

RENDERMAN FOR MAYA

AND PRACTICAL APPLICATIONS IN THE CHARACTER ANIMATION PIPELINE



Jared Bittner

GETTING STARTED - THE BASICS!

- So you've finally finished installing Renderman for Maya! How Exciting. At least that's the assumption if you're reading this - you've taken the time to download and install the plugin for Non-Commercial use and you'd like to learn how to use this fantastic rendering package. Bravo!
- If the previous statement doesn't apply, don't despair - there's still hope! You can follow this link: <https://renderman.pixar.com/view/non-commercial-renderman> and follow the simple installation instructions to get started.



- So now we're ready to go! Probably. Open an empty scene in Maya and check to see if the Renderman option tab and shelf have appeared in the top of your workspace. If they haven't, check your Plug-in Manager in Windows>Settings/Preferences>Plug-in Manager and check to see if your Renderman plug-in is loaded. If it isn't, check the boxes and refresh!



THE BASICS cont. - EVEN MORE BASIC!



- So let's get into what all of these shelf buttons mean! From left to right we have:
 - Render Current Frame - Renders your scene using attributes set in the Render Settings and Advanced Renderman Controls.
 - Start IPR - Renders your scene using attributes set in the Render Settings and Advanced Renderman Controls. Right click for options to select your render camera, set your IPR resolution and set your update mode (I prefer Continuous, but On Idle is less taxing on the system).
 - Light - Creates a Renderman light at the origin. Right click for options to create: PxrRectLight, PxrDiskLight, PxrDistantLight, PxrSphereLight & PxrAovLight.
 - PxrDomeLight - Creates a global Renderman environment light. Right click for options to create: PxrDomeLight, PxrPortalLight & PxrEnvDayLight.
 - PxrMeshLight - Creates a Renderman light from a selected piece of geometry.
 - Create Light Filter - Filter any Renderman light. Right click for options to create: PxrBarnLightFilter, PxrBlockerLightFilter, PxrCookieLightFilter, PxrGoboLightFilter, PxrMultLightFilter, PxrRampLightFilter & PxrRodLightFilter.
 - PxrSurface - Creates the default Renderman material. Right click for options to create: PxrSurface, PxrLayerSurface & PxrMarschnerHair.
 - Volumes - Creates the default Renderman material for rendering "Volumes" - aka Renderman's fancy word for fluid and particle effects/simulations. Right click for options to create: PxrVolume & Open VDB Visualizer.

THE BASICS cont. - EVEN MORE BASIC!



- Shelf Buttons cont. From left to right:
 - Holdout - Holdouts are assigned to objects that you wish to catch shadows on, but not the geometry. Ex. a ground plane in a scene that will be comped with a live action plate.
 - Archive - Creates an RIB archive of your scene.
 - Open "it" - This is your render bestfriend. You will learn to love "it".
 - Open Light Lister - A global panel for control of all of your lighting within the scene.
 - Open Dynamic Rules Editor
 - Open Texture Manager - Lists and gives control over every texture loaded into the directory.
Ex. Desktop\Project\sourceimages\3dPaintTextures
 - Open Preset Browser - This Preset Library contains the same production quality materials Pixar uses
 - Open Projection Editor
 - View Statistics - Opens an XML file containing render stats for the scene.
 - Load Plugin - Loads the Renderman Plug-in to Maya. "Why didn't you just say this earlier?" you might ask. To show you there's always more than one way of doing things in maya. And to be difficult. Na-na-na-na.
 - Help - Links to the HTML Renderman Documentation.
- Phew. What a mouthful.

