



Walt Disney World Swan and Dolphin Resort
Orlando, Florida

Lights, Camera, Action! Becoming a Producer with Inventor Studio

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and Sean Dotson (Assistant); Jerry Berns (Assistant)

MA14-1L Product visualization is very important for selling projects to both management and customers. Learn how to render near photorealistic product imagery to improve how you communicate your designs. Receive in-depth, step-by-step instructions for creating your own textured surface and light styles. Learn how to compose a scene in order to produce excellent results. Then, learn how to animate components, constraints, and user parameters to demonstrate product concepts and functionality. Camera animation and timeline editing are also covered in this class.

About the Speaker:

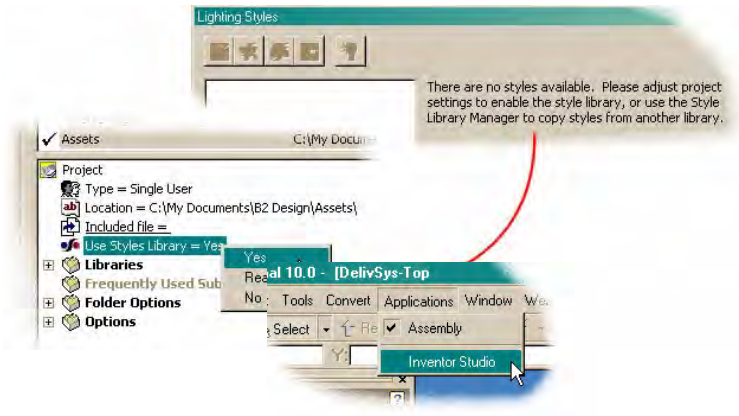
Bill is a self-employed product designer who contracts his skills in both mechanical and software design. Bill's experience covers technical illustration, drafting, and mechanical design for products as diverse as dental tools and construction equipment. Bill has also worked as a product engineer and designer for two different CAD software companies and has performed product training at various levels. Bill is well-versed in Autodesk Inventor, having been a product designer for Inventor since before its first release, and he currently works regularly with Inventor Studio.

Accessing the Styles...

Style library access

If you find that you do not have access to a style, the most common reason for that is that this value is set to **Read Only** or **No**. If you want to modify surface styles, set the value to **Yes**

To access Inventor Studio, open a part or assembly and go to menu **Applications > Inventor Studio**

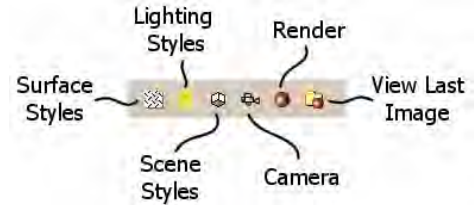


Studio UI

Render - User Interface

Render commands

- Surface Styles – interface for creating surface styles. These are akin to Color Styles, except that in Studio there are more controls over the elements of the style.
- Lighting Styles – interface for creating lighting for rendering, whether single image or an animation.
- Scene Styles – interface for creating a background used in rendering.
- Add Camera – studio starts with a “current camera” but allows you to add as many cameras as you want. Only one camera can be recorded at a time.
- Render Scene – interface for creating a rendered image.
- View Last Image – displays the last rendered image.



Surface Styles

Mini Toolbar Style Management

- New Style – Clones the current surface style, creating a Copy of...
- Purge Style – removes local style from style list
- Update Style – replaces the selected local surface style with the global style of the same name
- Save Style to Library – saves a local style edit, or a new local style to the global style library, making the style accessible across all documents.

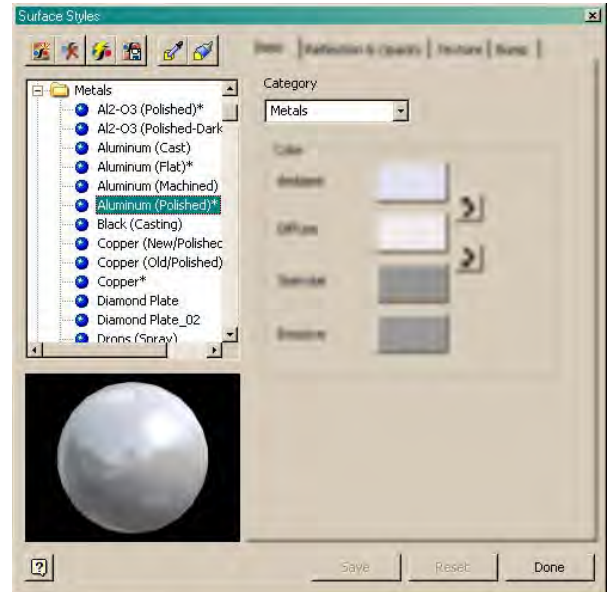
Style Assignment

- Get Surface Style – accesses the components surface style and displays it in the dialog.
 - The parts surface style is local, if not listed among the global styles an information dialog informs you that you should open the part and save the style to make it available.
 - If the parts surface style is out of sync with the global style of the same name, you will be informed via a dialog box.
- Assign Surface Style – assigns the selected style to the selected component

Preview Style – a more neutral color will be coming, instead of the black background.

