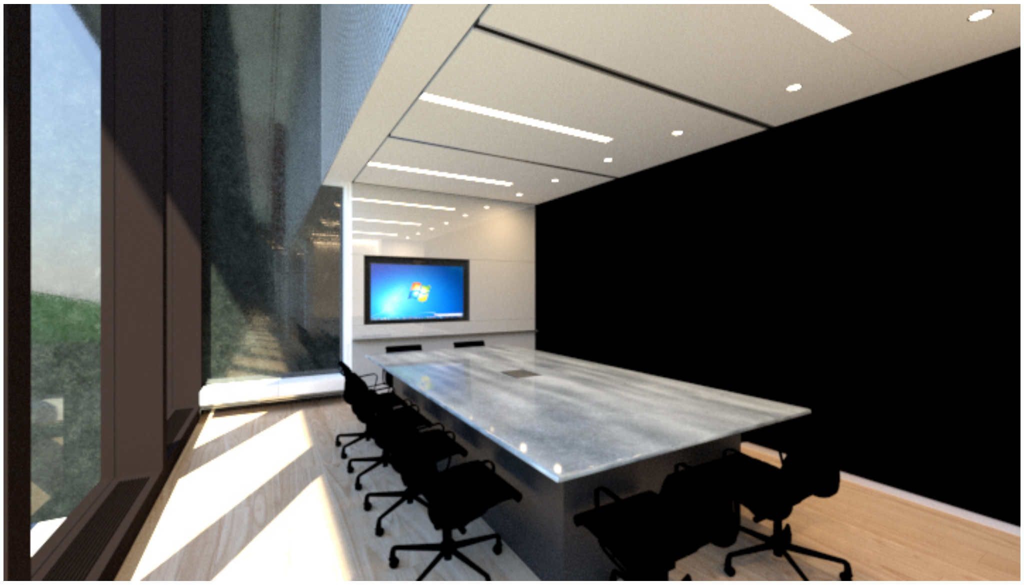
L.* <RD'chairs'> .*E

Chair - Glossy

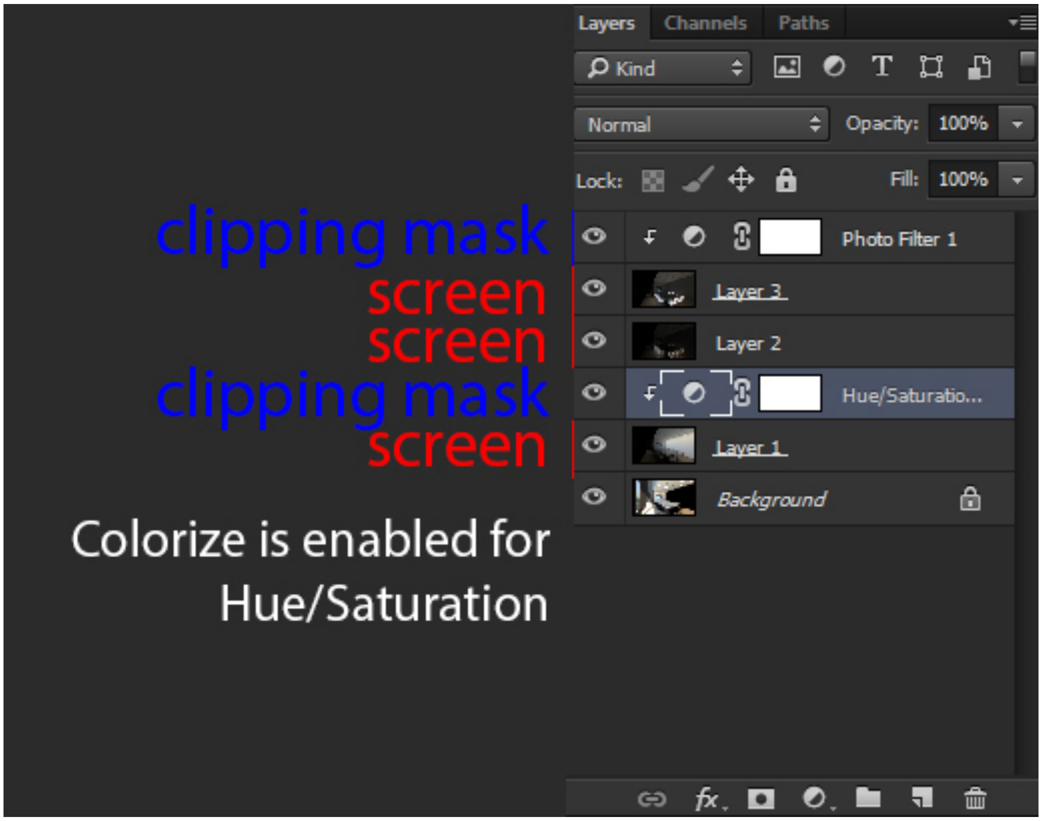


L.* <RG'chairs'> .*E

Invert FWP and Chairs



^(L.* ('fwp' | 'chairs') .*E)



Normal
Opacity: 100%
Fill: 100%

clipping mask — Photo Filter 1
screen — Layer 3
screen — Layer 2
clipping mask — Hue/Saturatio...
screen — Layer 1
Background

Colorize is enabled for Hue/Saturation

IMAGE 7-1: This is the way to blend all the LPEs together inside of Photoshop.