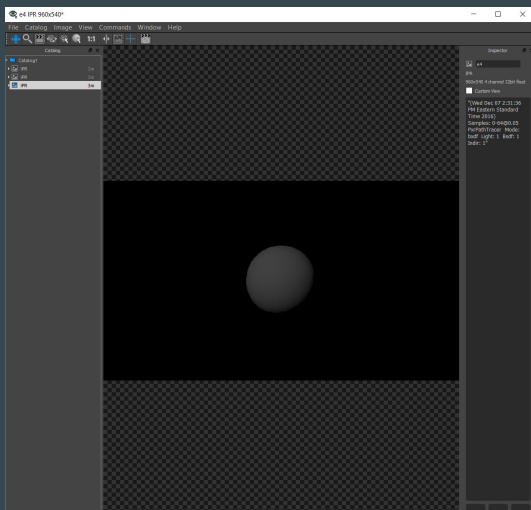
THE “it” WINDOW AND LEARNING TO LOVE

“it”

- The “it” window is Renderman’s proprietary render view window that contains a variety of options for previewing and rendering your frames. It can be accessed by clicking these 3 icons.



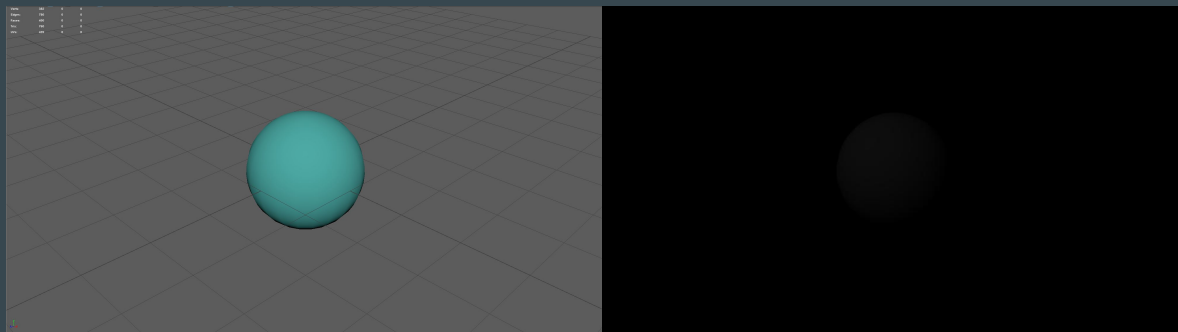
- And “it” looks like this:



- Every render job you start will push to the “it” window, which updates fast and in real time for IPR renderings.
- A catalog of all of your jobs can be opened by hitting “C”, and each of these renders can be reviewed.
- An Inspector for each job can be opened by hitting “I”, and each of the cataloged render’s Metadata can be reviewed.
- A variety of tools and commands are present for tweaking renders in the “it”, including but not limited to: Copy, Paste, Crop, Rotate, Scale, Zoom In/Out, Pixel Aspect Ratio, Channel selection, and more!
- I find the “Fit Image To Window” (Shift + F) and “Window Always On Top” (T) commands useful when working in a cluttered workspace.

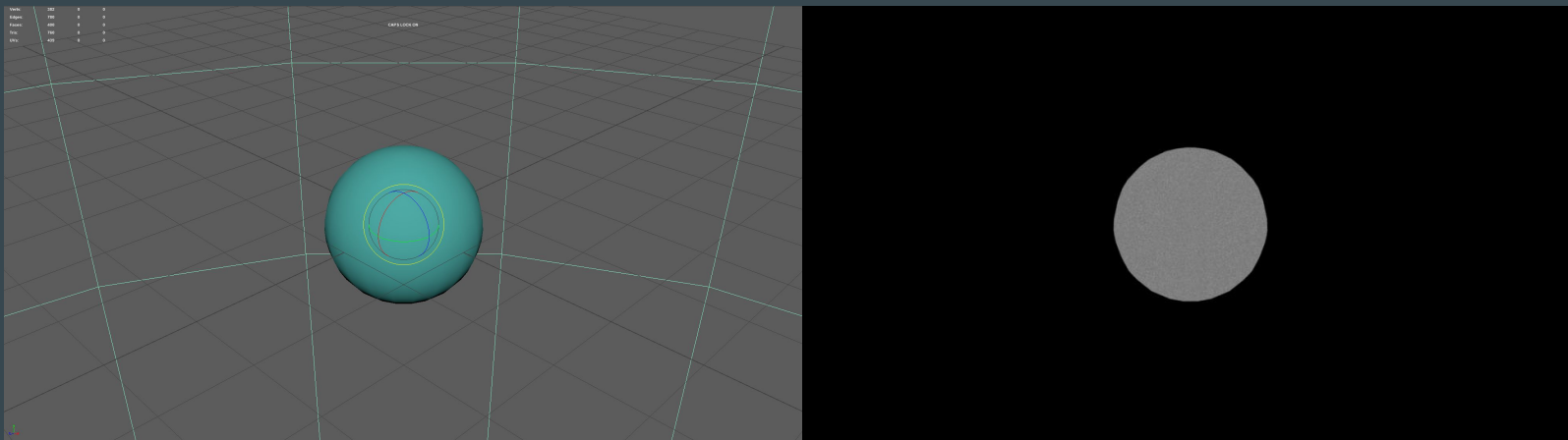
YOUR FIRST RENDER!