Style List – all available styles in the component

- Categories – Surface styles can be assigned to categories to provide faster access, or a logical organization for searching out the appropriate surface style



Basic

Category creation and assignment - You create a new category by simply typing in a new name.

Color management

- Ambient – sets the overall color as it would appear with an even, indirect light source
- Diffuse – sets the color of a face in response to directed light
- Specular – sets the color of the reflection from an external light
 - For shiny nonmetal surfaces, this should be set to white (the exception is metallic auto paint finishes)
 - For shiny metal surfaces, this should be set to the color of the metal
- Emissive - sets the overall color as if the surface contained the light source

Reflection & Opacity

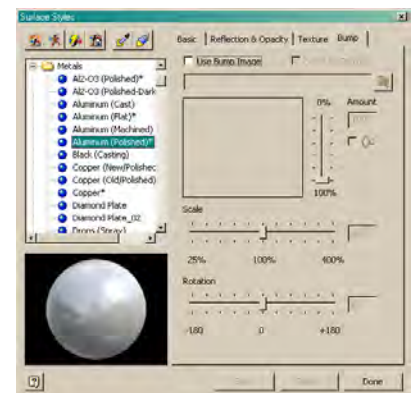
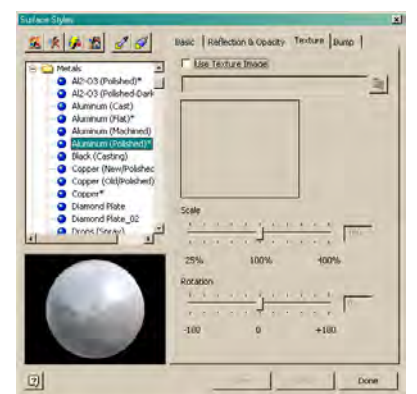
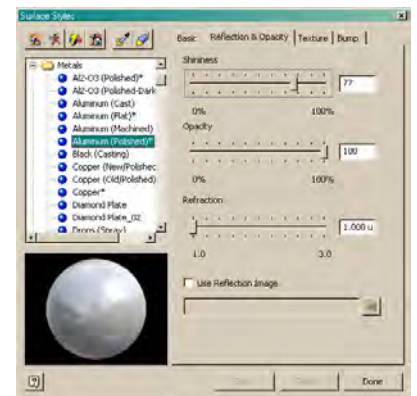
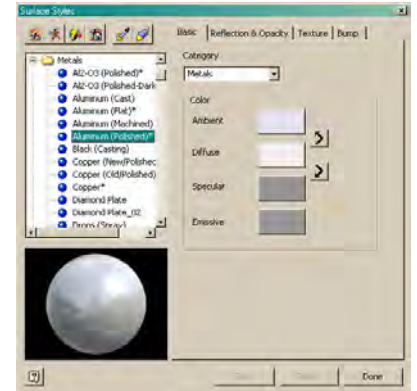
- Shininess – reflective effect, controls the amount of light (specular) bouncing back off the surface, looked at as a percentage (50/50, 80/20, etc) of specular to diffuse reflection
- Opacity – controls the transparency of the surface, effects the transmission of light through an object
- Refraction – bending or turning of light as it crosses from one medium to another, controls the level of refraction; e.g. glass = 1.50
- Use Reflection image – specify the image to use. If you set up a scene inside a building you can use a reflection map made from a picture of the inside of the building to add authenticity

Texture

- Use Texture Image – checked, enables setting the texture image used in connection with the surface style.
- Scale – controls the scale of the texture image
- Experiment with different image DPI settings – less DPI increases the size of the image on the surface
- Rotation – controls the angle of the texture image as it lays on the surface

Bump

- Use Bump image – checked, enables setting the bump image for the surface style
- Image should be black and white as a general rule – white controls the recess, black the protrusion of the surface
- Scale – similar to texture scale, when used in combination with a texture, it should be set to the same value
- Rotation – similar to texture rotation, when used in combination with a texture, it should be set to the same value



Lighting Styles

A Light Style consists of one or more lights.

