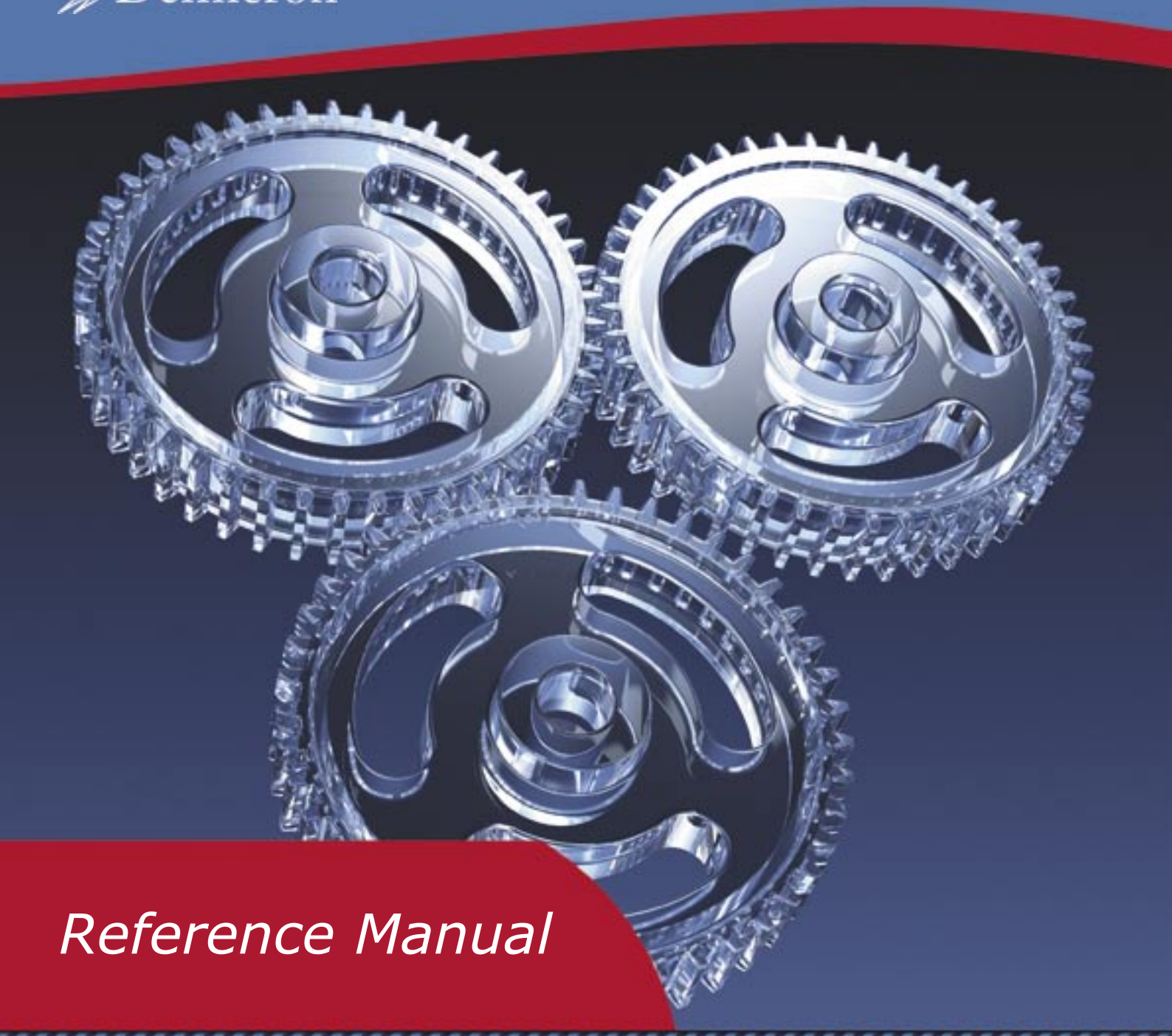
Demicron



Reference Manual

WireFusion 5

Volume II: 3D Reference

Contents

Introduction

WireFusion offers you a real-time 3D solution more powerful than anything else on the market today. You will get one of the smallest 3D engines available, and one of the most advanced when it comes to features, quality and performance. WireFusion 3D has enormous capabilities and possibilities, which you soon will discover.

As the WireFusion technology is based on Java, you will reach the major part of all Internet users worldwide without the need of a browser plug-in, no matter which platform or browser they are using. WireFusion is also one of the most affordable solutions available today, especially when taking into account the time it takes to develop a complex 3D presentation. The visual interface and visual programming found in WireFusion allows you to quickly create and deliver advanced and robust presentations, even as a non-programmer. A 3D API (available in the Enterprise and Educational editions only) allows advanced users to control X3D/VRML nodes and fields in the 3D models, giving the option to dynamically manipulate parameters and settings. The capability to dynamically add, replace and remove 3D models and textures to/from a running 3D scene makes it possible to create, for example, large and advanced 3D configurators.

The idea with WireFusion is that you create your 3D models in any third-party 3D authoring tool capable of exporting to X3D or VRML, you then import the models to WireFusion where you can manipulate the models in a variety of ways. You can also seamlessly integrate your 3D models with other media types, such as MPEG movies, GIF animations, slide shows, MP3 audio and even with Adobe Flash®.

NOTE: WireFusion does not use Sun Microsystems Java3D. The WireFusion 3D technology is an in-house developed technology.

Please send comments and feedback regarding this manual or the software to contact@demicron.com

About this Manual

This manual explains how to use the various 3D features found in WireFusion. Because the program is so flexible, it does not attempt to provide you with a total description, but instead to give you enough information to understand the features and the ideas how to create sophisticated 3D presentations.

NOTE: This manual does not explain how to work in general with the WireFusion tool, but how to work with 3D. For more general information about the WireFusion tool, please read the reference manual ***WireFusion, Volume I***.

TIP: To learn how to use 3D in WireFusion, read the hands-on 3D tutorial ***Getting Started, Volume II***.

Getting Started

General Creating

WireFusion is capable of importing 3D models specified in the ISO standard 3D formats X3D and VRML, which can be exported from the major part of all 3D authoring tools on the market today. All major 3D scanners also have the possibility to export to VRML and so do also 2D-to-3D conversion software like e.g. Realviz ImageModeler®.

Even though there is no preset limit in WireFusion of how large your 3D scenes can be or how many objects (shapes) and polygons you can use in your models, you should always try to make the models as simple as possible when creating them in your 3D authoring tool. By reducing the number of objects and polygons, the final rendering performance increases and the file size gets smaller. This will of course increase the user experience, so try to find a good balance between size and quality while creating the models. There is a built-in Crease Angle (smoothing) method in WireFusion, which helps to improve the smoothness of objects and hence removes the need of high polygon models. WireFusion also supports LOD (Level of Detail), which can be used to construct an object that alters its geometric complexity, or level of detail based on how close the camera is to the object.

Further, you do not create 3D animations inside WireFusion; you create them directly in your 3D authoring tool. You can make object mesh animations (morphing) and you can animate cameras and light sources, everything is included with the X3D/VRML export and supported by WireFusion. Then you can control the animation time, program animation events and create touch sensors from inside WireFusion.

The philosophy is to let you stay in your favorite 3D authoring tool as long as possible; to create models and animations there. Then you import the models to WireFusion for final tuning and to add interactivity and logic before publishing to the web.

NOTE: Consult the user manual for your specific 3D authoring tool for information regarding model creation and X3D/VRML export.

TIP: It is highly recommended to read the WireFusion 3D Modeling guide.

3D Tools Exporting to X3D and VRML

Below is a selection of popular 3D tools capable of exporting to X3D and VRML that can be used together with WireFusion.

- Amapi
- AutoCAD *
- Autodesk 3ds Max
- Autodesk AliasStudio
- Autodesk Inventor *
- Autodesk Maya
- Autodesk Mechanical *
- Autodesk VIZ

- Blender
- Carrara
- Chief Architect
- Cinema 4D
- LightWave 3D
- Matlab
- Microstation
- Plasma
- Poser
- Pro/ENGINEER
- SketchUp
- Thinkdesign
- thinkiD DesignXpressions
- trueSpace
- and many more

* Requires a third party exporter

TIP: If your 3D authoring tool does not support X3D or VRML export, then you can use a conversion tool like e.g PolyTrans or Deep Exploration. They are capable of importing and converting most 3D formats on the market.

3D Scene Object

Introduction

When working with 3D in WireFusion you will notice that you will spend quite a lot of time in the 3D Scene object. The 3D Scene is the WireFusion object that imports your X3D/VRML files and also where you make all the 3D settings.

Importing 3D Models

When you are done creating in your 3D authoring tool and have exported your 3D model to either X3D or VRML, then it is time to import the 3D file to WireFusion.

When you drop the 3D Scene object in the Script Area you will be prompted with a dialog with some loading options (Figure 1).

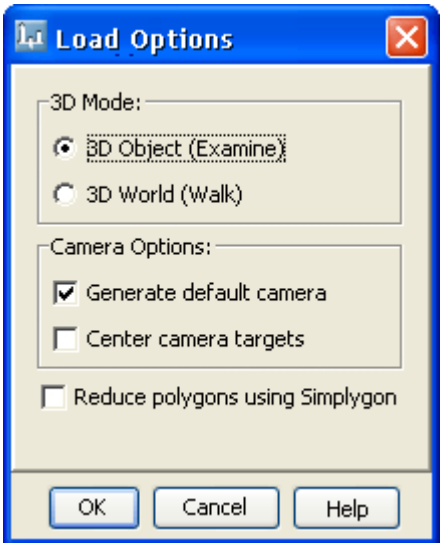


Figure 1: 3D Type dialog

3D Object (Examine)

The 3D Object mode is used to examine 3D models as a whole, allowing the user to zoom, pan, and rotate camera views.

3D World (Walk)

The 3D World mode is used to navigate the 3D model as a virtual world, allowing the user to walk and look around in the model by controlling an avatar.

NOTE: The appearance of the 3D Scene dialog differs slightly depending on if you have loaded a 3D Object or a 3D World.

Generate default camera

Select this checkbox to add a default camera to your 3D scene. The camera is automatically positioned so that your entire scene will fit into the viewport.

Rotate camera around scene center

Select this checkbox to automatically adjust the camera rotation around the 3D scene bounding box center.

Reduce polygons using Simplygon

Select this checkbox to load the 3D model into the mesh optimizing tool Simplygon, before loading it into the 3D Scene object. Simplygon is a high-quality polygon reduction and polygon repair tool that effectively will optimized your 3D models. Read more about how to get and how to use Simplygon together with WireFusion at http://www.demicron.com/simplygon/

After choosing loading options, a loading dialog appears and you are supposed to browse for your 3D file (X3D or VRML). Once the file is loaded, the 3D Scene configuration dialog opens and you can preview your model and change the 3D settings.

Example: Import 3D model

We want to import a 3D bicycle computer to WireFusion.

Step 1

In WireFusion, insert a 3D Scene object into your project (Figure 2).

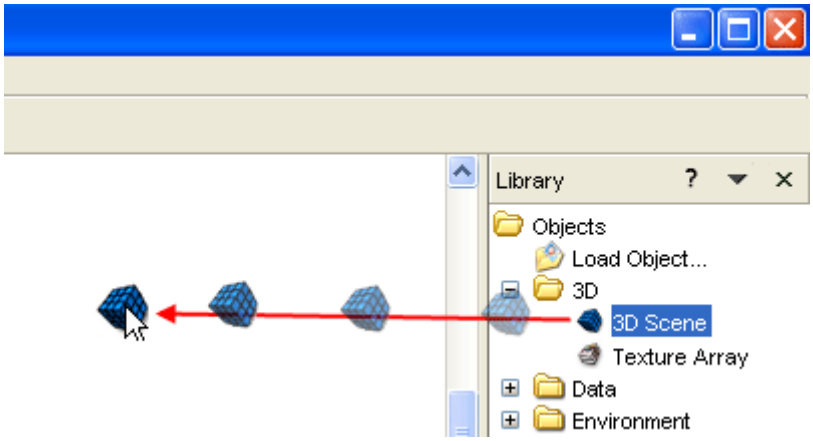


Figure 2: Inserting a 3D Scene object

In the 3D Type dialog (Figure 1), choose 3D Object mode.

When the loading dialog opens, browse for your 3D model, and then click Open to load it (Figure 3).

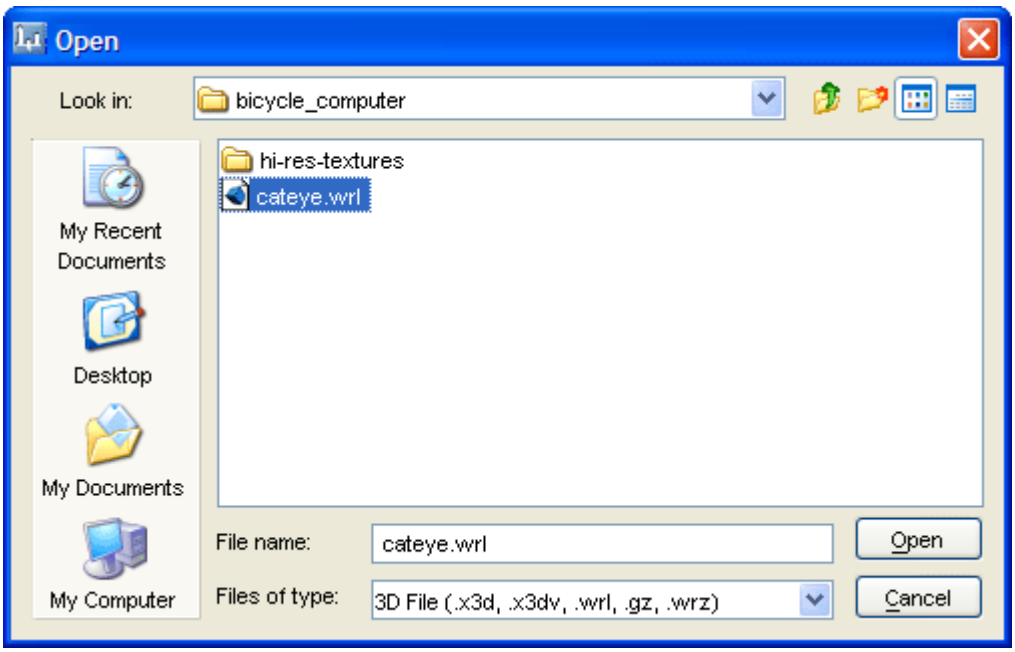


Figure 3: 3D Scene loading dialog

TIP: In order to have textures loaded properly, make sure to have them located in the same folder as the 3D file (or in the prefix location specified when exporting the 3D file).

