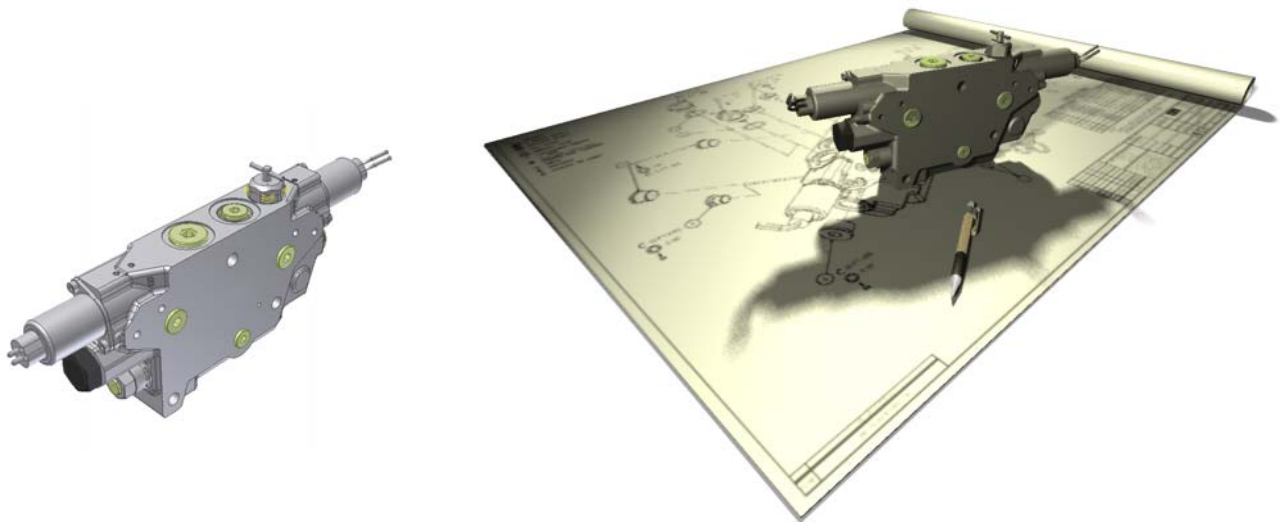


Styling Inventor Studio

Inventor Studio allows you to create realistic renderings or animations of models. To render images, you can set the surface styles, lighting styles, scene styles, resolution, and camera views. To animate models, a number of rendered images are compiled to create an AVI file.

Perhaps the most important aspect of a solid rendering or animation is the use of good styles and cameras in program. Here we have two images the one on the left has no styles applied to it other than the default of the software and the one on the right has been assigned new lighting, surface, and scene styles to give it a more professional look and feel as well as camera manipulation.



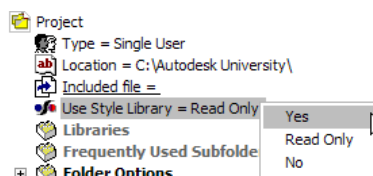
The purpose of this whitepaper is to give the user insight into the different aspects of the editable styles inside Inventor’s Studio environment as well as camera manipulations and how to manage them.

Styles Access

The initial setup of your styles can be very painful or very easy depending on how you approach your setup. Ideally, a known set of materials are already in play in your templates. These materials have their own color styles associated to them through the Styles Library.