Style Tools

- New, Purge, Update, Save Style to Library
- New Light

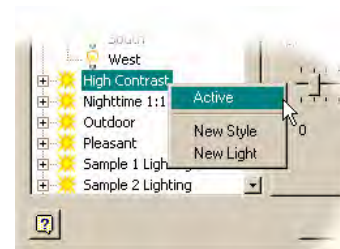
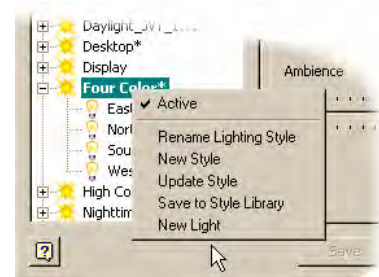
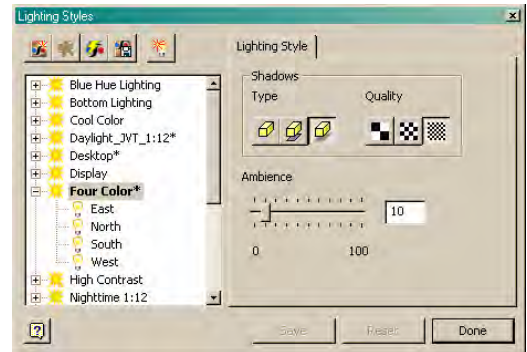
Style List

- **Active** – active lighting style, used for rendering, emboldened – context menu
- Inactive – inactive lighting style – context menu

Lighting Style Settings

- Type
 - None
 - Hard Shadows – well defined shadow boundaries, greater contrast between lit and unlit areas.
 - Soft Shadows – shadow edges are slightly blurred
- Quality
 - Low – coarsest shadow edge setting, little antialiasing
 - Medium – mid-level shadow edges, modest antialiasing
 - High – finest shadow edge setting, aggressive antialiasing, does impact render time

Tip – Use Hard shadows to set things up and review renders, switch to soft shadows with appropriate quality for final renders

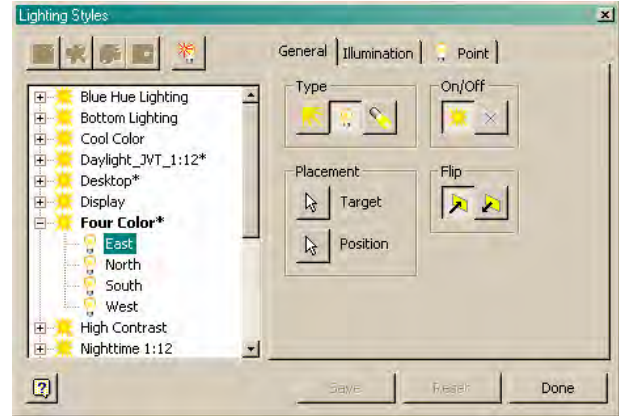


Lighting Styles

Light Types & Settings

General tab

- Type – change between light types without having to redefine all its parameters
 - Directional
 - Point
 - Spot
- On/Off – defines if a light is used or unused – try turning off lights and seeing the effect
- Placement
 - Target – activates the target edit mode so you can redefine the light target, alternative to graphic selection
 - Position – activates the position edit mode so you can redefine the light position, alternative to graphic selection
- Flip – inverts the target and position positions, effectively reversing the light direction by 180 degrees.

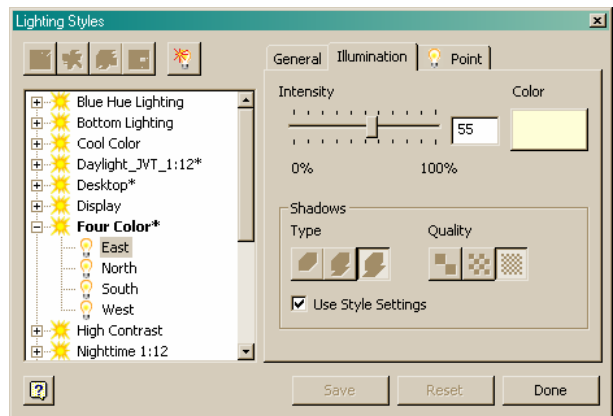


Lighting Styles

Light Types & Settings

Point Light – Illumination tab

- Intensity – percentage setting for the amount of light emitted
- Color – sets light color
- Shadows – sets the overall color as it would appear with an even, indirect light source
- Type – None, Hard, Soft
- Quality – sets the color of the reflection from an external light
- Use Style Settings – checked, defers individual light shadow settings, uses lighting style setting instead



