REDSHIFT TO RADEON PRORENDER CONVERSION REPORT

Version 2.19, 27 February 2019 (all reports)

This report summarizes results of tests made to convert Redshift nodes to Radeon ProRender nodes.

- **Software**: Maya 2018, Redshift 2.6.29, RPR 2.5.245
- **Hardware**: GTX 980/GTX 1080TI (for autotests)

SUMMARY

For the report, **54** Redshift nodes within **7** node groups has been tested in total. The results of conversion are as follows:

- **CONVERTIBLE**: **10** nodes (**18%**), see details
- **PARTIALLY CONVERTIBLE**: **9** nodes (**17%**), see details
- **NOT CONVERTIBLE**: **22** nodes (**41%**), see details
- **RESEARCH IS NEEDED**: **13** nodes (**24%**), see details

In this update, we focused on the carpaint material. Now, we transfer all colors used in the original material, and we are mixing edge and frontal colors through Fresnel, with IOR calculated from the original curve falloff.

Previously, we didn't convert properly the IOR and roughness values from carpaint, but now we do the conversion using Fresnel's IOR from the reflectivity formula.

Currently, most of the nodes are converted by the script. In some cases, we preserve original information as is, in other cases, we are trying to accommodate input values from Redshift to available RPR features. Architectural, rsMaterial, Incadescent, VolumeScatter, PhysicalLights and IBL (Dome and Enivronment) – the majority of their parameters are converted as close to original, as possible. This is a continuous process of refining the formulas to better match render results, as more testing provides more sample data.

REPORT DETAILS

In this report:

HISTORY

v.1.0 — First version.

v.1.1 — IBL issue, Displacement conversion in rsMaterial.

v.1.2 — Link to Reflection conversion change in rsMaterial.

v.1.3 — Area light conversion.

v.1.4 — Ambient Occlusion, Fresnel support.

v.1.5 — Clean scene from redshift (dialog).

v.1.6 — Redshift Material Blender conversion, updated all material conversion.

v.1.7 — Fix bugs, deleting lights with transforms.

v.1.8 — Opacity conversion in Redshift Material, rsColorLayer support.

v.1.9 — Fix area light conversion.

v.2.0 — Add bumpBlend support.

v.2.1 — Fix bug with channel converting, fix bug with creating extra materials.

v.2.2 — ColorCorrection support. Update physical light & subsurface material conversion.

v.2.3 — rsVolumeScattering conversion.

v.2.4 — Added the ability to re-convert scene.

v.2.5 — RedshiftArchitectural conversion updates.

v.2.6 — RedshiftIncandescent conversion updates.

v.2.7 — RedshiftMaterial & RedshiftSubSurface conversion updates.

v.2.8 — RedshiftIESLight & RedshiftPortalLight conversion.

v.2.9 — Fresnel mode & SS units mode conversion updates in RedshiftMaterial, Conversion of light units, Update conversion of color + edge tint mode in RedshiftMaterial, VolumeScattering update, Update conversion of metalness in RedshiftArchitectural, Multiscatter layers conversion update in RedshiftMaterial.

v.2.12 — Intensity conversion in dome light, Intensity conversion in Redshift Environment, Update conversion of Fresnel modes in RedshiftMaterial.

v.2.11 — Fix displacement conversion in Redshift Material, Update image unit type conversion in physical light.

v.2.12 — Update unit's type of physical light conversion.

v.2.13 — Update opacity conversion, fix material & bump map conversion, Update rsColorLayer conversion. Fix bug with file color space, Global settings conversion. Mel -> Python.

v.2.15 — Fix rsNoise conversion, Update setProperty func, Update rsMaterial Translucency conversion, finished rsSprite conversion, Finished rsNoise conversion, Alpha conversion in rsIncandescent material, Update opacity conversion in rsMaterial, rsBumpMap and rsNormalMap fixes, Render settings adjustment for Irradiance.

