Autodesk University 2009 LEARN. CONNECT. EXPLORE.

Hold that Pose! Still Imagery with Autodesk® Inventor® Studio

Mark Flayler – Imaginit Technologies

Virtual Session Autodesk Inventor Studio allows users to create illustrative or photorealistic imagery using existing designs and without expensive third party software. This class takes a deeper look into proper rendering methods using Lighting, Surface, and Scene Styles to obtain optimal results. Learn how to setup and modify advanced Lighting methods and Cameras. Create Illustrative renderings useful for catalogs or artistic expression of your designs. Finally, learn how to setup up wrapper assemblies to streamline the rendering process.

About the Speaker:
Mark is an Application Engineer with the IMAGINiT Division of Rand Worldwide, specializing in the Autodesk manufacturing products. He has implemented the Autodesk Manufacturing products with many industries including the blow and 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 has been instrumental in the training of hundreds of users. Mark is certified in AutoCAD, AutoCAD Mechanical, AutoCAD Electrical, Autodesk Data Management, and Autodesk Inventor

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Introduction

Engineers need to be able to leverage marketing during the design phase, and marketing also needs to be able to leverage engineers to prepare sales material. This is the essence of collaborative engineering. What most companies don't realize is that with Inventor the engineer's data holds the power to effectively handle this collaborative relationship.

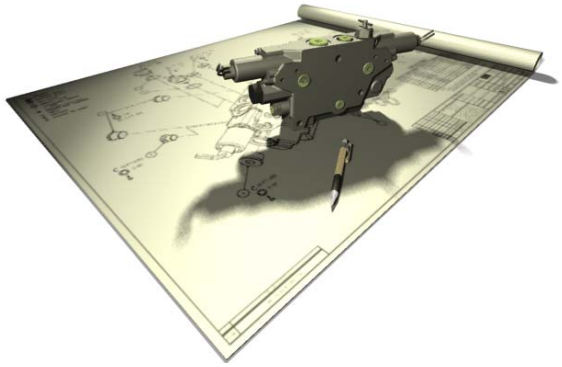
The Studio package that comes with all versions of Inventor utilizes the engineer's data to make high impact presentations, marketing collateral, manual/catalog documentation, and more. If this capability is not understood or realized, companies can end up spending a hefty sum of money in third party contracting, additional software which ultimately can cause longer lead times bringing products to market. With Studio companies can leverage all of these tasks within a single software; Autodesk Inventor.

Session Highlights:

- Learn to setup different Studio Styles including Lighting, Scene, and Surface Styles
- Create advanced Lighting methods to suit your renderings
- Learn to Set up Cameras to remember positioning of renderings
- Create Illustrative Renderings for use in Catalog and other media distribution
- Create Wrapper Assemblies to streamline rendering processes and reduce rework

Studio can be accessed in any Part (.ipt) or Assembly file (.iam), as well as, Sheet Metal and Weldment files. Presentation and Drawing files have no access to Studio. To access Studio, select **Environments Tab > Inventor Studio**.

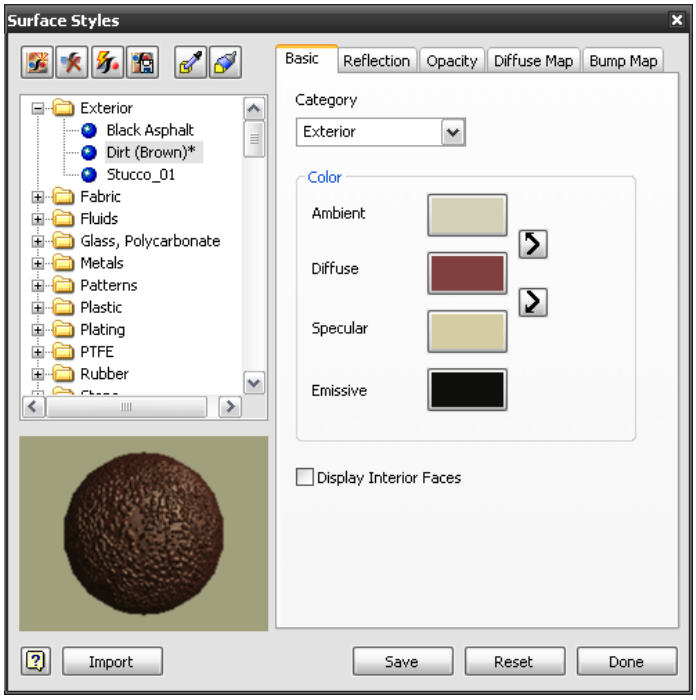
Inventor Studio allows you to create realistic or illustrative renderings of models. To render images, you can set the surface styles, lighting styles, scene styles, resolution, and camera views. Perhaps the most important aspect of a solid rendering or animation is the use of good styles and cameras. 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, scene styles, and camera manipulations to give it a more professional look and feel.