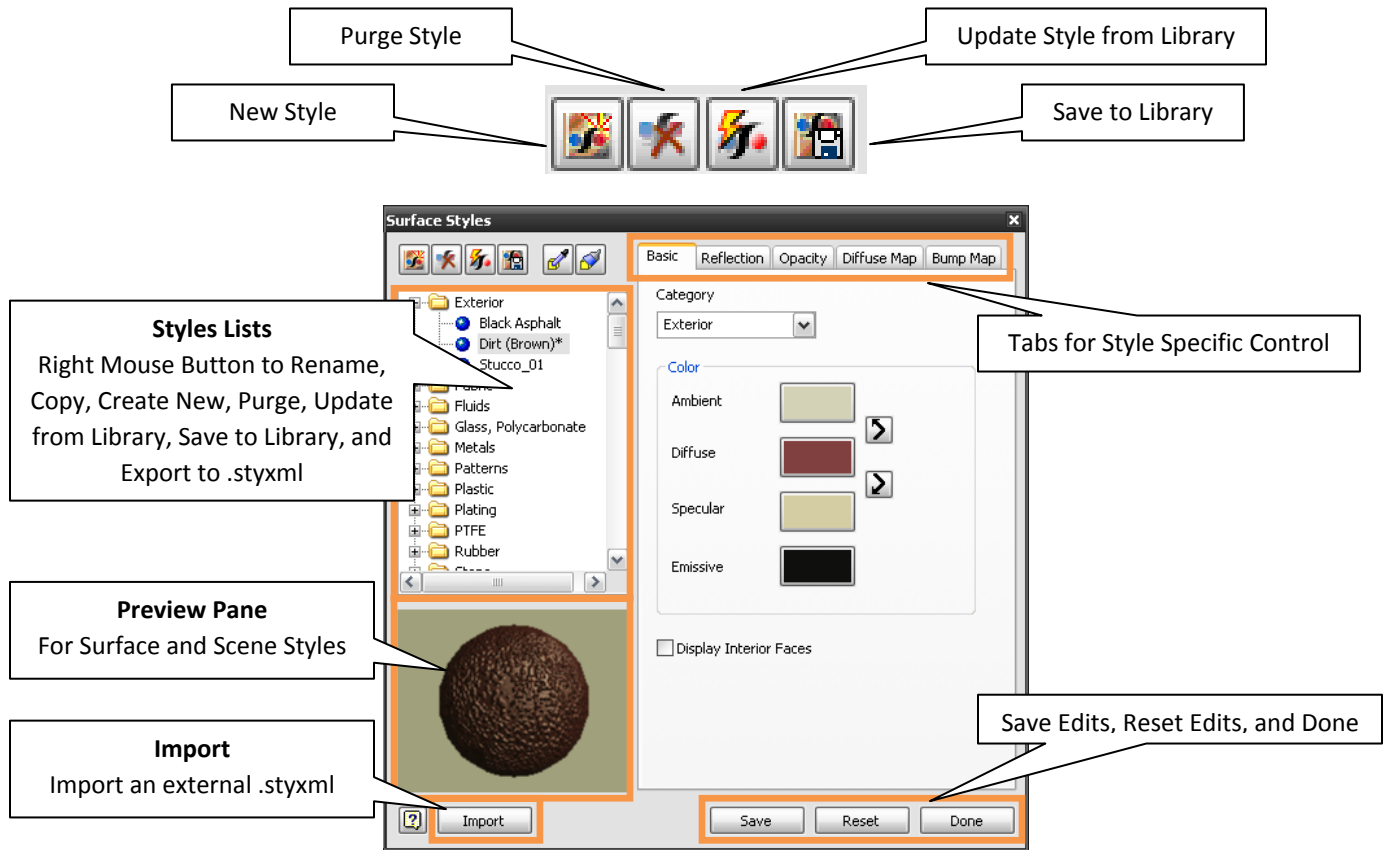
For instance, inside the  Style and Standard Editor... **Steel, Mild** has a color style set to  Color Style

The most prominent reason why a color style or a material does not exist in your library is that it is not inherently in your part template or in your current Styles Library. In order to modify and use your Styles Library make sure the setting in your project file (.ipj) is set to **Yes** (Read/Write) and not **No** (No Library) or **Read Only** (Styles are Read Only).



Command Boxes



The dialog boxes for Surface, Lighting, and Scene are all somewhat similar to each other. In the upper left portion of the dialog box you will find command buttons to make changes to the Styles Library. Just to the right of these four standard commands will be style specific buttons (Get or Assign for Surface Styles; and New Light for Lighting Styles).



Surface Styles

Surface Styles control the overall look and feel of your components bringing together both color and texture. Inventor categorizes these into Standard folders and also permits user created categories for organization. Some of the advanced controls here modify reflection, opacity, diffuse and bump map settings.

The tools used to get and assign surface styles are located at the upper left area of the dialog box. These two icons control how surface styles are obtained, modified, and then re-painted to a face or component. Inside Part mode, these commands will work on individual faces and inside Assembly mode these commands will work on individual components.

-  **Get Surface Style:** Use this to grab a surface style from the model and see it in the Surface Styles box
-  **Assign Surface Style:** Use this to assign a selected surface style from the dialog to a part or face

TIP: The best way to assign surface styles to a part is to do so with physical properties and then override certain faces that need it such as machined polished faces of a casting. **Note:** Waiting to assign surfaces styles in the assembly will not matriculate the style back to the individual parts that are assigned a surface style.

Basic Tab

Category

Create a new Category by typing a name in the pull down box or choose one from the list to categorize the surface style

Ambient

Color that appears in areas created by shadows

Diffuse

Color that appears with direct daylight and artificial lighting; use arrows to match Ambient or Specular to Diffuse

Specular

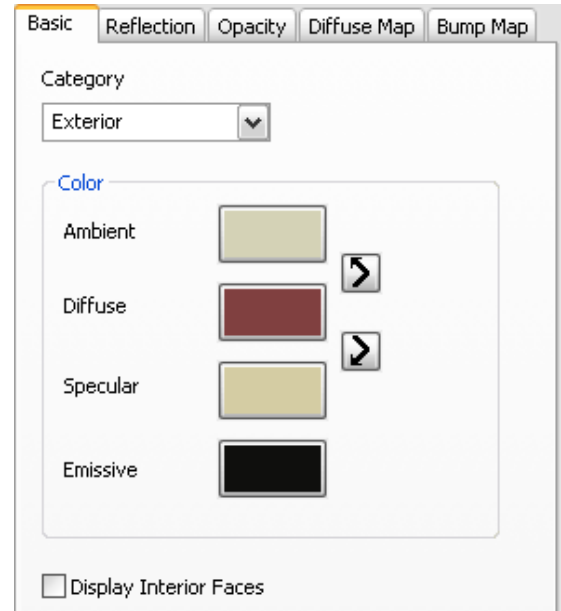
Color that appears in reflections of an object

TIP: for non-metal material set to white, for metal materials set to closet color to the metal, matching the specular to the diffuse will reduce the overall shininess of the color

Emissive – Color that appears through an object as if it contained a light source (does not interact with light objects)

Display Interior Faces

If creating a transparent surface, use this for control of the interior faces and edges.