NOTE: Supported 3D file extensions are: x3d, x3dv, wrl, wrz, gz, wf.wrl, and .w3f.

Step 2

The 3D Scene configuration dialog opens and if you can see the model in the Preview window, then the model is probably correctly imported (Figure 4).

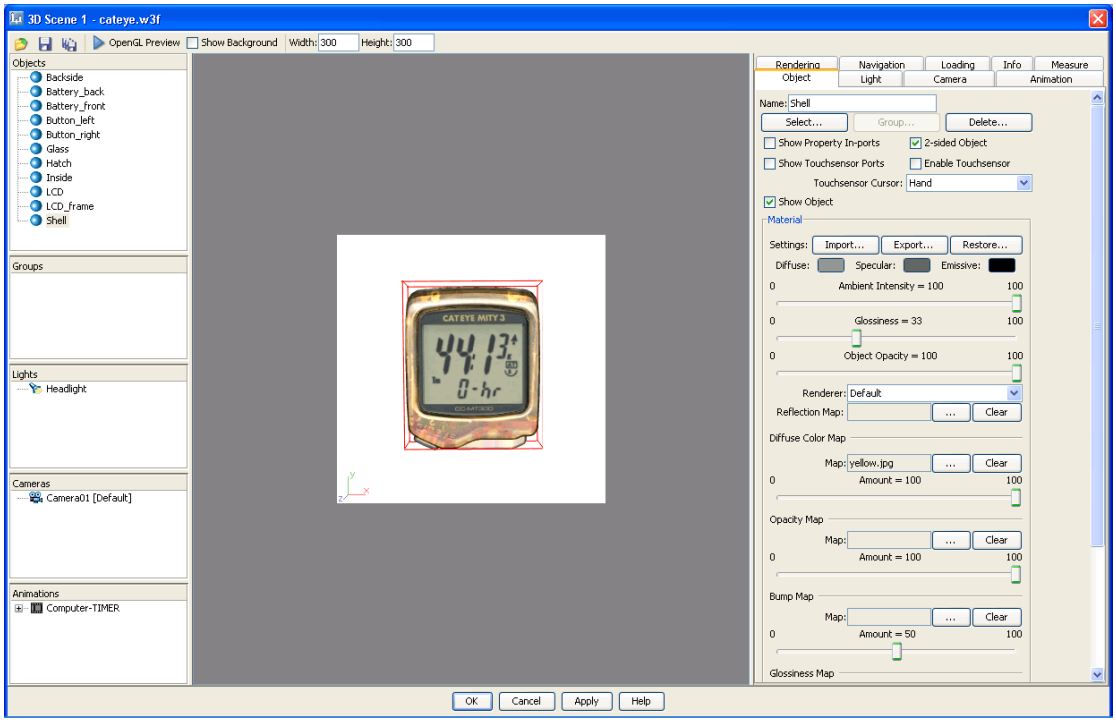


Figure 4: 3D Scene configuration dialog

NOTE: If you do not see the 3D model in the Preview window, then there might be something wrong with your 3D file, or it contains X3D or VRML features that are not supported in WireFusion. When something is wrong, then the Objects view is normally empty. Another alternative is that you have not added a camera to your scene before exporting and that your model simply can not be seen by the default created camera. If that is the case, then try to navigate the Preview window until you can see your model.

User Interface

The 3D Scene object differs quite a lot from the other WireFusion objects with its extensive configuration dialog. The dialog almost looks and works like a small program.

There are two different appearances of the 3D Scene dialog, depending on if you have imported a 3D Object or a 3D World. Both appearances allow you to preview your 3D models, to make settings to them and to work with cameras, lights, animations etc.

In the below sections we will describe the user interface and the different views in the 3D Scene dialog (Figure 5).

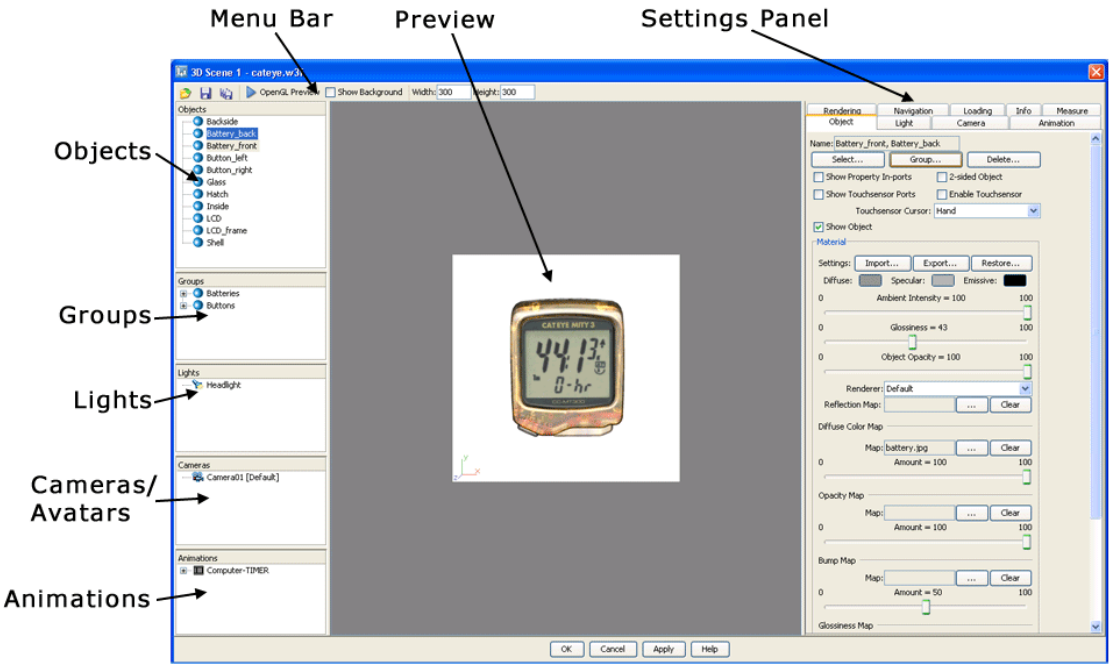


Figure 5: 3D Scene dialog

Menu Bar

The Menu Bar consists of Replace, Save and Batch Convert buttons. Width and height for the 3D Scene Target Area (and Preview window) are also set here.

Preview

The 3D model is previewed in this window. The size of the Preview window is set in the Menu Bar.

Objects

The Objects view displays all the objects (shapes) in your 3D model.

Groups

The Groups view displays all object groups in your 3D model.

Lights

The Lights view displays all the light sources in your 3D scene.

Cameras (3D Object mode)

The Cameras view displays all the cameras in your 3D scene.

Avatars (3D World mode)

The Avatars view displays all the avatars in your 3D scene.

Animations

The Animations view displays animations (if any).

Settings Panel

The Settings Panel consist of eight panels that give you access to all the settings of the 3D models; Rendering, Object, Camera/Avatar, Animation, Light, Navigation, Measure, Loading and Info.

Menu Bar

The Menu Bar is located directly under the 3D Scene window's title bar (Figure 6)..

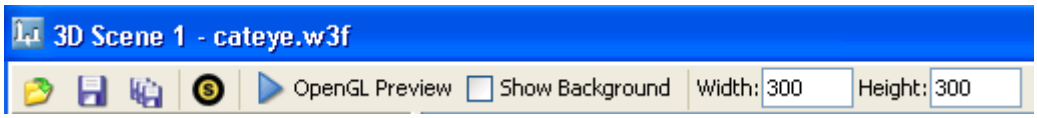


Figure 6: The 3D Scene Menu Bar

Replace

Loads and replaces the existing 3D model with a new or updated model. The new model can optionally keep the old material, camera, light and touch sensor settings. This feature requires that your new model has not changed too much compared to the old model, and that you have not changed the names of the objects (shapes).

Save

Saves the current 3D model to the WireFusion 3D format (*.w3f*). Textures used in the model are saved to the same location as the saved 3D file.

Batch Convert

[Enterprise edition only] A batch mode process to convert several X3D/VRML models at the same time to the WireFusion 3D format (*.w3f*). Textures used in the models are saved to the same location as the converted X3D/VRML files.

Simplygon

Loads selected objects into the mesh optimizing tools Simplygon. Simplygon is a high-quality polygon reduction and polygon repair tool that effectively will optimized your 3D models. Read more about how to get and how to use Simplygon together with WireFusion at http://www.demicron.com/simplygon/

OpenGL Preview

Previews the 3D scene in a separate window using OpenGL acceleration.

Show Background

Shows the Stage background in the preview window.

Width

(number) Sets the Target Area width (and also the Preview window width) in pixels.

Height

(number) Sets the Target Area height (and also the Preview window height) in pixels.

Preview

In the Preview window you can navigate your 3D model in software mode, and test your settings instantly, in real-time, without the need of leaving the 3D Scene dialog. You navigate the 3D model by using the mouse or the keyboard, and navigation settings are done in the Navigation panel.

The Preview window has the same width and height as the Target Area for the 3D Scene, and the same background color as the Stage. The Preview window always displays a camera (or avatar) view. A WireFusion 3D scene always contains a camera (or avatar), even if you have not added one before exporting the 3D model from your 3D authoring tool, WireFusion will add one for you.

When clicking an object in your 3D model, a red boundary box is shown in the Preview window (Figure 7), indicating that the object is selected and making it possible to change the settings for the object in the Object panel.

Figure 7: The Preview window

Objects

The Objects view displays all the objects (shapes) in your 3D model (Figure 8). Objects are listed in the hierarchy from parent to child, as they were linked in the 3D authoring tool where they were created. When clicking on an object in the Objects view or in the Preview window, the object gets selected, making it possible to change the settings for the object in the Object panel.

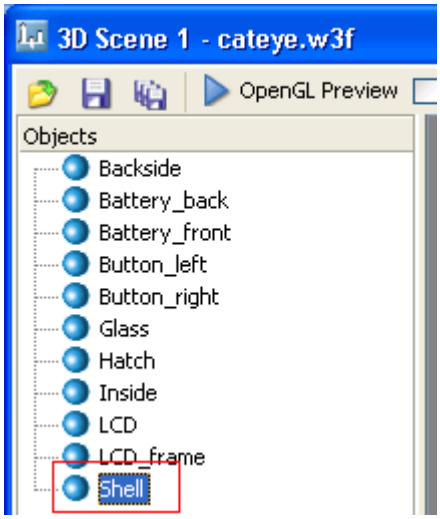


Figure 8: Objects view showing a selected object

Groups

The Groups view displays grouped objects in your 3D scene (Figure 10). The group command combines a selection set of objects or groups into a single group.

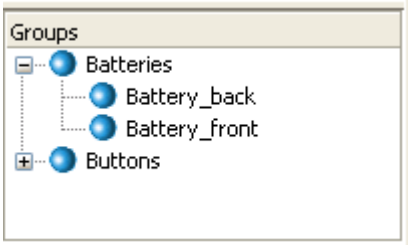


Figure 9: Grouped objects

Lights

The Lights view displays all the lights in your 3D scene (Figure 10). Two different types of light sources are supported; Directional light and Omni light. All scenes automatically have a Headlight added. A Headlight works as a Directional light, always directed on the object from the user's point of view.

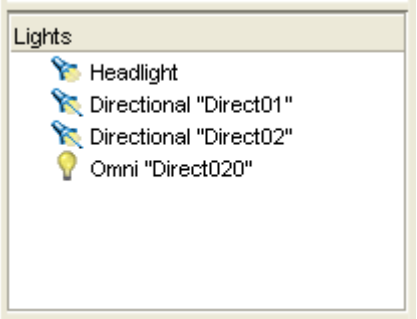


Figure 10: Light sources

When clicking on a light source icon, the light source gets selected, making it possible to change the settings for the light in the Light panel.

Cameras (3D Object mode)

The Cameras view, which is visible in the 3D Object mode, displays all the cameras in your 3D scene (Figure 11). The default camera, i.e. the camera used at presentation startup, is denoted with [Default]. To switch camera view in the Preview window, click a camera icon. After being selected you can change settings for the camera in the Camera panel.

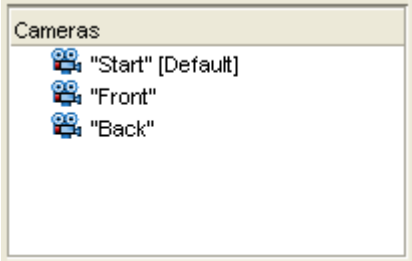


Figure 11: Cameras view

Avatars (3D World mode)

The Avatars view, which is visible in the 3D World mode, displays all the avatars in your 3D scene (Figure 12). The default avatar, i.e. the avatar used at presentation startup, is denoted with [Default]. To switch avatar view in the Preview window, click an avatar icon. After being selected you can change settings for the avatar in the Avatar panel.

Figure 12: Avatars view

Animations

The Animations view displays all existing animations in your scene, if any (Figure 13). When clicking on an animation icon, that animation gets selected, making it possible to change the settings for the animation in the Animation panel.

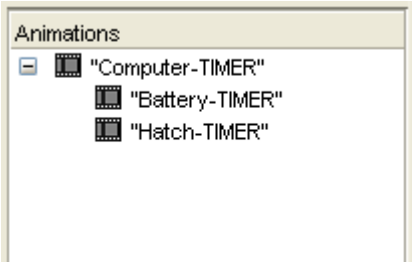


Figure 13: Animations view

Settings Panel

The Settings Panel is described in more detail under the 3D Scene: Settings Panel, page 14.

Settings Panel

The Settings Panel consist of eight panels (Figure 14) that give you access to all the settings of your 3D scene; Rendering, Object, Camera/Avatar, Animation, Light, Navigation, Measure, Loading and Info.