Lighting Styles

Light Types & Settings

Point Light – Point tab

Position

- Uses component origin axes as reference points

Decay

- None – light does not diminish along its path
- Inverse – light diminishes at an inverse rate
- Inverse Squared – bending or turning of light as it crosses from one medium to another, controls the level of refraction; e.g. glass = 1.50

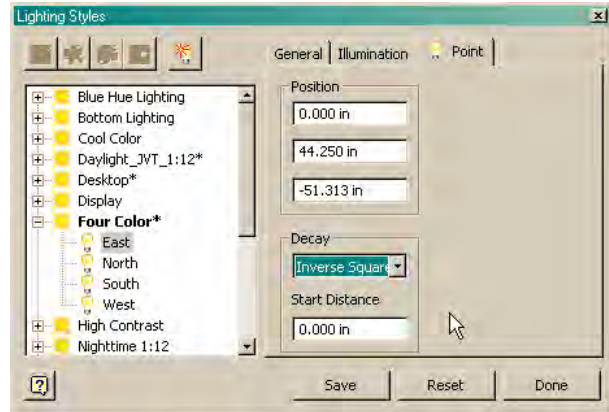
Start Distance

- Distance from the light source where light begins to diminish

Inverse Square Law* – what does it mean for the image?

- Real world behavior, predictable
- Creates a maximum depth of light for the scene
- Shadows, especially soft shadows, will look much better using this setting
- Specular reflection improves
- Price: **longer** rendering times

*Note: light decay refers to the spreading of light over distance. This occurs at a rate that is the square of the distance it has traveled. Thus, at 2 feet light illuminates an area 4X larger, and at 4 feet it illuminates an area 16X larger.



Lighting Styles

Settings

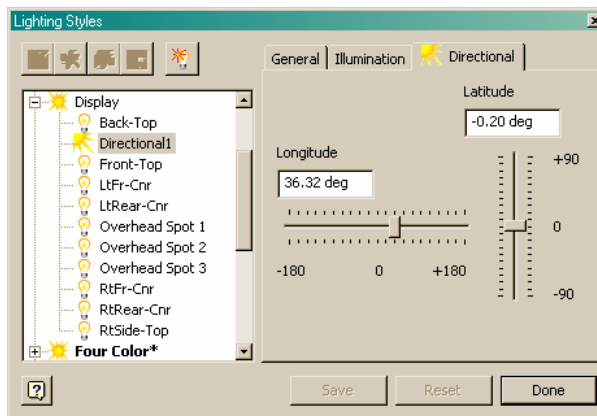
Directional Light

Longitude

- Relative to the YZ plane

Latitude

- Relative to the XY plane



Light Types &



Scene Styles

Getting some background...

Scene Styles

Background

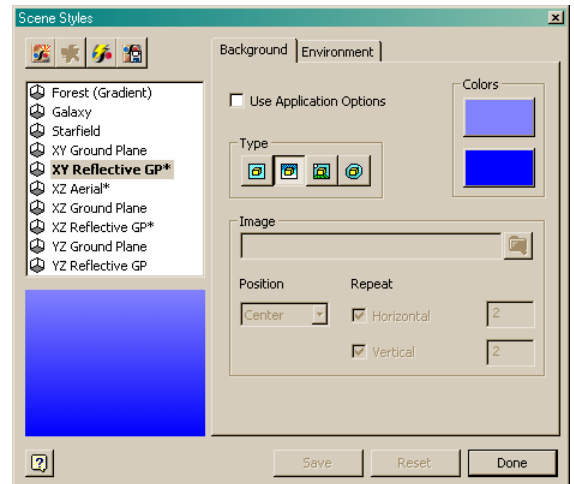
Type

- Use Applications Options – defer to Application Options selection
- Single Color – single color
- Gradient – two color gradient
- Image – specifies an image background
- Spherical image – specifies a **seamless** image background

Color – self-explanatory

Image – specify image

- Position
- Repeat



Environment

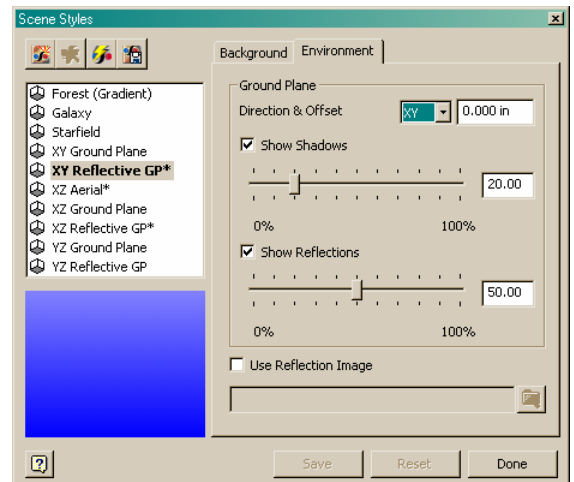
Direction & Offset

- Specify plane – XY, XZ, or YX planes
- Specify value – amount of offset above or below plane

