REDSHIFT TO RADEON PRORENDER CONVERSION REPORT

Version 2.13, 16 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: **22** nodes (**41%**), see details
- RESEARCH IS NEEDED: **15** nodes (**28%**), see details

This update is focused around utility nodes and connections, render settings transfer, general bugfixes, and, most importantly — **switching to Python**, as it provides more solid error catching and logging, and generally is more stable and flexible.

- Comparison between MEL and Python autotests outputs can be seen here: RS2RPR
- Comparison between MEL and Python complex scenes outputs can be seen here: RPRTOOL-21

To track issues, improvements and tasks, a JIRA project was created, with an epic for the RS-to-RPR conversion script: RPRTOOL-1. In this project, you can track our nearest plans described in stories and the implementation status for separate items.

Currently, most of the nodes are converted by the script. In some cases, we preserve original information as is, in some we are trying to accommodate the 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. 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.

REPORT DETAILS

In this report:

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

HISTORY

v.1.0 — First version.

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

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

v.1.3 — Area light convertion.

v.1.4 — Ambient Occlusion, Fresnel support.

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

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

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

v.1.8 — Opacity convertion 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.

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)

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.

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.

There is also an issue with different reflectivity between rsMaterial and Ubermaterial, which gives rsMaterial more reflected light.

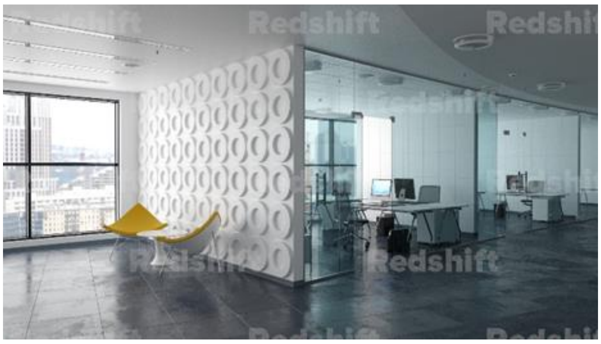
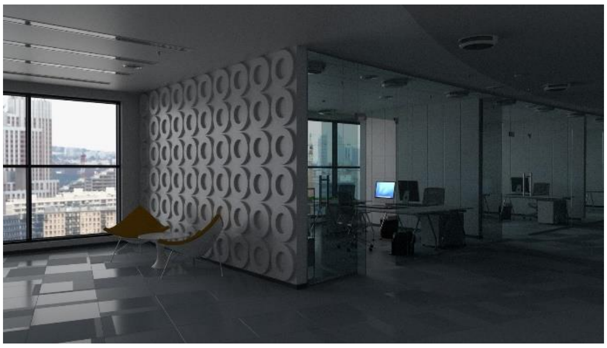
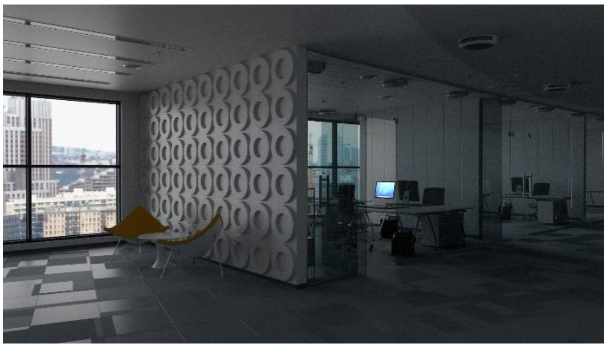
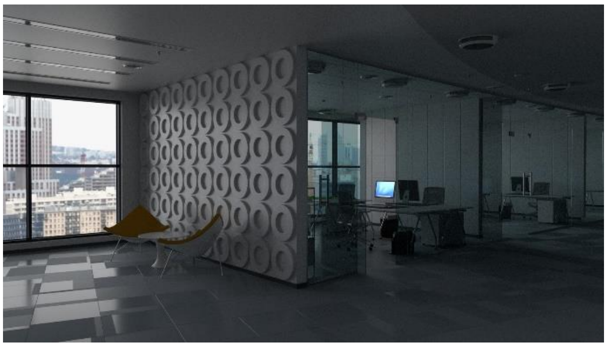
COMPLEX SCENES

Scene 1

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

Known issues:

1. Noise procedural for floor material got lost (RPRTOOL-80).
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 the RS. Besides that, there is still an issue with reflectivity and global area coefficients.

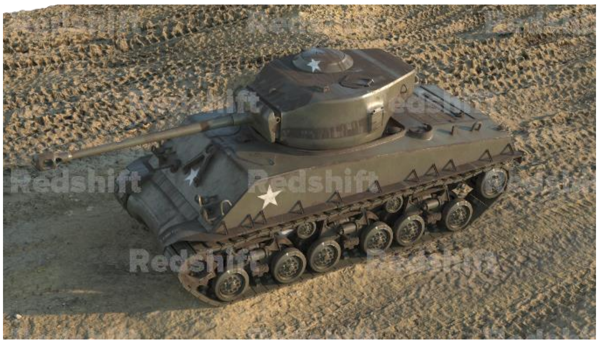
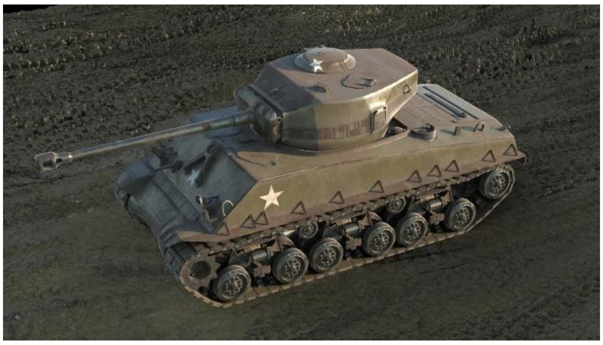
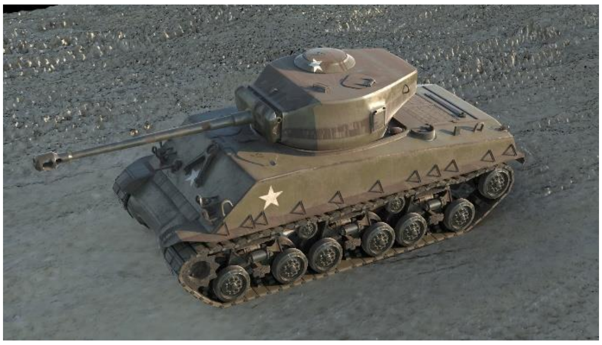
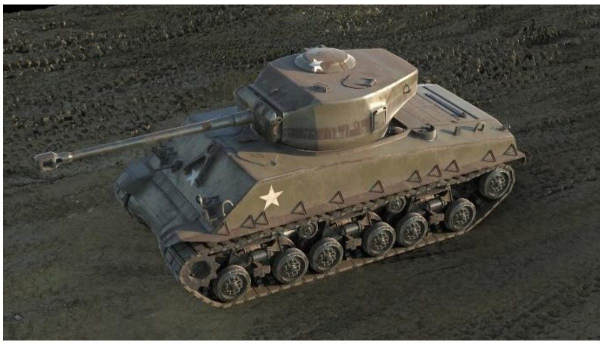
Redshift	**Radeon ProRender (script v.2.13 python)**
	