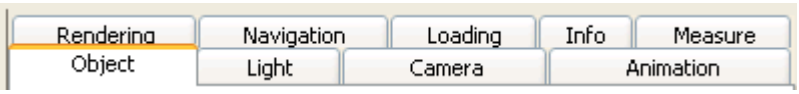


Figure 14: Settings panel

Rendering Panel

In the Rendering panel you set some general settings for your model, you choose for example the default shading method and whether to use anti-aliasing, bilinear filtering, MIP mapping, real-time shadows etc.

Renderer

Sets the default renderer for your 3D model (Figure 15).

TIP: In the Object panel, you have the option to set the shading method for each individual object in your 3D scene.

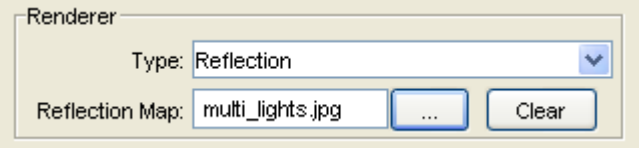


Figure 15: Choosing renderer type

Type

Choose the default renderer type for your 3D scene. Choose between Constant, Flat, Gouraud, Phong, Reflection, Wireframe and Contour.

Constant

(alternative) No lighting is performed (Figure 16). Object surfaces are 100% illuminated. Useful with texture-mapped surfaces when the texture image is preferred to reproduce on the object as close to the original color as possible, for example when using baked textures.

Figure 16: Constant shading

Flat

(alternative) Calculates the lighting for each facet and gives it a constant color (Figure 17). No smoothing information is displayed. Use this mode to provide a faceted look to your geometry.

Figure 17: Flat shading

Gouraud

(alternative) Calculates the lighting for each polygon vertex (Figure 18). The resulting colors are interpolated over the polygon surface to give it a smooth appearance. Gouraud shading removes the faceted look of objects, but highlights on glossy objects may be deformed and bright or dark intensity streaks, called Mach bands, may appear on the surface.

Figure 18: Gouraud shading

Phong

(alternative) Performs shading calculations for each screen pixel (Figure 19). To get the normal used for the shading calculation you interpolate the vertex normals over the polygon surface. This shading correctly shows highlights on glossy objects and generally gives the object a smoother look compared to Gouraud shading.

Figure 19: Phong shading

Reflection

(alternative) By mapping a texture, showing the surrounding of a 3D scene, onto 3D objects using a reflection vector calculated from the surface normals and the camera position, you simulate reflections of the surrounding on the objects (Figure 20). This can, for example, be used to increase the metallic feel of objects, and can also be used as a way of lighting the objects without specifying light sources. If chosen, all light sources in your 3D scene are deactivated.

NOTE: A Reflection Map has to be loaded when using the Reflection renderer, else you will not get any effect.

Figure 20: Reflection

Wireframe

(alternative) Displays the model as wireframe with no shading applied (Figure 21).

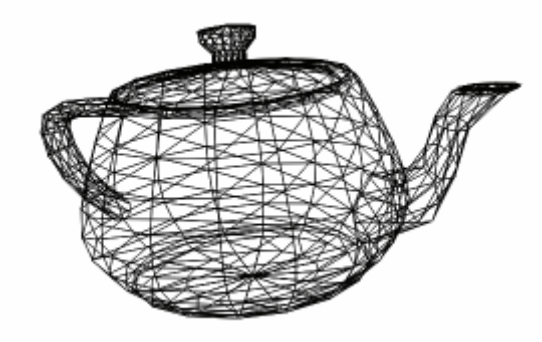


Figure 21: Wireframe

Contour

(alternative) Displays the contour of the model with no shading applied (Figure 22).

Figure 22: Contour

TIP: The different renderer types, as listed above, can be dynamically changed in your presentation during runtime by using in-ports found in the 3D Scene object (Figure 23):

3D Scene > In-ports > Rendering > Renderer

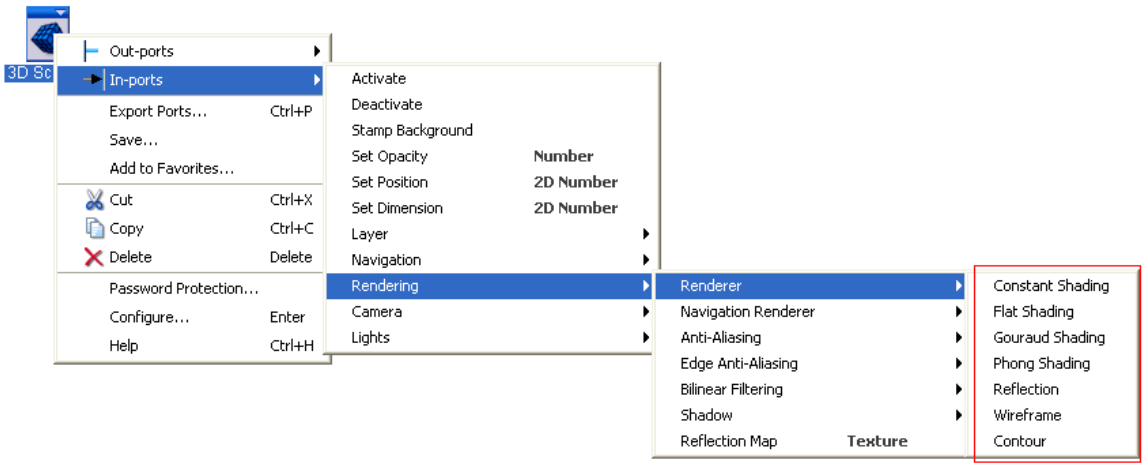


Figure 23: Renderer in-ports

Reflection Map

Applicable if the Reflection method is selected in the Renderer Type menu (see above).

"..."

(loading dialog) Loads a default reflection map. Supports JPEG, GIF or PNG format with any width and height. It is however recommended to use sizes to the nearest (lower) power of 2.

Clear

(button) Removes the loaded reflection map.

NOTE: A loaded reflection map will be included in the published presentation, even if it is not used. Therefore, make sure to remove the map (Clear) if you do not use Reflection as renderer type.

Reflection maps are usually static, but in WireFusion you can dynamically switch reflection maps in a presentation during runtime. You can even have animated reflection maps. For doing this you need either the Scene object or the TextureArray object (not available in the Freeware edition). In order to switch the default reflection map, you have to connect to a 3D Scene in-port (Figure 24):

3D Scene > In-ports > Rendering > Reflection Map [Scene]

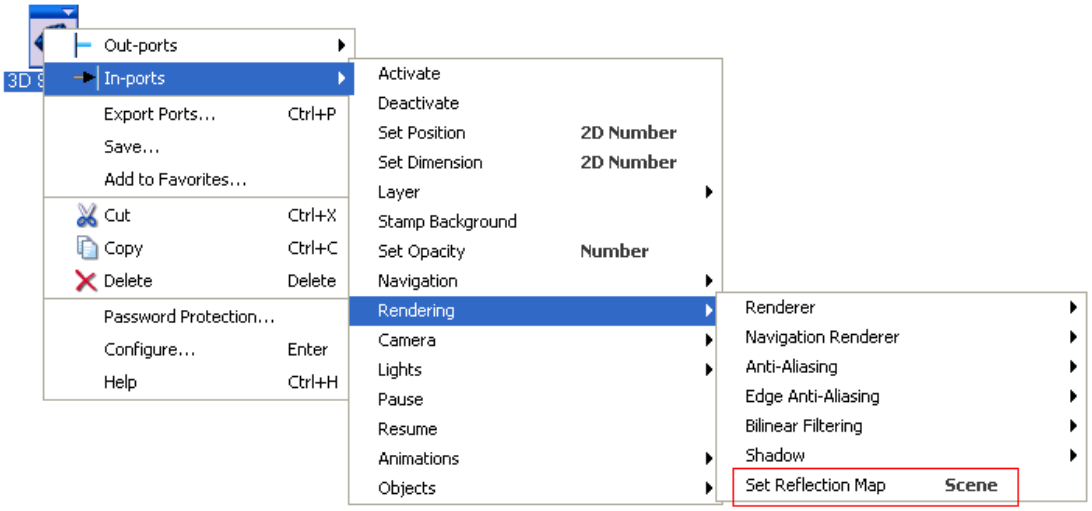


Figure 24: Reflection Map in-port

Navigation Renderer

Optionally you can choose to switch render method while navigating a 3D model by using the Navigation Renderer (Figure 25).

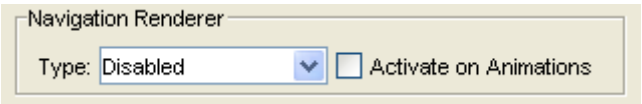


Figure 25: Navigation Renderer

Type

Choose the type of renderer that will be used while navigating the 3D model. Choose between Disabled, Constant, Flat, Gouraud, Phong, Reflection, Wireframe and Countor. Disabled means that the Navigation Renderer is turned off.

Activate on Animations

(checkbox) Mark this checkbox to automatically use the Navigation Renderer when animations are running. If not marked, the default renderer will be used when animations are running.

TIP: The different types of navigation renderer, as listed above, can be dynamically changed in your presentation during runtime by using in-ports found in the 3D Scene object (Figure 26):

In-ports > Rendering > Navigation Renderer

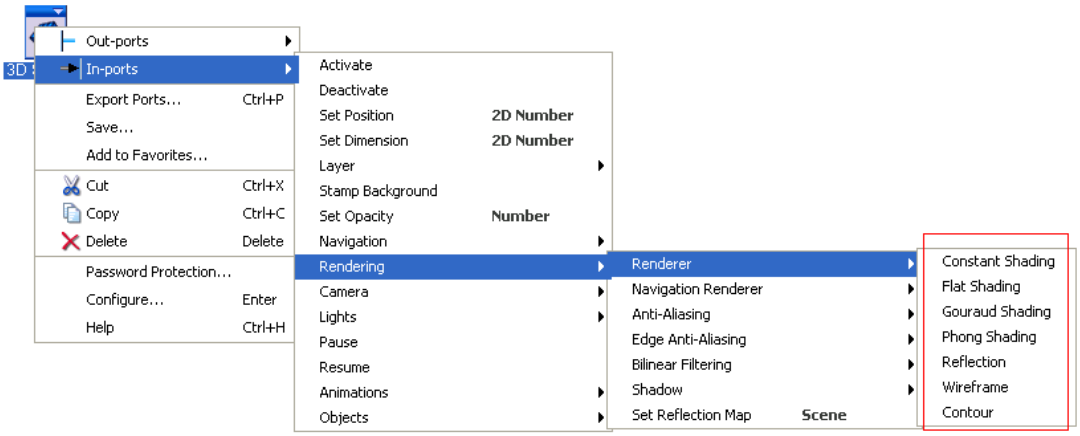


Figure 26: Navigation Renderer in-ports

Rendering Options

Contains general rendering options (Figure 27).

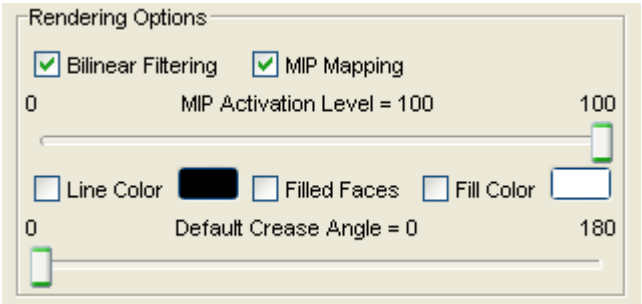


Figure 27: Rendering Options

Bilinear Filtering

(checkbox) Mark this checkbox to activate Bilinear Filtering (smoothing) for all textures and reflection maps in the 3D scene (Figure 28). Bilinear Filtering creates a smoother non-pixelated view of close-ups of the textures mapped on 3D objects.

Figure 28: (A) Bilinear Filtering off, (B) Bilinear Filtering on

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TIP: The bilinear filtering can be dynamically turned On or Off in your presentation during runtime by using in-ports found in the 3D Scene object (Figure 29):

3D Scene > In-ports > Rendering > Bilinear Filtering

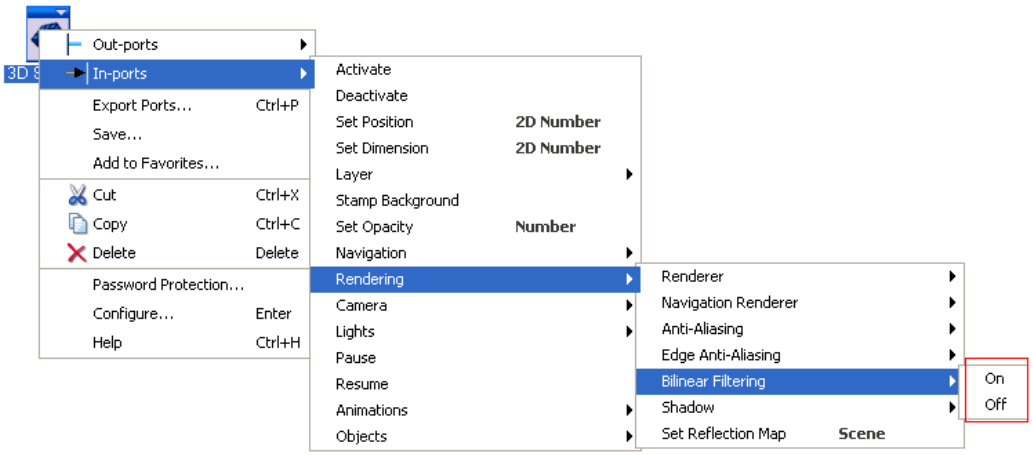

Figure 29: Bilinear filtering in-ports

MIP Mapping

(checkbox) Mark this checkbox to activate MIP mapping for all textures in the 3D scene. MIP Mapping is a technique to remove aliasing artifacts on textures, where scaled versions of the textures are pre-computed, and the distance between object and camera decide which version to use.

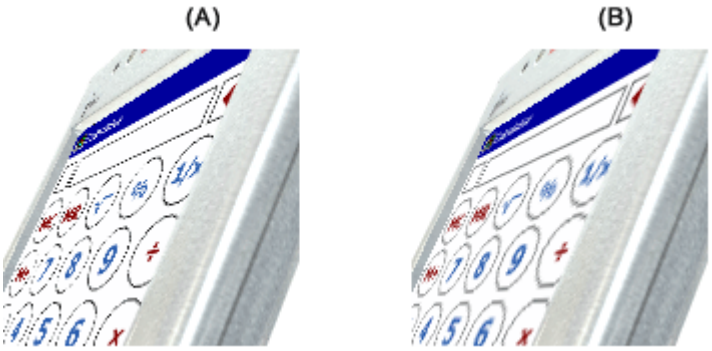

Figure 30: (A) MIP Mapping off, (B) MIP Mapping on

MIP Activation Level

(slider) Adjusts the distance for when the MIP mapping is activated. 0=activates closer to screen, 100=furthest away from the viewer.