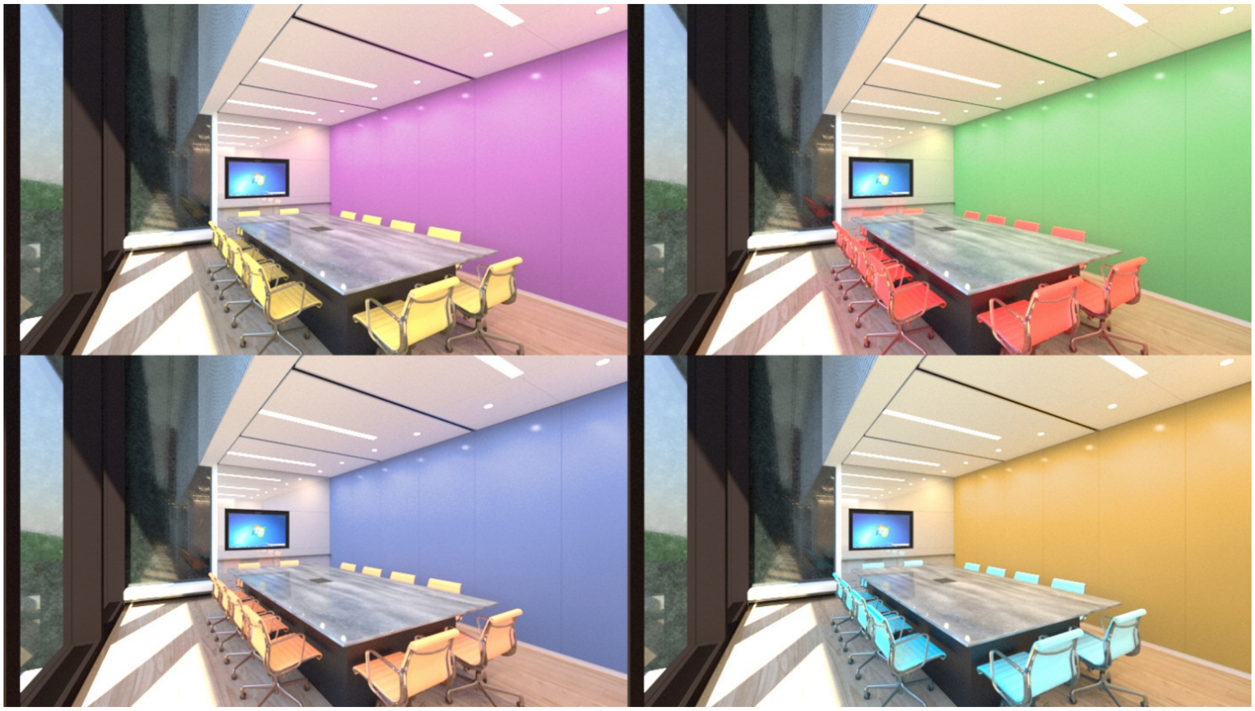


IMAGE 7-2: The combined LPE's above generate the Beauty Pass, and then can be altered for an infinite amount of color variations without ever having to re-render the image. This can be extremely helpful when studying color options for finishes, etc. Since the LPE's show all the rays that bounce per pass, the color adjustments will show up in the bounce lighting and reflections!