Radeon ProRender (script v.2.12 mel)	**Radeon ProRender (script v.2.13 python)**
	

Scene 2

Tank. Object render with displacement ground.

Known issues:

1. Ground material. We need to fix normal map conversion settings (RPRTOOL-46).
2. Displacement, while working now, has an issue with artifacts (RPRMAYA-329).

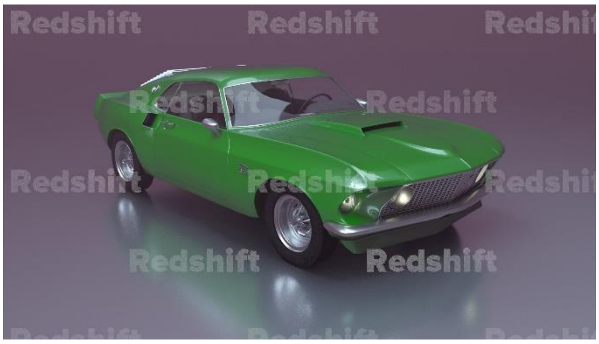
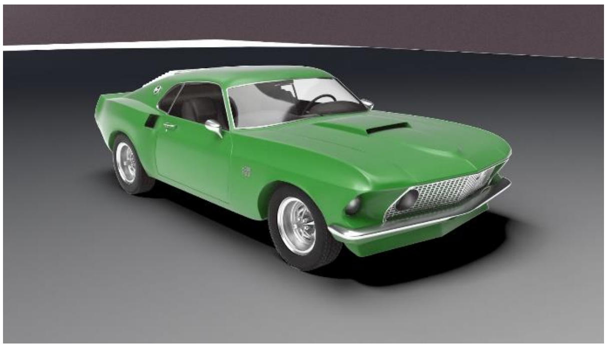
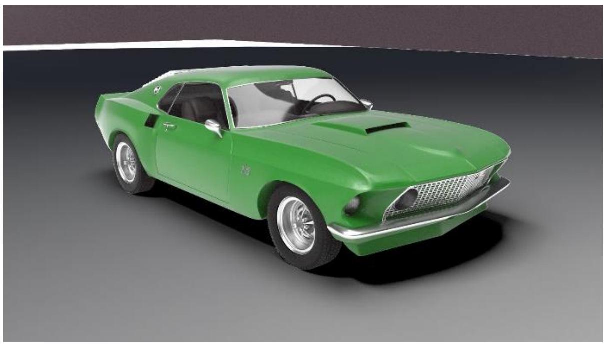
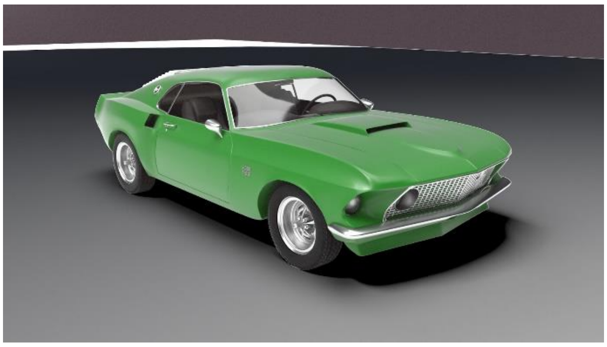
Redshift	**Radeon ProRender (script v.2.13 python)**
	
Radeon ProRender (script v.2.12 mel)	**Radeon ProRender (script v.2.13 python)**
	

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).

Redshift	Radeon ProRender (script v.2.13 python)
	
Radeon ProRender (script v.2.12 mel)	**Radeon ProRender (script v.2.13 python)**
	

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.