Reflection

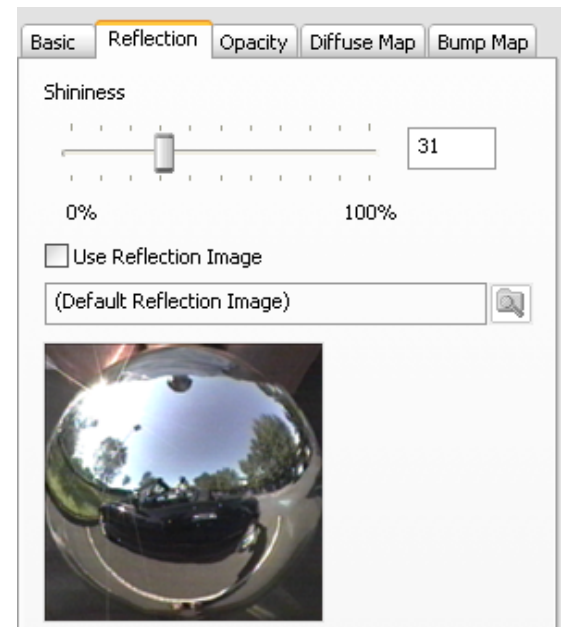
Shininess

Controls the amount of specular light that bounces off the surface; Consider this as a percentage (50/50 = specular/diffuse reflection). For shinier surfaces like polishes and chromes set this value in the range of 80 and for a duller material set around 20-30.

Note: Materials that are shiny take longer to render.

Use Reflection Image

Uses Car3.bmp as default image, here the image can be changed to a user defined file. To change the global default image, replace the existing default in your installation. The replacing image must have the same name as the default to work properly.



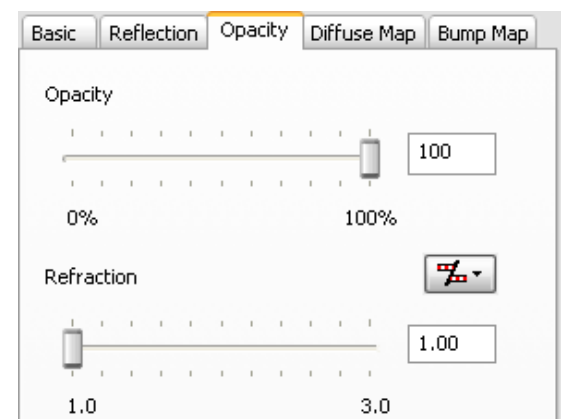
Opacity

Opacity

Controls how lights permeate the surface. Opacity of 100 is a surface that is completely opaque and will not let light through. Opacity is essentially the opposite of transparent. The more opaque the object the darker the shadows will be cast from it.

Refraction

Controls the overall bending of light as it permeates through the object and also assumes a low opacity setting for the style. The Refraction Presents are available in the pull down button for common materials.



Diffuse Map

Use Texture Image

Click the radio box to allow a texture map to map to the surface style. Using a texture image can give the effect of a material without bumpiness. Think of this like a toy marble or a bowling ball with multiple colors. Inventor does come with a great standard library of textures. However consider searching online for new maps of materials to match your products. Just place them in your standard directory.

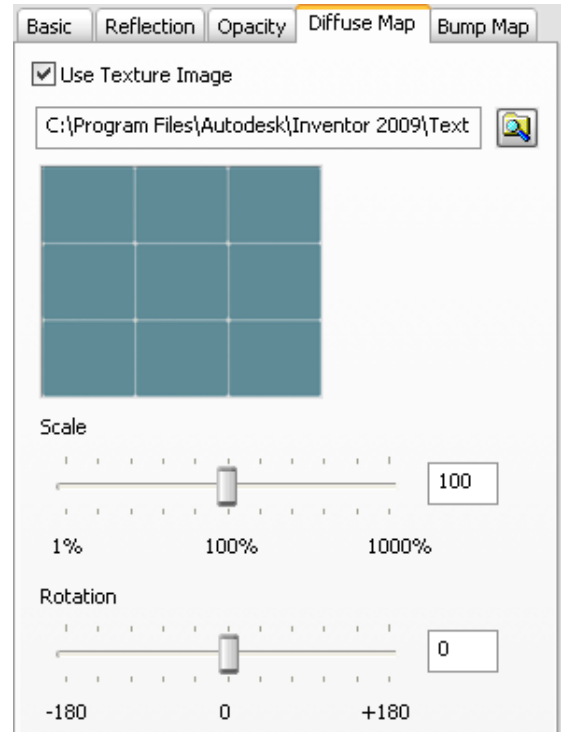
Scale

Use Scale to control the overall sizing of the texture image on the surface, this may need dynamic editing depending on the actual size of the object or face applied with the surface style. If the scale does not work out correctly for the object, it will need to be resized outside the software for best effect. Increasing the pixels per inch will result in a smaller texture on the object.