- So now that we know and love “it” let’s create a simple polygon sphere right out of the box and assign a new lambert colored teal. When we hit IPR...



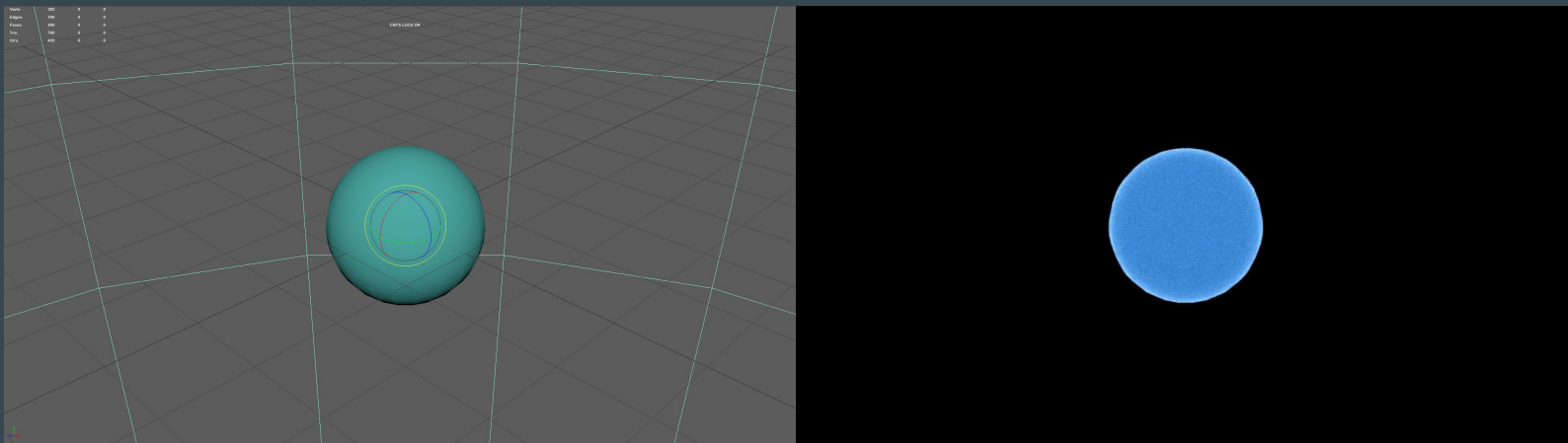
- Oh look, nothing. Of course, we didn’t have a Renderman light in the scene. Let’s add a PxrDomeLight and see what we get...

YOUR SECOND RENDER!



- Well at least we can see the mesh now, but it looks like we're not picking up any color information. Must be a material issue. Let's replace our lambert2 with something like a PxrDisney material...