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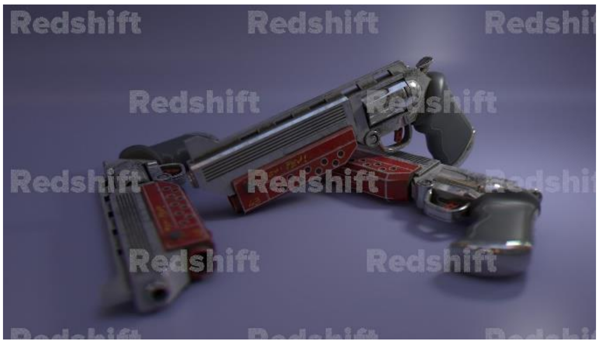	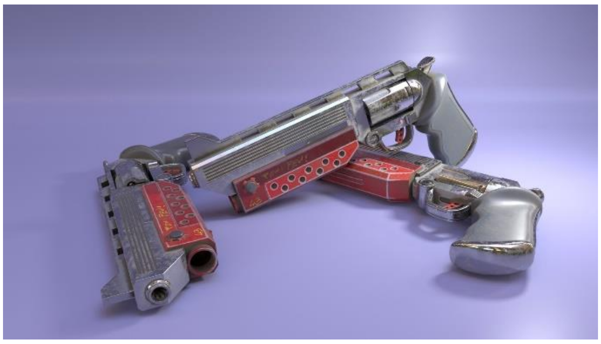
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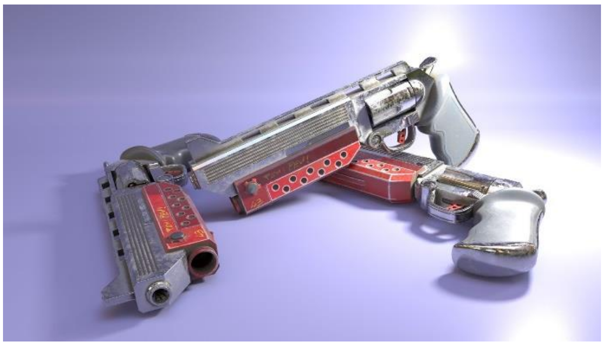
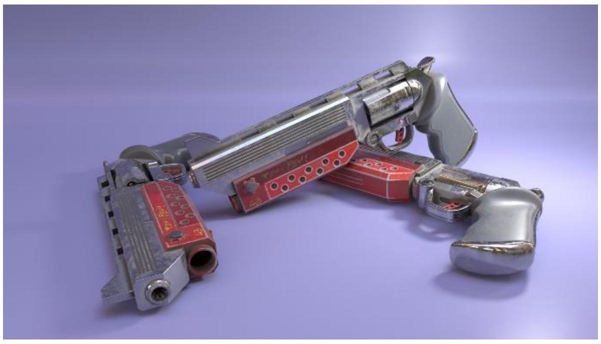
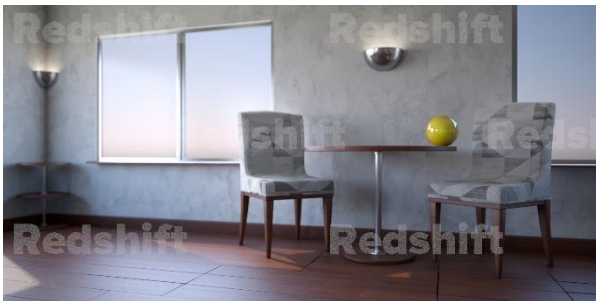
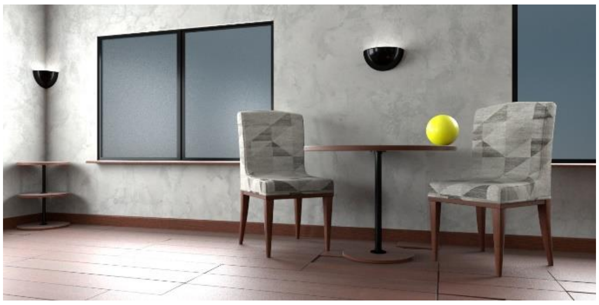
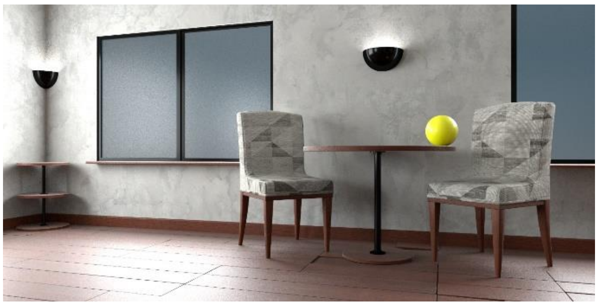
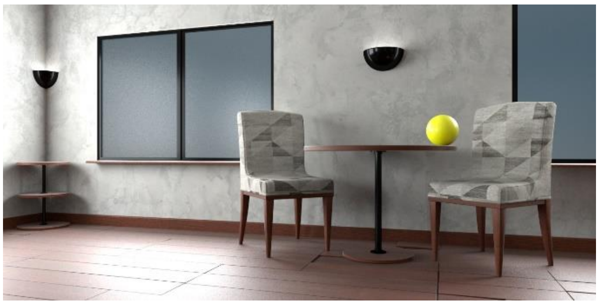
	

Scene 5

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.
3. DoF, as above.
4. Architectural material metalness reflection color is not calculated properly (RPRTOOL-67).

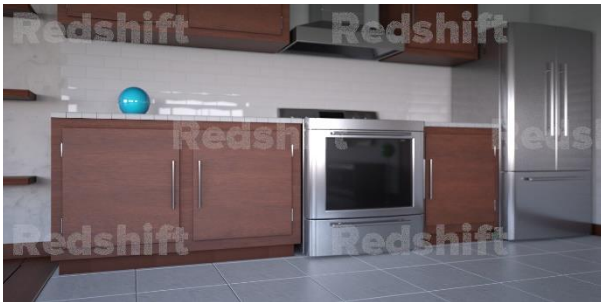
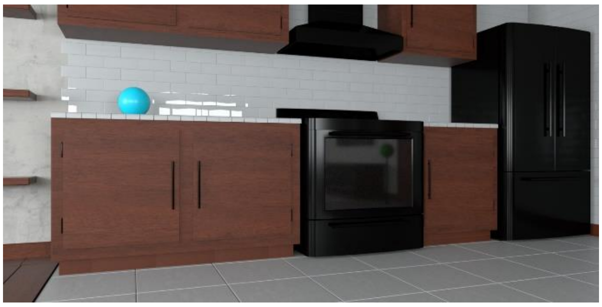
Redshift	**Radeon ProRender (script v.2.13 python)**
	
Radeon ProRender (script v.2.12 mel)	**Radeon ProRender (script v.2.13 python)**
	

Scene 6

Simple interior, part 2

Known issues:

1. Metal for Architectural material gets converted into too dark reflection color.
2. Reflections for Architectural non-metals needs compensation for more effect.
3. DoF, Portal and Area lights as above.

Redshift	Radeon ProRender (script v.2.13 python)
	