Rotation

Rotation control for the texture from -180 to +180. If your texture does not adhere to the object or face correctly you might have to make multiple surface styles for different faces of an object.

TIP: Create a Rotation for Wood that is at 90 and one at 0 for varying grain directions.



Bump Map

Use Bump Image

Choosing allows individual selection of a user bump map to add a notion of a textured surface. Colors of the Bump map do not affect the Diffuse Map but do play a role in general bump control. Generally the images are black and white where black controls protrusion and white controls recession. Using a gray and white creates a less visible bump mapping.

Same as Texture

Inventor has some bump maps that match default textures, use this radio box to use the Inventor defined Bump Map

Bump Percentage

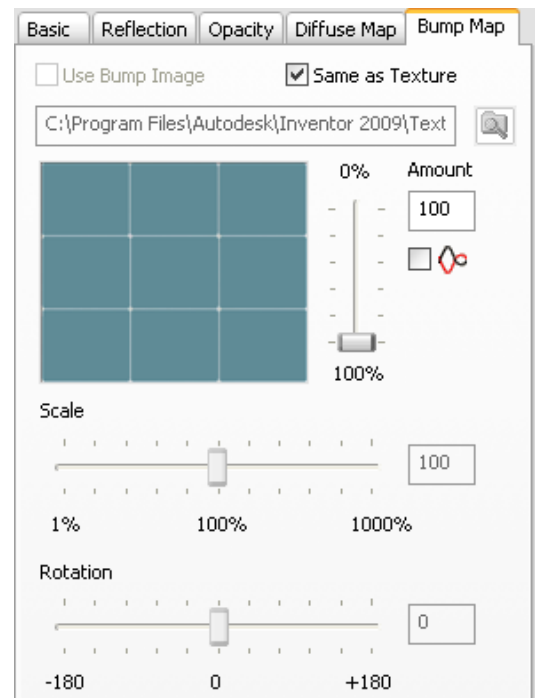
Use the slider bar or the input box to control the amount of bumpiness

Invert Map

Use to invert the Bump Map to reverse the bump image protrusions

Scale

Set same as Diffuse Map



Lighting Styles

Lighting Styles control the overall lighting in a render and can be activated by right mouse clicking on the desired style and selecting **Active**. Each style contains individual lights that make up the unique style. Inventor’s lights types consist of Directional, Spot, and Point types. When the overall style is selected one set of options are available on the tabs. When an individual light in the style is selected another set of styles are available. The settings for the active style are:

General

Brightness

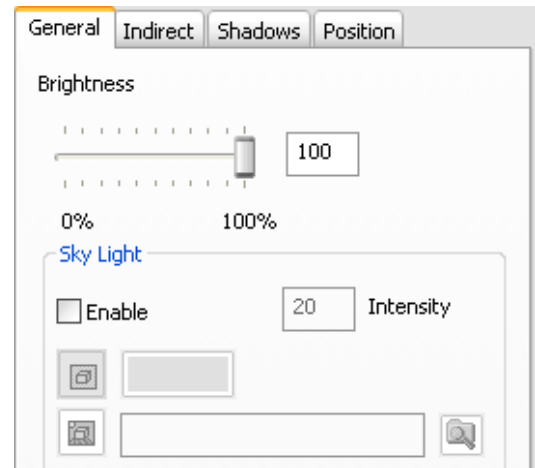
Changes overall brightness in the style

Note: This controls overall brightness for all lights in a style.

Sky Light

Provides uniform, directionless illumination in the render, when enabled intensity can be chosen and an overall color for the illumination; conversely, an image can be provided to provide varying color for the render from the image.

TIP: Avoid using Skylight until you are prepared for your final render as it will increase the amount of processing time as this lighting is very intensive on resources.



Indirect

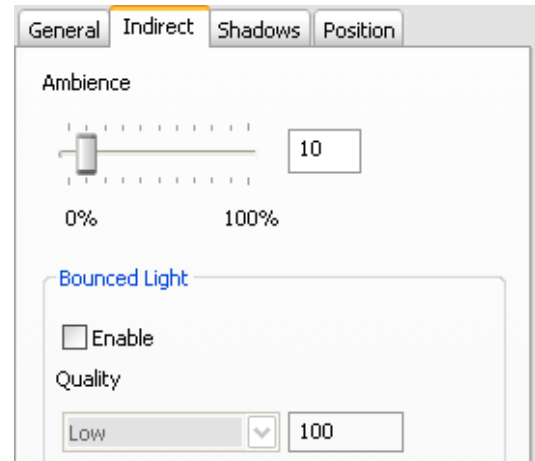
Ambience

Use this to control indirect light in a scene, default amount is 10.

TIP: If your scene is just a little too bright or a little too dark after a lighting style is chosen adjust this value to fine tune

Bounced Light

Bounced Light is needed when Skylight is chosen, but can be used without it. This is light bounces off a surface as it encounters them. With Bounced Light there are three settings Low, Medium, and High and Custom which allows for a manual input for the number of sampling rays in the bounced light.