Line Color

(checkbox, color) Mark this checkbox to activate the Line Color, and then click the color button to select a color that will be used for all lines (Figure 31). Only applicable when using Wireframe or Contour renderers. If not marked, the lines will have the same color as the objects' diffuse colors.

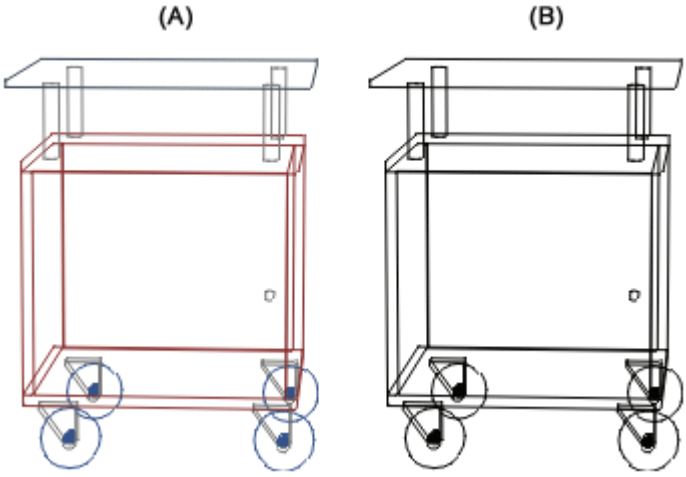

Figure 31: (A) Line Color Off: Lines have the same color as the objects' diffuse color, (B) Line Color On: All lines have the same color

Filled Faces

(checkbox) Mark this checkbox to fill the polygons faces with the same color as the objects' diffuse colors (Figure 32). Only applicable when using the Wireframe or Contour renderers.

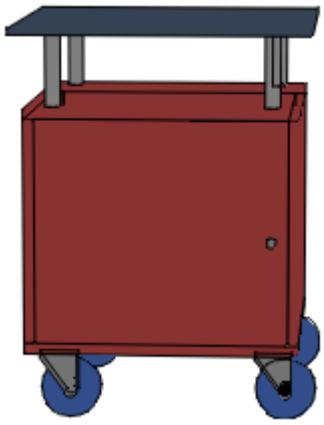

Figure 32: Filled faces

Fill Color

(checkbox, color) Mark this checkbox to activate the Fill Color, and then click the color button to select a color to be used to fill the faces (Figure 33). Only applicable when using Wire-frame or Contour renderers, and when the Filled Faces checkbox is marked.

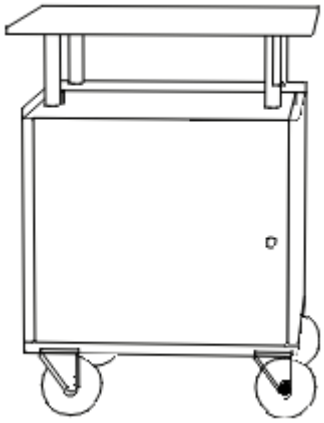

Figure 33: Fill Color activated

Default Crease Angle

(slider) Sets a default crease angle (in degrees) for all objects in your model (Figure 34). minimum=0 degrees, maximum=180 degrees.

NOTE: Crease angles can optionally be set for individual objects (see Object Panel, page 29).

Figure 34: (A) Crease Angle = 0, (B) Crease Angle = 70

Anti-Aliasing

Aliasing is caused by the sampling of smooth data onto a screen consisting of discrete pixels. The result is the visible stair stepping or jaggies at the edges of the object polygons. Anti-aliasing is the method to remove this and results in smoother edges and sharper images (Figure 36). Three modes of anti-aliasing are supported, On, Off and Auto (automatic switching between On and Off) (Figure 35). Since anti-aliasing is a processor-intensive operation the Auto option is preferred, where the anti-aliasing method is temporarily turned off when animations are running, when interacting with the model or if a texture animation is running.

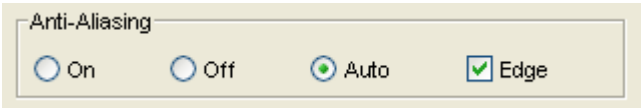

Figure 35: Anti-Aliasing options

On

(radiobutton) Full-scene anti-aliasing is always On, even if an animation is running, if the 3D model is moved or if parameters are changed.

Off

(radiobutton) Full-scene anti-aliasing is always Off.

Auto

(radiobutton) Full-scene anti-aliasing is automatically turned Off when the 3D model is moved, when an animation is running or parameters are changed (i.e. animations through in-ports), else it is turned On.

Edge

(checkbox) Mark this checkbox to turn edge anti-aliasing on. Edge anti-aliasing will be applied to edges of objects, and will result in smoother object contours.

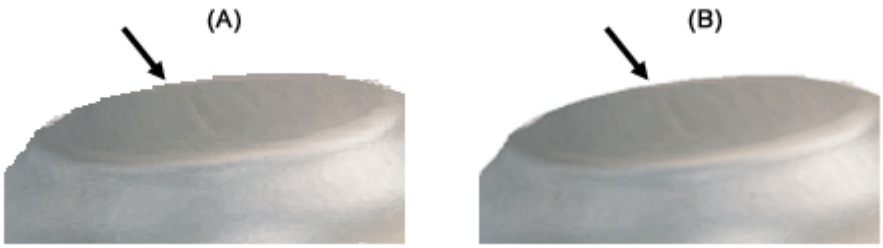

Figure 36: (A) Anti-Aliasing Off, (B) Anti-Aliasing On

TIP: The anti-aliasing settings can be dynamically changed in your presentation during runtime by using in-ports found in the 3D Scene object, (Figure 37):

3D Scene > In-ports > Rendering > Anti-Aliasing

Figure 38, respectively:

3D Scene > In-ports > Rendering > Edge Anti-Aliasing

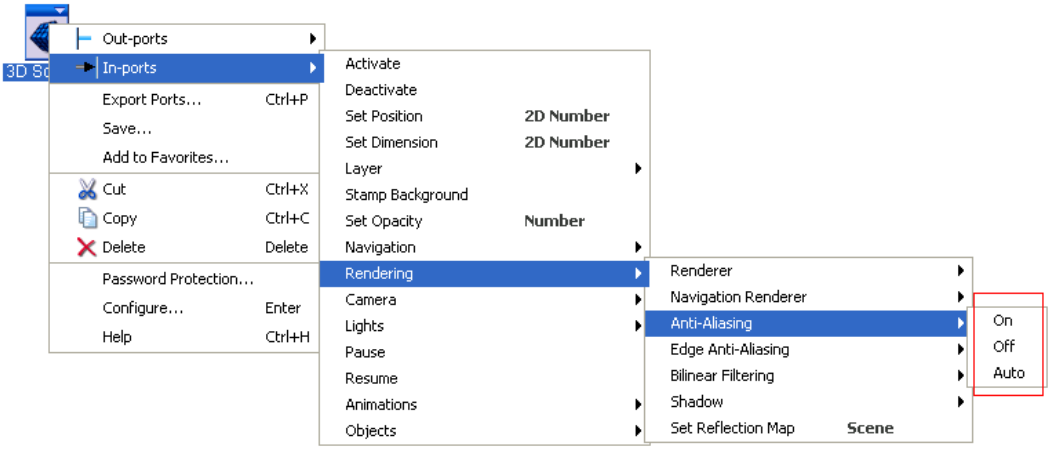

Figure 37: Anti-Aliasing in-ports

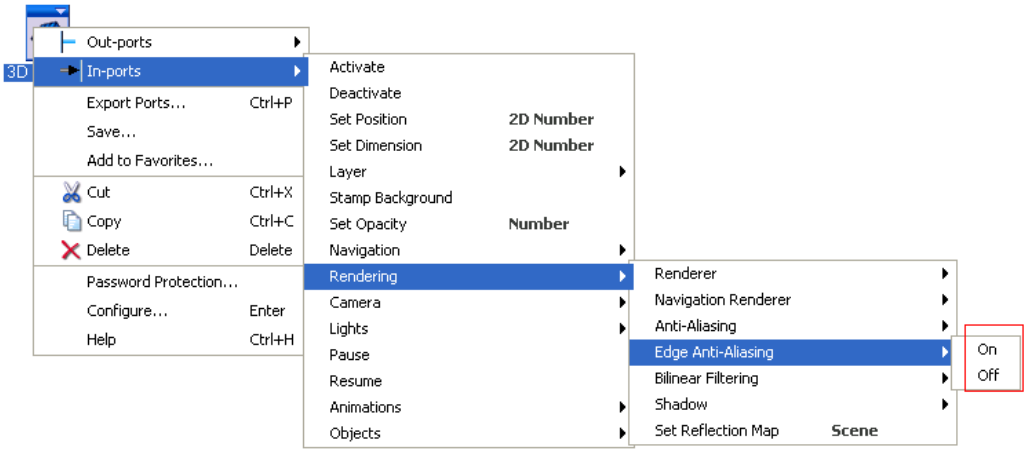

Figure 38: Edge Anti-Aliasing in-ports

Shadow

Real-time shadows can optionally be added, giving a more realistic feeling to your 3D scene (Figure 39). Shadows are automatically updated when objects are moving (i.e. when they are animated), and they are also sensitive to the object opacity level.

NOTE: Real-time shadows are not available when importing a 3D model in 3D World mode, only in 3D Object mode.

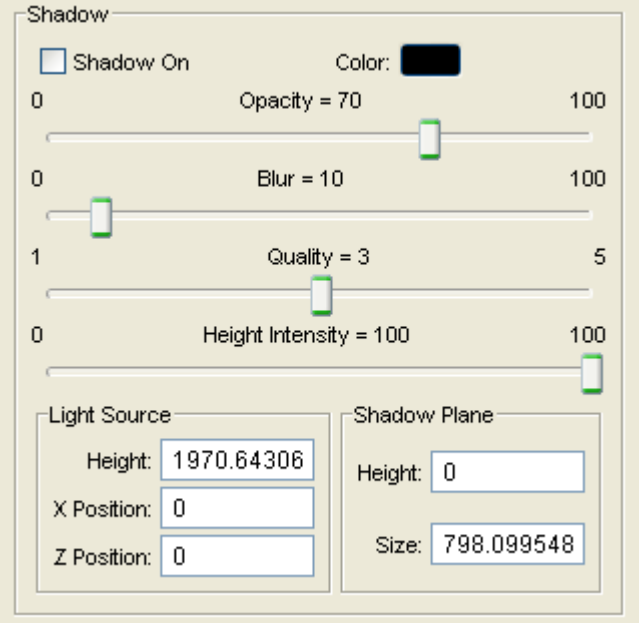

Figure 39: Shadow options

Shadow On

(checkbox) Mark this checkbox to turn real-time shadows on.

Color

(color) Sets the shadow color.

Opacity

(slider) Sets the shadow opacity.

Blur

(slider) Sets the shadow blurriness.

Quality

(slider) Sets the quality of the shadow. 1=lowest quality (fastest), 5=highest quality (slowest)

Height Intensity

(slider) Adjusts the shadow intensity with respect to the height of the model. 0=lowest intensity, 100=highest intensity

Light Source

(group) By default the light source used for calculating the shadow is placed straight above the model at a suitable height (automatically calculated by WireFusion). Both the light source height and its x- and z-position can be set.

Height

(number) Sets the light source height above the shadow plane. A default value is automatically calculated by WireFusion.

X Position

(number) Sets the light source x-position.

Z Position

(number) Sets the light source z-position.

Shadow Plane

(group) By default the shadow plane is added directly below the lowest object in the 3D model.

Height

(number) Sets the height from the shadow plane to the lowest objects in the 3D model.

Size

(number) Sets the shadow plane size. A default value is automatically calculated by WireFusion. You might need to increase the shadow plane size if animations move objects far away from the main model.

TIP: The real-time shadows can be dynamically turned on and off in your presentation during runtime by using in-ports found in the 3D Scene object (Figure 40):

3D Scene > In-ports > Rendering > Shadow

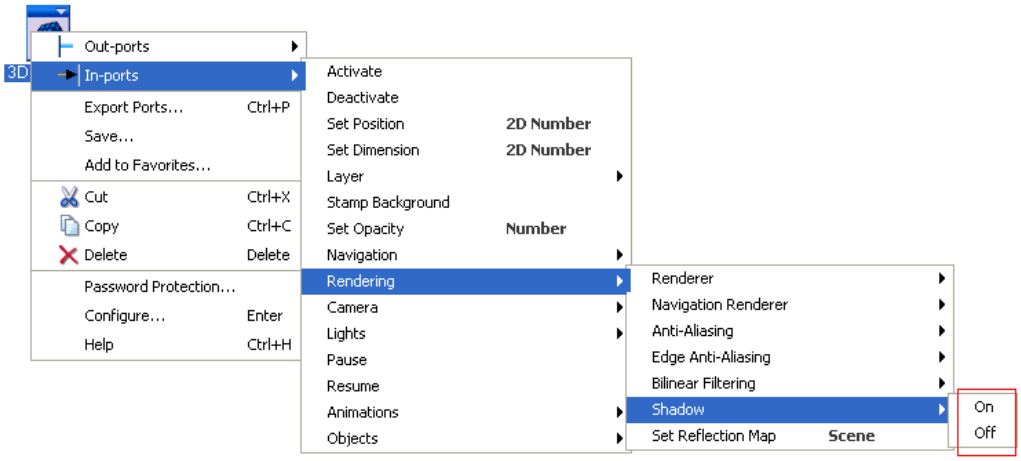

Figure 40: Shadow in-ports

Visibility Limit

The Visibility Limit sets the visible boundary of the 3D scene (Figure 41). All parts of the 3D scene nearer than the front clip distance or farther away than the back clip distance will be removed. This feature is useful when working with large 3D scenes, such as 3D worlds.