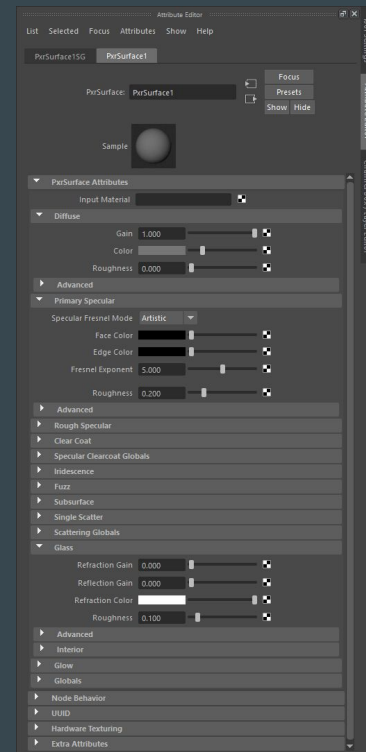
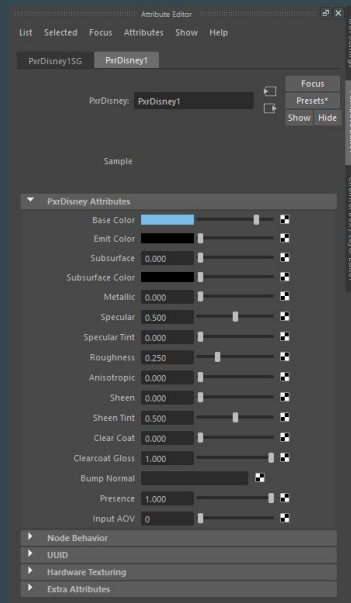
YOUR THIRD RENDER!



- LOOK AT THAT! In a roundabout way this illustrates how in order for Renderman to output a useable result, your scene must consist entirely of Renderman materials and lights. Certainly a stipulation that should be taken into consideration before committing to using renderman on a pipeline style production as we do here in UCF Character animation.