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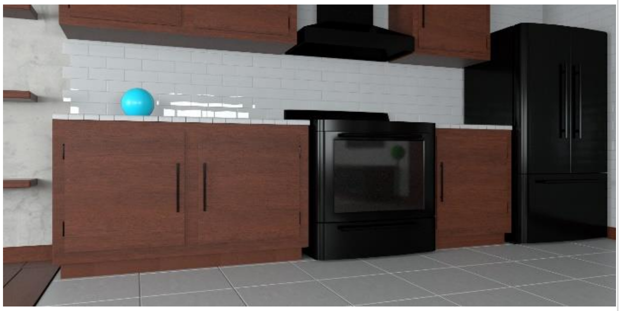
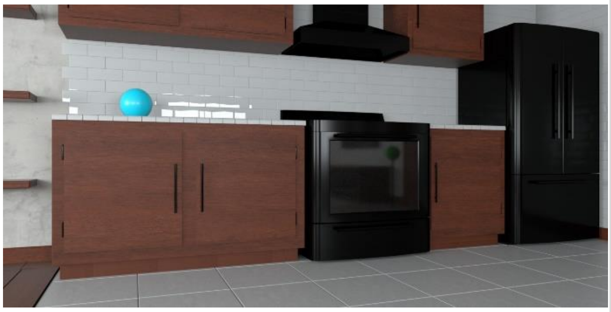
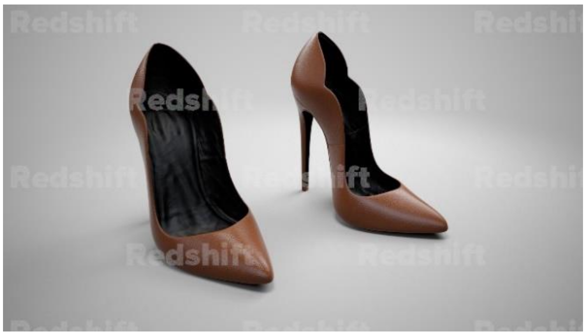
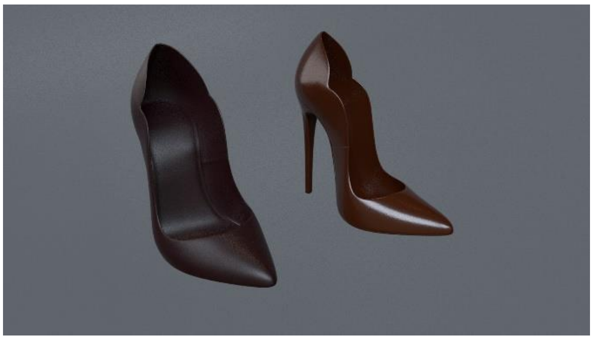
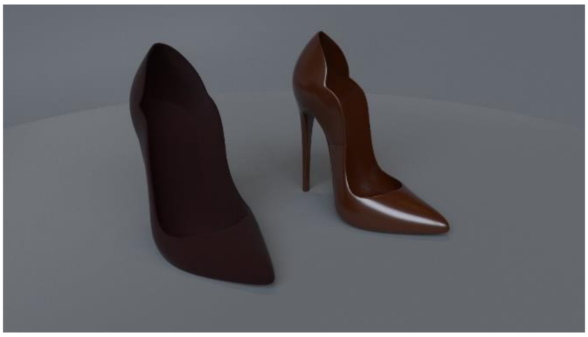
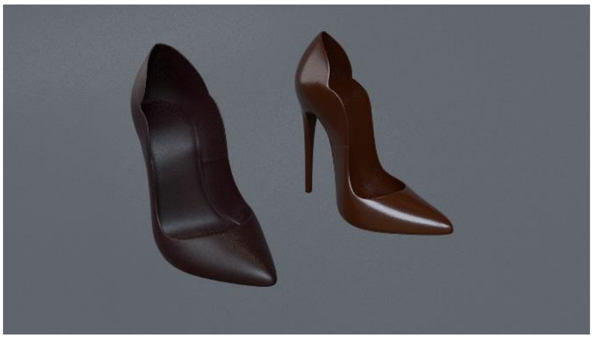
	

Scene 7

Shoes

Known issues:

1. Tonemapper as above.
2. Some of the shading network connections got lost, and there is also issue with black reflectivity value, that Redshift ignores, but our values get damaged because of that.
3. Ramp transparency mask for the floor material got lost, and transparency defaulted to 1 (RPRTOOL-81).

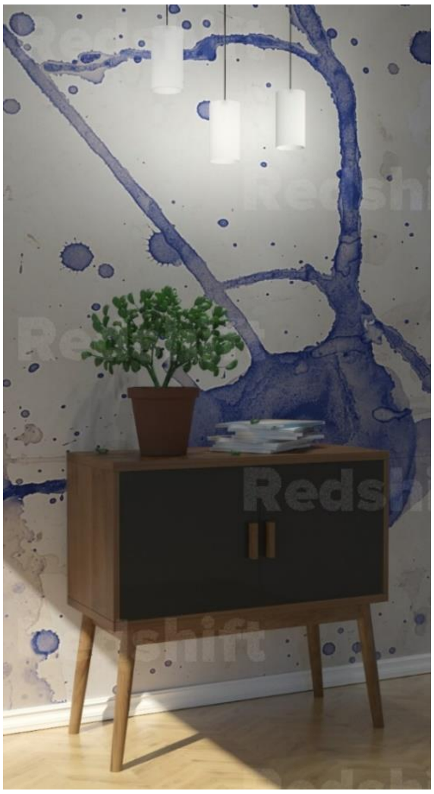
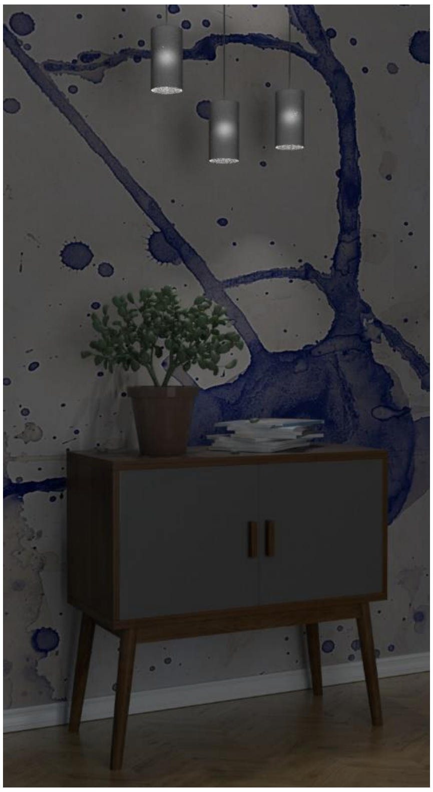
Redshift	**Radeon ProRender (script v.2.13 python)**
	