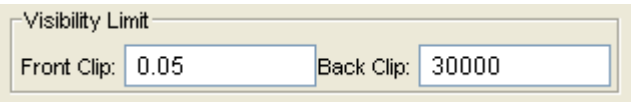

Figure 41: Visibility Limit

Front Clip

(number) Specifies the front (near) clipping distance between the viewer and the 3D model (Figure 41 and Figure 42).

Back Clip

(number) Specifies the back clipping distance. You can hence have an object disappear in the distance.

NOTE: There are no exact values for the clipping, as it depends on the size of the 3D model. You have to test it out for yourself.

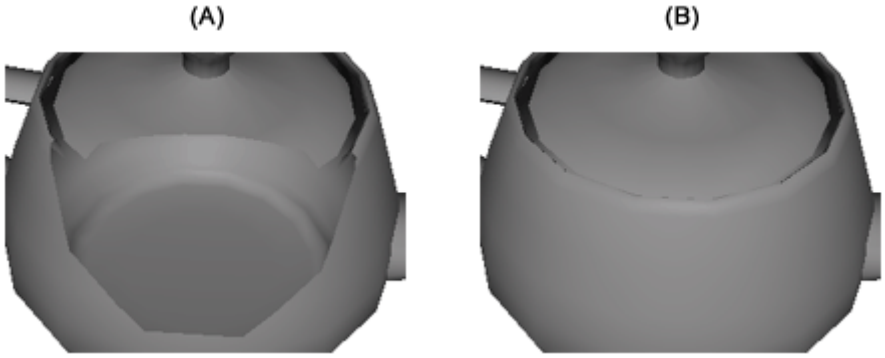

Figure 42: (A) Front clipping, (B) no front clipping

Object Panel

In the Object panel you specify and change object related settings, such as material settings, texture settings, smoothing.

NOTE: In order to edit settings for an object, you first have to select the object either by clicking the object in the Preview or by selecting it in the Objects view (Figure 43).

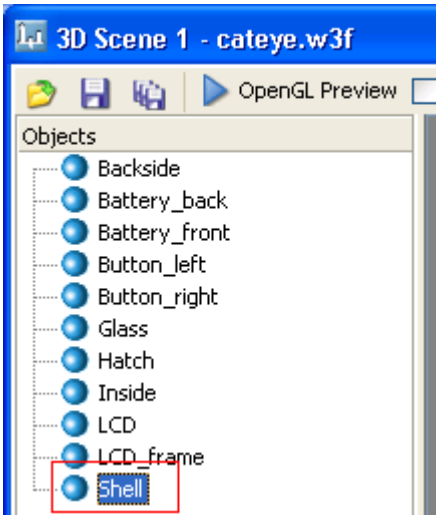

Figure 43: Object view

General Settings

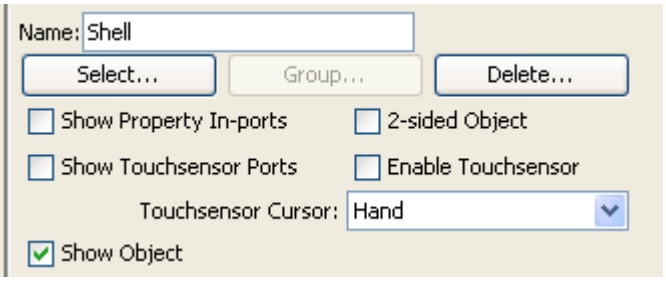

Figure 44: General object settings

Name

(text) Sets the name of the selected object, or the selected group.

Select…

(dialog) Allows to multi-select objects after certain rules (Figure 45).

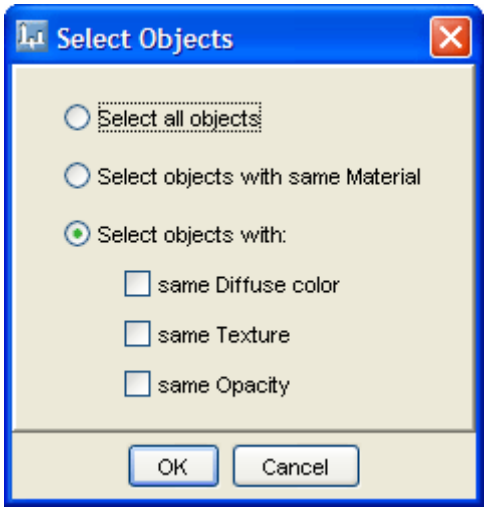

Figure 45: Select Objects are rules

Select all objects

(radiobutton) Mark this option to select all objects in the 3D model.

Select objects with same Material

(radiobutton) Mark this option to select all objects in the 3D model that has the same material settings as the selected object.

Select objects with same Diffuse color

(checkbox) Mark this option to select all objects in the 3D model that has the same diffuse color as the selected object.

Select objects with same Texture

(checkbox) Mark this option to select all objects in the 3D model that has the same texture as the selected object.

Select objects with same Opacity

(checkbox) Mark this option to select all objects in the 3D model that has the same opacity value as the selected object.

Group

(button) Groups multi selected objects into a group.

Delete

(button) Deletes selected objects or groups.

Show Property In-ports

(checkbox) Mark this checkbox to display in-port options for the selected object in the 3D Scene object. These ports can be used to dynamically change object's properties in your presentation during runtime (Figure 46):

3D Scene > In-ports > Objects > '<object name>'

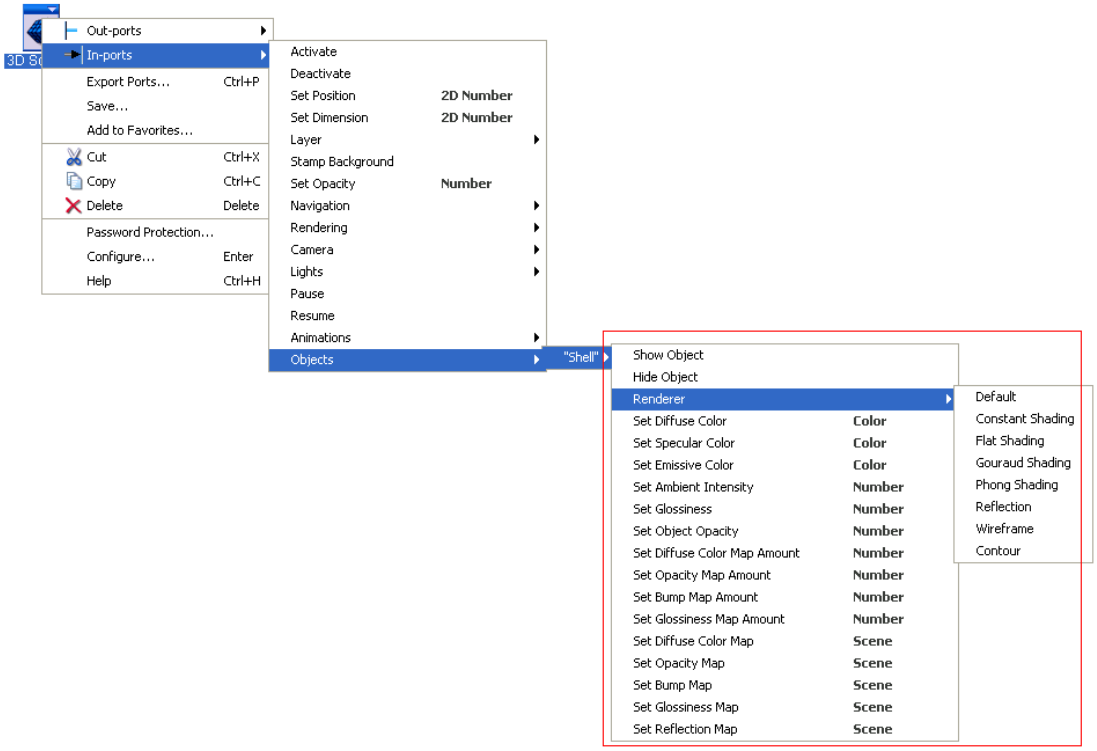

Figure 46: Objects in-ports

2-sided Object

(checkbox) Mark this checkbox to make the object faces two-sided.

Show Touchsensor Ports

(checkbox) Mark this checkbox to show touch sensor ports of the selected object. When marked, in-port and out-port options are displayed in the 3D Scene object, Figure 47:

3D Scene > Out-ports > Touch Sensors > '<object name>'

Figure 48 respectively:

3D Scene > In-ports > Touch Sensors > '<object name>'

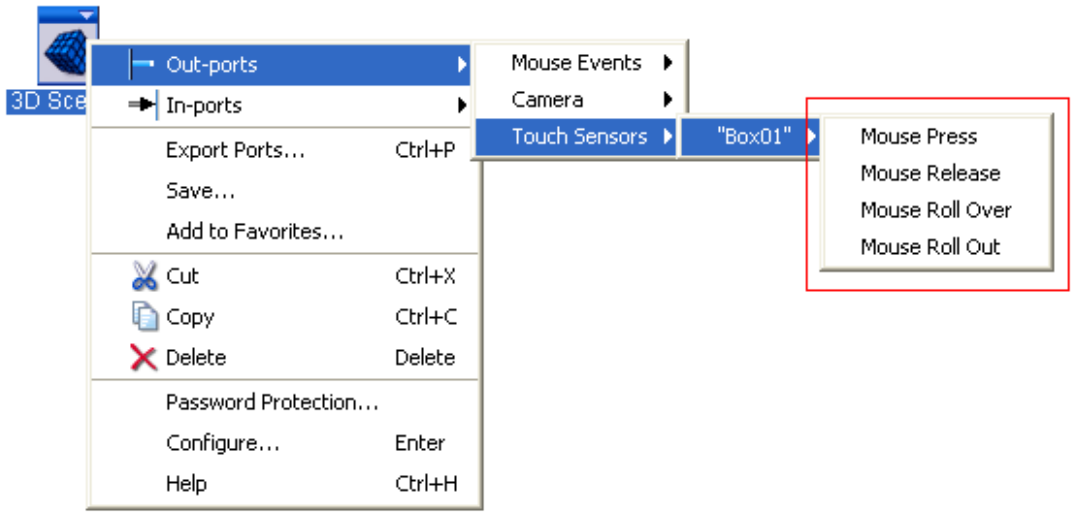

Figure 47: Touch sensor out-ports

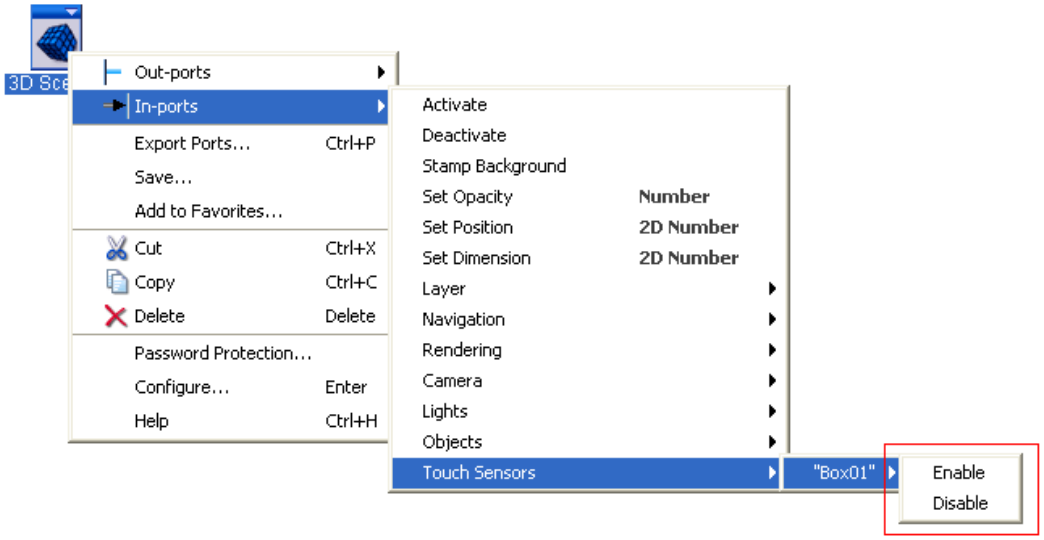

Figure 48: Touch sensor in-ports

Enable Touchsensor

(checkbox) Mark this checkbox in order to enable the object's touch sensor at presentation startup. You can dynamically enable and disable the touch sensor using in-ports (Figure 48)

Touchsensor Cursor

(checkbox) Sets the mouse cursor when moving the mouse over an enabled touch sensor.

Show Object

(checkbox) Mark this checkbox to make the object visible at presentation startup (marked by default).

Material

In the Material section (Figure 49) you edit material settings for selected objects. You can also import and export material settings as a WireFusion Material file (.mtl).

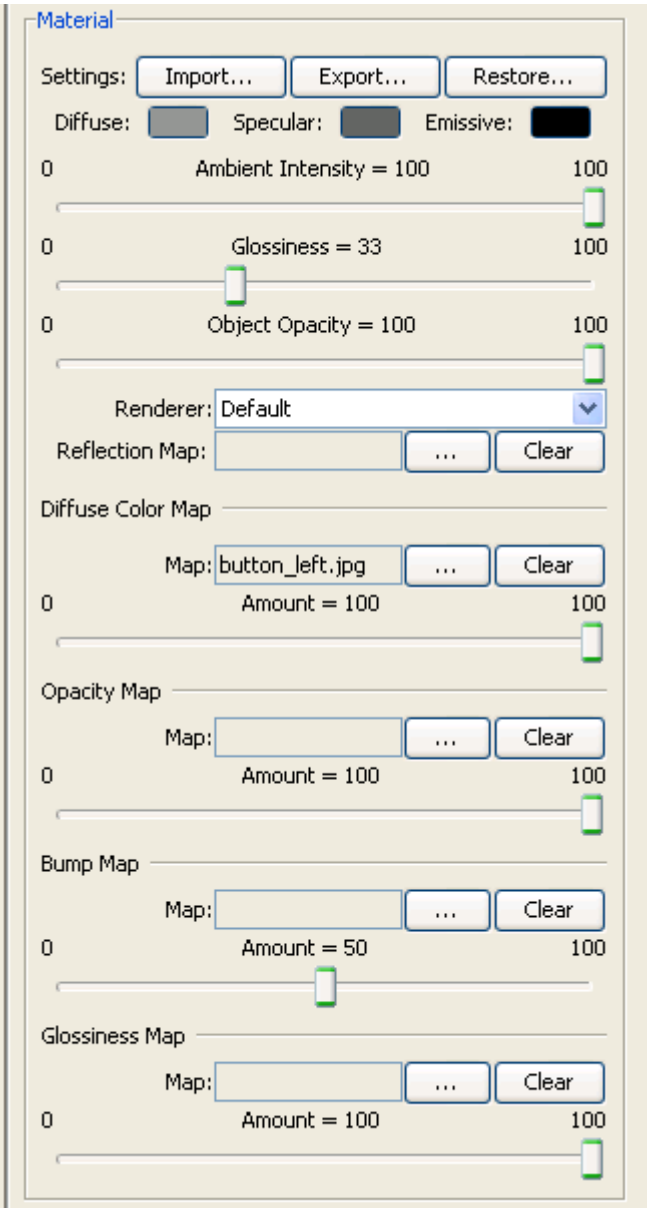

Figure 49: Material settings

Import…

(loading dialog) Loads a material file (.mtl), which will be assigned to all selected objects.