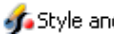
Styles Overview

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 four buttons to make changes to the Styles Library. To the right of these, there are style specific commands. (Get or Assign for Surface Styles; and New Light for Lighting Styles).

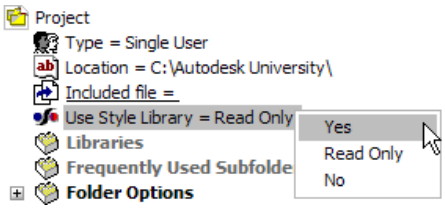
Option	Description
	Creates a new local style in the file that can be saved to the style library by using the Save to Library button.
	Removes locally created styles.
	Updates the current style to what is stored in the existing Style Library (Overwrites local changes).
	Saves a locally created style to the project's Style Library.
Import	Imports externally saved .styxml files.
Save and Reset	Resets changes made to the styles or saves local changes made to the styles but not to the Library.



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 available in your templates. These materials have their own color styles associated to them through the Styles Library.

For instance, inside the  **Steel, Mild** has a color style set to 

The most prominent reason why a color style or a material does not exist in your library is that it does not exist 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).



Surface Styles

Surface Styles control the overall look and feel of your components by combining both color and texture. Inventor categorizes these into Standard folders and also permits user created categories for organization. Some of the advanced options enable you to control reflection, opacity, texture 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 option to grab a surface style from the model and apply it to the Surface Styles box.

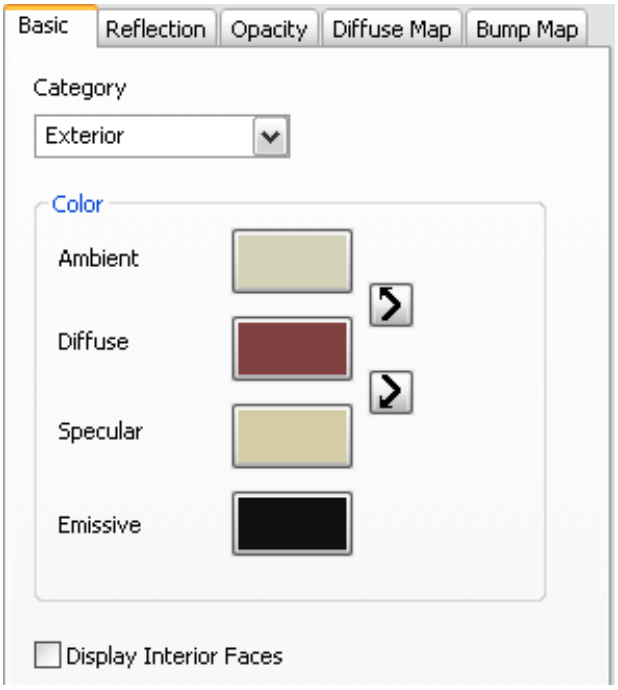
 **Assign Surface Style:** Use this option to assign a selected surface style from the dialog box to a part or face.

TIP: The best way to assign surface styles to a part is to do so with physical properties and then override certain faces (e.g., machined polished faces of a casting).

Note: Assigning surfaces styles in the assembly will not reflect the style back into the individual parts.

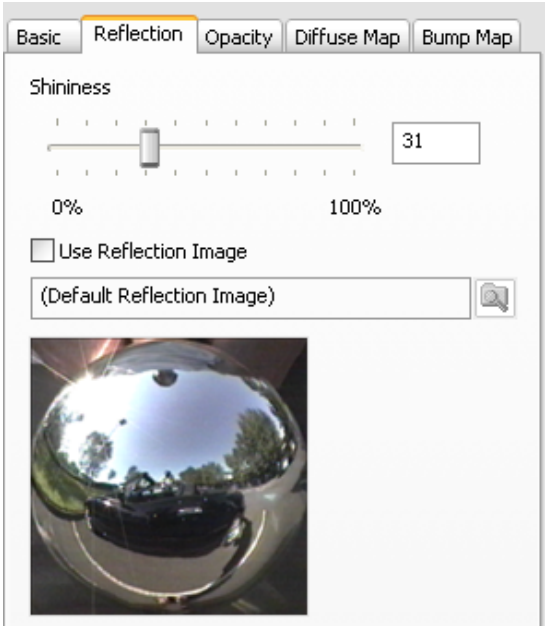
Basic Tab

Option	Description
Category	Creates a new Category by typing a name in the pull down box or choose one from the list to categorize the surface style.
Ambient	Defines thecolor that appears in areas created by shadows.
Diffuse	Defines the color that appears with direct daylight and artificial lighting; use arrows to match Ambient or Specular to Diffuse.
Specular	Defines the 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	Defines the color that appears through an object as if it contained a light source (does not interact with light objects).
Display Interior Faces	Controls the interior faces and edges if creating a transparent surface.