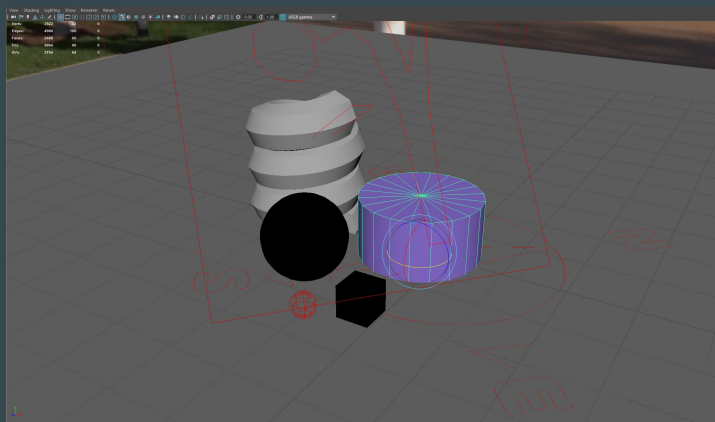
The PxrDisney & PxrSurface

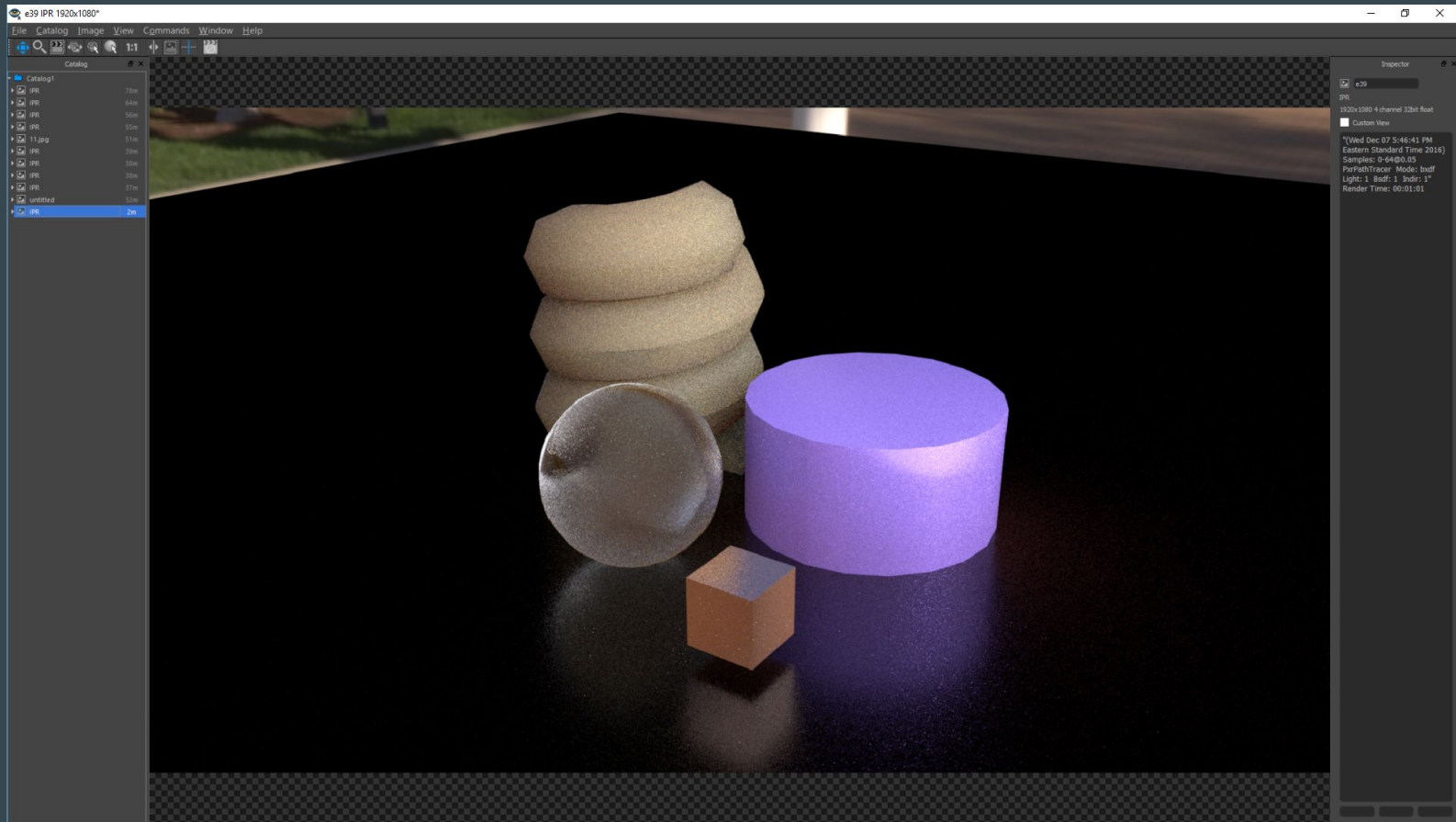
- A mini history lesson before we discuss these materials. As of this writing this (December 2016), For nearly a decade the default Renderman material was the PxrDisney. This material is a streamlined multipurpose surface containing all of the artistic material attributes artists could desire with metric attributes of 0 to 1. Its key attributes include diffuse, specularity, subsurface and anisotropy which makes it highly adaptable.
- The PxrSurface is an extension of this streamlined material concept with added attributes for higher degrees of control. It was introduced in Renderman 21 and is the new default and standard material in Renderman. The PxrDisney can now be found under Legacy Materials.



NOW FOR SOME FUN!

- I'm going to create an example render by just throwing some objects into a scene, importing a PxrDomeLight of Luxo Jr. from the preset browser and just seeing what we get!
- I created a square 20x20 plane and assigned a brown PxrDisney to use as the ground and then added a holdout so that it would only render caught shadows and specular from other objects.
- I created a helix and assigned it a PxrLMSubsurface.
- I created a cylinder and added a metallic PxrDisney with anisotropy set to 1.
- I created a sphere and imported an ice preset material from the preset browser onto it.
- I created a cube and imported a copper material from the preset browser onto it.
- I lit the scene with a rectangle light and a PxrEnvDayLight set to the latitude and longitude of the CEM at 5pm on 12/29/2016 (Yeah, you can do that. I know it's nuts).

