REDSHIFT TO RADEON PRORENDER

CONVERSION REPORT

Version 2.15, 30 January 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**: **7** nodes (**13%**), see details

- **NOT CONVERTIBLE**: **23** nodes (**43%**), see details

- **RESEARCH IS NEEDED**: **14** nodes (**26%**), see details

This update covers major fixes in the way we handle utility node connections. We fully process complex shading networks trying to preserve as much connections as possible. Besides that, we now have full support for all main rsArchitectural features.

Currently, most of the nodes are converted by the script. In some cases, we preserve original information as is, in some cases, we are trying to accommodate the input values from Redshift to available RPR features. Architectural, rsMaterial, Incadescent, VolumeScatter, PhysicalLights and IBL (Dome and Environment) — the majority of their parameters are converted as close to original as possible.

Conversion for some of the nodes is yet to be implemented, such as lens and tonemapping effects, as well as proper SSS effects in rsMaterial. Translucency effects are finally covered — both solid color and textured.

REPORT DETAILS

In this report:

- History
- Script Link
- Known Issues
- Complex Scenes
- Test Report Link
- Conversion Status by Node Group

Prepared by: QA Team **Date**: 30-Jan-19

HISTORY

v.1.0 — First version.

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

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.2.14 — 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.2.15 — 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.

SCRIPT LINK

The latest version of the conversion script: download script.

KNOWN ISSUES

The following JIRA issues affecting the conversion process were identified:

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

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 the 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.

Having full shading network processing working, we finally reached a set of issues with BumpBlender that, it seems, doesn't have a viable solution for us. This issue is especially glaring now, and attempts to find proper workaround of manageable proportions have failed.

For more information, please refer to this feature request for Maya: RPRMAYA-737 (there is a link inside with HLSL code examples of a possible solution).

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.
2. Area light is dimmer, due to tonemapper. Manual adjustment showed, that using the Photolinear tonemapper with sensitivity between 15 and 20 could bring the image much closer to RS. Increasing Clamp Irradiance Value improved brightness by small margin, but the main issue remains with the Tonemapper (RPRTOOL-113).

Redshift	Radeon ProRender v.2.15
Radeon ProRender v.2.14	**Radeon ProRender v.2.15**

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 v.2.15
Radeon ProRender v.2.14	**Radeon ProRender v.2.15**

Scene 3

Mustang. Object scene with MatteShadow, VolumeScatter and Carpaint.

Known issues:

1. We need carpaint material implementation, or at least an additional adjustable camera-based falloff generator in addition to just physically-correct Fresnel (RPRMAYA-887).

2. Shadow catcher, volumes and refraction stacked against one another create extremely bad artifacts (RPRMAYA-891).

3. Unable to render error sometimes appears on nVidia GPUs (RPRMAYA-842).

4. We need to catch diffuse and reflective rays with our Shadow Catcher to match the features (RPRMAYA-946).

Redshift	Radeon ProRender v.2.15
Radeon ProRender v.2.14	**Radeon ProRender v.2.15**

Scene 4

Complex baked maps.

Known issues:
1. DoF needs to be implemented with the default camera parameters. Possible tonemapper needs to compensate for bokeh.

Redshift	Radeon ProRender v.2.15
Radeon ProRender v.2.14	**Radeon ProRender v.2.15**

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 difference in reflections — area light planes are visible in reflections.

3. DoF, as above.

4. Tonemapping affects the result brightness (RPRTOOL-113).

5. Glaring bump is due to bump blender not working. There are 2 main issues with it: unconvertible node in the base input, and the fact that RPR doesn't have angle corrected blends for normal maps (RPRTOOL-120, RPRMAYA-737).