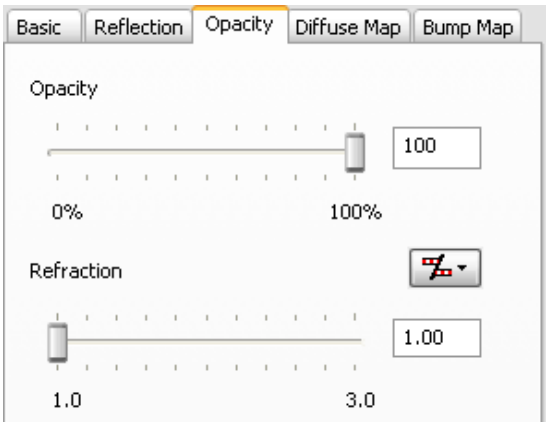
Reflection Tab

Option	Description
Shininess	Controls the percentage of specular light that bounces off the surface (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	Defines the reflection image. By default, Car3.bmp is used. 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 Tab

Option	Description
Opacity	Controls how light permeate a surface. Opacity of 100 is a surface that is completely opaque and will not let light though. 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. Refraction presets are available in the pull down button for common materials.



The next two tabs assign Texture and Bump mapping. Inventor comes with many predefined textures; however not enough to cover all industries. Obtaining your own texture or bump map is actually quite easy but will require a little bit of administration from one release of the software to the next to maintain a valid library of new images. These directories should be where new textures and bump maps reside so they can be easily backed up and found with the software when upgrading. They are also the default directories when searching inside Inventor.

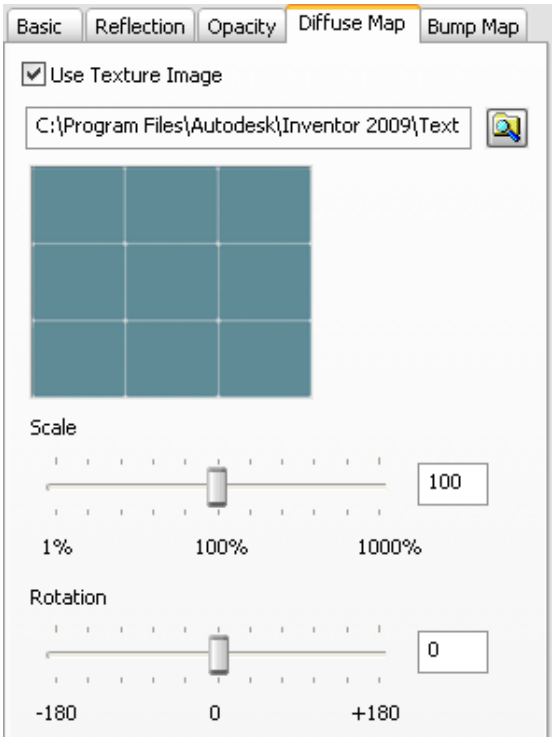
Texture Directory (XP): C:\Program Files\Autodesk\Inventor 2010\Textures\surfaces

Bump Map Directory (XP): C:\Program Files\Autodesk\Inventor 2010\Textures\bumpmaps

A couple really good sources for textures is Google Images as well as cgtextures.com where you can find a plethora of similar but different texture maps for metals, woods, and ceramics.

Diffuse Map Tab

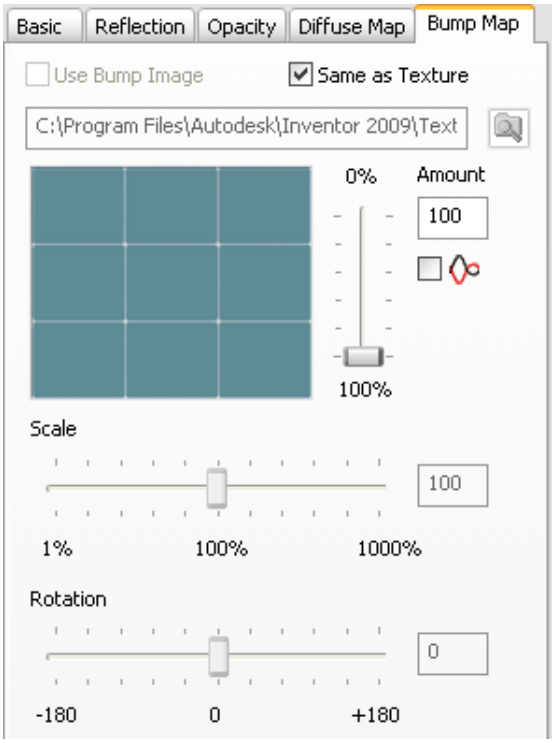
Option	Description
Use Texture Image	Allows a texture map to map to the surface style. Using a texture image can give the effect of a material without bumpiness. (e.g., toy marble or a bowling ball with multiple colors)
Scale	Controls the overall sizing of the texture image on the surface, this may need 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 results in a smaller texture on the object.
Rotation	Controls the texture rotation from -180 to +180. If your texture does not adhere to the object or face correctly you might have to make multiple surfaces styles for different faces of an object.