Show Shadows – enables shadows on ground plane

Show Reflections – enables reflections on ground plane

Use Reflection Image – browse path for reflection image



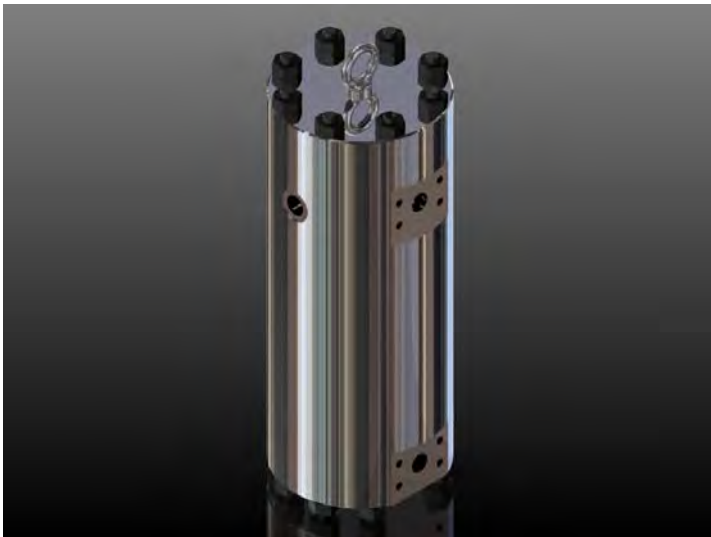
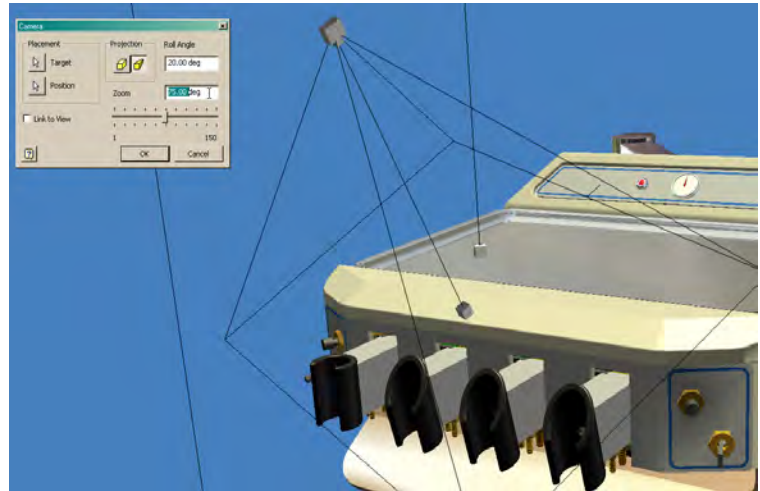
Scene Styles

Getting the picture...

Camera

- Placement
- Target
- Position
- Projection
- Orthographic Camera
- Perspective Camera
- Roll Angle – Rotates the camera about its lens axis
- Zoom – widens/narrows the exposure area
- Link to View – view reflects what camera sees. Use the view at this time, to change the position real time.

This is very useful, but be aware you are editing the camera with it.



Render

Pulling it off...

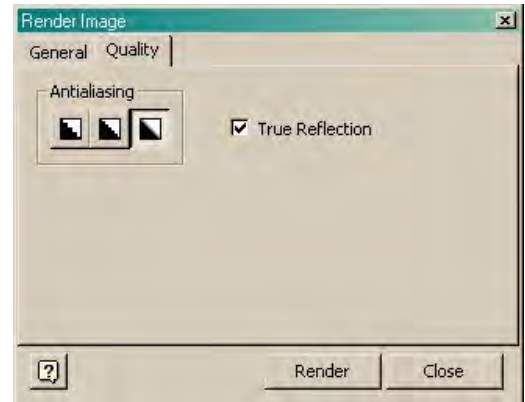
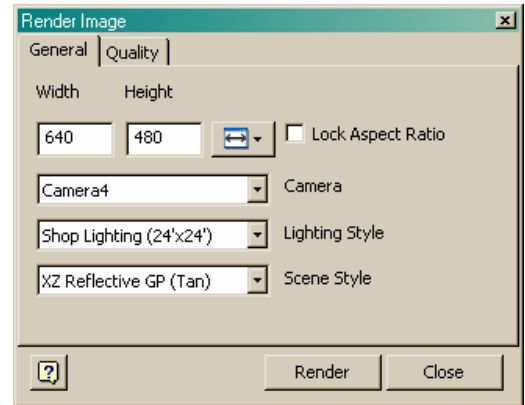
Render