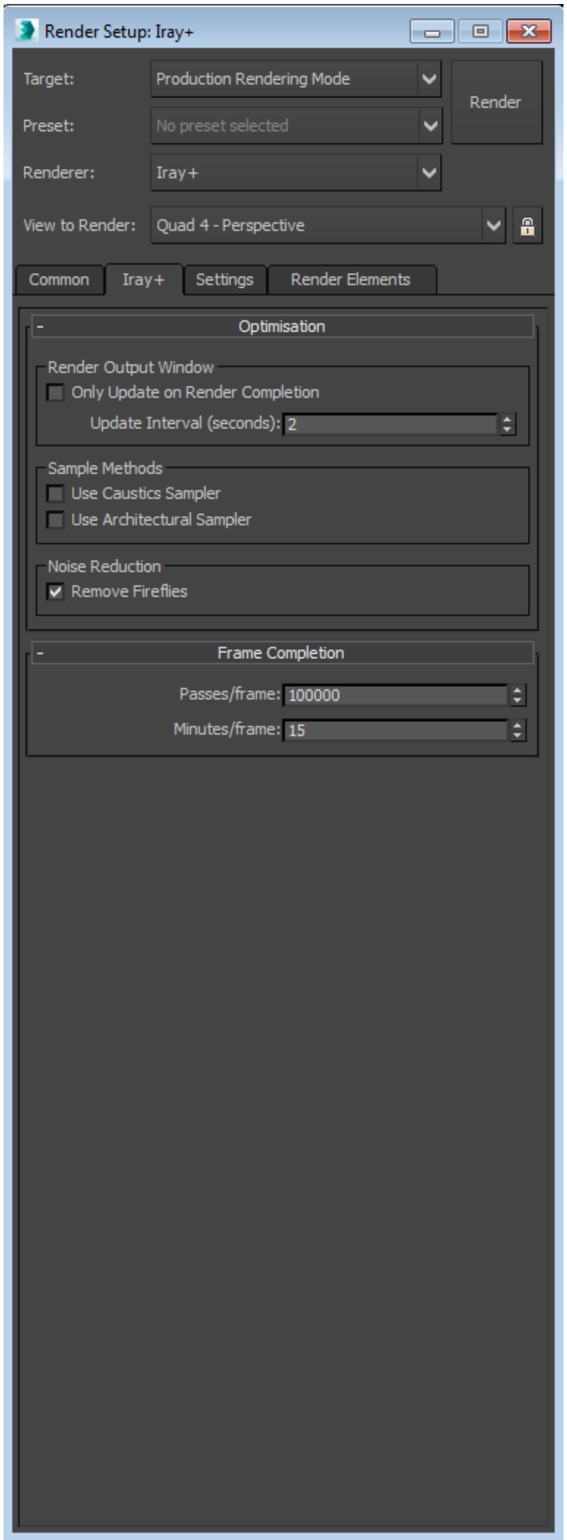
Chapter 8: Iray +

In addition to the version of Iray that comes installed with 3ds Max, NVIDIA has developed a 3rd Party Plug-in for 3ds Max, in partnership with LightWorks, called Iray for 3ds Max. This version of Iray is much like the version that comes with 3ds Max 2016, but has more advanced support and rendering features.

Iray for 3ds Max Features

- **Convert Iray from 3ds Max to Iray for 3ds Max with a few clicks through an included converting tool.**
  - Iray for 3ds Max does not support shaders other than the Iray for 3ds Max shaders, so scenes will need to be converted.
  - Iray for 3ds Max does not fully support the 3ds Max 2016 Physical Camera at this time.
- **Direct MDL Support**
  - Import MDL through the Iray for 3ds Max Shader
  - Supports "Measured Material" MDLs
- **Fully Interactive in Active Shade**
  - Every change in the scene will be updated in Active Shade buffer
- **Two Flavors**
  - Iray for 3ds Max
    - Used for Photorealism
  - Iray for 3ds Max Interactive
    - Super-fast, but limits ray bouncing to achieve the speed.
- **NVIDIA VCA Support**
- **Iray Server**

IMAGE 8-1: A rendering of the Gensler LA Office done with Iray for 3ds Max!



Render Setup: Iray+

Target: Production Rendering Mode

Preset: No preset selected

Renderer: Iray+

View to Render: Quad 4 - Perspective

Optimisation

Render Output Window
- □ Only Update on Render Completion
- Update Interval (seconds): 2

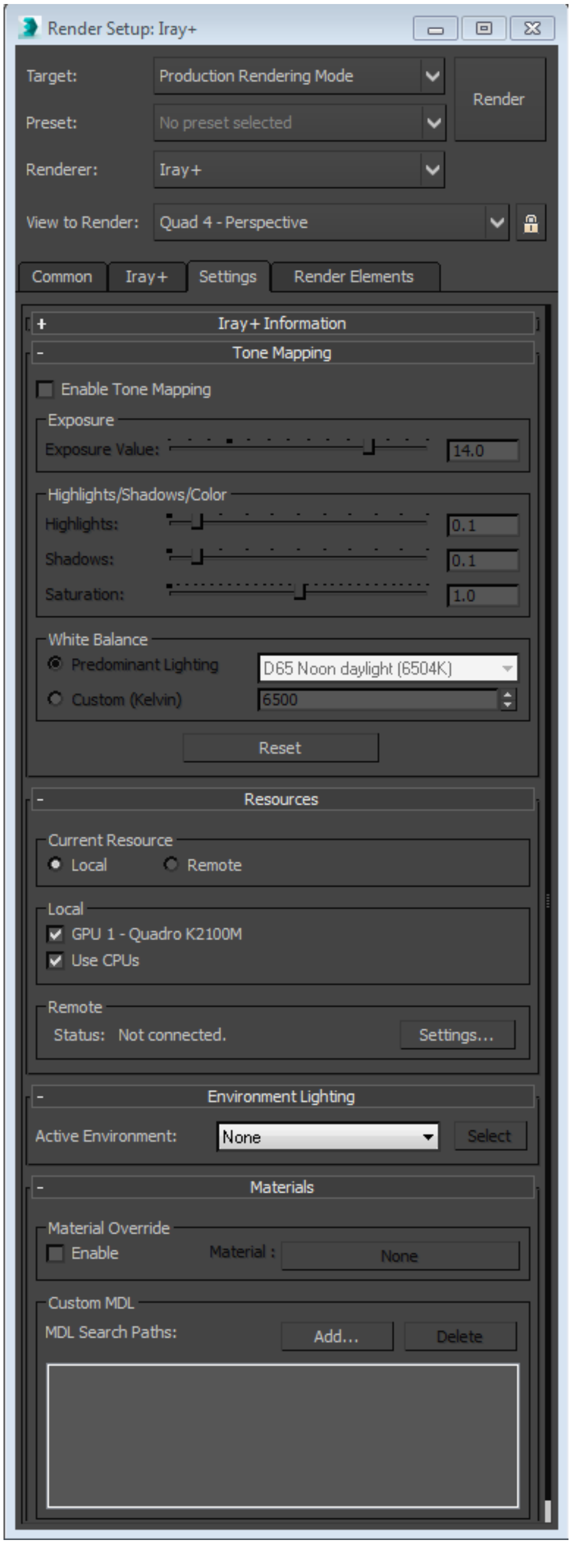
Sample Methods
- □ Use Caustics Sampler
- □ Use Architectural Sampler