Tip: Create Multiple Surface Styles for varying grain orientations along the X, Y, and Z by adding &X, &Y, and &Z to the texture image name. For Instance: Wood&X.bmp, Wood&Y.bmp, and Wood&Z.bmp

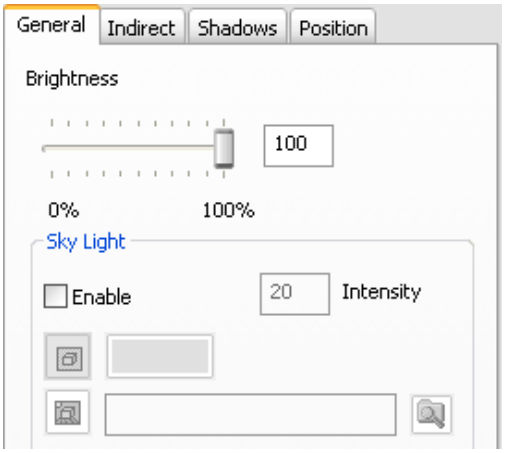
Bump Map Tab

Option	Description
Use Bump Image	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	Enables Inventor's defined default Bump Map textures.
Slider Bar	Assigns a value for the amount of bumpiness. You can use the slider bar or the input box to control the value.
Invert Map	Reverses the bump map image protrusions.
Scale	Set same as Diffuse Map
Rotation	Set Same as Diffuse Map



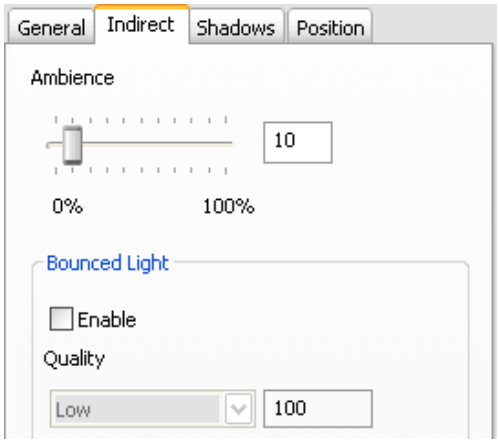
Lighting Styles

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 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 tabs are available.



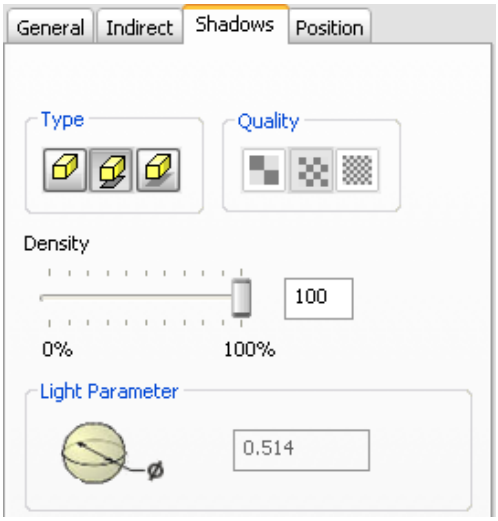
General Tab (Overall Style)

Option	Description
Brightness	Changes overall brightness in the style for all lights. **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 set; conversely, an image can be provided to provide varying color for the render. **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 Tab

Option	Description
Ambience	Controls indirect light in a scene. The 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 it.
Bounced Light	Controls if light bounces off surfaces as it encounters them. This option is required if using a Sky Light but a Sky Light is not required to specify a bounce setting. Settings include Low, Medium, High, and Custom. Custom allows for a manual input for the number of sampling rays in the bounced light.

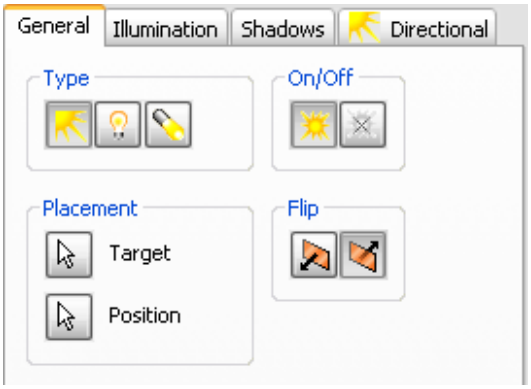


Shadows Tab (Overall Style)

Option	Description
Type	Controls the type of shadows. Options include, None (No Shadows), Sharp (Well-defined), and Soft (Soft blend).
Quality	Controls the quality of shadows when Soft Shadows; Low (256x256 resolution), Medium (512x512 default), and High (1024x1024) are used.
Density	Controls the overall darkness of the Shadow that is cast. This is used to lighten or reduce density.
Light Parameter	Controls the spherical diameter for Soft Shadow casting. **TIP:** Limit the size of the spherical diameter to the size of the model to be rendered and add a little extra. If the diameter is too large it may take longer to process as well as give shadows to wrapper assemblies that do not need shadows.