v.2.16 — Improve normal map conversion in rsMaterial and rsArchitectural, Improvements of translucency conversion in rsMaterial, Fixed bug with unsupported nodes conversion, Fixed bug with temperature in RPRPhysical lights, Improve rsArchitectural conversion.

v.2.16 — Improve rsArchitectural and rsMaterial conversion, Changed BumpBlender conversion, Photoexposure conversion.

v.2.17 — rsBumpBlender Mixing Ubers method, clamp irradiance fix, reflection fix.

v.2.18 — Multiscatter SSS improvement, SSS updates.
v.2.19 — Fixed bug with conversion color channels using nodes to each channel separately. Improve conversion speed, materials and nodes will not be converted repeatedly, rsCarPaint material conversion update

SCRIPT LINK

The latest version of the conversion script: download script.

KNOWN ISSUES

The following JIRA issues affecting the conversion process were identified:

- [RPRMAYA-880] Render view doesn't conform to resolution gate in viewport
- [RPRMAYA-801] Shadow catcher render with a lot of noise and sometimes gets bad results
- [RPRMAYA-848] Textures are being downscaled by supported standard Maya nodes
- [RPRMAYA-329] [Core] Artifacts when using Displacement
- [RPRMAYA-147] [Core] Sky System issue
- [RPRMAYA-737] Normal+normal and normal+bump angle corrected blend

Currently, we have several issues with how some of the values get converted. Mostly, this concerns SSS effects in rsMaterial and SubsurfaceScatter materials. RPR handles color brightness and saturation differently, so to have a better match to Redshift output, we are researching the way to bring it as close as possible.

VolumeScatter needs further refinement, to compensate for difference between RPR and RS scatter algorithms.

Physical Sky, node connections from standard Maya nodes and noises, as well as tonemapping still need implementation or refinement.

While we did implement conversion for every type of light, there are still some issues left to resolve. First, we still need a way to extract mesh lights from the rs light sources, and we also need to devise a more universal workaround for the spot light angle calculation.

RPR doesn’t give us control over penumbra gradient curve, so we need to find how to emulate its effect. Currently, we try to find the maximum outer cone falloff and inner cone angle through the Cone angle as an average, biased by falloff angle and curve, but this doesn’t cover all cases.

Multiscatter SSS still needs some tweaking to get rid of washed out colors. While running tests on Car scene, we encountered another Shadow Catcher bug [RPRMAYA-973].

COMPLEX SCENES

Scene 1

Office interior. Small scene with Sun and Sky, refractive materials, and procedural maps for bump and roughness.

Known issues:

1. We have noise in Bump now, but some of the mixing is still lost. To achieve more clean result, we should avoid to use standard nodes after conversion, so we need to convert them too [RPRTOOL-54]. This still won't bring floor roughness to the correct values. Needs additional research, as RPRBlendValue doesn't give expected result when interpolating between to maps.
2. Highlights were reduced and tonemapper matched, but it seems that Redshift and RPR have too different methods of building GI.

Redshift	**Radeon ProRender v2.19**
	
Radeon ProRender v2.18	**Radeon ProRender v2.19**
	

Scene 2

Tank. Object render with displacement ground.

Known issues:

1. Barely visible displacement artifacts [RPRMAYA-329].
2. Reflections are a bit brighter, could be difference in color space for roughness maps. It seems that this issue covers this case: [RPRMAYA-947].

Redshift	Radeon ProRender v2.19
	
Radeon ProRender v2.18	**Radeon ProRender v2.19**
	

Scene 3

Mustang. Object scene with MatteShadow, VolumeScatter and Carpaint.

Known issues:

- Car Paint is converted but color mixing differs from the original due to different falloff curve between RPR Fresnel and what Redshift uses.
- Shadow catcher, volumes and refraction stacked against one another create extremely bad artifacts [RPRMAYA-891]. Same for reflections. [RPRMAYA-973].
- We need to catch diffuse and reflective rays with our Shadow Catcher to match the features [RPRMAYA-946].
- To better match colors, we need to add white balance conversion into the Tonemapper, but currently there is no way to match free color white balance from Redshift to temperature-based color in RPR.