Radeon ProRender (script v.2.12 mel)	**Radeon ProRender (script v.2.13 python)**
	

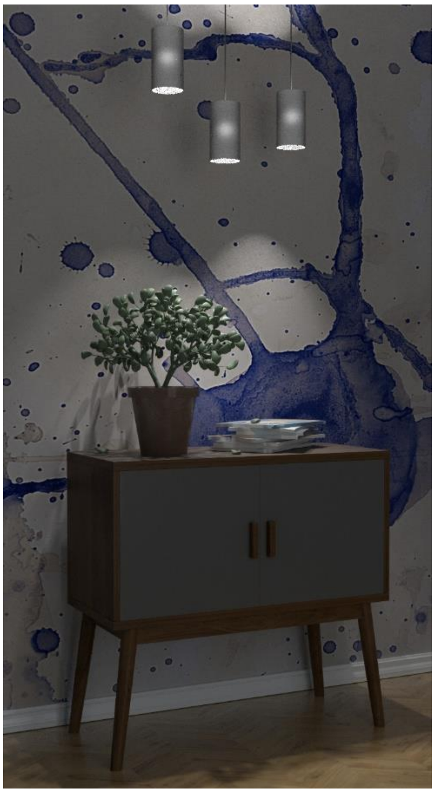
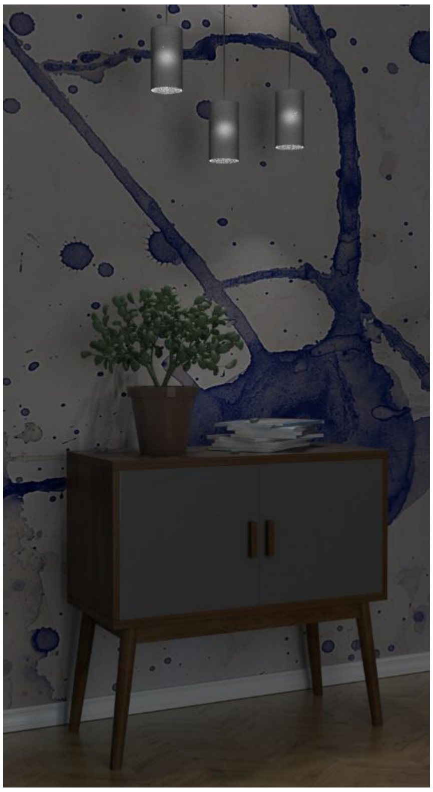
Scene 8

Small object render, lit by Physical Sun and arealights.

Known issues:

1. Translucency->Backscatter conversion issue, need to find more accurate formulas to convert. First iteration of the math was outlined in RPRTOOL-66
2. Translucent lamp cover doesn't let the light out, needs adjustment in materials
3. Grey color gets too light. Needs investigation.
4. Sun currently doesn't convert to the Directional light, TBD.
5. rs Sun and Sky go paired with photoexposure node. Tonemapper needs to be adjusted accordingly.

Redshift	Radeon ProRender (script v.2.13 python)
	

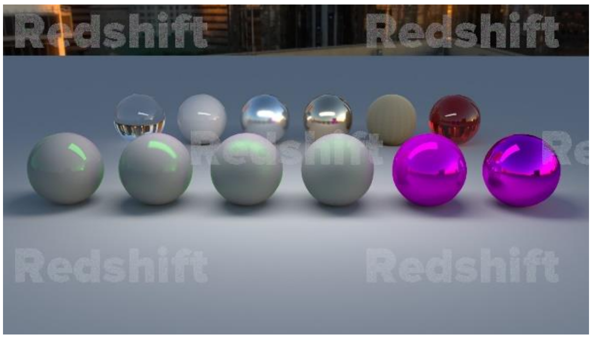
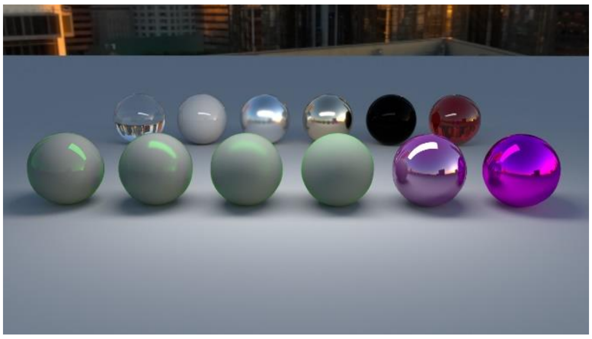
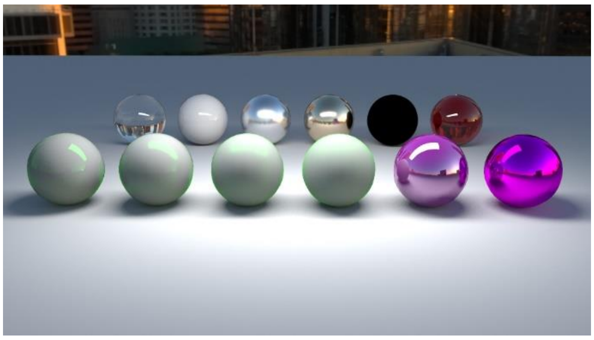
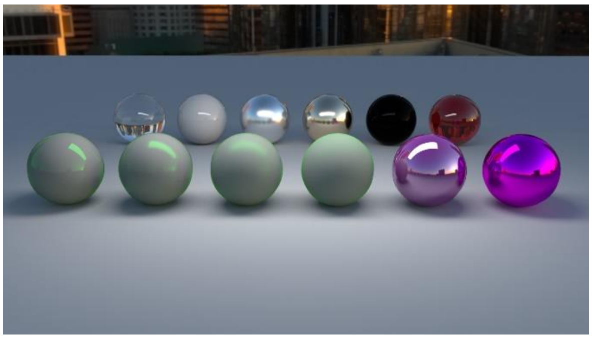
Radeon ProRender (script v.2.12 mel)	Radeon ProRender (script v.2.13 python)
	

Scene 9

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

Known issues:

1. Diffuse weight 0.5 gives more saturated color in Redshift. Possibly expected behaviour.
2. Material with milky coffee preset is currently unsupported. We are looking for the solution to properly preserve colors and values for extinction mode.