Redshift	Radeon ProRender v.2.15
Radeon ProRender v.2.14	**Radeon ProRender v.2.15**
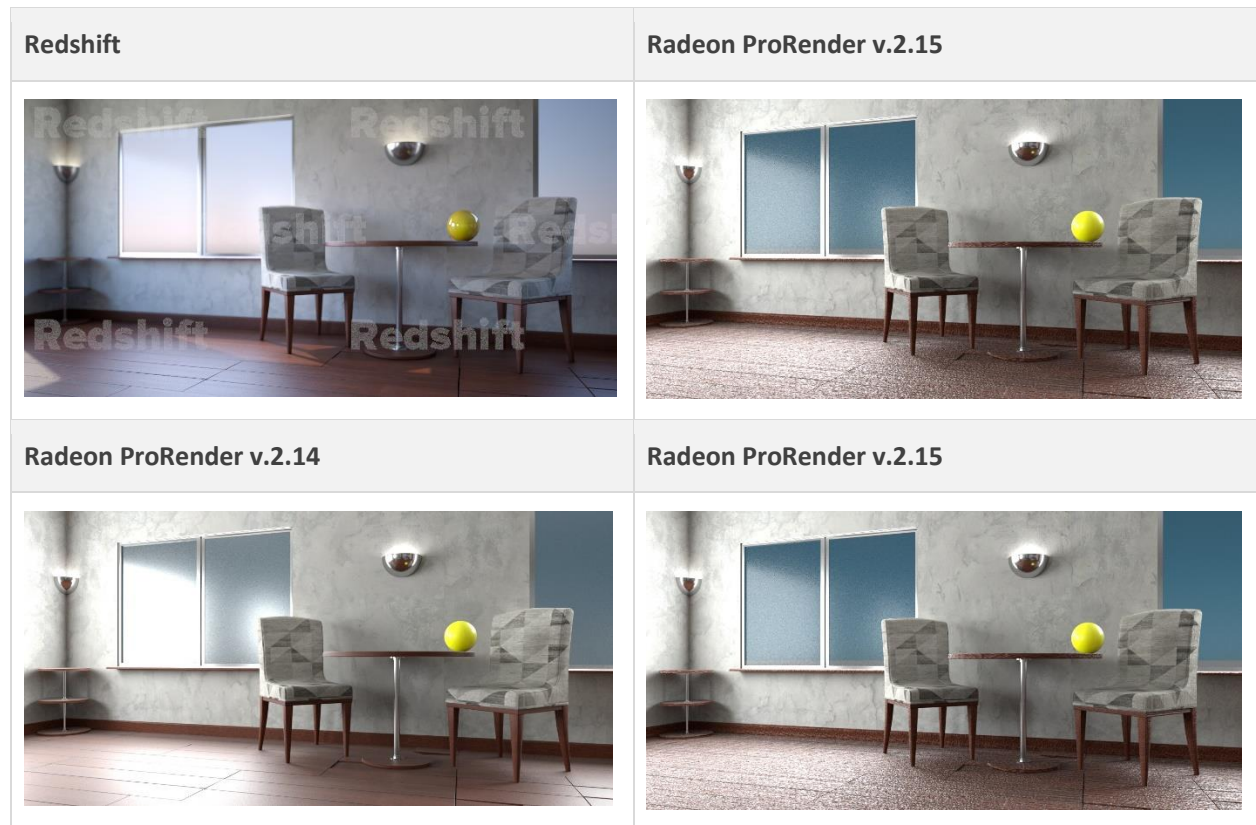
Scene 6

Simple interior, part 2.

Known issues:

1. DoF, Portal lights and Tonemapper, as above

2. More accurate CarPaint and Achitectural materials conversions are needed.

Redshift	Radeon ProRender v.2.15
Radeon ProRender v.2.14	**Radeon ProRender v.2.15**

Scene 7

Shoes

Known issues:

1. Tonemapper as above.
2. Issues both with BumpBlender RPRTOOL-120 and Metalness maps RPRMAYA-947 revealed themselves, when we got full shading network processing.

Redshift	Radeon ProRender v.2.15
Radeon ProRender v.2.14	**Radeon ProRender v.2.15**

Scene 8

Small object render, lit by Physical Sun and arealights.

Known issues:

1. Translucent lamp cover doesn't let the light out, needs adjustment in materials. Could that be expected behavior for Backscatter?

2. Grey color gets too light. Needs investigation.

3. Sun currently doesn't convert to the Directional light, TBD.

4. RS Sun and Sky go paired with photo exposure node. Tonemapper needs to be adjusted accordingly.

5. More powerful noise is visible here more than in the other scenes. Cause is increased Clamp Irradiance value (RPRTOOL-113).