Redshift	**Radeon ProRender v2.19**
	
Radeon ProRender v2.19	**Radeon ProRender v2.19**
	

Scene 4

Complex baked maps.

Redshift	Radeon ProRender v2.19
	
Radeon ProRender v2.18	**Radeon ProRender v2.19**
	

Scene 5

Simple interior, part 1.

Known issues:

1. Physical sky needs to have more brightness with conversion.
2. Portal lights are converted to area light with white color. Also the fact that Portal lights became Area lights causes a difference in reflections – area light planes are visible in reflections.

Redshift	Radeon ProRender v2.19
	
Radeon ProRender v2.18	**Radeon ProRender v2.19**
	

Scene 6

Simple interior, part 2.

Known issues:

1. More accurate CarPaint materials conversion is needed.

Redshift	Radeon ProRender v2.19
	
Radeon ProRender v2.18	**Radeon ProRender v2.19**
	

Scene 7

Shoes.

Known issues:

1. We need to look into standard Maya node used for background, Surface Shader. It looks like it causes some color differences when placed behind lit plane with Uber material. Maps in area light color could affect the result too.
2. It is possible we should deny user to have semi-metallic materials after conversion. Redshift handles it differently, so it's possible we should convert materials with 0 < metalness < 1 as non-metallic with IOR set to match effect.

Redshift	**Radeon ProRender v2.19**
	
Radeon ProRender v2.18	**Radeon ProRender v2.19**
	

Scene 8

Small object render, lit by Physical Sun and area lights.

Known issues:

1. Translucent lamp cover doesn't let the light out, needs adjustment in materials. Could that be expected behavior for Backscatter?
2. Reduced Clamp Irradiance value reduced the highlight visible through backscatter. We will try and find a way to make this effect less concentrated.
3. Grey color gets too light. Needs investigation.
4. Sun currently doesn't convert to the Directional light, TBD.
5. More powerful noise is visible here more, than in the other scenes. Even after reducing clamp Irradiance value it still the case.

Redshift	Radeon ProRender v2.19
	

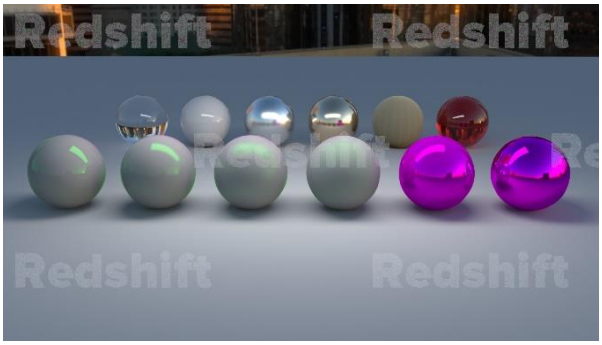
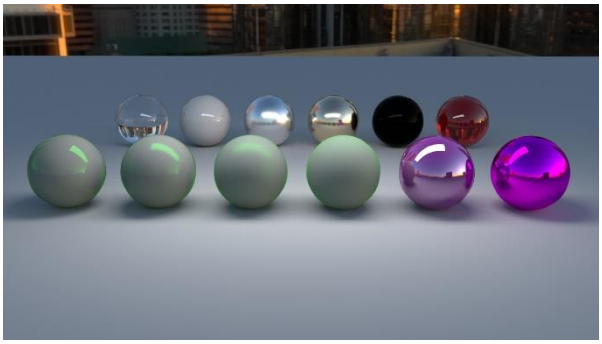
Radeon ProRender v2.18	Radeon ProRender v2.19
	

Scene 9

Shaderballs scene with color reflections and metalness variants.