Shadows

Type

None (No Shadows), Sharp (Well-defined), and Soft (Soft blend)

Quality

Only available for Soft Shadows; Low (256x256 resolution), Medium (512x512 default), and High (1024x1024)

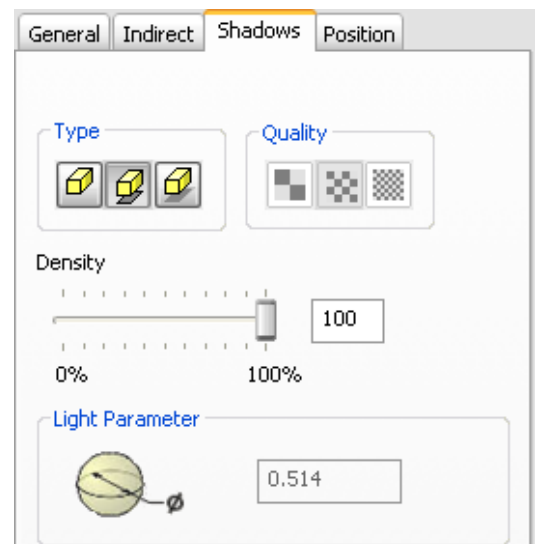
Density

Overall darkness of the Shadow that is cast; to lighten, reduce density

Light Parameter

Spherical Diameter for Soft Shadow casting.

TIP: Limit the size of the spherical diameter to model to be rendered and add a little extra. If the diameter is too large it may take longer to process the render as well as give shadows to wrapper assemblies that do not need shadows.



Position

Orientation

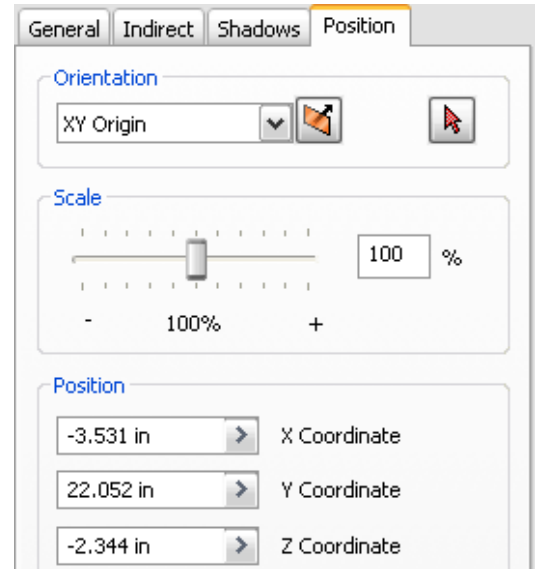
Orients the light styles to specified planes with the default being XY; use Flip to change the orientation to flip to normal of the orientation or use the selection arrow to choose any user work place or model face


Scale

Use this if your lighting style is too large or too small in respect to your object(s) to be rendered. Uniform from 1 to 1000

Position

Use this to reorient the overall positioning of the Lighting Style based on the center of the Assembly or the Part file.



The settings for the individual lights in a style can be controlled as well as new lights can be created inside using the  command on the upper left of the dialog box.

General

Type

Choose the type of Light to create (Directional, Point, or Spot)

On/Off

Light is defaulted to On or Off

TIP: Q: Why create a light that is off? A: To animate it to be on later.

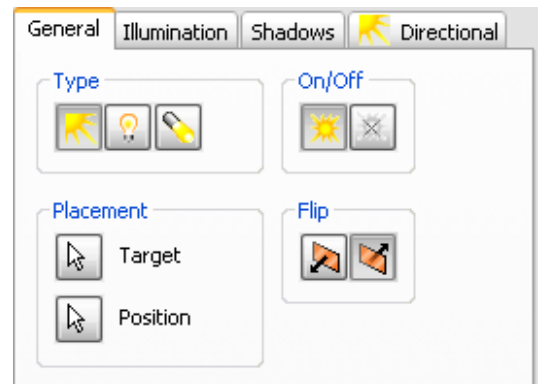
Placement

Target specifies a face to place the light normal to; this will define target position and beam direction. Position will be manually placed along this normal to the face.

Flip

Use to flip the position and target locations with each other

TIP: Flipping the light is a very quick way to create LEDs on parts with the Point type or light radiating from an object instead of casting down on to it.



Illumination

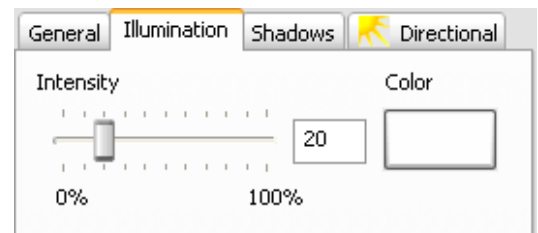
Intensity

Color Intensity of the Light

Color

Color to be used in the Light

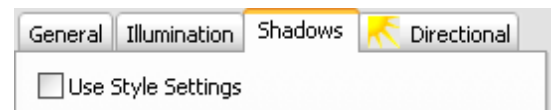
TIP: Consider animating the light to different colors and intensities



Shadows

Use Style Settings

Set identical to the Active style or leave unchecked to make changes to the individual light. The rest of the settings here are identical to what is found in the active style tab for shadows.