Redshift	Radeon ProRender v.2.15
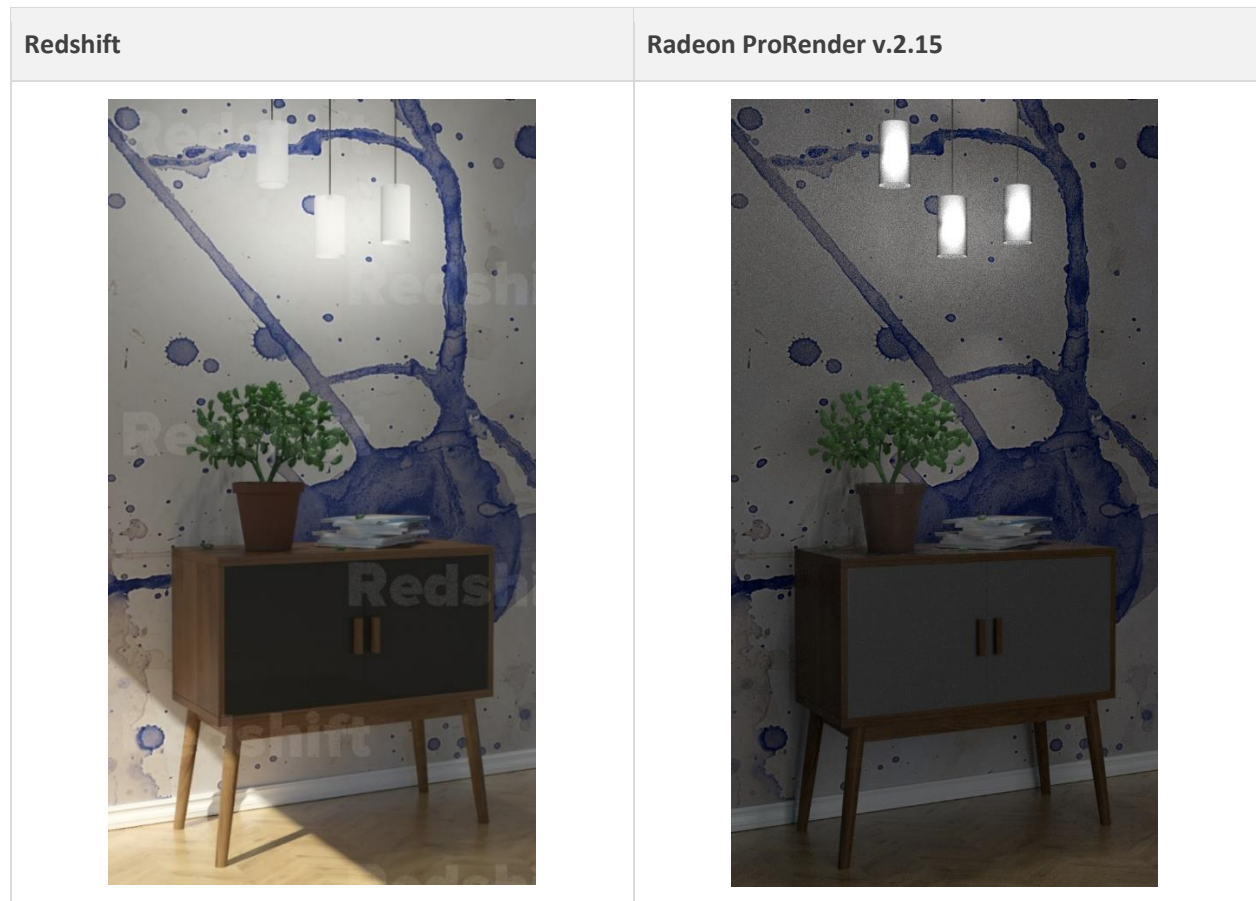
Radeon ProRender v.2.14	Radeon ProRender v.2.15
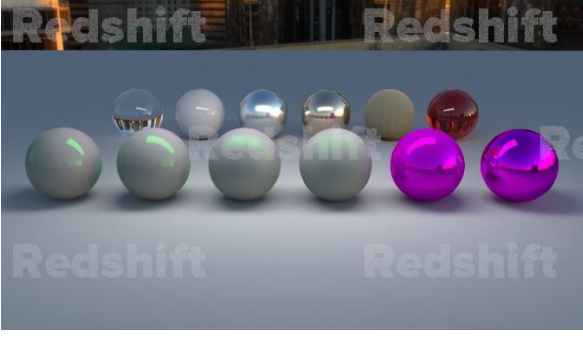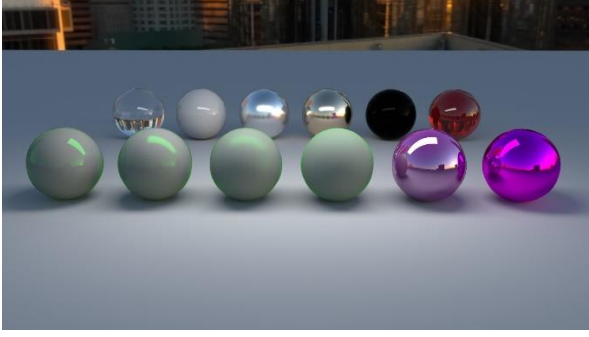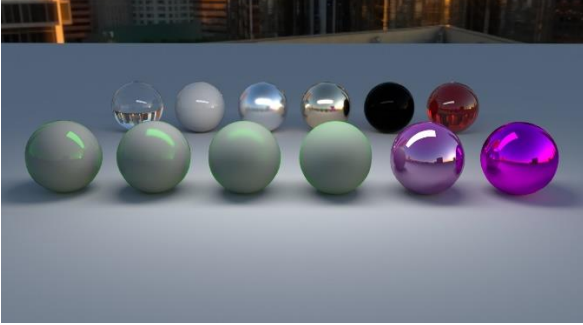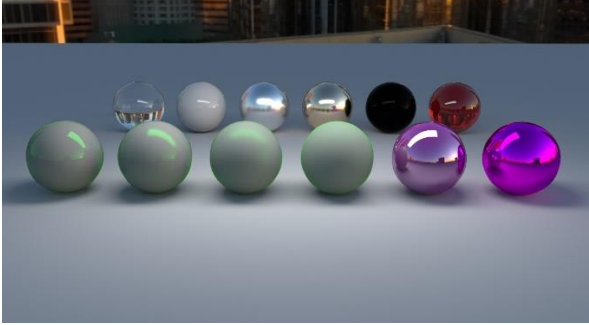
Scene 9

