Maya + Arnold Lights: Overview and Basic Use

Lighting establishes form, depth, atmosphere, scale, and focus within a 3D scene. Maya includes several standard light types, and Arnold adds additional lights and controls designed for physically based rendering.

Viewing Lights in the Maya Viewport

By default, the Maya viewport may use Default Lighting rather than lights you have created in the scene. Default Lighting is not an actual light object; it is temporary viewport illumination.

- Preview scene lights: Lighting > Use All Lights
- Hotkey: 7
- Return to Maya default lighting: Lighting > Use Default Lighting
- Preview viewport shadows: Lighting > Shadows
- For an accurate preview of Arnold lighting, use Arnold RenderView / IPR. The viewport does not reproduce every Arnold lighting, material, shadow, or volumetric effect accurately.

Maya Lights + Arnold

Standard Maya lights can be rendered with Arnold. When Arnold is loaded, Maya lights also receive an Arnold section in the Attribute Editor. Most useful Maya lights for Arnold:

- Directional Light
- Point Light
- Spot Light
- Area Light Maya also includes Ambient and Volume lights, but these are not supported by Arnold (MtoA). For similar effects, use Arnold alternatives such as a Skydome Light or Atmosphere Volume.

Arnold Radius and Shadow Softness

For Point and Spot Lights, Arnold Radius controls the apparent size of the light source and therefore the softness of the shadows it casts.

- Radius 0: very hard shadows
- Radius 0.25: slight softening
- Radius 0.5: moderate softening

- Radius 1.0: distinctly soft shadows
- Radius 2.0+: broad, very soft shadows These values are scene-scale dependent. If changing Radius has little visible effect, the scale of the scene may require larger values. The same basic principle applies to other light types, but the control is different:
- Point / Spot Light: increase Radius
- Directional Light: increase Angle
- Area Light: increase the physical size of the light The larger the apparent light source, the softer the shadow.

Directional Light

Create > Lights > Directional Light A Directional Light behaves like an extremely distant source. Its rays are parallel and illuminate the scene from one direction. Useful for:

- sunlight
- moonlight
- broad exterior lighting
- strong directional illumination The position of a Directional Light does not matter. Its rotation determines the direction of the light. Because the source is effectively infinitely distant, moving it closer to or farther from an object does not change the illumination. ### Arnold: Angle Angle controls the apparent size of the source and therefore shadow softness.
- Angle 0°: very sharp shadows
- Angle 0.5°: approximately the angular size of the real sun; relatively crisp natural sunlight
- Angle 1–2°: softer, hazier sunlight
- Angle 5–6°: very soft directional shadows

Point Light

Create > Lights > Point Light A Point Light emits light outward in all directions from a single location, somewhat like a bare light bulb. Useful for:

- lamps
- bulbs

- candles
- small practical lights
- local illumination Unlike a Directional Light, position matters. Move the Point Light closer to or farther from the subject to change its relationship to the scene.

Spot Light

Create > Lights > Spot Light A Spot Light produces a cone-shaped beam that widens as it travels away from the source. Useful for:

- lamps
- flashlights
- theatrical lighting
- pools of focused light
- dramatic key lights
- rim lights Both the position and direction affect the result. ### Positioning a Spot Light For precise aiming:
- Modify > Transformation Tools > Show Manipulator Tool
- Eye Point: position of the light source
- Look-at Point: point toward which the light is aimed
- Panels > Look Through Selected: view through the Spot Light and aim it directly ### Cone Angle Controls the width of the beam.
- Smaller Cone Angle: narrow, focused beam
- Larger Cone Angle: broad beam ### Penumbra Angle Controls the softness of the outer edge of the spotlight beam. Increasing Penumbra creates a softer transition between illuminated and unilluminated areas. Penumbra softens the edge of the beam itself. It does not soften the shadows cast by objects. ### Dropoff Controls how quickly illumination decreases from the center of the beam toward the edge. Higher Dropoff values concentrate the strongest illumination near the center.