Directional Type

Provides parallel beams of light from a single direction (arrow on screen)

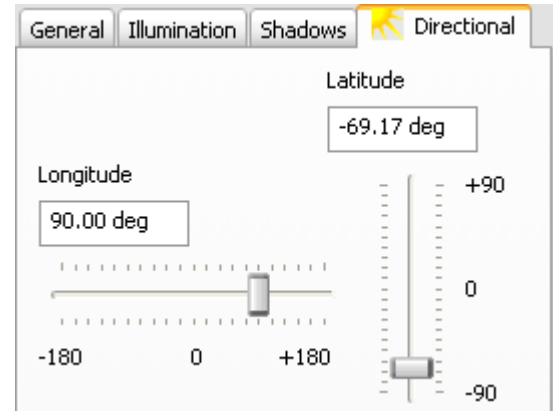
Longitude

Sets the infinitely distant light's angle XY Plane adjustment

Latitude

Sets the infinitely distant light's angle YZ Plane adjustment

Note: Soft Shadows are disabled for Directional lighting



Point Tab

Provides light cast in all directions (octahedral on screen)

Position

Values listed in absolute values from X,Y, and Z origin of file

No Decay

Light energy does not decay over distance, sets lighting to be constant regardless of relation to components or part

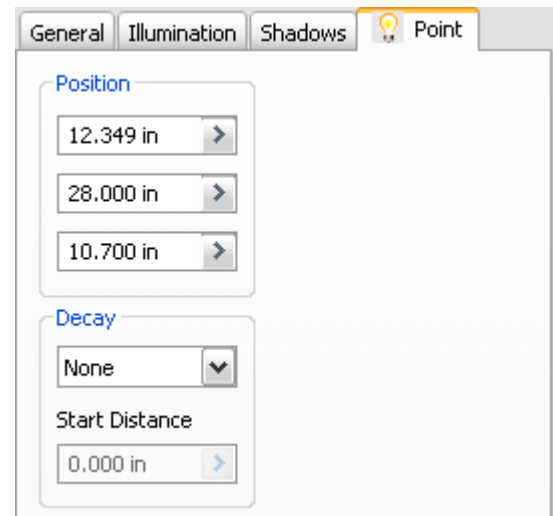
Inverse Decay

Light energy decays at a specified rate of 1/d where d is the distance to the light source

Inverse Squared Decay

Light energy decays at a specified rate of 1/d² where d is the distance to the light source (Real life value but requires more lights to make a realistic effect)

TIP: Use Inverse Decay and specify start values further away from your model to maintain brightness up close but trails off the further away it gets from the light object.



Spot

Provides light in a focused manner (cone and rings on screen)

Position

XYZ Position of the Spot

Target

XYZ Position of the Target for the Spot

Decay

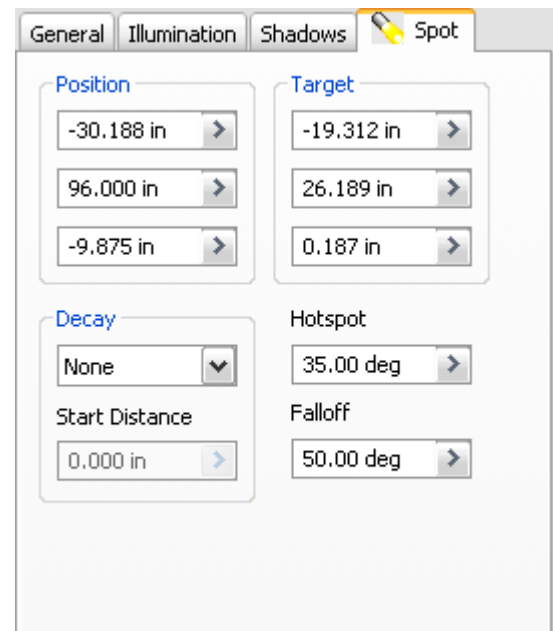
Same as Point Tab's settings

Hotspot

Controls angle of the hotspot (inner circle of cone) from the Cone Position; values range from 1 to 150 in degrees; default = 45.

Falloff

Controls angle of the falloff (outer circle of cone) from the Cone Position; values range from 1 to 150 in degrees; default = 50.



Scene Styles

Scene Styles allow the setup of a backdrop for the rendering. These background settings can be set for the general background as well as the environment they exist and how they interact with the Inventor files.