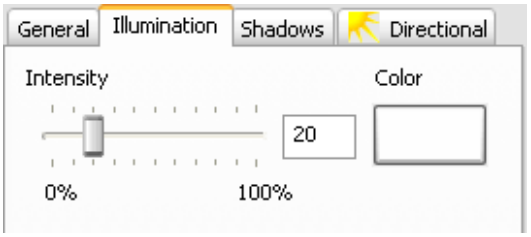
General Tab (Individual Lights)

Option	Description
Type	Specifies the type of Light to be created (Directional, Point, or Spot).
On/Off	Enables or disables a light.
Placement	Controls the placement of a light. Target specifies a face to place the light normal to; this will define target position and beam direction. Position manually places the light normal to the face.
Flip	Flips the position and target locations with each other. **TIP:** Flipping the light is a quick way to create LEDs on parts with the Point type or light radiating from an object instead of casting down on to it.



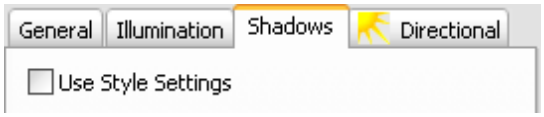
Illumination

Option	Description
Intensity	Controls the color intensity of the Light
Color	Sets the color to be used in the Light. **Tip:** Use this to dim the scene without turning lights off.



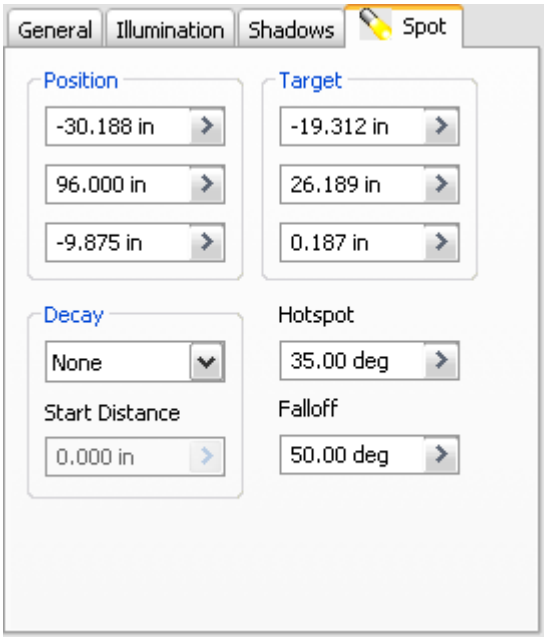
Shadows (Individual Lights)

Option	Description
Use Style Settings	Controls whether style settings are used or whether you 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.



Point / Spot / Directional Tab (Light Specific)

Option	Description
Longitude and Latitude (Directional Only)	Defines the Longitude values. Sets the infinitely distant light's angle XY Plane adjustment Defines the Latitude values. Sets the infinitely distant light's angle YZ Plane adjustment
Position (Spot and Point)	Defines the absolute positional values for the X, Y, & Z origin of light.
Target (Spot Only)	Defines the absolute target values for the X, Y, & Z origin of light. (Not valid for Point lights since they radiate in all directions)
Decay (Point and Spot)	Defines the Decay option for the light. **No Decay:** Light energy does not decay over distance **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 $1/d^2$ where d is the distance to the light source (this is closest to real life lighting)
Hotspot (Spot Only)	Controls the angle of the hotspot (inner circle of cone) from the Cone Position; values range from 1 to 150 in degrees; default = 45.
Falloff	Controls the angle of the falloff (outer circle of cone) from the Cone Position; values range from 1 to 150 in degrees; default = 50.

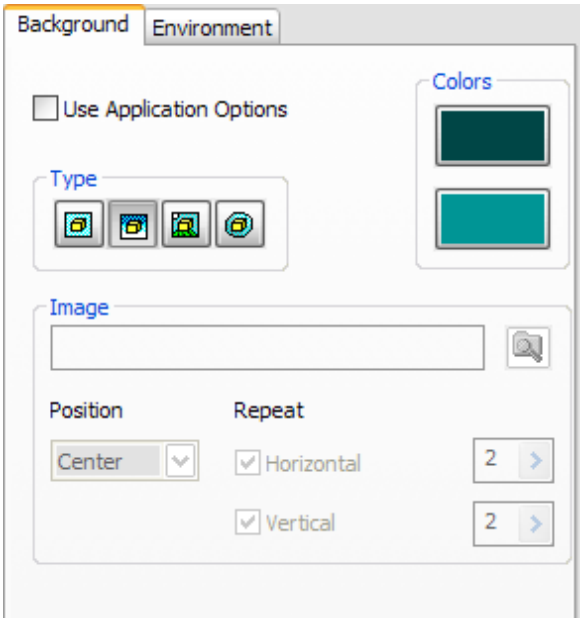


Scene Styles

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 in and how they interact with the Inventor file.