General

- Image Size
- Width
- Height
- Aspect Ratio – maintains selected or specified aspect ratio
- Camera - Select from one or more cameras, plus the current camera position
- Lighting Style - Select any lighting style – this allows for experimentation
- Scene Style - Specify scene style

Quality

- Antialiasing – none, low, high – jaggedness of rendered image. Higher has better results, but longer rendering times
- True Reflection – use to reflect other objects in scene, otherwise the specified reflection maps will be used.

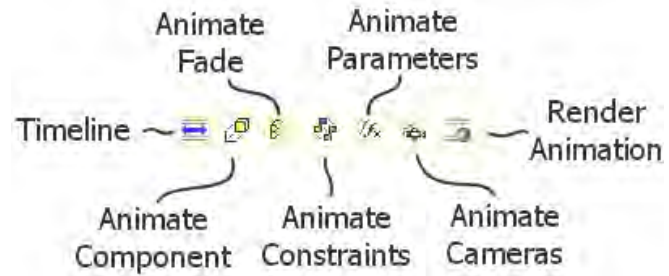


Studio UI

Render & Animation

Animation commands

- Timeline – opens the timeline window at the bottom of the graphics window
- Animate Component – interface for animating components
- Animate Fade – interface for animating the opacity of components
- Animate Constraints – interface for animating constraints
- Animate Parameters – interface for animating parameters
- Animate Cameras – interface for animating cameras
- Render Animation – interface for rendering an animation



Animating

Components...

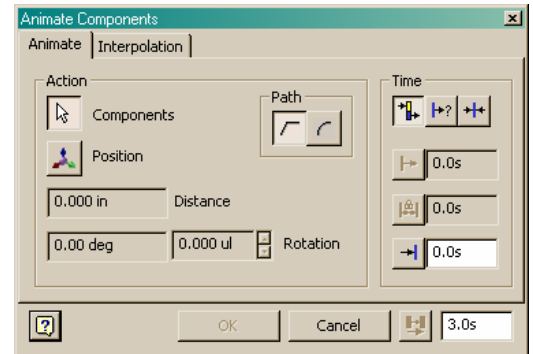
Animate components

Action

- Components – select button, depress when selecting components to animate
- Position – activates the 3D M/R tool for moving components
- Distance – distance animated object moves
- Rotation – rotation action for a component, specify by degrees or number of turns

Time

- Start from Previous – begin action from previous action end. If no action, starts at zero time position.
- Specify Start/Finish – enables start / duration / finish fields for supplying those values
- Instantaneous action – specifies that the action occur instantaneously – no duration.

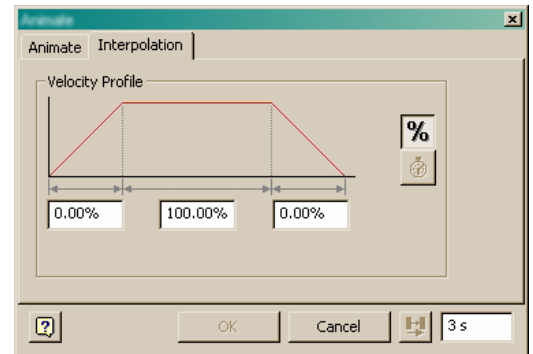


Complete / New Action

- Alternative to clicking OK, completes the current action definition and starts a new action of the same type and specified duration.

Interpolation

- Ramp up – from stop to acceleration
- Duration – acceleration
- Ramp Down – from acceleration to stop



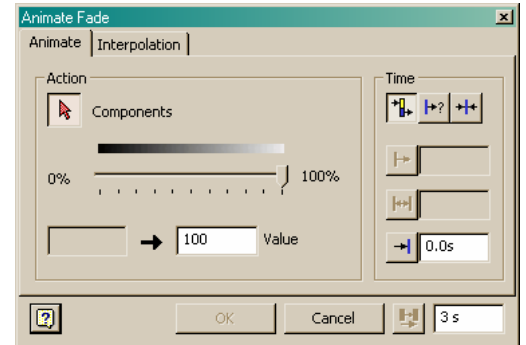
Animating

Fade...