Known issues:

1. Diffuse weight 0.5 gives more saturated color in Redshift. Possibly expected behavior? As in scene 7, it'd probably be best to convert semi-metallic materials into non-metals with high IOR.
2. Material with milky coffee preset is currently unsupported. We are researching ways to properly preserve colors and values for extinction mode.

Redshift	**Radeon ProRender v2.19**
	
Radeon ProRender v2.18	**Radeon ProRender v2.19**
	

Scene 10

Shaderballs scene with set of rsMaterials, CarPaints, Incadescents and Subsurface scatter materials, including materials from the previous scene.

Known issues:

1. Same as above, extinction mode is not supported.
2. Subsurface materials have darker colors than they should, needs research for proper formula.
3. Anisotropic effects in RS are more prominent than in RPR. Either an expected behaviour or we need value adjustment beyond inputs from RS. Needs research.
4. Backscatter, converted from rsArchitectural translucency has more bright color due to the fact that Translucency builds color on thickness but for RPR we use linear gamma-corrected mix.

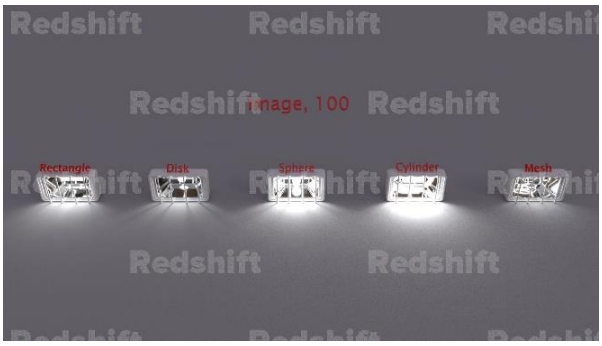
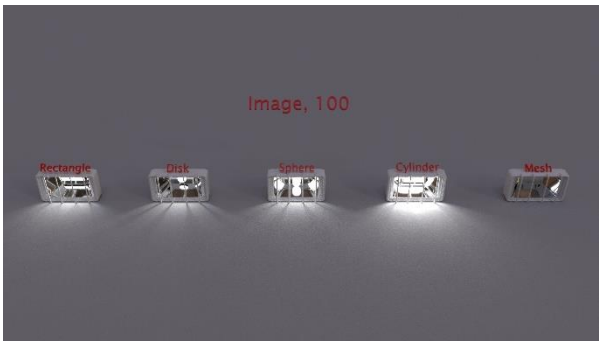
Redshift	Radeon ProRender v2.19
	
Radeon ProRender v2.18	**Radeon ProRender v2.19**
	

Scene 11

Area light shapes.

Known issues:

1. Mesh light conversion isn't supported yet.

Redshift	Radeon ProRender v2.19
	
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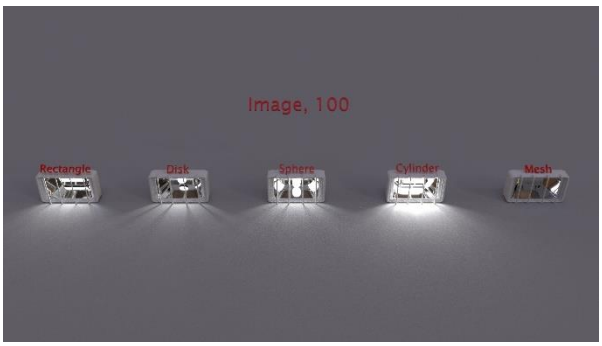	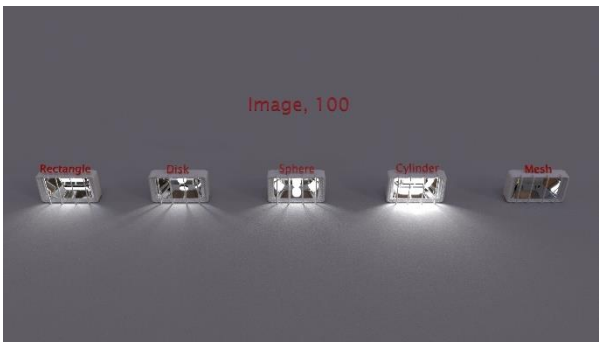

Scene 12

Physical light types.