Background

Use Application Options

Uses the Inventor Application Options Color Tab for background

Solid Color

Uses a specified color to be chosen on the right of the dialog

Color Gradient

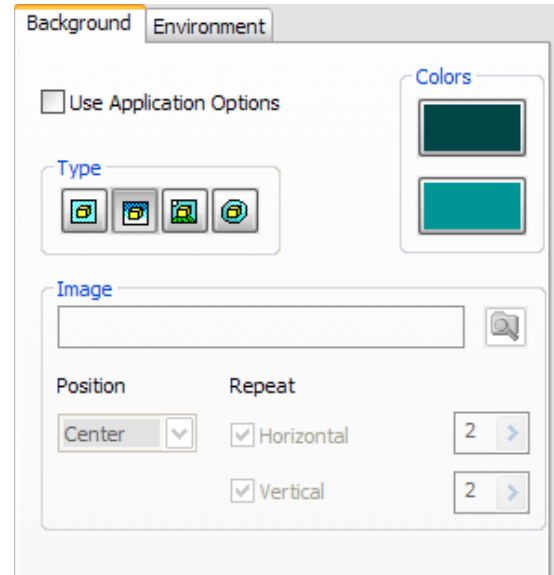
Uses a gradient set of colors chosen on the right of the dialog where the upper color blends to the lower color

Image

Uses a specified image which is chosen from file and controlled with positioning of the image for centering, stretching and tiling. When tiling is enabled controls for the repeating image are available.

Spherical Image

Uses the image to wrap around a sphere; usually needs to be an interesting pattern, imagery is hard to obtain this way



Environment

Ground Plane

All Scenes are based off the default Origin Planes in the Assembly or Part file. Use this setting to change which plane will be oriented for the ground as well as any offset that is necessary.

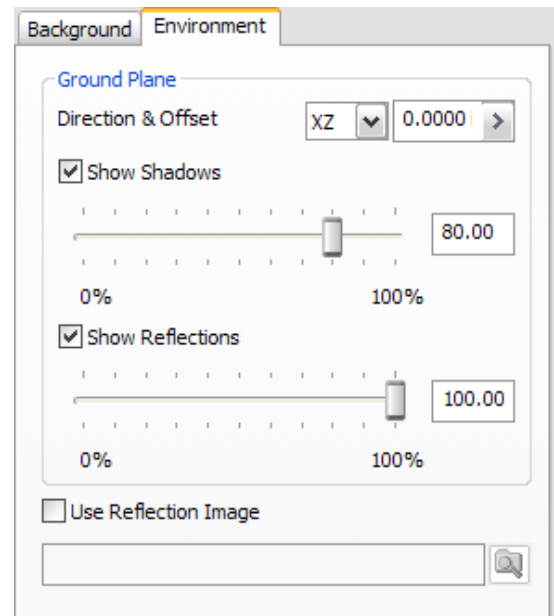
TIP: Create a work plane or use a face to measure from the default plane to your face or plane. There is a Measure fly out available in the offset's "right arrow" submenu.

Show Shadows

Controls whether shadows are cast onto the plane; use if the ground plane doubles as the floor / work area. Set closer to 100 for more shadows on the plane.

Show Reflections

Controls whether reflections are cast onto the plane; use if the ground plane doubles as the floor / work area. Set closer to 100 to have the ground plane appear like a mirror in quality; can also be customized with a specified image.



Wrapper Assemblies

Consider creating a standard assembly to place parts or other assemblies into for quick rendering. Having a predefined "stage" to create your renders saves time from setting up Light and Scene styles over and over again; especially if you not in the habit of saving them to your Styles Library. Consider having walls, props, floors, tables, and anything else that might add to the atmosphere of your product without detracting from the product itself while still giving the scope or scale of the design. Another great part of wrapper assemblies is the fact that you can have your cameras set up already as well.

Cameras

Use the camera command to create user cameras for different viewing control options. This is beneficial for recalling multiple visual orientations, angles, or f-stops. They can also be animated after they have been set up to do path animations and turntable animations.

Cameras

Placement

All Scenes are based off the default Origin Planes in the Assembly or Part file. Use this setting to change which plane will be oriented for the ground as well as any offset that is necessary.

Projection

Orthographic or Perspective (Use Ctrl+Shft+F3 to change deg.).

Roll Angle

Controls the twist in the camera to the target (-180 to 180)

Link to View

Changes view from user perspective to that of one looking through the purposed camera; helpful for checking settings.

Zoom

Controls the zoom in the camera to the target (1 – 150 deg)

Depth of Field

Click to enable focus based on depth

Focus Limits

Near – specifies the distance at which objects are clear (green plane)

Far – specifies the distance at which objects are out of focus (blue plane)

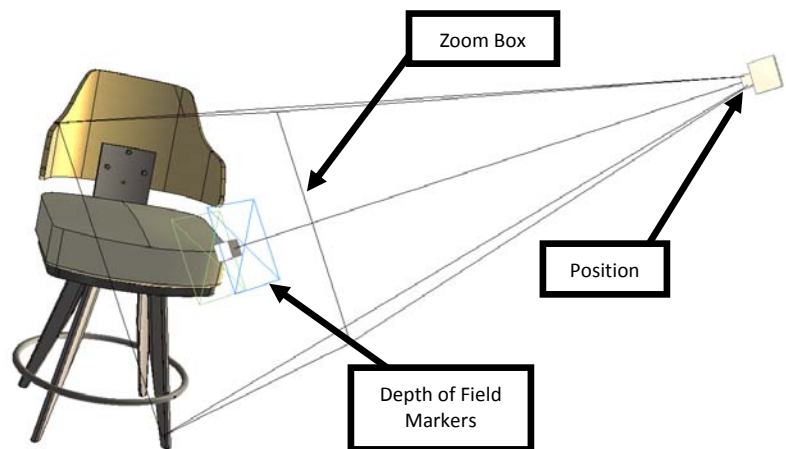
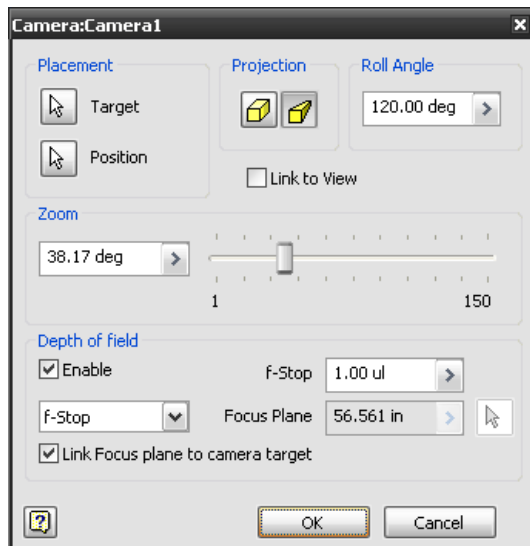
f-stop