Shaderballs scene with color reflections and metalness variants.

Known issues:
1. Diffuse weight 0.5 gives more saturated color in Redshift. Possibly expected behavior?
2. Material with milky coffee preset is currently unsupported. We are researching ways to properly preserve colors and values for the extinction mode.
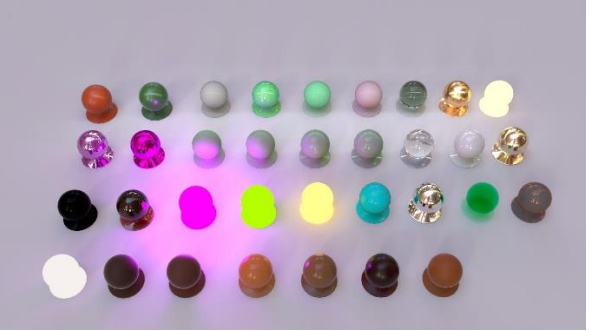
Redshift	Radeon ProRender v.2.15
Radeon ProRender v.2.14	**Radeon ProRender v.2.15**

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 a proper formula.

3. Anisotropic effects in RS are more prominent than in RPR. Either an expected behavior, or we need value adjustment beyond inputs from RS. Needs research.
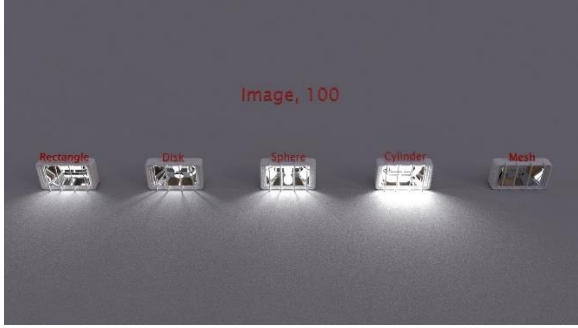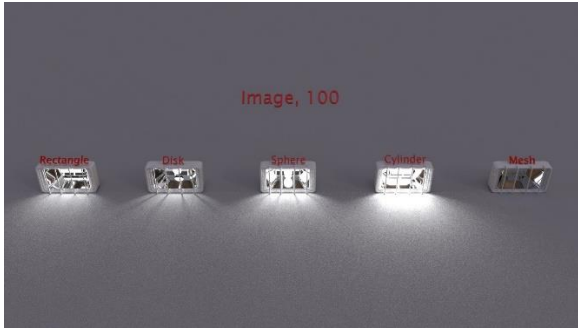
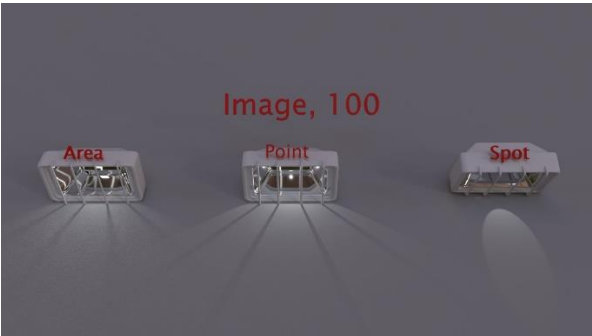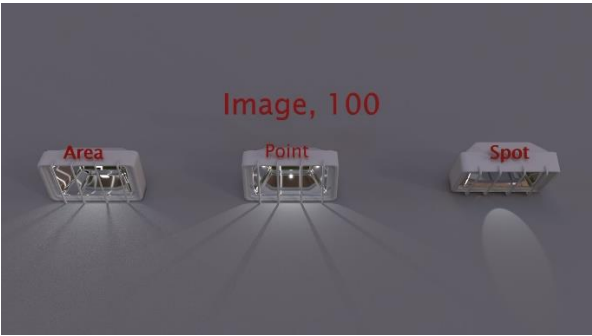| Redshift	Radeon ProRender v.2.15
Radeon ProRender v.2.14	**Radeon ProRender v.2.15**

Scene 11

Area light shapes.
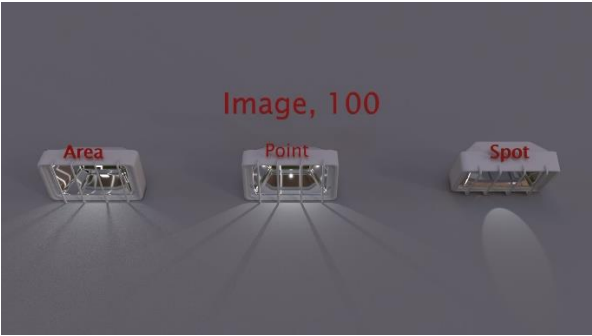
Known issues:
1. New Clamp irradiance value makes more noise. Possibly, we should reduce that number and compensate with brighter tonemapping when we implement conversion for it.