Noise Reduction
- ☑ Remove Fireflies

Frame Completion

Passes/frame: 100000

Minutes/frame: 15



Render Setup: Iray+

Target: Production Rendering Mode

Preset: No preset selected

Renderer: Iray+

View to Render: Quad 4 - Perspective

Iray+ Information

Tone Mapping

□ Enable Tone Mapping

Exposure
- Exposure Value: 14.0

Highlights/Shadows/Color
- Highlights: 0.1
- Shadows: 0.1
- Saturation: 1.0

White Balance
- ● Predominant Lighting: D65 Noon daylight (6504K)
- ○ Custom (Kelvin): 6500

Resources

Current Resource
- ● Local ○ Remote

Local
- ☑ GPU 1 - Quadro K2100M
- ☑ Use CPUs

Remote
- Status: Not connected.

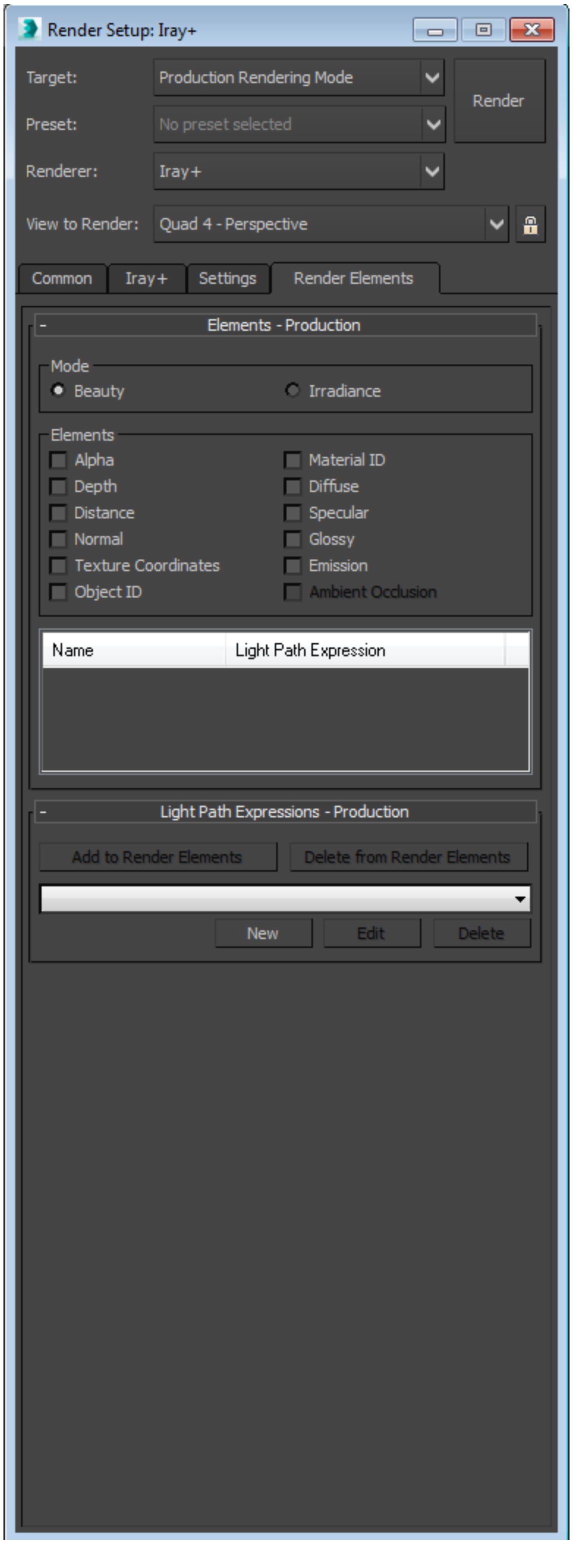
Environment Lighting

Active Environment: None

Materials

Material Override
- □ Enable Material : None

Custom MDL
- MDL Search Paths:



Render Setup: Iray+

Target: Production Rendering Mode

Preset: No preset selected

Renderer: Iray+

View to Render: Quad 4 - Perspective

Elements - Production

Mode

● Beauty ○ Irradiance

Elements

□ Alpha □ Material ID

□ Depth □ Diffuse

□ Distance □ Specular

□ Normal □ Glossy

□ Texture Coordinates □ Emission

□ Object ID □ Ambient Occlusion

Name	Light Path Expression

Light Path Expressions - Production

IMAGE 8-2: These are the rendering settings for Iray for 3ds Max. They are just as straight forward as Iray in 3ds Max 2016!

NVIDIA VCA

The NVIDIA VCA is a server contains 8 Quadro M6000s and can be linked together with other VCAs through InfiniBand technology. Iray for 3ds Max will allow a direct connection to the VCA, enabling users to have access more GPUs than their desktops could ever hold. When the VCAs are linked, the number of GPUs that are available to render with go up exponentially.

- 8 Quadro M6000s per VCA
- Linked VCAs through InfiniBand
- Direct Connection to VCA through Iray for 3ds Max Interface
- Can reduce rendering times drastically

Iray Server

In order to take advantage of more than just the GPUs in the main workstation used for rendering, NVIDIA has created Iray Server. This will allow Iray for 3ds Max to access CUDA enabled NVIDIA GPUs across the network in other machines. Iray Server has the ability to do typical offline batch rendering or handle interactive streaming via H.264 or image formats. Iray Server is supported through any NVIDIA Iray Plugin Products. This can be an ideal solution for when the primary rendering machine is a laptop, which cannot take advantage of the powerful desktop Quadro GPUs.

- Supports any version of NVIDA Iray Plugins
- Can run on either Windows or Linux machines
- Cache Management minimizes submission times
- Flexible queue management system
- Entire cluster can coordinate together for rapid image creation
- Custom scripting allowed when jobs are completed
- Streaming behaves identically to local interactive rendering

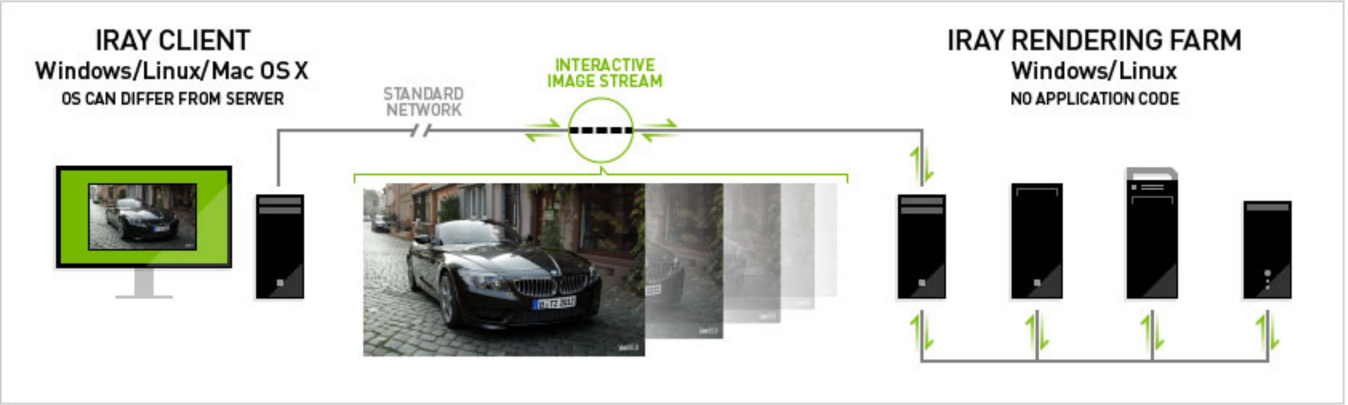


IMAGE 8-3: This diagram shows how Iray Server works across a network. (Provided by NVIDIA).

Chapter 9: Other Rendering Engines

One question I get ask a lot after this course is: “Does this workflow work for XXXX Render Engine?” And the answer is: “Absolutely! There’s just a catch.”