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	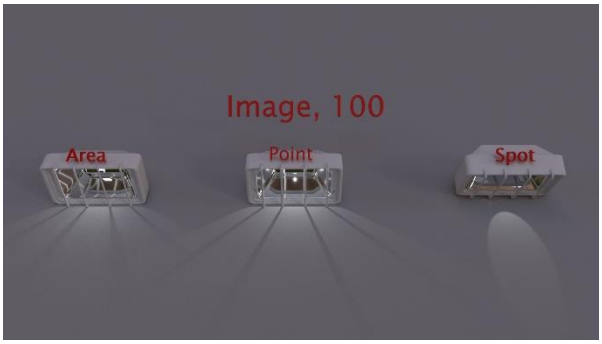
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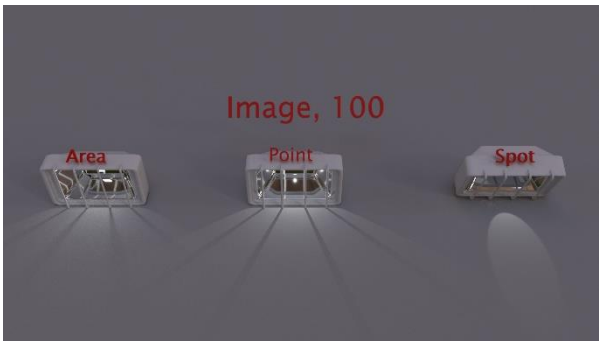
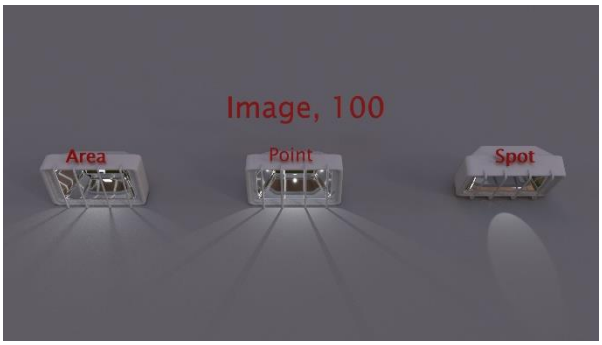
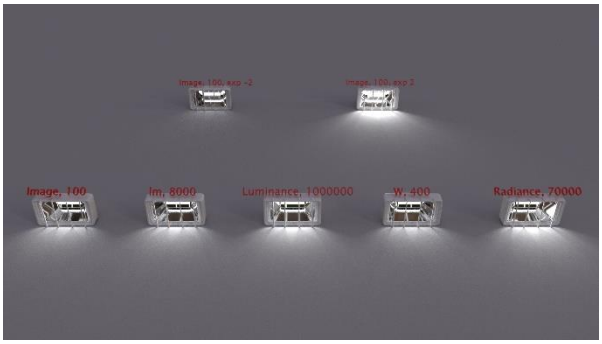
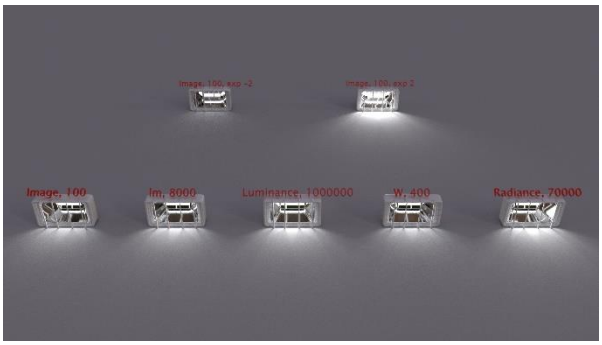
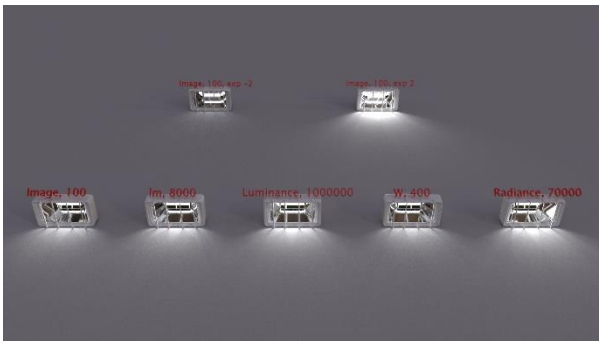
	