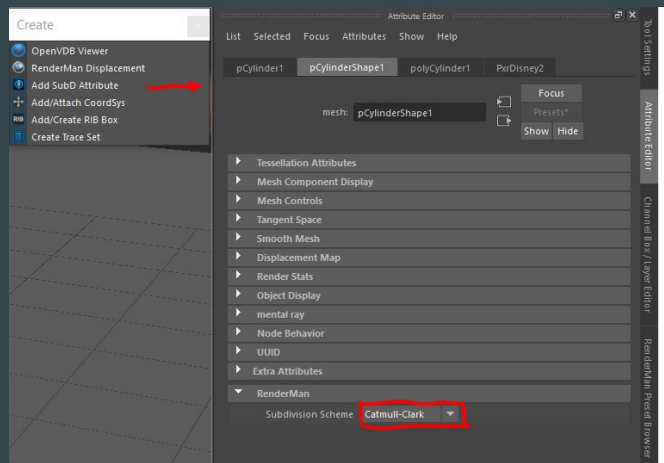
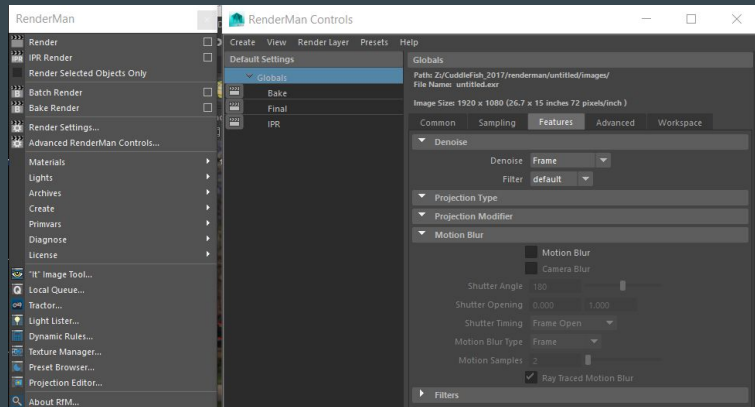