Area Light

Create > Lights > Area Light
or Arnold > Lights > Area Light An Area Light emits light from a surface rather than from

a single mathematical point. This makes it one of the most useful lights for realistic rendering. Useful for:

- windows
- softboxes
- fluorescent fixtures
- studio lighting
- product lighting
- soft key and fill lights The size of the Area Light directly affects shadow softness.
- Larger light: softer shadows
- Smaller light: harder shadows

Arnold Area Light Shapes

Quad

Rectangular light source. Useful for windows, softboxes, LED panels, and large studio lights. ### Disk Circular flat source. Useful for round fixtures, reflectors, and circular studio lights. ### Cylinder Tubular source. Useful for fluorescent tubes, neon-style fixtures, and long cylindrical lights. Choose a shape that roughly corresponds to the physical source you are simulating.

Intensity and Exposure

Lights include an Intensity control, but Arnold also provides Exposure. Exposure is convenient for large brightness changes. Each increase of 1 Exposure doubles the amount of light.

- Exposure 0: base level
- Exposure +1: twice as bright
- Exposure +2: four times as bright
- Exposure +3: eight times as bright Negative values reduce the light by the same stop-based system. A useful workflow is to use Exposure for broad brightness changes and Intensity for smaller adjustments.

Light Color

Color controls the color of the light. Colored illumination can suggest:

- warm sunlight
- cool skylight
- fluorescent lighting
- colored LEDs
- fire
- theatrical lighting
- stylized environments

Arnold Color Temperature

Arnold lights can use Color Temperature. Enable Use Color Temperature. Temperature is measured in Kelvin.

- 2700–3500 K: warm incandescent light
- 4000–5000 K: neutral or warm white
- 5500–6500 K: daylight
- 8000 K and higher: increasingly cool blue light

Arnold Normalize

Normalize controls whether changing the physical size of a light also changes its total brightness. ### Normalize ON The light can be enlarged to soften shadows without substantially changing the total emitted light. This is useful when studying shadow softness. ### Normalize OFF Increasing the size of the light also increases the total amount of light it emits.

Shadows in Arnold

Arnold calculates shadows through ray tracing. You do not need to choose between older Maya shadow systems such as Depth Map Shadows and Ray Trace Shadows. Important controls include:

- Cast Shadows: turns shadow casting on or off
- Shadow Density: controls how dark the shadow is
- Shadow Color: allows the shadow to be tinted For physically based lighting, leave Shadow Density at 1 and Shadow Color black in most situations. Control shadow appearance primarily through:
- light position
- light size

- light angle
- distance from the subject
- fill lighting
- environmental lighting

Creating Soft Shadows

The most important rule: Larger apparent light source = softer shadow
Smaller apparent light source = harder shadow Do not create soft shadows simply by reducing Shadow Density or making the shadow gray. That changes shadow darkness, not the softness of its edge. Use the appropriate control for the light type:

- Point / Spot Light: increase Arnold Radius
- Directional Light: increase Arnold Angle
- Area Light: increase the physical size of the light Example starting points:
- Point / Spot Radius 0: hard shadows
- Point / Spot Radius 0.5: moderate softness
- Point / Spot Radius 1.0: noticeably soft shadows
- Directional Angle 0.5°: crisp natural sunlight
- Directional Angle 1–2°: moderately soft sunlight
- Directional Angle 5–6°: broad, soft directional shadows
- Area Light approximately the size of the subject: moderately soft shadows
- Area Light 2–3 times the size of the subject: broad studio-style shadows ### Distance and Apparent Size The apparent size of a source matters more than its absolute size. A large light far away can behave like a relatively small source. The same light placed closer to the subject appears larger and creates softer shadows. For softer Area Light shadows:
- make the light larger
- move it closer to the subject
- adjust Exposure if necessary ### Example: Soft Studio Light Arnold Area Light, Quad:
- Normalize: ON

- Light size: approximately 1–2 times the size of the subject
- Position: relatively close to the subject
- Exposure: adjust as needed ### Example: Soft Sunlight Directional Light:
- Angle: 1–2°
- Color Temperature: approximately 5500–6500 K Increase Angle toward 5–6° for much softer shadows. ### Example: Soft Lamp or Bulb Point Light:
- Radius: 0.5–1.0
- Normalize: ON
- Color Temperature: approximately 2700–3500 K
- Exposure: adjust as needed

Soft Shadow Noise

Very soft shadows may appear grainy because Arnold must sample many possible locations across the surface of the light. If the shadow shape is correct but contains visible grain, increase sampling. A useful starting point:

- Light Samples: 3 Higher values may produce cleaner results but also increase render time. Establish light size and shadow softness first. Use Samples to reduce noise afterward.