Scene 13

Light units.

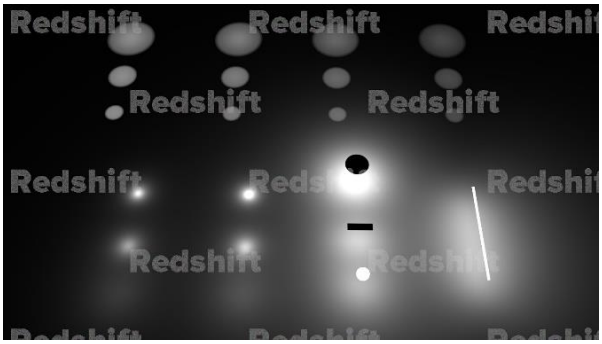
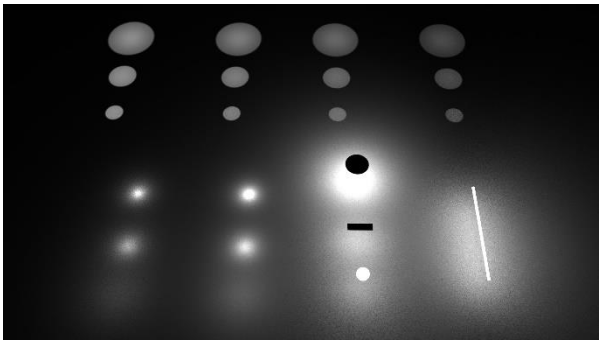
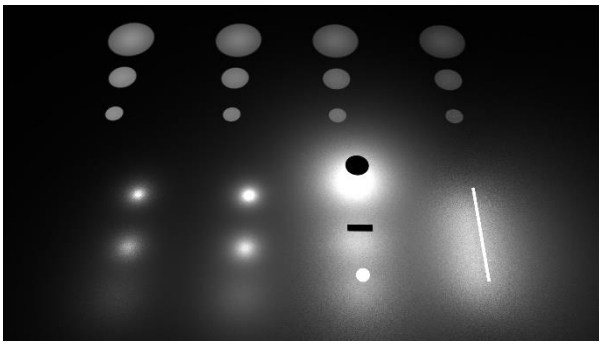
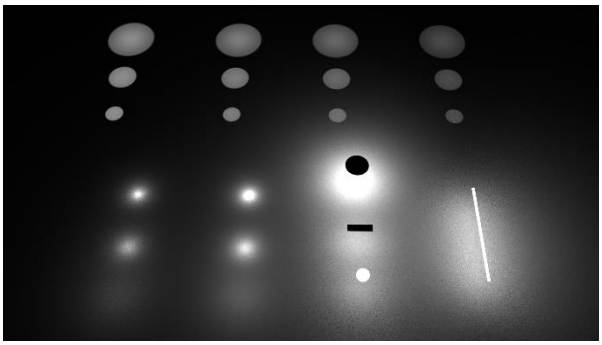
Redshift	Radeon ProRender v2.19
	
Radeon ProRender v2.18	**Radeon ProRender v2.19**
	

Scene 14

Light array. All physical lights (sans mesh and directional).