2. Mesh light conversion isn't supported yet.

Redshift	Radeon ProRender v.2.15
Radeon ProRender v.2.14	**Radeon ProRender v.2.15**

Scene 12

Physical light types.

Redshift	Radeon ProRender v.2.15
Radeon ProRender v.2.14	**Radeon ProRender v.2.15**

Scene 13

Light units.

Known issues:
1. New Clamp irradiance value makes more noise. Possibly, we should reduce that number and compensate with brighter tonemapping when we implement conversion for it.
2. Mesh light conversion isn't supported yet.

Redshift	Radeon ProRender v.2.15
Radeon ProRender v.2.14	**Radeon ProRender v.2.15**

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).

2. Intensity for area-dependent light sources have a bit different falloff for RPR, which makes light sources close to surfaces to be brighter by 20-25%. This issue doesn't present itself for light units that do not depend on the source area (RPRTOOL-113).
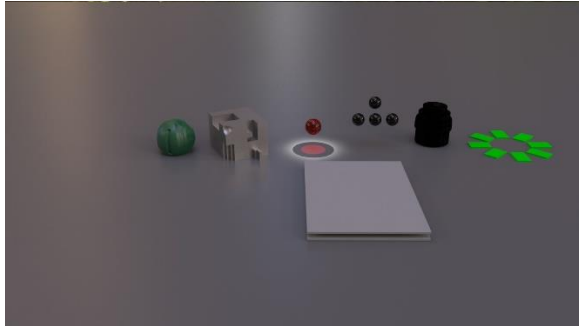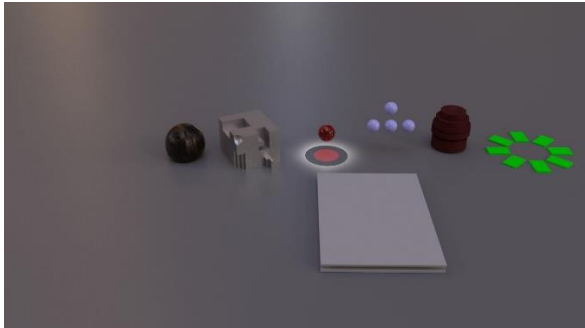
Redshift	Radeon ProRender v.2.15