Export…

(saving dialog) Saves the current material settings to a new material file. You can optionally choose to export maps to the material file.

Restore…

(button) Restores the material for the selected objects the original material found in the original 3D file.

Diffuse

(color) Sets the object diffuse color.

Specular

(color) Sets the specular color, which is the color of the highlight shown on objects when Gouraud or Phong shading is used. The size of the highlight is set with the Glossiness slider.

Emissive

(color) Sets the emissive color (called "Self-illumination Color" in 3ds Max). Makes the object self-illuminating.

Ambient Intensity

(slider) Sets the ambient level of the object. This value combined with the ambient intensity set on the lights decides the resulting general brightness of the object. 0=minimum, 100=maximum

Glossiness

(slider) Sets the shininess value. Increases or decreases the size of a highlight when using Gouraud or Phong shading. Increases or decreases the object reflection when a Reflection Map is used. 0=no reflection, 100=full reflection.

Object Opacity

(slider) Sets the opacity level of the object. 0=transparent, 100=opaque

Renderer

(option) Sets an individual renderer for the selected object. Choose between; Default, Constant, Flat, Gouraud, Phong, Reflection, Wireframe or Contour. Default uses the same renderer type as chosen in the Rendering panel.

Reflection Map

Shows the reflection map used for the selected object (if any).

"..."

(loading dialog) Loads a reflection map for the selected object. This map is only used when Reflection is chosen as renderer type.

Clear

(button) Clears the loaded reflection map.

Diffuse Color Map

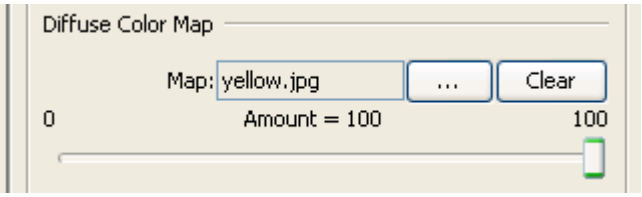

Figure 50: Diffuse color map settings

Map

Shows the object diffuse map file (if any).

"..."

(loading dialog) Loads a new diffuse color map. Supports JPEG, PNG and GIF format.

Clear

(button) Removes the current diffuse map.

Amount

(Slider) Sets the opacity for the diffuse color map. 0=transparent, 100=opaque.

NOTE: It is not possible to load and apply a diffuse color map to an object if no texture was mapped to the object before importing the 3D model to WireFusion. You need to define texture mapping in your 3D authoring tool.

Opacity Map

The opacity map is used to make an object partially transparent using a bluescale image (Figure 52).

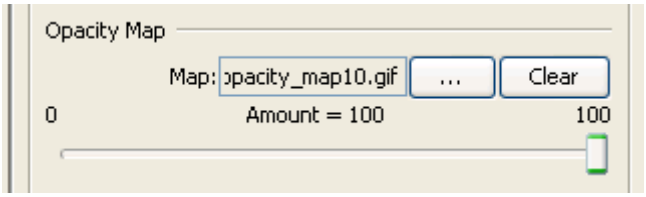

Figure 51: Opacity map settings

Map

Shows the opacity map file (if any).

"..."

(loading dialog) Loads a new opacity map. Supports JPEG, PNG and GIF format.

Clear

(button) Removes the current opacity map.

Amount

(Slider) Sets the strength for the opacity map. 0=turns the map off, 100=applies all of the map.

NOTE: It is not possible to load and apply an opacity map to an object if no texture was mapped to the object before importing the 3D model to WireFusion. You need to define texture mapping in your 3D authoring tool.

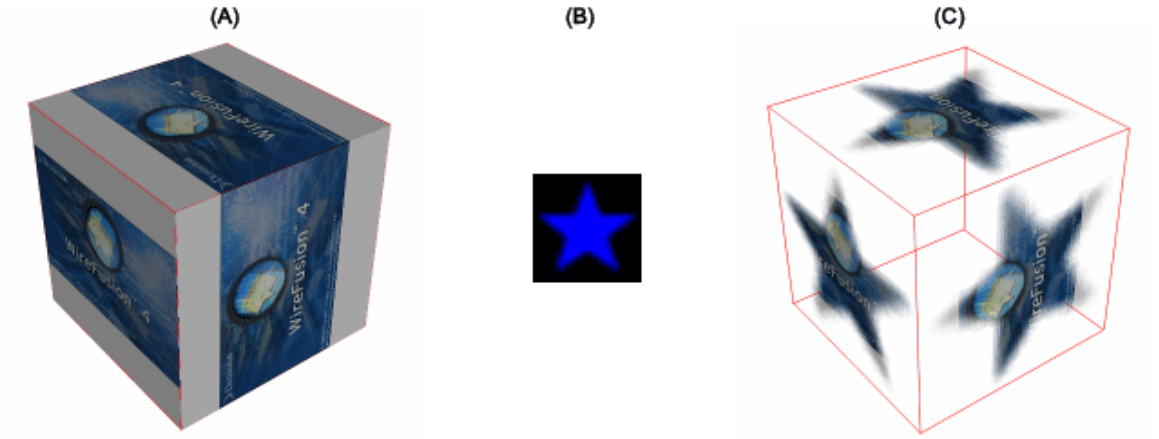

Figure 52: (A) Textured box, (B) Alpha channel map, (C) Textured box with the alpha map applied

Bump Map

The bump map makes an object appear to have a bumpy or irregular surface using a blues-cale image (Figure 54).

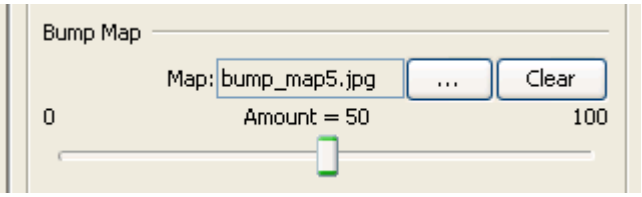

Figure 53: Bump map settings

Map

Shows the bump map file (if any).

"..."

(loading dialog) Loads a new bump map. Supports JPEG, PNG and GIF format.

Clear

(button) Removes the current bump map.

Amount

(Slider) Sets the strength for the bump map. 0=no bump map effect, 100=maximum bump map effect.

NOTE: It is not possible to load and apply a bump map to an object if no texture was mapped to the object before importing the 3D model to WireFusion. You need to define texture mapping in your 3D authoring tool.

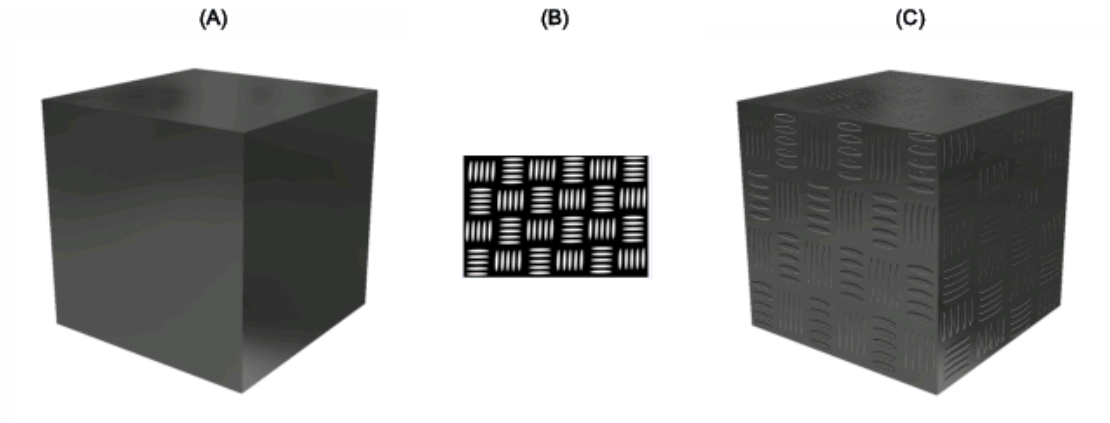

Figure 54: (A) box, (B) bump map, (C) box with bump map applied

Glossiness Map

The glossines map affects where specular highlights appear using a bluescale image (Figure 56).

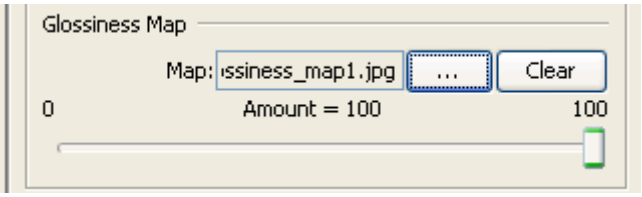

Figure 55: Glossiness map settings

Map

Shows the glossiness map file (if any).

"..."

(loading dialog) Loads a new glossiness map. Supports JPEG, PNG and GIF format.

Clear

(button) Removes the current glossiness map.

Amount

(Slider) Sets the strength for the glossiness map. 0=no glossiness map, 100=full glossiness map.

NOTE: It is not possible to load and apply a glossiness map to an object if no texture was mapped to the object before importing the 3D model to WireFusion. You need to define texture mapping in your 3D authoring tool.

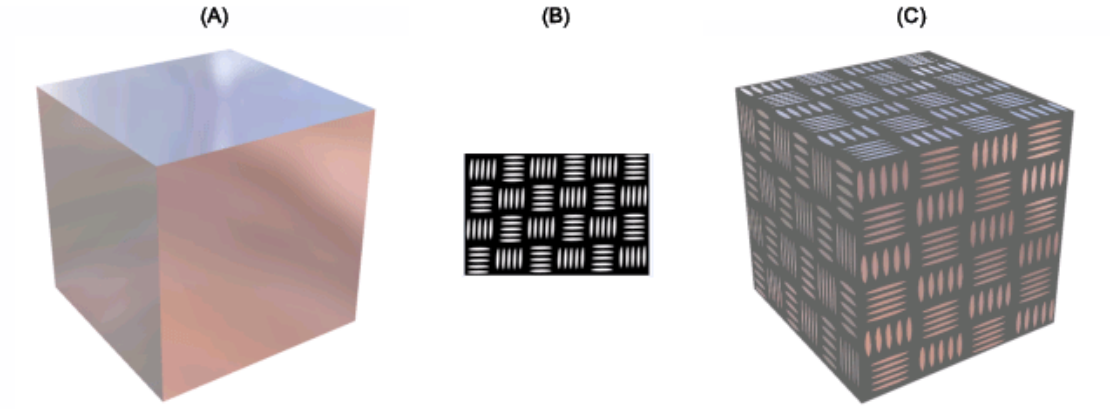

Figure 56: (A) box, (B) glossiness map, (C) box with glossiness map applied

Smoothing

There are two different methods to get smooth shapes in WireFusion; either you export normals from your 3D authoring tool or you use the built-in crease angle function.

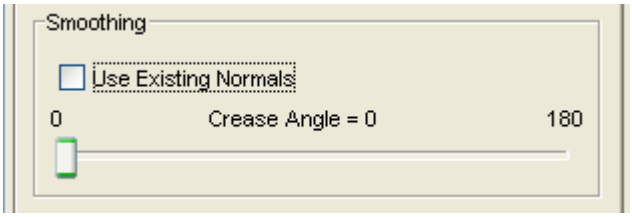

Figure 57: Smoothing settings

Use Existing Normals

(checkbox) This checkbox is only active if you have exported normals from your 3D authoring tool. By default, no normals are used in your model (checkbox unmarked), but you can optionally use the normals for selected objects by marking this checkbox.

Crease Angle

(slider) Sets the object crease angle in degrees (between 0 and 180 degrees). Overrides the Crease Angle settings done in the Rendering panel.

Camera Panel (3D Object mode)

In the Camera panel, which is visible only when you have imported a 3D Object (examine mode), you can add and delete camera views, change their positions, set Field Of View (FOV), set camera restrictions etc.

NOTE: In order to edit settings for a camera, you first have to select the camera in the Cameras view (Figure 58).

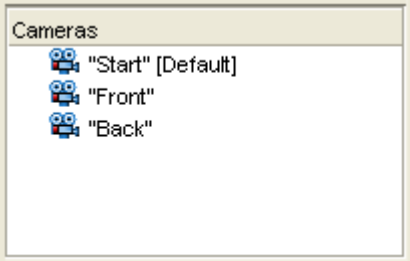

Figure 58: Cameras view

Cameras

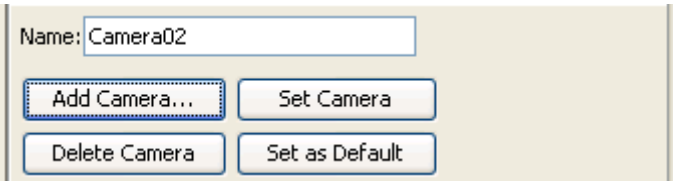

Figure 59: Adding, deleting and setting cameras

Name

(text) Sets the name of the selected camera.

Add Camera

(button) Adds a new camera view to your 3D scene. New ports are created in the 3D Scene for every camera you add, allowing you to dynamically set the camera (Figure 60).