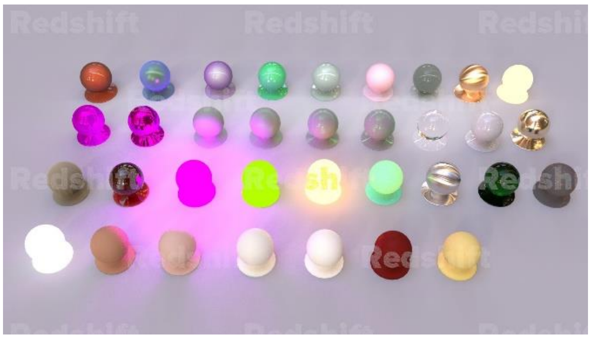
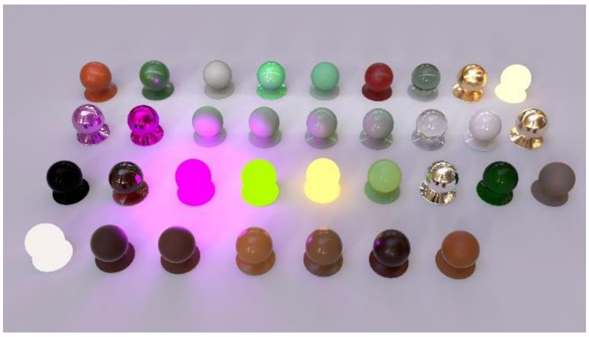
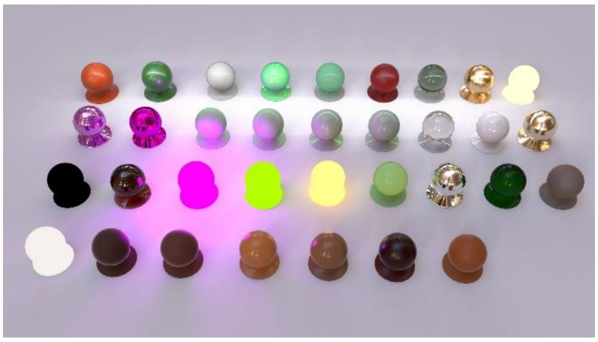
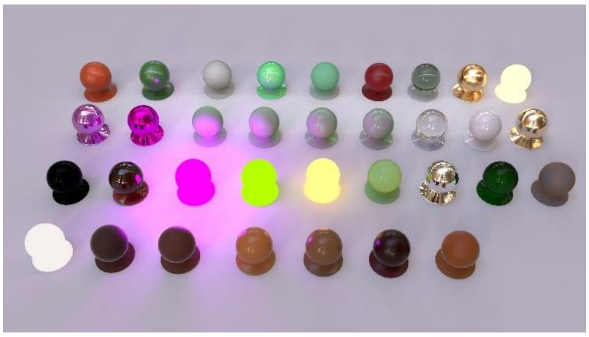
Redshift	**Radeon ProRender (script v.2.13 python)**
	
Radeon ProRender (script v.2.12 mel)	**Radeon ProRender (script v.2.13 python)**
	

Scene 10

Shaderballs scene with set of rsMaterials, CarPaints, Incadescents and Subsurface scatter materials, including materials from 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. Research is needed.
4. Translucency->Backscatter conversion issue, need to find more accurate formulas to convert. First iteration of the math was outlined in RPRTOOL-66.

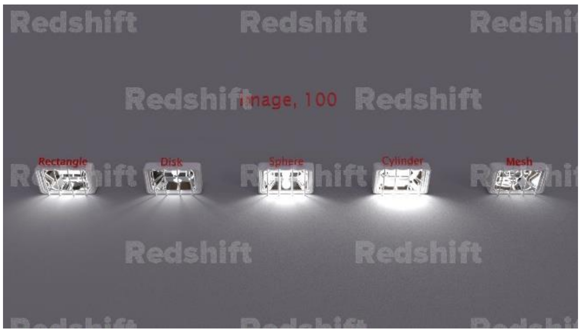
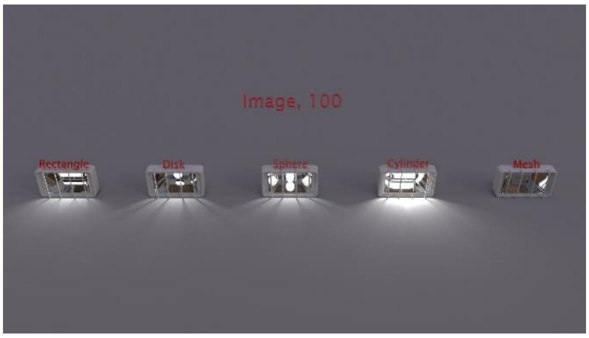
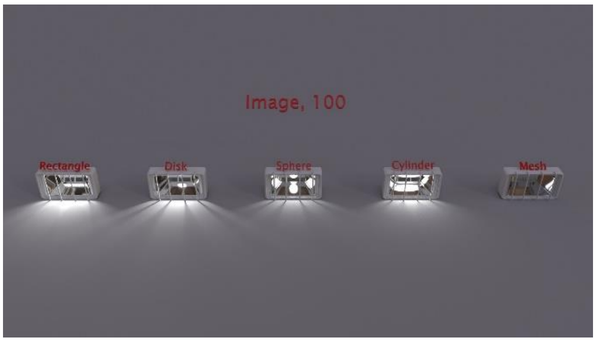
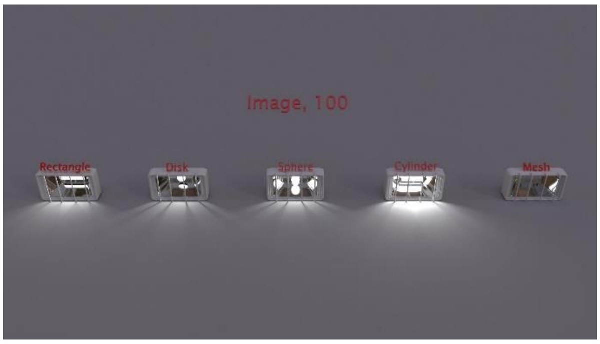
Redshift	Radeon ProRender (script v.2.13 python)
	
Radeon ProRender (script v.2.12 mel)	**Radeon ProRender (script v.2.13 python)**
	

Scene 11

Area light shapes

Known issues:

1. Light intensity is being affected by Irradiance values (bigger in RS)
2. Mesh light conversion isn't supported yet.

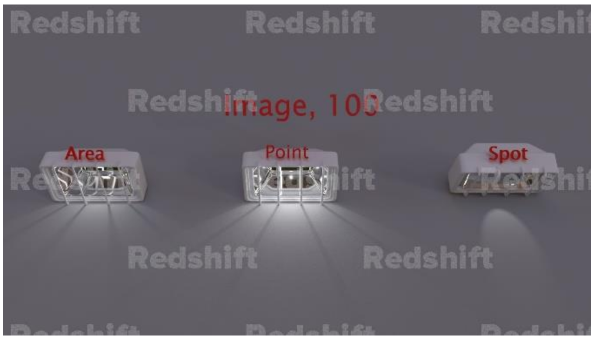
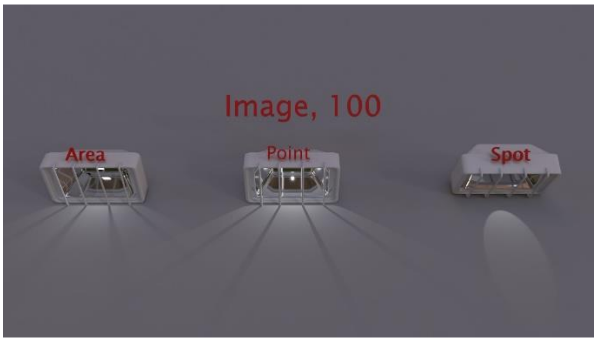
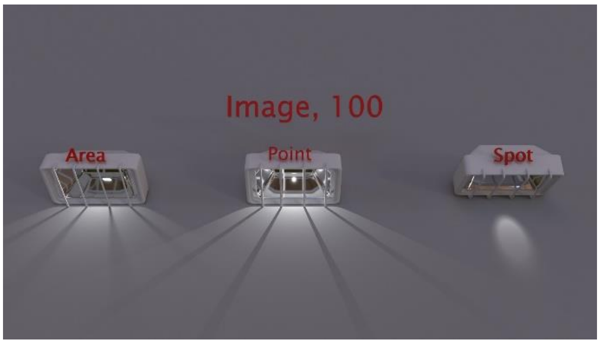
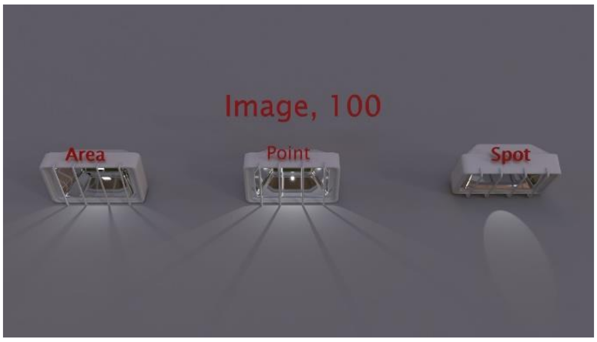
Redshift	**Radeon ProRender (script v.2.13 python)**
 Redshift Image, 100 Rectangle Disk Sphere Cylinder Mesh	 Image, 100 Rectangle Disk Sphere Cylinder Mesh
Radeon ProRender (script v.2.12 mel)	**Radeon ProRender (script v.2.13 python)**
 Image, 100 Rectangle Disk Sphere Cylinder Mesh	 Image, 100 Rectangle Disk Sphere Cylinder Mesh

Scene 12

Physical light types

Known issues:

1. Light intensity is being affected different Irradiance values RPRTOOL-84

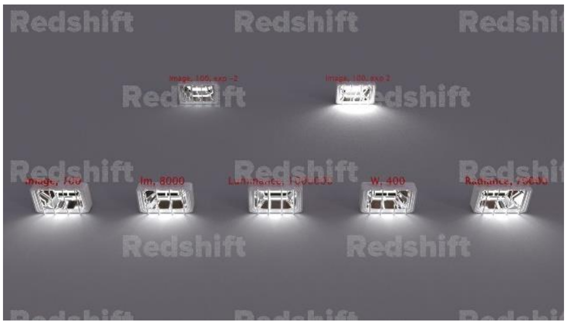
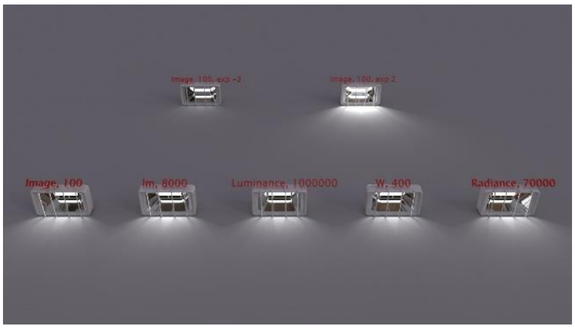
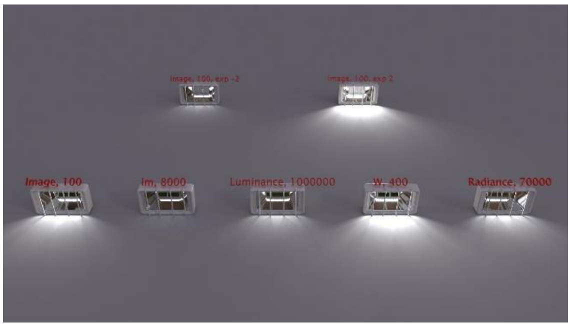
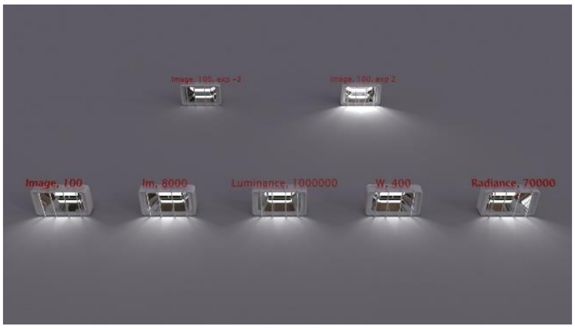
Redshift	**Radeon ProRender (script v.2.13 python)**
	
Radeon ProRender (script v.2.12 mel)	**Radeon ProRender (script v.2.13 python)**
	

Scene 13

Light units

Known issues:

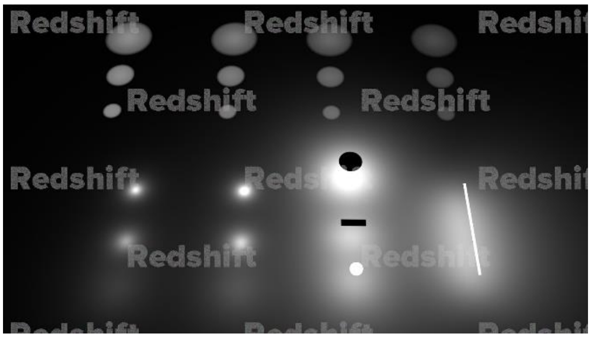
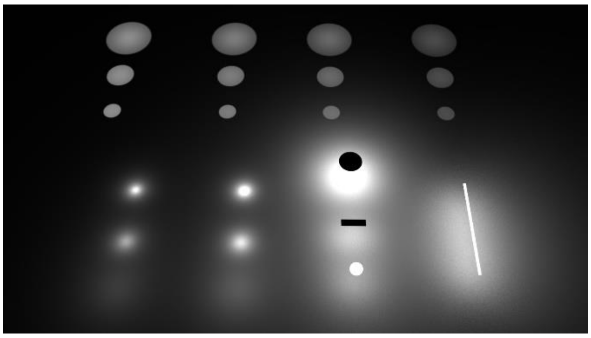
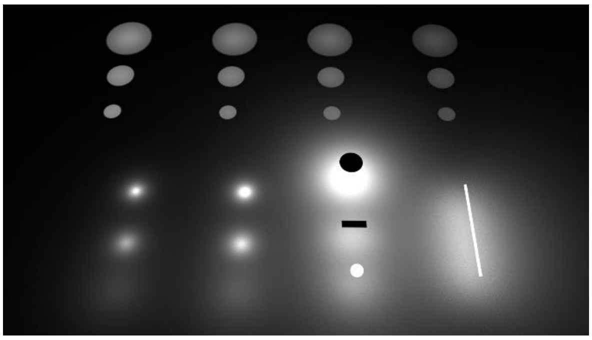
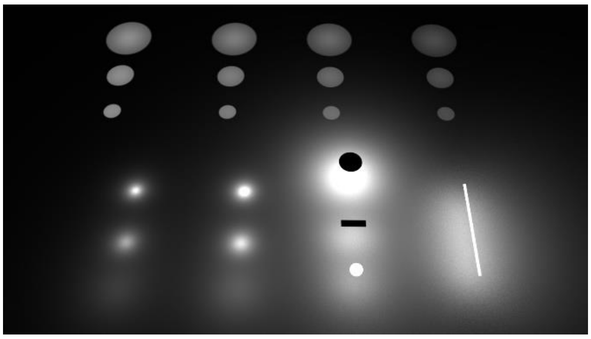
1. Light intensity is being affected by different Irradiance values (RPRTOOL-84).

Redshift	Radeon ProRender (script v.2.13 python)
 Redshift Image, 100, exp -2 Image, 100, exp 2 Image, 100 lm, 8000 Luminance, 1000000 W, 400 Radiance, 70000	 Image, 100, exp -2 Image, 100, exp 2 Image, 100 lm, 8000 Luminance, 1000000 W, 400 Radiance, 70000
Radeon ProRender (script v.2.12 mel)	**Radeon ProRender (script v.2.13 python)**
 Image, 100, exp -2 Image, 100, exp 2 Image, 100 lm, 8000 Luminance, 1000000 W, 400 Radiance, 70000	 Image, 100, exp -2 Image, 100, exp 2 Image, 100 lm, 8000 Luminance, 1000000 W, 400 Radiance, 70000

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 source area. This could be possibly amended by including 2 redshift render config values into the formula. RPRTOOL-84.

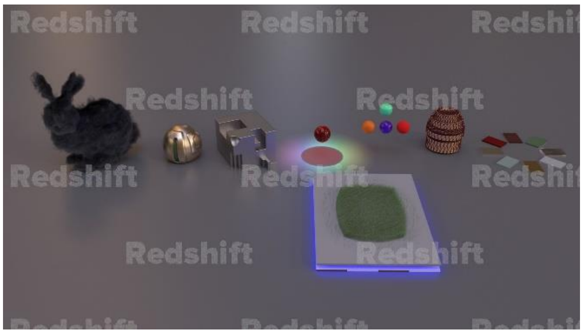
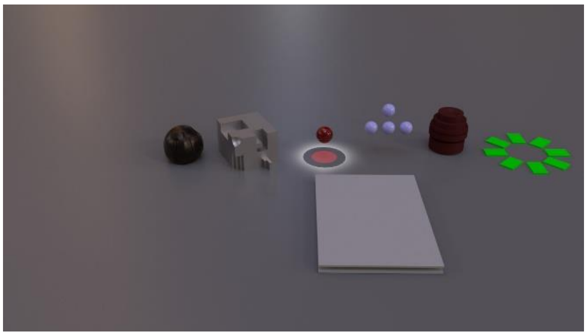
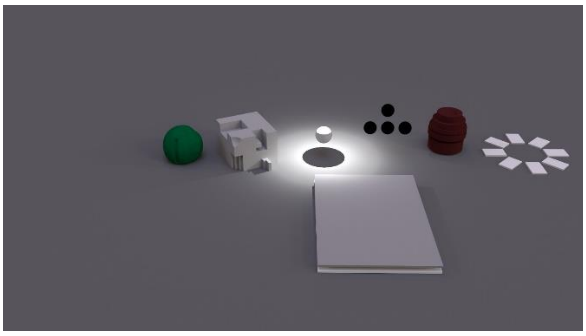
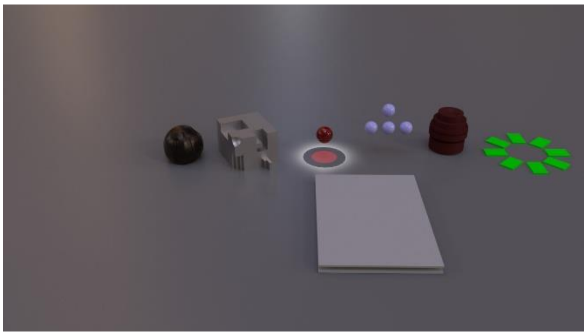
Redshift	**Radeon ProRender (script v.2.13 python)**
	
Radeon ProRender (script v.2.12 mel)	**Radeon ProRender (script v.2.13 python)**
	

Scene 15

Unconvertable 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 (script v.2.13 python)
	
Radeon ProRender (script v.2.12 mel)	**Radeon ProRender (script v.2.13 python)**
	

TEST REPORT LINK

For detailed comparison of rendered scenes, see Test Report.

```
Login: rpruser
Password: rpruser2017
```

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	2	2	2	5	Link
Physical Sky	1	0	0	0	1	Link
Utility Nodes	29	5	3	17	4	Link
Volume Scattering	2	0	0	1	1	Link
Total	**54**	**10**	**7**	**22**	**15**	Link