Background Tab

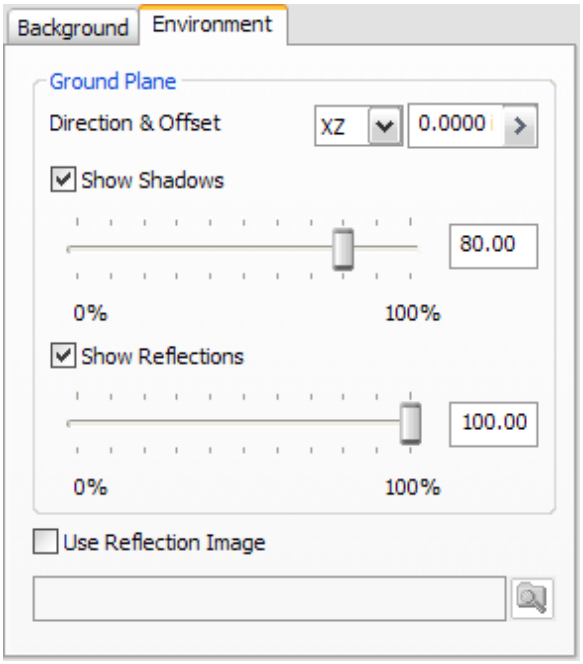
Option	Description
Use Application Options	Sets the background to use the application options or not.
Solid Color	Specifies a color for the background.
Color Gradient	Uses a gradient set of colors chosen on the right of the dialog where the upper color blends to the lower color.
Image	Specifies an image for the background. It also controls the positioning of the image (centering, stretching and tiling). When tiling is enabled controls for the repeating image are available.
Spherical Image	Wraps the image around a sphere. Usually the image needs to be an interesting pattern as a good image can be difficult to obtain.



Tip: Consider taking a photo of the installation location or position and using that as a background.

Environment Tab

Option	Description
Ground Plane	Changes which plane is oriented as ground as well as setting any offsets. All Scenes are based off the default Origin Planes in the Assembly or Part file. **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. Uuse if the ground plane doubles as the floor or work area. **Tip:** 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 or work area. **Tip:** Set closer to 100 to have the ground plane appear like a mirror in quality; can also be customized with a specified image.



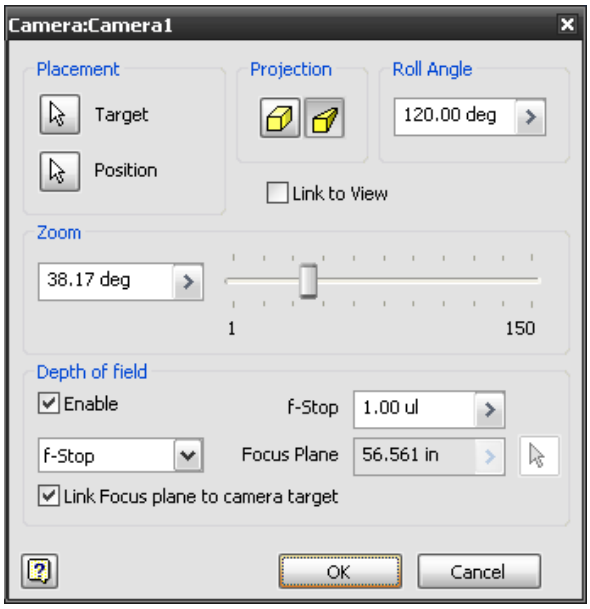
Tip: Use the Measure fly out on the Direction & Offset control to quickly adjust an out of place plane.

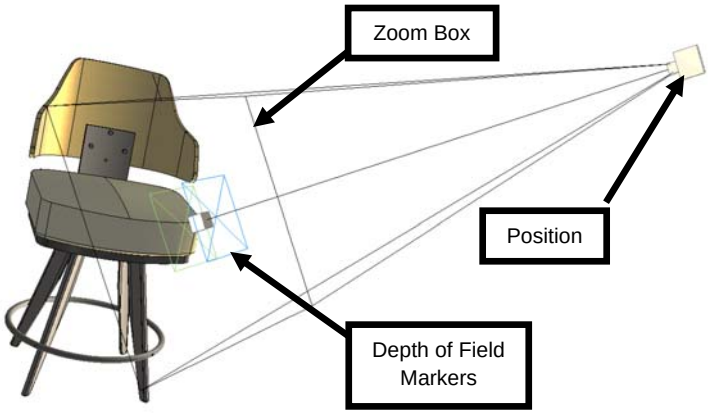
Cameras

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.