Skydome Light

Arnold > Lights > Skydome Light A Skydome Light surrounds the scene and provides environment illumination from all directions. It can use:

- a solid color
- a procedural texture
- an HDR / HDRI environment image

HDRI Lighting

An HDRI can be connected to the Color input of a Skydome Light. The HDRI provides:

- illumination
- environmental reflections Rotate the Skydome Light to change the direction of the environment lighting. Use Exposure to control brightness. Useful for:

- outdoor scenes
- product rendering
- realistic reflections
- look development
- matching CG objects to photographed environments

Skydome Background Visibility

A Skydome can illuminate the scene without necessarily appearing as the visible background. Arnold visibility controls allow the environment to contribute lighting and reflections while a different background is rendered.

Mesh Light

Select a polygon mesh, then: Arnold > Lights > Mesh Light A Mesh Light uses polygon geometry as the source of illumination. Useful for:

- neon signs
- irregular fixtures
- sculptural light sources
- unusual architectural lighting Complex mesh lights can require more render time than simple Area Lights. When possible, use simple light geometry for illumination and separate geometry for the visible fixture.

Photometric / IES Light

Arnold Photometric Lights use real-world lighting data stored in IES profiles. IES files describe the distribution pattern of physical lighting fixtures. Useful for:

- architectural visualization
- wall sconces
- recessed lights
- commercial fixtures
- reproducing manufacturer lighting data

Emissive Materials

Arnold materials such as Standard Surface or OpenPBR Surface can appear to emit light using Emission controls. Useful for:

- screens
- LEDs
- neon
- glowing panels
- illuminated signs Emissive geometry can introduce more render noise than dedicated Arnold lights. A common approach:
- Emissive material for the visible glowing object
- Area, Mesh, or Point Light for efficient illumination of the surrounding scene

Volumetric Light and Fog

The Maya Volume Light is not supported by Arnold. For fog, haze, visible light beams, and atmospheric scattering, use an Arnold volume shader such as Atmosphere Volume. Arnold Render Settings > Environment > Atmosphere Atmosphere Volume can produce:

- visible beams
- haze
- fog
- volumetric shadows
- light scattering through dusty or smoky air

Light Linking

Light Linking allows a light to affect only selected objects. Useful when separate control is needed over:

- characters
- backgrounds
- architectural surfaces
- props
- products
- specific effects Use light linking when normal physical placement does not provide enough control.

Arnold Light Contribution Controls

Arnold lights can independently control their contribution to:

- Diffuse

- Specular
- SSS
- Transmission
- Volume For physically realistic rendering, leave these values at their defaults unless there is a specific reason to change them.

Choosing a Light

- Directional Light: sunlight, moonlight, distant directional source
- Point Light: small source radiating in every direction
- Spot Light: focused cone of illumination
- Area Light: physically sized source with controllable soft shadows
- Skydome Light: environmental and HDRI lighting
- Mesh Light: illumination emitted from custom geometry
- Photometric / IES Light: real-world architectural light distribution

Basic Arnold Lighting Workflow

1. Set Arnold as the renderer.
2. Create a light appropriate to the source being simulated.
3. Position and rotate the light.
4. Evaluate the result in Arnold RenderView / IPR.
5. Adjust Exposure for overall brightness.
6. Adjust Radius, Angle, or physical light size to control shadow softness.
7. Adjust Color or Color Temperature.
8. Add additional lights only when they perform a specific function.
9. Use a Skydome Light for environmental or HDRI illumination.
10. If soft shadows are grainy, increase sampling only after the desired softness is established. A small number of purposeful lights usually produces a clearer and more controllable setup than many overlapping lights.