Known issues:

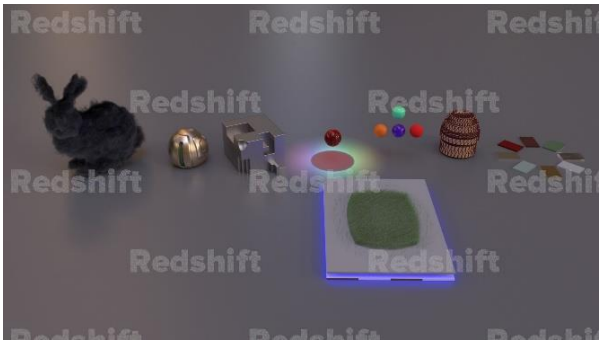
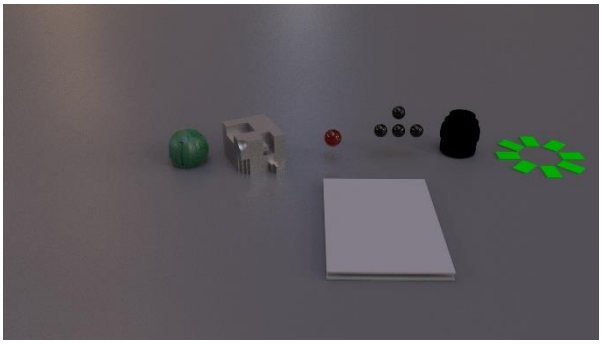
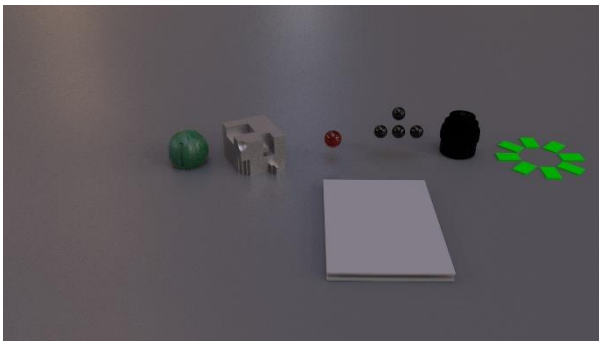
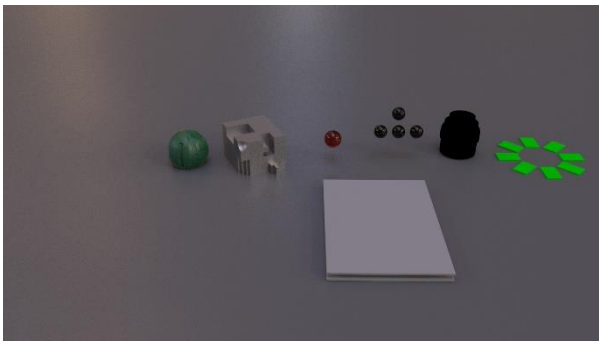
1. Spot light angle is calculated very approximately due to lack of control over penumbra curve [RPRTOOL-83].

Redshift	Radeon ProRender v2.19
	
Radeon ProRender v2.18	**Radeon ProRender v2.19**
	

Scene 15

Inconvertible nodes.

- **From left to right**: rsVolume, rsCurvature, rsRoundCorners, rsLightGobo, rsUserAttribute (color, scalar). rsWireframe, rsShaderSwitch.
- **On the front**: rsRaySwitch on the bottom, and rsHair and rsAttributeLookUp on xGen Collection.

Redshift	Radeon ProRender v2.19
	
Radeon ProRender v2.18	**Radeon ProRender v2.19**
	

Scene 16

Alien figure.

Known issues:

1. SSS for rsMaterial needs a little more tweaking before it could be considered done.
2. Shadow catcher doesn't catch diffuse and reflection rays [RPRMAYA-946].
3. Metalness maps affect the color [RPRMAYA-947].
4. There is curvature node used on the columns. It's possible we could eventually make a fake with AO node, but that won't work in many cases, since there is no object space for AO calculations.
5. Absorption distance for refraction needs some minor adjustment to better match original colors.
6. It seems that light propagation from emissive spheres is random with each render run. Needs investigation for possible RPRMAYA bug.