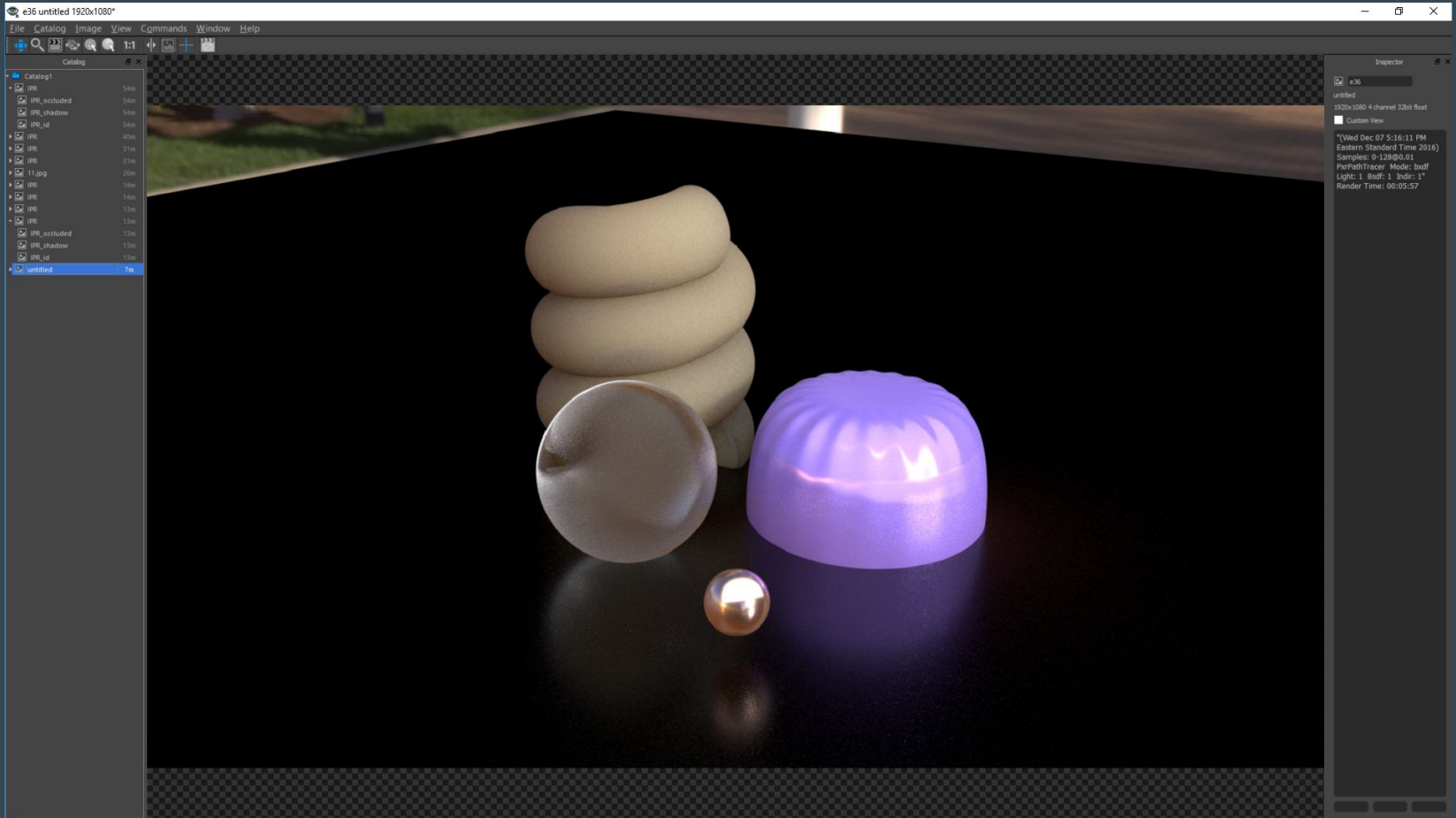


LOOK AT THAT RESULT! This IPR was finished in only a minute and I threw some really heavy lighting and materials at it.

INTRODUCING THE DENOISER AND SubD

- The image was rather noisy though, and I think maybe we should smooth our geometry to give us a nicer render.
- In Renderman>Advanced Renderman Controls... we can turn on the denoise feature under the Features tab. This process will scrub a render of noise after it has been completed.
- We can also add SubD attributes to all of our geometry which will calculate subdivisions of the meshes using a Catmull-Clark scheme and “smooth” the geo with little to no increase in render time! Select the mesh you’d like to smooth and go to Renderman>Create>Add SubD Attribute.

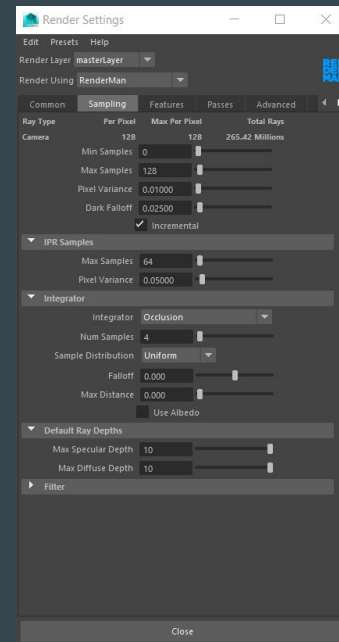
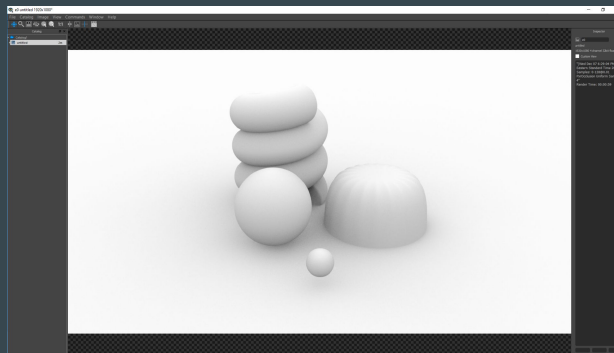




NICE!