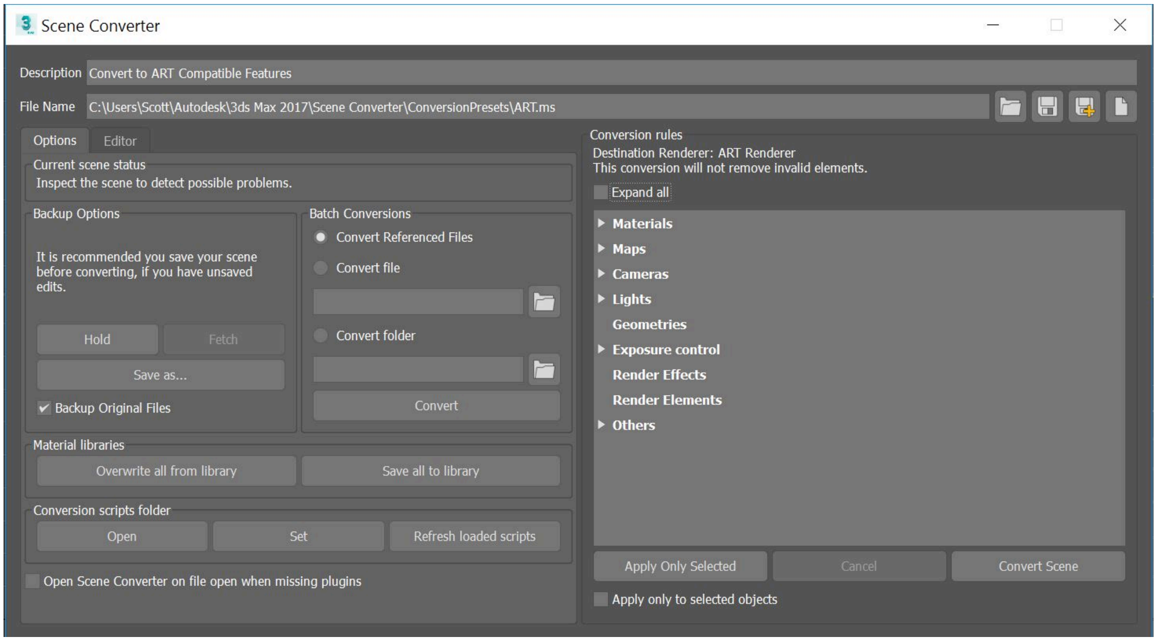
The “catch” is that everything we’ve talked about in this document assumes you’re staying in the Revit/3ds Max ecosystem, which mainly refers to Materials, Lights, and Cameras. All of these elements are easily understood between the two applications, which is party of the beauty of this workflow. But if a 3rd Party Rendering Engine is introduced into the mix, that interoperability is broken. To put it simply, you’re going to have to convert Materials, Lights, and Cameras into something that the 3rd Party Rendering Engine can understand. Most Render Engines have their own Materials, Lights and Cameras to use. (Sometimes they will understand the Cameras inside of 3ds Max just fine, as that’s a native aspect of the 3ds Max SDK.)

Iray for 3ds Max, which we just covered, is a 3rd Party Rendering Engine developed directly by NVIDIA and Lightworks. If one were to follow this workflow, they would need to swap all the Lights and Materials with Iray+ Lights and Materials. So using a 3rd Party Rendering Engine adds and extra layer of work to the process. It isn’t the end of the world however. There are plenty of tools and scripts out in the 3ds Max community to help with this process.

3ds Max 2017 Scene Converter

This is Autodesk’s answer to converting Max Files to different rendering engines, and upgrading legacy content, inside of 3ds Max. It’s a UI that can combine MaxScripts into an easy way to template and load scene conversions to another Rendering Engine.

Currently by default, it only supports conversion to the newly introduced ART (Autodesk Raytracer). This is the new Render Engine that has been introduced with 3ds Max 2017, and it too supports very specific materials, lights and maps.



Scene Converter

Description: Convert to ART Compatible Features

File Name: C:\Users\Scott\Autodesk\3ds Max 2017\Scene Converter\ConversionPresets\ART.ms

Current scene status: Inspect the scene to detect possible problems.

Backup Options: It is recommended you save your scene before converting, if you have unsaved edits.

☑ Backup Original Files

Batch Conversions:
● Convert Referenced Files
○ Convert file
○ Convert folder

□ Open Scene Converter on file open when missing plugins

Conversion rules:
Destination Renderer: ART Renderer
This conversion will not remove invalid elements.