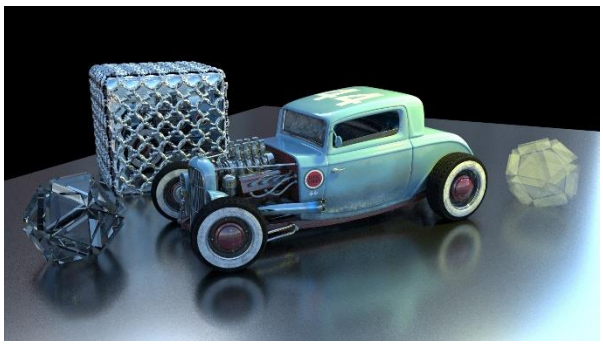
Redshift	**Radeon ProRender v2.19**
	
Radeon ProRender v2.18	**Radeon ProRender v2.19**
	

Scene 17

Retro car and shapes. Complex textures and textured glass, displacement on non-planar object, transparency.

Known issues:

1. We need to better match displacement subdivision.
2. Floor material is brighter, possibly due to the fact, that it's not fully metallic. By our formula, this means that its reflection color is a mix between the original reflection color and original reflectivity color. Possibly expected behavior since its non-PBR material?

Redshift	**Radeon ProRender v2.19**
	
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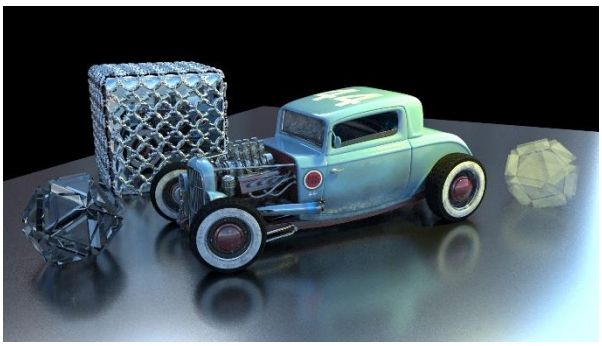	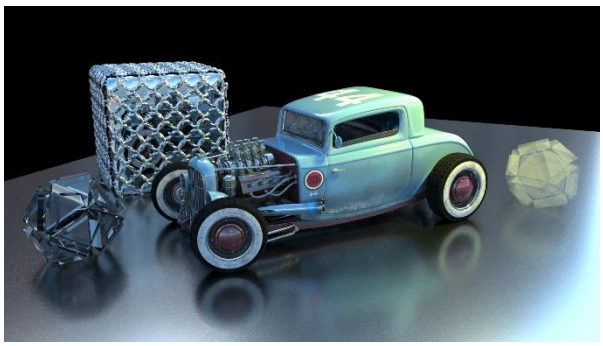

Scene 18

Tropical foliage. Mapped translucency and transparency, displacement, sprite material and mapped transparency for Incandescence.

Known issues:

1. Displacement artifacts, same as before.

Redshift	Radeon ProRender v2.19
	
Radeon ProRender v2.18	**Radeon ProRender v2.19**
	

TEST REPORT LINK

For detailed comparison of rendered scenes, see Test Report.

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Login: rpruser
Password: rpruser2017
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Note that this is still the Alpha version of the report. The report includes 306 scenes.

CONVERSION STATUS BY NODE GROUP

Node Group	Total Nodes	Convertible	Partially Convertible	Not Convertible	Research Is Needed	Details
Environment	1	1	0	0	0	Link
Lens	3	0	0	1	2	Link
Lights	7	2	2	1	2	Link
Materials	11	3	3	2	3	Link
Physical Sky	1	0	0	0	1	Link
Utility Nodes	29	4	4	17	4	Link
Volume Scattering	2	0	0	1	1	Link
Total	**54**	**10**	**9**	**22**	**13**	Link