Design Visualization with Autodesk® Alias®, Part 2

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Who am I?

- Wonjin John is an automotive and industrial designer. Born in Seoul, Korea, he moved to United States after finishing engineering school in Korea. He studied automotive design at the Art Center College of Design in Pasadena, California. He later moved to Japan to work for an independent automotive design house as a designer and Alias® expert. Later, he joined Alias Wavefront® as an application engineer, and is now working as Business Development manager for Digital Concept/Visualization at Autodesk Japan.
Class Summary

This class will teach you how to use the rendering capability of Autodesk Alias products. We had part 1 that covered the basic knowledge of materials and textures, and for part 2, we will cover the basic knowledge of lightings and how to set up effective environment for rendering.
Learning Objectives

At the end of this class, you will be able to:

- Work with environments and lights to make more realistic renderings
- Explain the different types of lights and definitions and how to use the important parameters of lights
- Use the techniques to set up basic but effective lighting scenario and environments
Agenda

Design Visualization with Autodesk® Alias®, Part 2

- Lights
  - Types of Lights
  - Important Parameters of Lights
  - Parameters of Spot Lights
  - Light Effects
  - Shadow Parameters
  - Raytracer Soft Shadows
  - 3 point Lighting

- Rendering Techniques
  - How to create and setup simple but effective environment for Raytracing
  - Technique of using Reflective Plane
  - How to create nice silhouette of the model using light reflection
Lights
Types of Lights

- Ambient
- Volume
- Area
- Spot
- Linear
- Point
- Directional
Ambient Light

Ambient light is a light that could be used as either environmental light or point light, or somewhere between.

- Ambient Shade = 0 means the light comes from all direction
- Ambient Shade = 1 means the light comes from the position of the light

Ambient light is located on the top of the scene

Ambient Shade=0.0
Ambient Shade=0.5
Ambient Shade=1.0
Directional Light

Directional Light illuminates in one direction and can be used to simulate very distant light sources, like sun.
Point Light

Point Light illuminates from the location of the light to all directions, and can be used to simulate incandescent light bulbs.

- Decay: controls how quickly light intensity decreases with distance
Linear Light

Linear Light is a fluorescent tube-like light.
- Linear Light is a serious of Point lights and is costly in calculation time.
- No self shadow available in Hardware shading

Using Linear Light

Using a Cylinder with a Spot linear can create better quality with less rendering time
Area Light

Area Light is a rectangular light source useful for simulating lightbox reflections

- Area Light is costly in calculation time and could be replaced with other technique
Volume Light

Volume Light creates a geometrical volume that illuminates objects contained within the volume without illuminating objects outside the volume.
Spot Light

Spot light illuminates in one direction in an expanding cone.

Spot view to check how the light will illuminate the scene.
Common parameters of Lights

- **Light**: controls whether the light is on/off
- **Cast Shadows**: Creates Shadows

<table>
<thead>
<tr>
<th></th>
<th>Shadow</th>
<th>Soft Shadow</th>
</tr>
</thead>
<tbody>
<tr>
<td>Raycast</td>
<td>Spot light only</td>
<td>Automatic</td>
</tr>
<tr>
<td>Raytrace</td>
<td>All lights</td>
<td>Need to set up soft shadow</td>
</tr>
</tbody>
</table>

- **Intensity**: controls the strength of the lights
Common parameters of Lights

- Color: add colors to the lights. You can add textures to simulate special lighting effects.
Common parameters of Lights

- Light Radius: can control the size of the light source when soft shadow is on.
- The light itself will be not be rendered but it influence the soft shadow

Light radius = 1
Light radius = 10
Spot Light parameters

- **Spread**: controls the angle (in degrees) from edge to edge of the spot light’s beam.
- **Decay**: controls how quickly light intensity decreases with distance.