f-Stop – value for depth of field; lower the number the narrower the depth

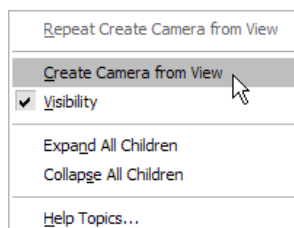
Focus Plane – pick a known planar surface to set the f-stop

Link focus plane to camera target

When linked, moving the camera target also modifies the focal plane location.



A quicker way to create a camera is to manually position the model using normal model manipulation commands so that you are imagining your eyes as the camera. Once the view is set, in the Studio Browser Bar, right mouse button on Camera and select "Create Camera from View". This will create a camera where the user just positioned their viewing of the model.



Making your Selections

Once surface styles are applied, lighting is set, scene are defined, and cameras are set a professional rendering can now take place. Use the Render Image command on the Studio Panel Bar.

Render Image

Aspect Ratio

Set Width and Height or choose a predefined ratio

Camera, Lighting Style, and Scene Style

Choose a predefined item from the pull down lists

Render Type

Realistic or Illustrative

Anti-Aliasing (Output Tab)

Smooth out edges; use highest only for renders with soft shadows and high for most others.

True Reflection (Style Tab – Realistic)

When selected, reflects objects in the scene. When not selected, the image map specified in Surface Styles or Scene Styles is used and rendering takes less time

Color Fill (Style Tab – Illustrative)

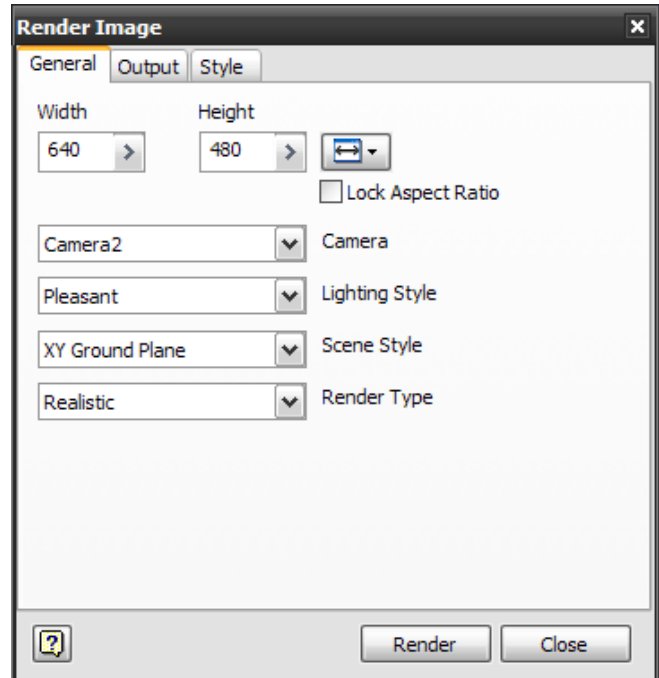
Source color selections (No Color, Surface Color, or Specified)

Levels (Style Tab – Illustrative)

Default at 2, increase for more color depth, use Shiny highlights (specular value of 50)

Edges (Style Tab – Illustrative)

Toggle Outline and Interior edge display and control the thickness and color of edge lines. Use a higher thickness value for a more artistic illustration.



About the Author: Mark Allen Flayler

Mark is an Application Engineer with IMAGINiT Technologies, specializing in manufacturing environments. He has implemented the Autodesk Manufacturing products with several industries including the blow/injection molding, automotive, and custom machinery markets. Inventor has been a profound augmentation in his abilities allowing him to bring 3D digital prototyping to the forefront of the industries with which he has interacted. He has extensive experience and a comprehensive understanding of the technical, practical business and human dimensions of implementation. He is an effective and skillful communicator, consulting with his clients to help achieve their business objectives. Mark is an ATC certified instructor and he provides training, support, and implementation. Mark is PSE and ATC certified in AutoCAD®, AutoCAD® Mechanical, AutoCAD® Electrical, Autodesk® Data Management, and Autodesk® Inventor™.



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