3D Scene > In-Ports -> Camera -> Set '<camera name>':

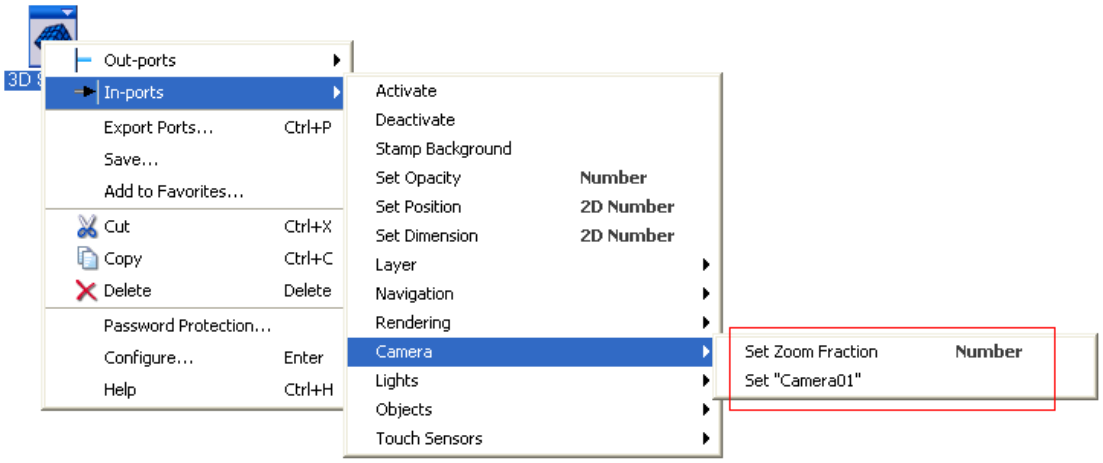

Figure 60: Camera in-ports

When a camera has been set, an event is sent out through the camera out-port:

3D Scene > Out-Ports -> Camera -> '<camera name>' Set

TIP: Use the camera Set out-port when using animated cameras to get an event when the animation has finished.

Delete Camera

(button) Deletes a selected camera view from your scene.

Set Camera

(button) Sets the selected camera to the present view.

Set as Default

(button) Sets the selected camera to the default camera, i.e. the camera view that will be used at presentation startup.

Camera Control

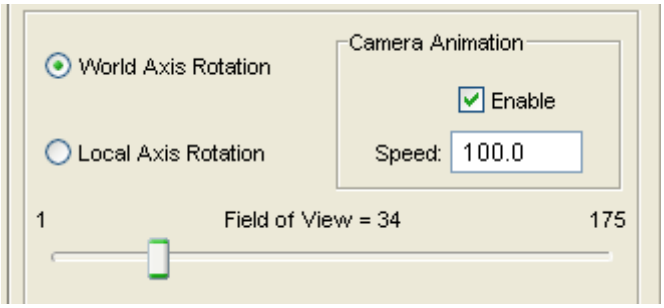

Figure 61: Camera control settings

World Axis Rotation

(radiobutton) Choose this option to rotate the camera around the world center and the world axis (Figure 62), rather than the local camera axis, when navigating.

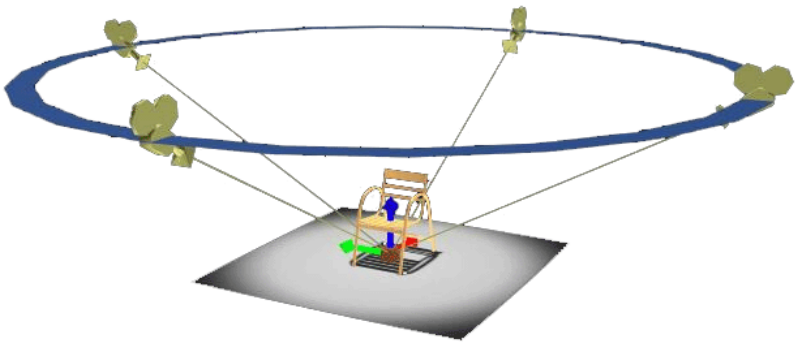

Figure 62: Camera rotation around world axis

Local Axis Rotation

(radiobutton) Choose this option to rotate the camera around the world center and the local camera axis (Figure 63), rather than the world axis.

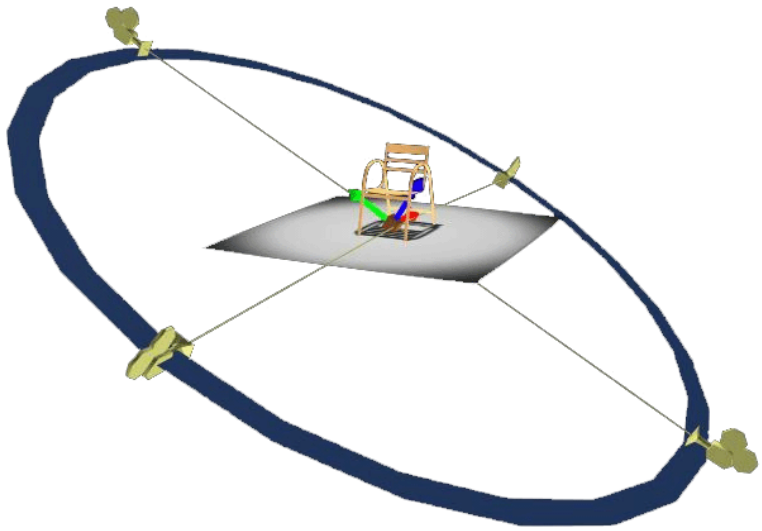

Figure 63: Camera rotation around local camera axis

Field of View

(slider) Sets the Field Of View (FOV) value for the selected camera in degrees. The FOV adjusts the amount of the scene that is visible in the viewport. The effect of changing FOV is similar to changing the lens on a camera (Figure 64). 1=minimum, 175=maximum

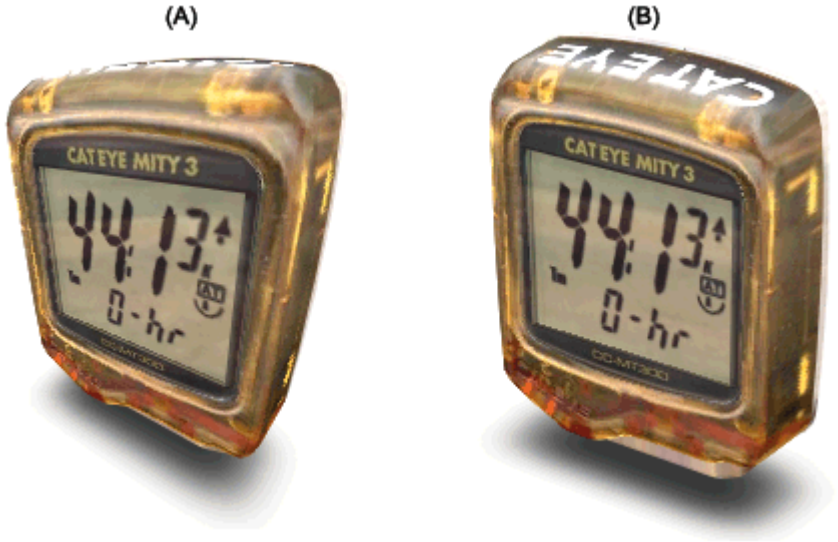

Figure 64: (A) High perspective FOV=80, (B) low perspective FOV=20

Camera Animation

When switching camera views, using the Camera in-ports (Figure 60), you can choose to have the camera glide between the current view and the selected camera view.

Enable

(checkbox) Mark this checkbox to enable camera animation for the selected camera.

Speed

(slider) Sets the animation speed, i.e. the speed for moving from the current view to the selected camera view.

Camera Restrictions

Sets zoom and rotation constrains for the selected camera (Figure 65).

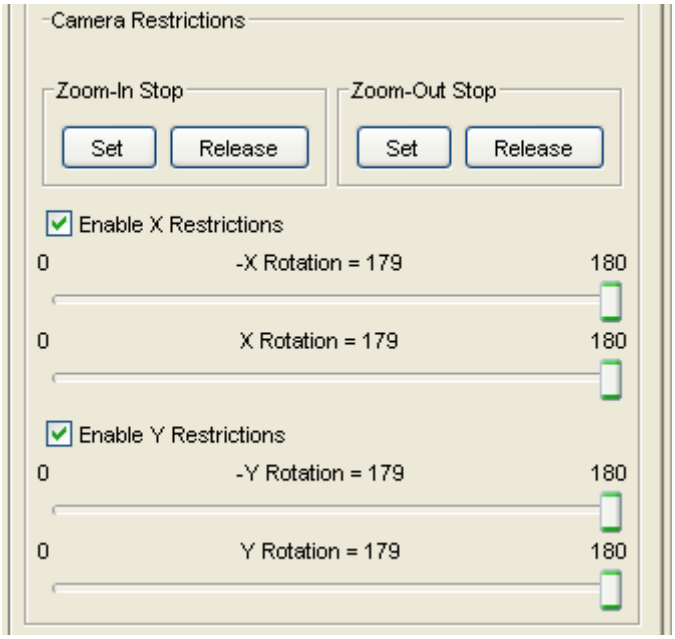

Figure 65: Camera restriction settings

Zoom-In Stop

The Zoom-in stop feature allows you to set a stop for the camera when zooming in. The default setting is set to the world center.

Set

(button) Sets the zoom-in limit for the chosen camera and for the present camera view, as seen in the Preview window.

Release

(button) Releases zoom-in limit for the chosen camera.

Zoom-Out Stop

The Zoom-out stop feature allows you to set a stop for the camera when zooming out. The default setting is set to infinity.

Set

(button) Sets the zoom-out limit for the chosen camera and for the present camera view, as seen in the Preview window.

Release

(button) Releases zoom-out limit for the chosen camera.

Enable X Restrictions

(checkbox) Enables camera restrictions for rotation around the X-axis. Use X-rotation sliders to set angles.

Enable Y Restrictions

(checkbox) Enables camera restrictions for rotation around the Y-axis. Use Y-rotation sliders to set angles.

-X Rotation

(slider) Sets the camera rotation restriction around the X-axis, in the downward direction. Only applicable if World Axis Rotation is chosen. -180 (degrees)=no restriction, 0 (degrees)=full restriction

X Rotation

(slider) Sets the camera rotation restriction around the X-axis, in the upward direction. Only applicable if World Axis Rotation is chosen. 0 (degrees)=full restriction, 180 (degrees)=no restriction

-Y Rotation

(slider) Sets the camera rotation restriction around the Y-axis, in the rightward direction. Only applicable if World Axis Rotation is chosen. -180 (degrees)=no restriction, 0 (degrees)=full restriction

Y Rotation

(slider) Sets the camera rotation restriction around the Y-axis, in the leftward direction. Only applicable if World Axis Rotation is chosen. 0 (degrees)=full restriction, 180 (degrees)=no restriction

Avatar Panel (3D World mode)

An avatar is a digital representation of a user in a 3D world. In WireFusion, an avatar works much the same as a camera, except that it has some physical boundaries, needed for collision detection. In the Avatar panel, which is visible only when you have imported a 3D World, you can add and delete avatars, change their positions, set Field Of View (FOV), set avatar restrictions, avatar heights etc.

NOTE: In order to edit settings for an avatar, you first have to select the avatar in the Avatars view (Figure 66).

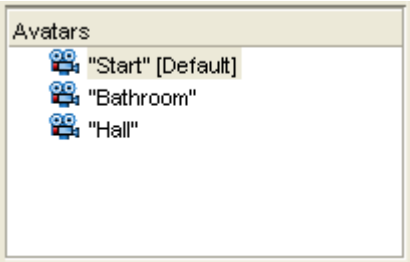

Figure 66: Avatars view

Avatars

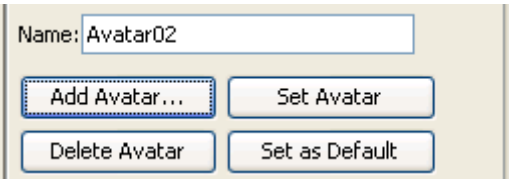

Figure 67: Adding, deleting and setting avatars

Name

(text) Sets the name of the selected avatar.

Add Avatar

(button) Adds a new avatar view to your scene. New ports are created in the 3D Scene for every avatar you add, allowing you to dynamically set the avatar (Figure 68).

3D Scene > In-Ports -> Avatar -> Set '<avatar name>':

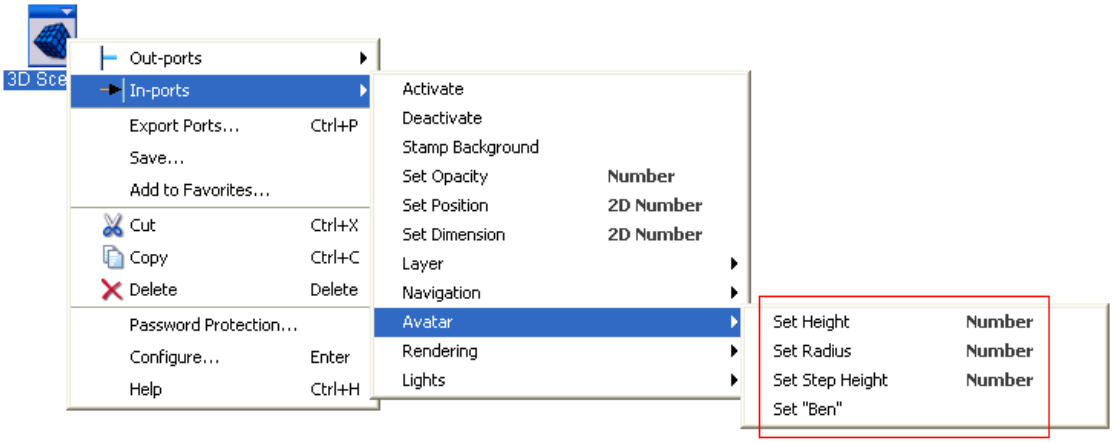

Figure 68: Avatar in-ports

When an avatar has been set, an event is sent out through the avatar out-port:

3D Scene > Out-Ports -> Avatar -> '<avatar name>' Set

TIP: Use the avatar Set out-port when using animated avatars to get an event when the animation has finished.

Delete Avatar

(button) Deletes a selected avatar view from your scene.

Set Avatar

(button) Sets the selected avatar to the present view.

Set as Default

(button) Sets the selected avatar to the default avatar, i.e. the avatar view that will be used at presentation startup.