<table>
<thead>
<tr>
<th>Decay Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>no decay; light reaches everything</td>
</tr>
<tr>
<td>1</td>
<td>light intensity decreases directly (linearly) with distance (slower than real world light)</td>
</tr>
<tr>
<td>2</td>
<td>light intensity decreases proportionally with the square of distance (the same as real world light)</td>
</tr>
<tr>
<td>3</td>
<td>light intensity decreases proportionally with the cube of distance (faster than real world light)</td>
</tr>
</tbody>
</table>

- **Dropoff**: controls the rate at which light intensity decreases from the center to the edge of the spot light beam.
- **Penumbra**: controls the angle (in degrees) over which the intensity of the spot light falls off linearly to zero.
Light Effects

- **Glow**: is a bright, fuzzy disk at the location of a light source
- **Halo**: is a bright ring that surrounds a light source
- **Lens flare**: consists of several bright disks of various sizes that extend from the light source
- Glow, Halo and Lens flare are rendered only when the light comes towards camera
- **Fog**: simulates light rays by rendering the particles in the course of the light
Shadow Parameters

- *Shadow color*: controls the color of the shadow casted

Shadow Color = Black  
Shadow Color = Dark Gray
Raytracer Soft Shadows

- **Soft Shadows**: blurs the edge of the shadows during raytracing

![Soft Shadows OFF](image1.png) ![Soft Shadows ON](image2.png)

Soft Shadows = OFF

Soft Shadows = ON
Raytracer Soft Shadows

- Soft Shadows vs Edge Shadow

Cloudy day

Sunny day
Raytracer Soft Shadows

- **Shadow Samples**: controls the number of samples for soft shadows
  - This will increase the rendering time

![Screenshot of software interface with Shadow Samples set to 2 and 30, showing the difference in shadow quality.]
Raytracer Soft Shadows

- Use Shadow Map: reflects the casted shadow onto other objects

Use Shadow Map = OFF

Use Shadow Map = ON
3 point lighting

- 3 point lighting is one of the most common lighting method used in photo shooting for products

- 3 point lighting is consisted of
  - Key light
  - Fill light
  - Back light.
3 point lighting

- **Key light**: is the main light and the most brightest among 3 lights in the scene. It should light the most important part of the objects and used often to create the shadow. Often it is used from $\frac{3}{4}$ position from front to side or 45 degree from front to left or right.

![Effect of Key light](Image1)

![Scenes with only Key light](Image2)
3 point lighting

- **Fill light**: lights up the dark part of the object where Key light can’t cover. It light up the dark part of the object slightly and soften the atmosphere of the rendering. If Fill light is too bright, more details of the object will be shown but will lose the contrast. Make sure you have weaker intensity than Key light and no need to add shadow.

![Fill light only](image1.png)

![Key light + Fill light](image2.png)
3 point lighting

- **Back light**: is the light located from the upper back part of the object and reproduce the silhouette of the object and separate the object from the background. In some case, adding different color to Back light than Key light could increase the effect.
3 point lighting is a starting point to get high quality rendering easily. Adding additional lights could create more dramatic atmosphere, but this basic 3 point lighting is sufficient for most of the cases.

- Key light + Fill light + Back light
- Key light + Fill light + Back light + Reflection
**Ambient Occlusion**

- **Ambient Occlusion**: can add additional effect of soft shadow and depth to the environment
  - Ambient Occlusion could be used for both Hardware shading and Software rendering
  - AO is more useful when you are using HW shading than Software rendering
Ambient Occlusion

- **Ambient Occlusion**
  - Ambient Occlusion is not influenced by the lights in the scene.
  - Ambient Occlusion is not in-direct shadow or soft shadow.
How to create simple but effective environments for rendering
The number of lights can add additional rendering times. You can create textures that fakes the lightings onto the environment and save the rendering times.
Technique to set up the environment 2

- Using the reflective plane is very important when you render an object with reflective paints like automotive. It gives you different stories and the focus point of your story-telling.
In real photo shooting, the light could be shooting to the environment instead of your object on the scene. This creates nice soft lighting effects on the model and creates nice silhouette to the model.
Technique to set up the environment 3

- You can use the same method in Raytracing to create similar effect of Back light in 3 point lighting.

2 spot lights shooting onto the wall

Final rendering