Animate Fade

Action

- Components – select components that participate in this animated segment.
- Slider – percent of opacity, from 0 (transparent) to 100% (solid)
- Opacity fields – alternative means of specifying opacity values



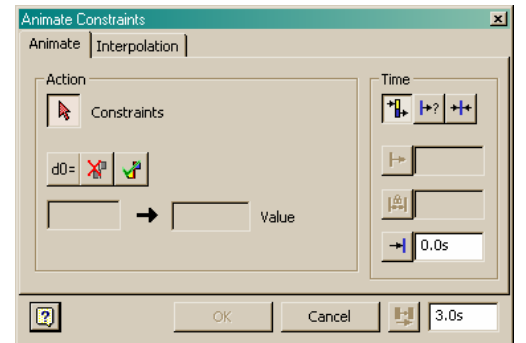
Animating

Constraints, Parameters...

Animate Constraints

Action

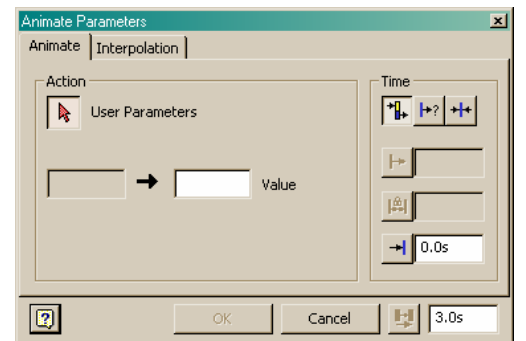
- Constraints – select the constraints that participate in the animation
- Buttons – constraint, enable, suppress – clicking on one of these specifies the action relative to the constraint. You can modify, enable or suppress it.
 - Suppressing constraints results in increased degree of freedom, which means you may need to suppress to animate on occasion.
 - E.g. if you wanted to create an exploded view using Studio, you can suppress the constraints and then animate the components to any location. Or, make use of some constraints and not others.
- Value – the constraint transition, from (value) to (new value) at current time



Animate Parameters

Action

- Active – active lighting style, used for rendering, emboldened – context menu
- Inactive – inactive lighting style – context menu



Animating

Cameras...

Animate Camera

Camera

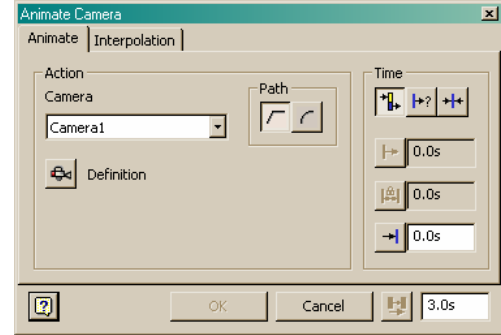
- Two ways to go about camera animation – via the dialog and interaction and using the camera action command on the timeline
- Timeline camera action – if you've used the camera capture mechanism in presentations, then you will have a feel for this. It's very nice – WYSIWYG.

Definition

- Specify the target
- Drag the camera along the path from the target, click to place it.

Path

- Straight
- Smooth

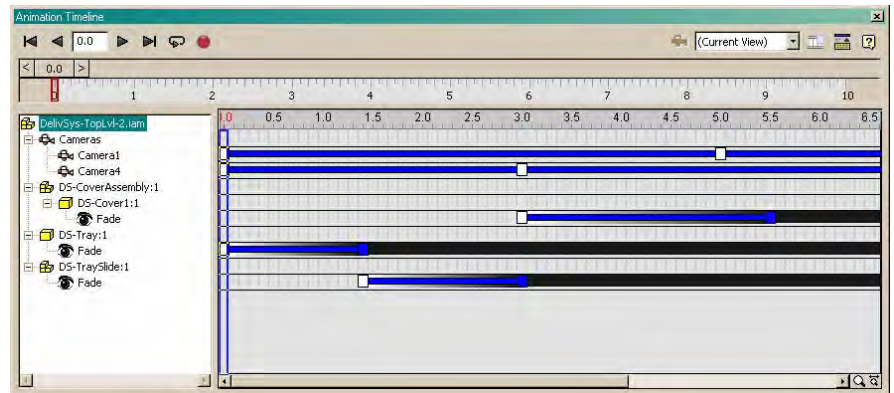


Timeline

UI...

Timeline UI

- Playback Controls
- Camera Action command – quick, convenient. Make sure the camera you're animating is selected (displayed in dropdown list)
- Animation Options – set the length of the animation
- Timeline Expand/Collapse
- Animation Browser – context menu
- Action (Track) Table – editing via context menu, handles, slide bar
- Zoom – use side to side motion
- Zoom Reset – is what it is



Render

Animations...

Render Animation

This dialog is setup so that you can test any combination without having to return to Studio to change the camera, lights, or scene. It is great for experimenting with results.