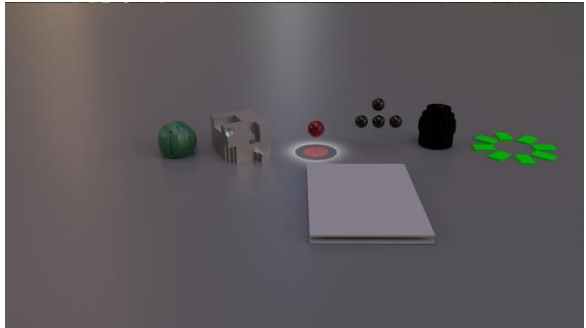| Radeon ProRender v.2.14	Radeon ProRender v.2.15
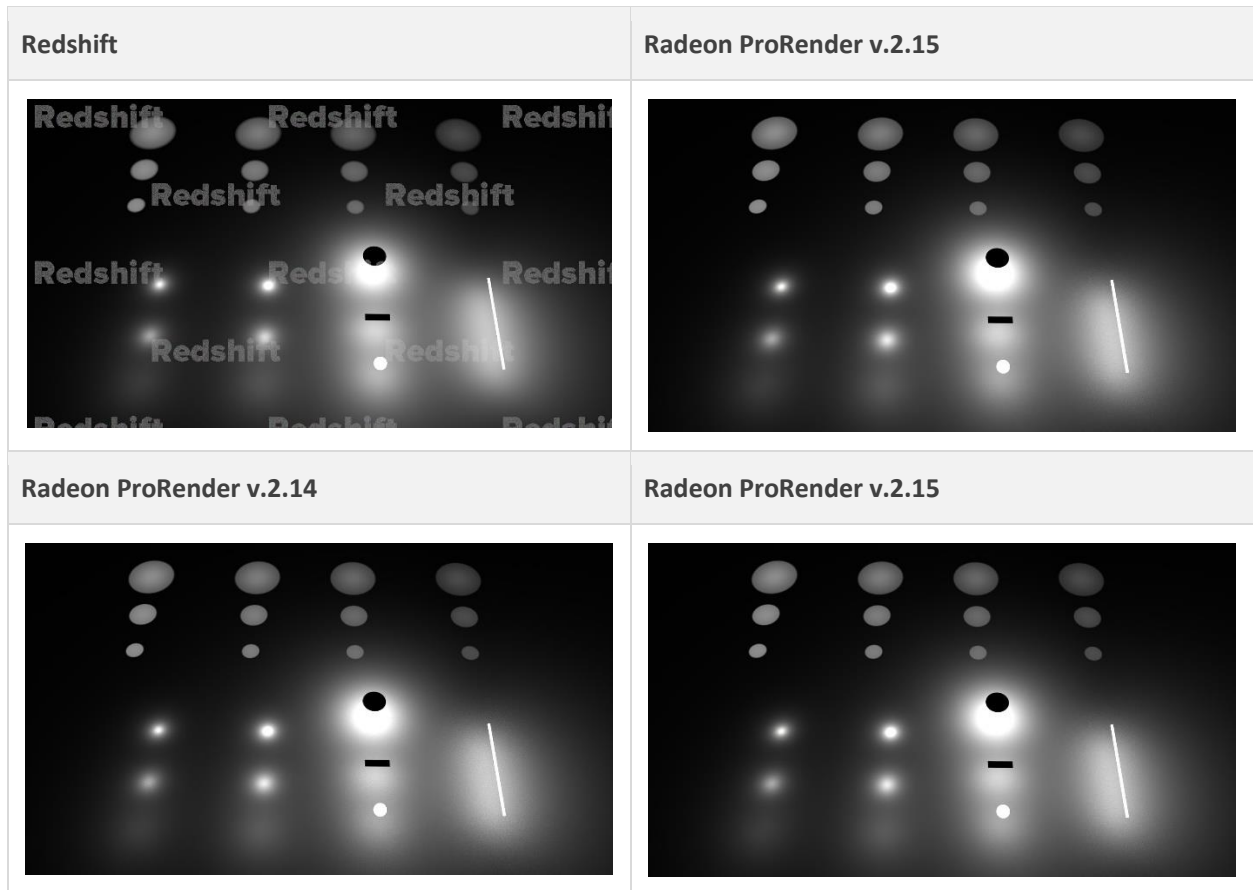
Scene 15