□ Expand all

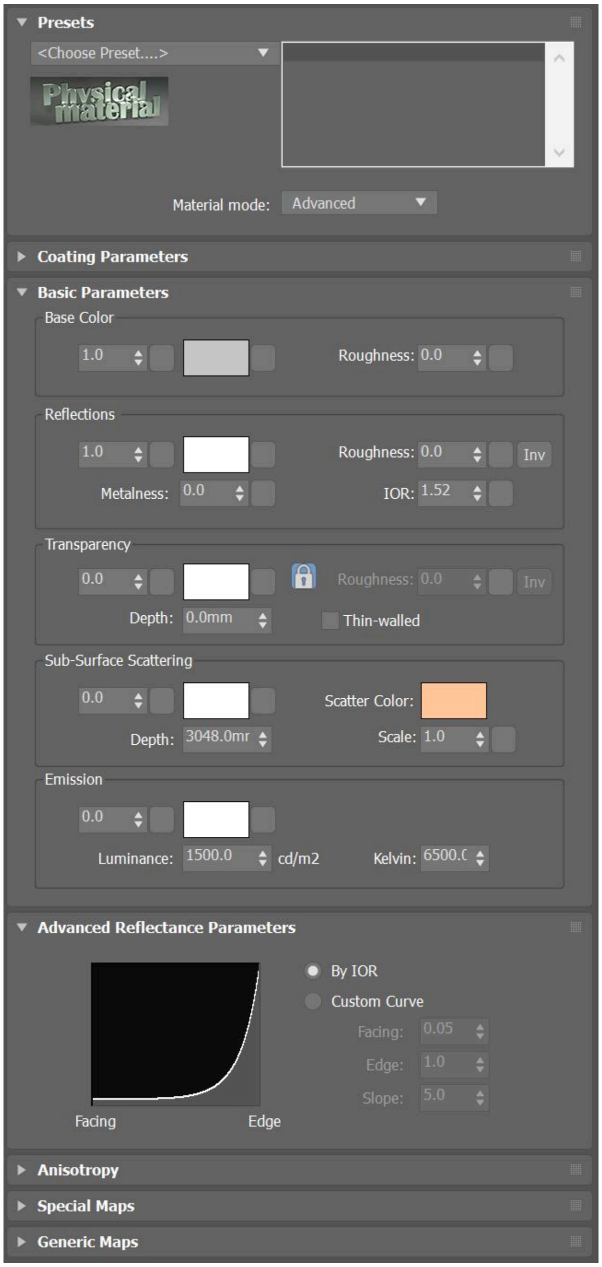
□ Apply only to selected objects

Image 9-1: The Scene Converter proves to be a very advance tool for converting scenes. It however still needs customization support from 3rd parties for their own engines.

Physical Material (3ds Max 2017+)

Recently introduced in 3ds Max 2017, the Physical Material is the spiritual successor to the Arch+Design Material. This new shader is Autodesk's first step into moving 3ds Max into a "render-agnostic" platform. This will allow 3rd Party Engines to adopt standard features in 3ds Max into their own engine.

The Physical Material, this will have the ability to give the user one single material to use across multiple rendering engines inside 3ds Max. Rendering Engines that currently support Scanline, Quicksliver, ART, V-Ray, and Mental Ray.