General

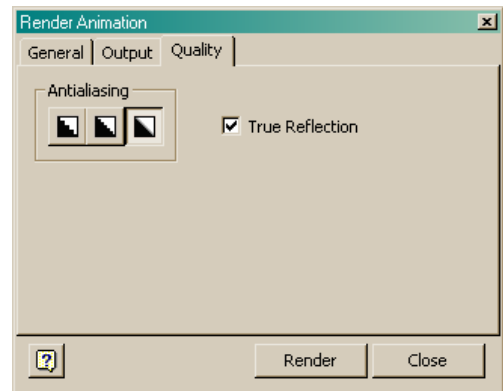
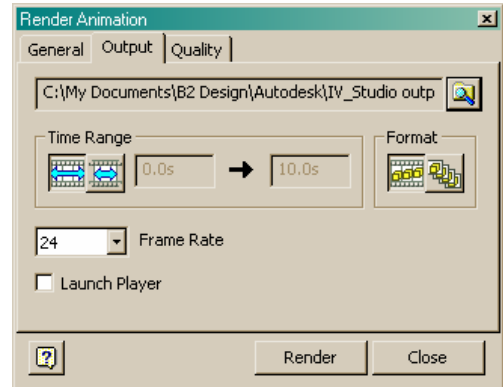
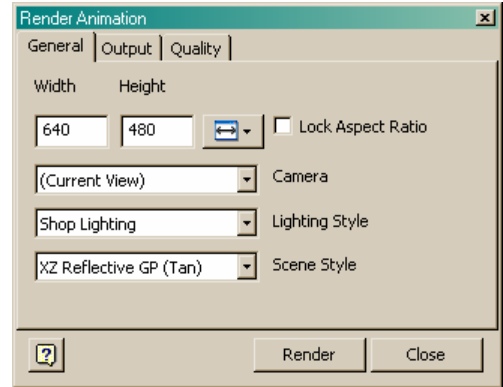
- Aspect Ratio
- Camera
- Lighting Style
- Scene Style

Output

- File & Directory
- Time Range – all frames or specify frame range
- Format – output as animation file or individual image files consecutively numbered
- Frame Rate – frames per second (fps), typical setting is 24, 25, 30 fps
- Launch Player – launches player when animation has been recorded

Quality

- Antialiasing
- True Reflection



Render

Lights, Camera, Action! Wait a minute!

Scenes, Props, Ambience

The Scene

Little Extras that make the difference

Wrapper Assemblies – place your main character (product assembly) into another assembly so that you can add props to give it scale, context, and so on.

Props – add scale, context, vision - contributing to understanding design intent and concept

Camera Angles – Camera motion can greatly enhance an animation or detract from it. Use it well, but use it with caution.



Render

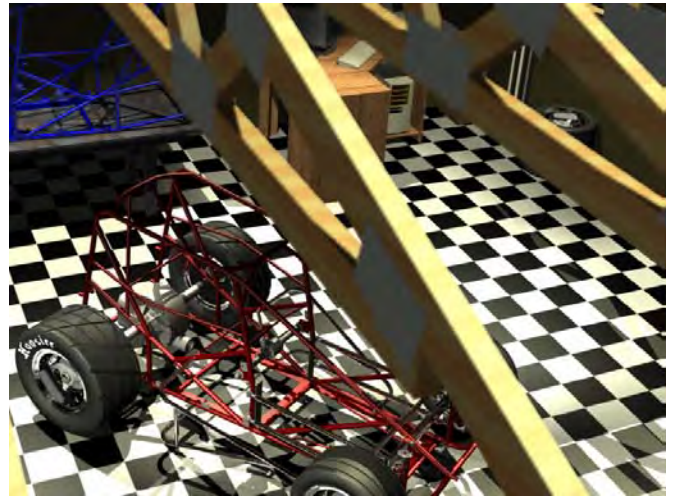
Lights, Camera, Action! Wait a minute!

Little Extras

Post Processing – add blur for depth of field. Eventually, Inventor Studio will have a depth of field setting, for now, minor image editing can improve the image.

Camera motion - can greatly enhance an animation. Can also detract from it. Use it well, but use it with caution.

One other thing you can do... (Compositing)



Final Cut

Composite Video!

Composite Video!

Using a product such as Discreet Combustion 4 or other video editing software you can make use of animation output from multiple cameras.

You can fade the animation as it makes a camera transition.

It requires rendering the animation with each camera, and then taking the multiple AVIs created into the video editing software and making it come to life.

Autodesk QA Engineer Randy Kreitzman did the animation associated with the image to the right.