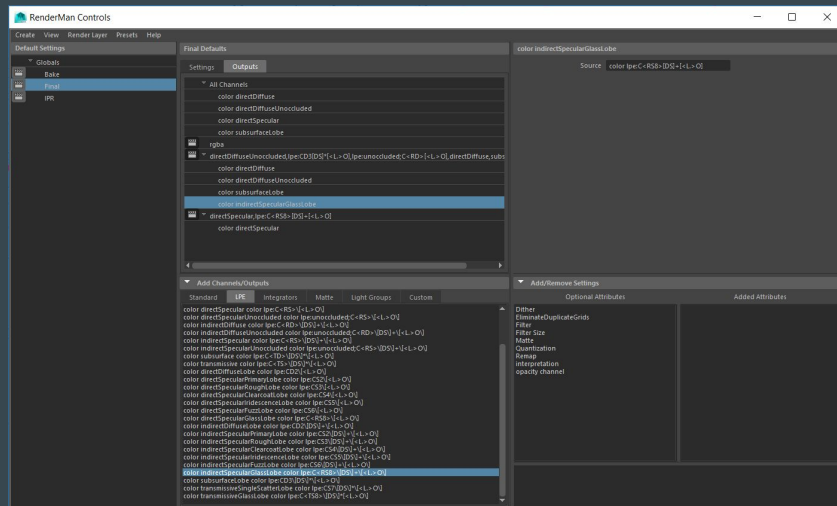
The Integrator and Occlusion

- In the Render Settings under the Sampling tab you'll find a dropdown called "Integrator". Think of the Integrator as a renderer inside the renderer. The default is set to Path Tracer which is a ray tracing renderer. Two other important integrators are the VCM, which is a higher quality ray tracer that calculates refraction considerably better than the Path Tracer - but tends to take 3 times as long to render a job, and The Occlusion Integrator.
- Occlusion is a recent addition to Renderman 21. Before this release, AO passes had to be written with a specific script but now rendering Ambient Occlusion is as simple as changing this Integrator!



Arbitrary Output Variables

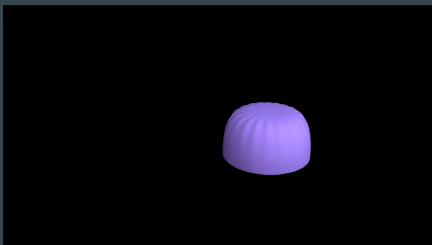
- Arbitrary Output Variables or AOVs for short are secondary image passes calculated by the renderer which are sort of like the layers that the final beauty render is built up from. They can be separated out for compositors to work with as they choose.
- AOVs can be found by going to RenderMan>Advanced RenderMan Controls..., selecting your Final or IPR render, going into the Outputs tab, dropping down Add Channels/Outputs.
- To add an AOV that will output as a separate .EXR file simply select the AOV you wish to output, right click and select “Create Output from Channel”.
- To add an AOV that will output into your final .EXR file and will be shuffled out by a compositor in Nuke, right click and select “Add Channel to Selected Outputs”.



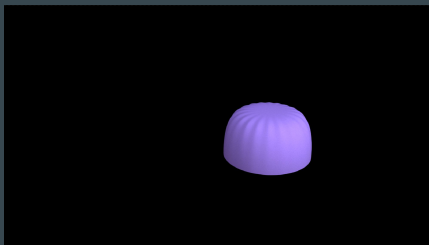
Arbitrary Output Variables cont.

- In my example I split up my render to render out: color directDiffuse, color directDiffuseUnoccluded, color subsurfaceLobe & color indirectSpecularGlassLobe AOVs in one .EXR file and color directSpecular in its own .EXR. The passes can be visualized in the “it” window.
- A Shadow AOV automatically is included whenever a holdout is used in the scene.

color directDiffuse



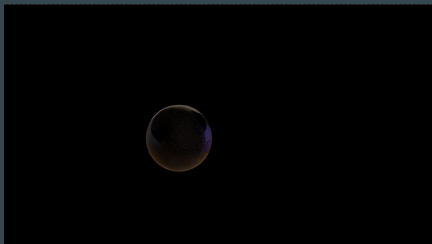
color directDiffuseUnoccluded



color subsurfaceLobe



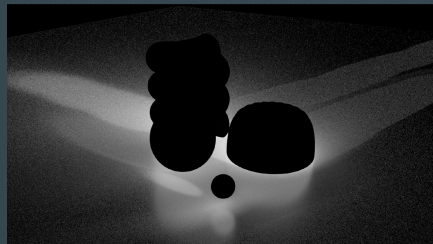
color indirectSpecularGlassLobe



color directSpecular



shadow



NOW GO MAKE BEAUTIFUL RENDERS!