Material mode: Advanced

Base Color: 1.0 Roughness: 0.0

Reflections: 1.0 Roughness: 0.0 Inv
Metalness: 0.0 IOR: 1.52

Transparency: 0.0 Roughness: 0.0 Inv
Depth: 0.0mm □ Thin-walled

Sub-Surface Scattering: 0.0 Scatter Color:
Depth: 3048.0mr Scale: 1.0

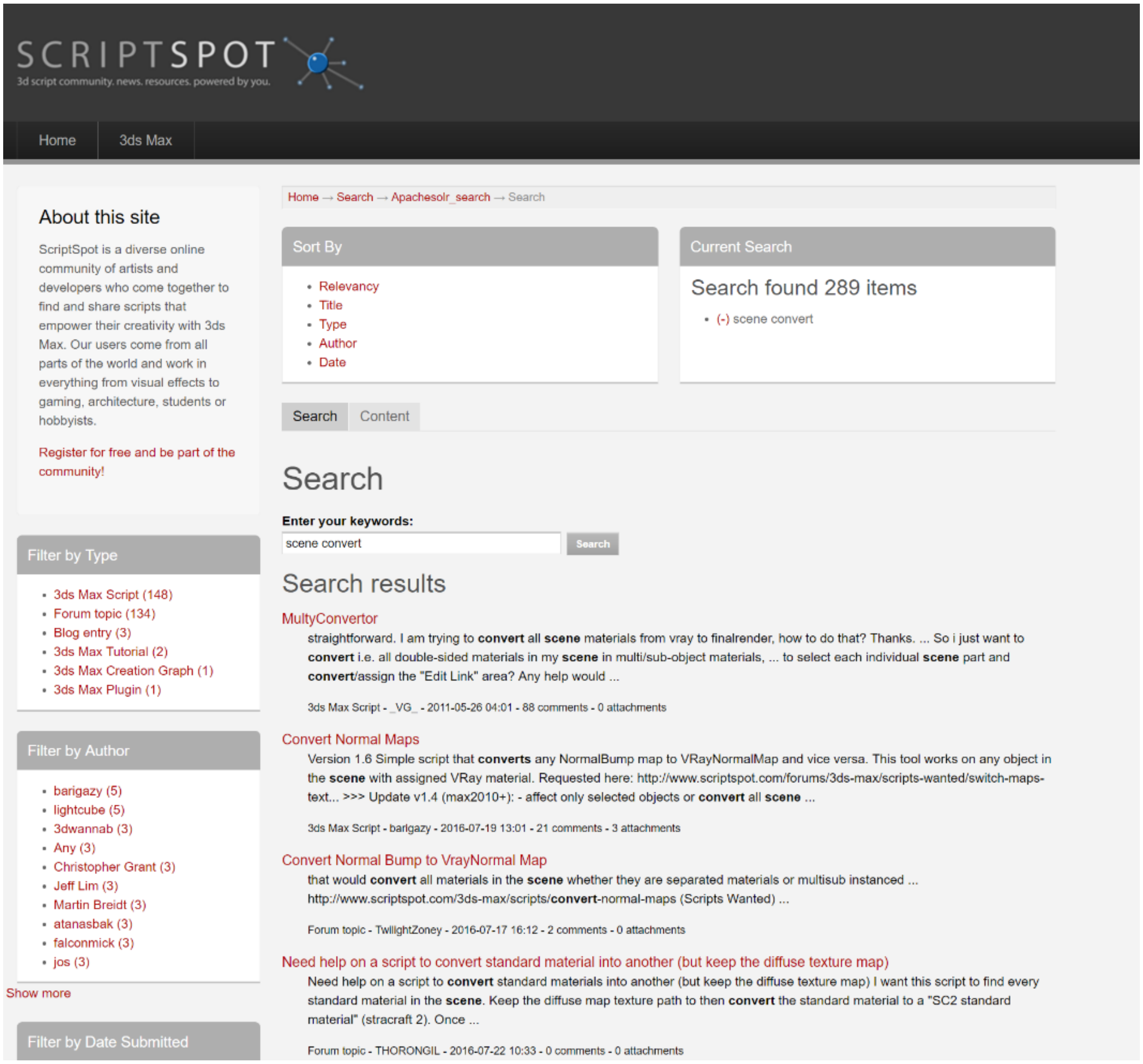
Emission: 0.0
Luminance: 1500.0 cd/m2 Kelvin: 6500.(

● By IOR
○ Custom Curve
Facing: 0.05
Edge: 1.0
Slope: 5.0

Image 9-2: The Physical Material inside of 3ds Max 2017

MaxScripts

One of the most powerful features that has been inside of 3ds Max for the longest time is the MaxScript. This is a programming language that can automate, and create new tools, directly inside of 3ds Max. There are websites dedicated to the distribution of free, and paid for, scripts that members of the 3ds Max community have made. There are numerous scripts created to do just about anything you can think of. I highly recommend looking on www.scriptspot.com for scripts that will help with the translation process.



About this site

ScriptSpot is a diverse online community of artists and developers who come together to find and share scripts that empower their creativity with 3ds Max. Our users come from all parts of the world and work in everything from visual effects to gaming, architecture, students or hobbyists.

Register for free and be part of the community!

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Search found 289 items

- (-) scene convert

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Search

Enter your keywords:

scene convert Search

Search results

MultyConvertor

straightforward. I am trying to **convert** all **scene** materials from vray to finalrender, how to do that? Thanks. ... So i just want to **convert** i.e. all double-sided materials in my **scene** in multi/sub-object materials, ... to select each individual **scene** part and **convert**/assign the "Edit Link" area? Any help would ...

3ds Max Script - _VG_ - 2011-05-26 04:01 - 88 comments - 0 attachments

Convert Normal Maps

Version 1.6 Simple script that **converts** any NormalBump map to VRayNormalMap and vice versa. This tool works on any object in the **scene** with assigned VRay material. Requested here: http://www.scriptspot.com/forums/3ds-max/scripts-wanted/switch-maps-text... >>> Update v1.4 (max2010+): - affect only selected objects or **convert** all **scene** ...

3ds Max Script - barigazy - 2016-07-19 13:01 - 21 comments - 3 attachments

Convert Normal Bump to VrayNormal Map

that would **convert** all materials in the **scene** whether they are separated materials or multisub instanced ... http://www.scriptspot.com/3ds-max/scripts/**convert**-normal-maps (Scripts Wanted) ...

Forum topic - TwilightZoney - 2016-07-17 16:12 - 2 comments - 0 attachments

Need help on a script to convert standard material into another (but keep the diffuse texture map)

Need help on a script to **convert** standard materials into another (but keep the diffuse texture map) I want this script to find every standard material in the **scene**. Keep the diffuse map texture path to then **convert** the standard material to a "SC2 standard material" (stracraft 2). Once ...

Forum topic - THORONGIL - 2016-07-22 10:33 - 0 comments - 0 attachments

Image 9-3: The Physical Material inside of 3ds Max 2017