Inconvertible nodes.

From left to right: rsVolume, rsCurvature, rsRoundCorners, rsLightGobo, rsUserAttribute (color, scalar). rsWireframe, rsShaderSwitch.

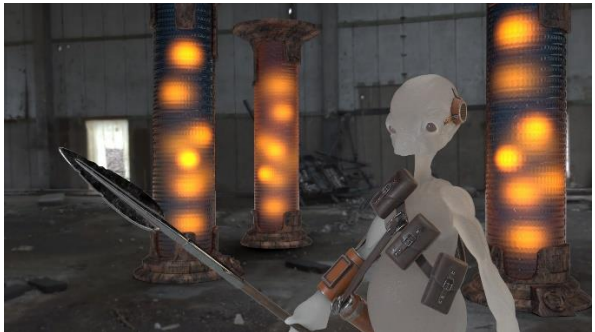**On the front**: rsRaySwitch on the bottom, and rsHair and rsAttributeLookUp on xGen Collection.
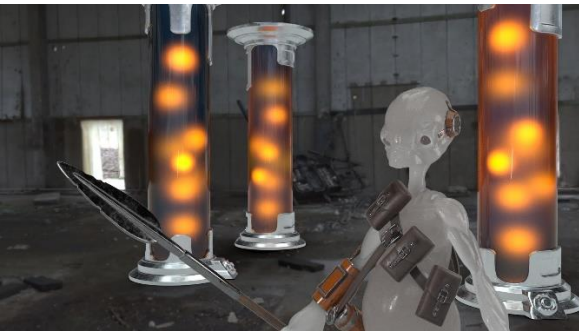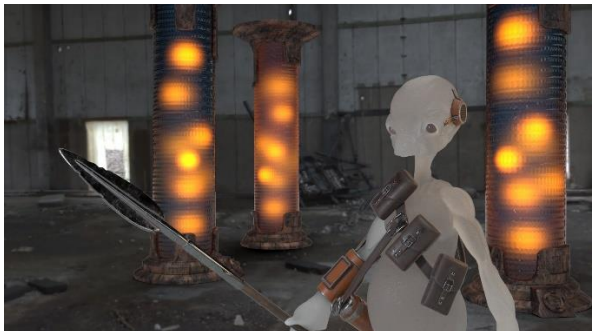
Redshift	Radeon ProRender v.2.15
Radeon ProRender v.2.14	**Radeon ProRender v.2.15**

Scene 16

Alien figure.

Known issues:

1. SSS for rsMaterial is waiting for implementation.
2. Shadow catcher doesn't catch diffuse and reflection rays (RPRMAYA-946).
3. We need to make sure that color space for maps is set and interpreted correctly.
4. Backscatter that is required for SSS to work, overpowers the SSS effect (RPRMAYA-759).
5. Metalness maps affects the color: RPRMAYA-947.
6. 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.
7. Absorption distance for refraction needs some minor adjustment to better match original colors.

Redshift	Radeon ProRender v.2.15
Radeon ProRender v.2.14	**Radeon ProRender v.2.15**

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 original reflection color and original reflectivity color. Possibly expected behavior, since its non-PBR material?

Redshift	Radeon ProRender v.2.15
Radeon ProRender v.2.14	**Radeon ProRender v.2.15**

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 v.2.15
Radeon ProRender v.2.14	**Radeon ProRender v.2.15**

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	2	2	4	Link
Physical Sky	1	0	0	0	1	Link
Utility Nodes	29	4	3	18	4	Link
Volume Scattering	2	0	0	1	1	Link
Total	54	10	7	23	14	Link