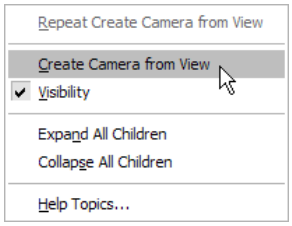
Camera

Option	Description
Placement (Target)	Defines the camera target placement. Click anywhere on the model to set the target point, or click in space to set the target on the view plane at the same view distance as the existing target. Displays a preview of the new camera target/direction when you move the mouse over a surface.
Placement (Position)	Defines the camera position placement. Click a point along the camera direction line to set the position of a camera at that point. Extends the direction line to the standard normal line distance if that distance is longer than the current camera distance.
Projection	Defines the projection of the camera as 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	Enables focus based on depth.
Focus Limits (pull down menu)	Specifies the focus distance. **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 (pull down menu)	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	Establishes a link such that moving the camera target also modifies the focal plane location.





A faster 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 click on the Camera and select "**Create Camera from View**". This creates a camera where the user just positioned their viewing of the model.

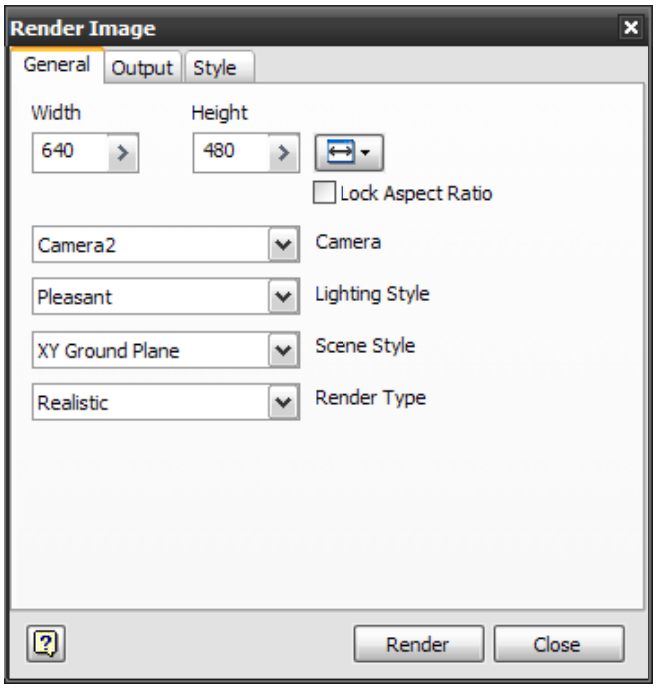


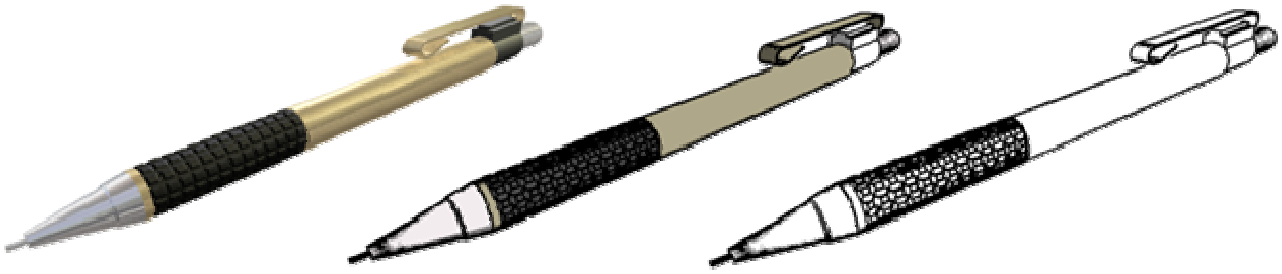
Rendering

Once all the Styles (Surface, Color, and Lighting), Cameras, and Scenes are set up in Studio it is all set to begin the rendering process. Inside the rendering dialog box there are settings to create 2 main types of renders, photorealistic and illustrative.

Render Image

Option	Description
Aspect Ratio	Sets Width and Height or enables you to choose from a predefined ratio
Camera, Lighting Style, and Scene Style	Defines a predefined camera or style.
Render Type	Set the render type as Realistic or Illustrative.
Anti-Aliasing (Output Tab)	Smoothes edges. Use highest only for renders with soft shadows and high for most others.
True Reflection (Style Tab – Realistic)	Defines reflection 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)	Defines color fill. Source color selections (No Color, Surface Color, or Specified Color)
Levels (Styles Tab – Illustrative)	Defines the color depth. The default value is 2. Increase for more color depth or use Shiny highlights (Specular value of 50)
Edges (Style Tab – Illustrative)	Toggles Outline and Interior edge display and controls the thickness and color of edge lines. Use a higher thickness value for a more artistic illustration





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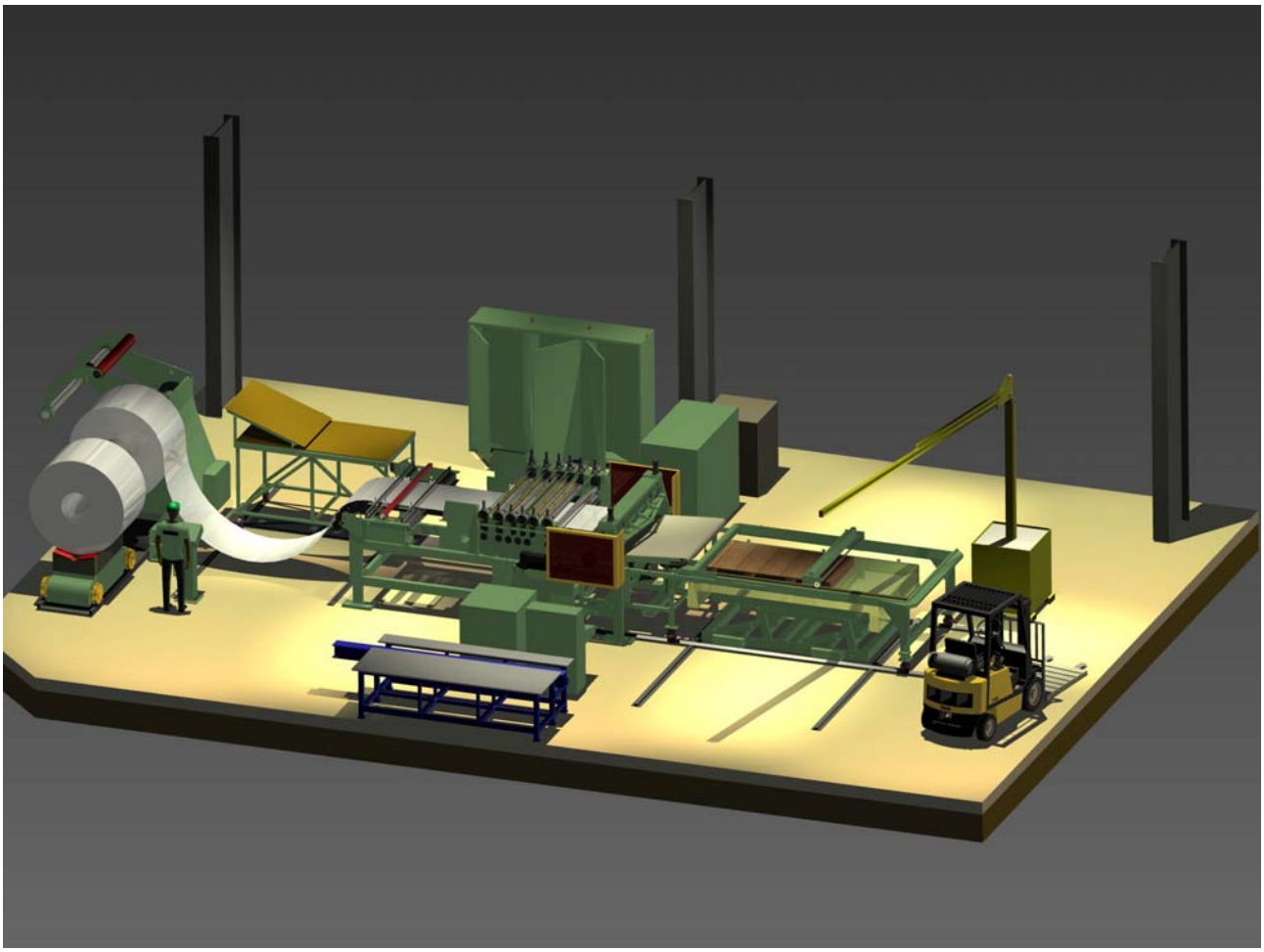
Wrapper Assemblies

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 are 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 already set up already. Removing the procedure of setting up Lights, Cameras, and Scenes dramatically reduces the amount of time to obtain a valid professional rendering for your documentation or marketing needs.



Class Summary: Creating rendered images from native engineering data streamlines many of the important aspects of design. By using the Studio tools inside Inventor, users can quickly create design iterations such as color selection as well as create quick marketing or presentation material for collaborative purposes. Renders can be used to increase your organization's marketing prowess or simply aid in conveying an idea to prospective clients. Consider using Inventor Studio to increase your technical documentation needs in your everyday designs.