Avatar Boundaries

The boundaries of an avatar are used for detecting collisions with the surroundings.

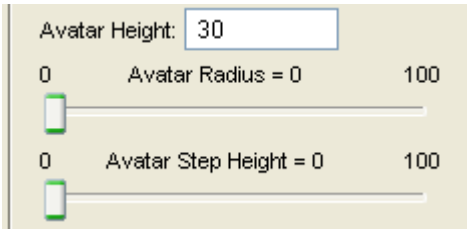

Figure 69: Avatar boundary settings

Avatar Height

(number) Sets the avatar height over the floor.

Avatar Radius

(slider) Sets the avatar radius, which is used as collision distance. The value reflects the percentage of the avatar height. 100=same radius as avatar height.

Avatar Step Height

(slider) Sets the minimum height the avatars should be able to step up on. The value reflects the percentage of the avatar height. 100=same minimum step height as avatar height.

TIP: It is possible to dynamically change the properties for the avatar boundaries in your presentation during runtime through a series of in-ports found in the 3D Scene object (Figure 68):

3D Scene > In-ports > Avatar

Avatar Animation

When switching avatars, using the Avatar in-ports (Figure 68), you can choose to have the avatar glide between the current viewpoint and the selected avatar viewpoint.

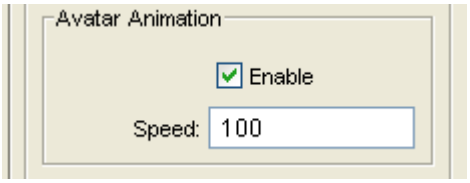

Figure 70: Avatar animations

Enable

(checkbox) Mark this checkbox to enable avatar animation for the selected avatar.

Speed

(number) Sets the animation speed, i.e. the speed for moving from the current view to the selected avatar view.

Avatar FOV

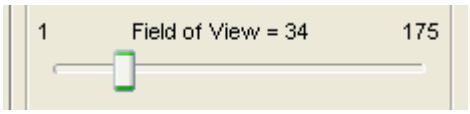

Figure 71: Field of View

The Avatar Field of View (FOV) adjusts the amount of the scene that is visible in the viewport. The effect of changing FOV is similar to changing the lens on a camera (Figure 72).

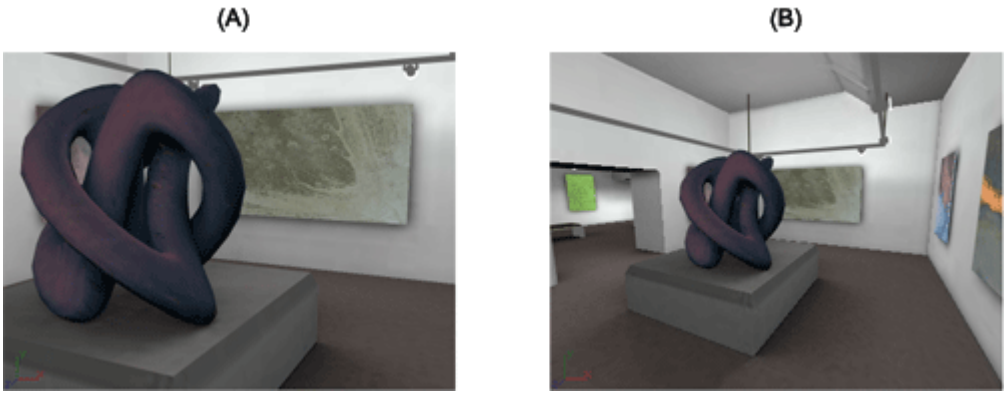

Figure 72: (A) FOV=50, (B) FOV=90

Avatar Restrictions

With the avatar restrictions you set look-up and look-down constrains for the selected avatar (Figure 73).

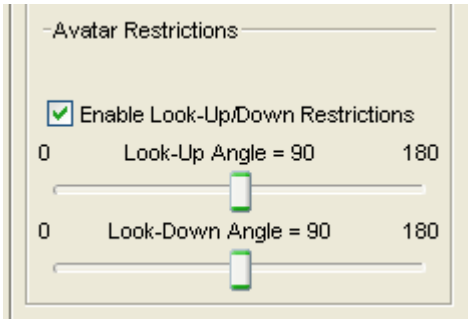

Figure 73: Avatar restriction settings

Enable Look-Up/Down Restriction

(checkbox) Enables avatar restrictions for looking up and down.

Look-Up Angle

(slider) Sets the avatar look-up restriction. 0 (degrees)=full restriction, 180 (degrees)=no restriction

Look-Down Angle

(slider) Sets the avatar look-down restriction. 0 (degrees)=full restriction, 180 (degrees)=no restriction

Animation Panel

In the Animation panel you can preview animations made in your 3D authoring tool. Animations in WireFusion are running from 0 (percent) to 100 (percent). Supported animation types are: object translation, object scaling, object rotation, camera translation, camera rotation, camera target translation, light source translation and mesh animations.

NOTE: You do not create animations from inside WireFusion, you do that in your 3D authoring tool before exporting your 3D file. You then trigger and control your animations from WireFusion.

There is also support for hierarchical animations in WireFusion. When an animation is specified on an object consisting of a hierarchical object structure the animations are separately controllable for each sub-object. This means that specifying an animation like the waving of a hand, you can run each finger's animation separately.

NOTE: In order to edit settings for an animation, you first have to select the animation in the Animations view (Figure 74).

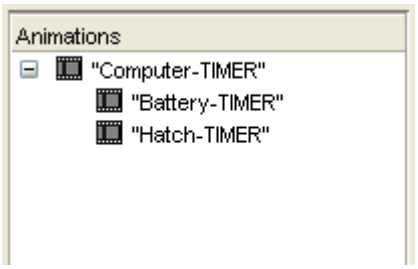

Figure 74: Animations view

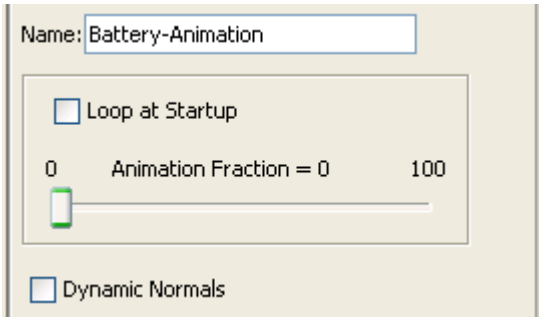

Figure 75: Animation settings

Name

(text) Sets the name of the selected animation.

Loop at Startup

(checkbox) Mark this checkbox if you want the animation to loop at presentation startup.

NOTE: When using Loop at Startup you cannot control the duration of the animation. It uses the default direction time from your 3D file. To both auto-start an animation and control it, use a Progressor object.

Animation Fraction

(slider) Sets the animation fraction to the value indicated by the slider. Use this slider to preview your animation, or to set a starting point for your animation. 0=start, 100=end

NOTE: In order to run an animation you need to send numbers between 0-100 to the Set Animation In-port, found in the 3D Scene object (Figure 76). This is usually done by connecting a Progessor object or a Slider object to the 3D Scene object.

3D Scene > In-ports > Animations > '<animation name>' > Set Animation Fraction [Number]

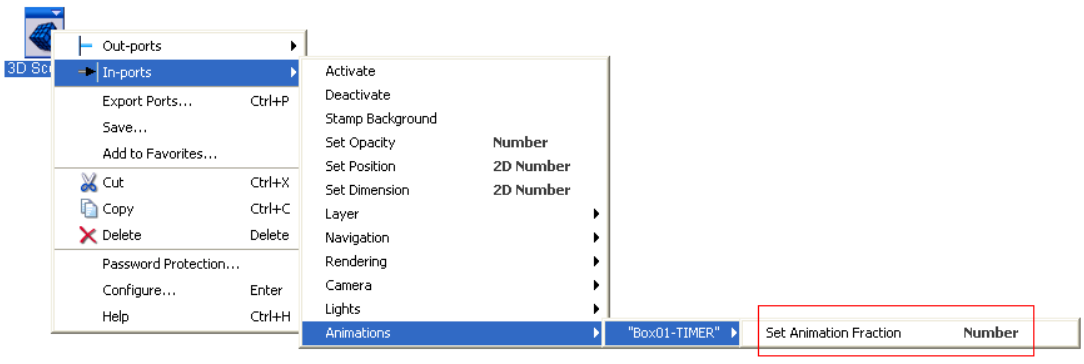

Figure 76: Animation in-ports

Dynamic Normals

(checkbox) Mark this checkbox if you want WireFusion to calculate new normals for each animation frame. Dynamic normals should only be used as an option when having mesh animations, as it is CPU intensive.

Light Panel

A 3D scene can have multiple light sources in it. Two different types of light sources are supported; Directional Light and Omni Light. Directional Lights simulates light sources that are far away from the 3D model and therefore only have a direction in the scene. Omni Light illuminates uniformly in all directions from a specific point in the 3D scene. All 3D scenes have a Headlight added to them automatically. A Headlight works as a Directional Light, always directed on the object from the user's point of view.

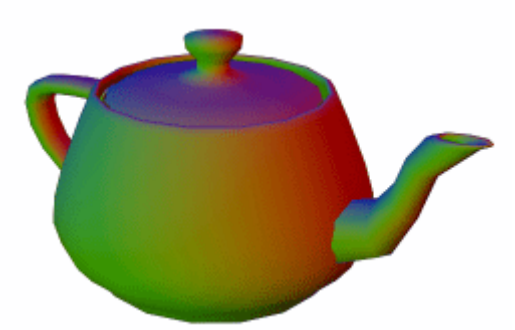

Figure 77: A 3D scene with three light sources: red, green and blue.

NOTE: In order to edit settings for a light source, you first have to select the light source in the Lights view (Figure 78).

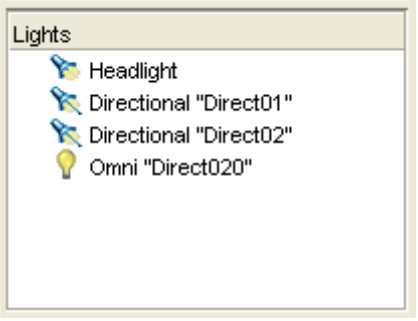

Figure 78: Lights view

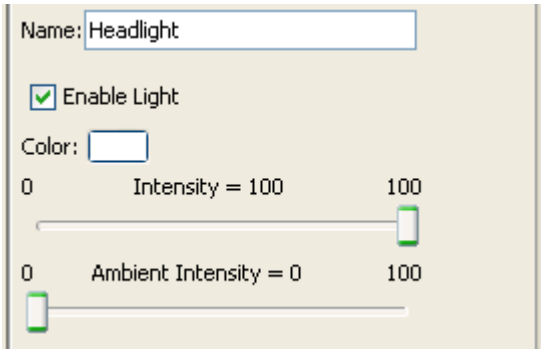

Figure 79: Lights settings

Enable Light

(text) Sets the name of the selected light source.

Enable Light

(checkbox) Mark this checkbox to enable/activate the light.

Color

(color) Sets the light source color.

Intensity

(slider) Sets the light source intensity. 0=minimum, 100=maximum

Ambient Intensity

(slider) Sets the ambient light intensity. Ambient intensity works for Flat, Gouraud and Phong shadings. 0=minimum, 100=maximum

---

TIP: It is possible to dynamically change the properties for light sources in your presentation during runtime by using in-ports found in the 3D Scene object (Figure 80).

3D Scene > In-ports > Lights

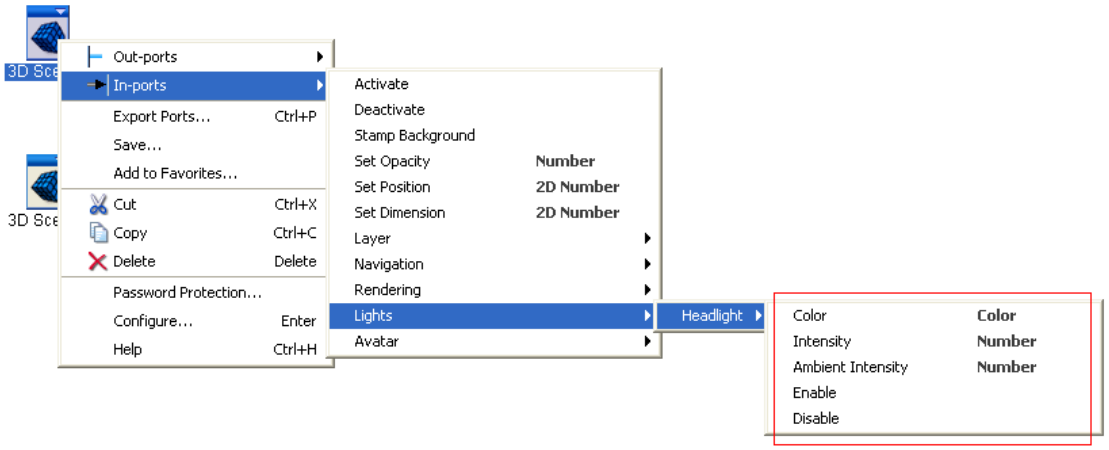

Figure 80: Lights in-ports

Navigation Panel (3D Object mode)

In the Navigation panel you configure and customize navigation modes for different occasions.

NOTE: The Navigation panel exists in two different versions, depending on if you have imported a 3D Object or a 3D World. This section talks about the Navigation panel for 3D Objects.

Configuration

Allows you to save and load configuration settings (Figure 81).

Figure 81: Save your navigation configurations

Select Configuration

(option) Choose between saved navigation configurations.

Delete

Delete a saved navigation configuration.

Save...

(saving dialog) Save a configuration.

Navigation Speed

Allows you to adjust the navigation speed (Figure 82).

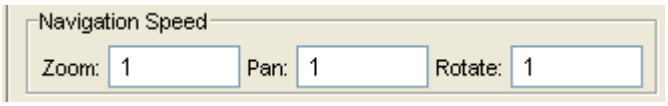

Figure 82: Navigation speed setting

Zoom

(number) Sets the zoom speed. 0=no motion, higher value=higher speed

Pan

(number) Sets the pan speed. 0=no motion, higher value=higher speed

Rotate

(number) Sets the rotation speed. 0=no motion, higher value=higher speed

---

TIP: Negative values invert the motion.

Navigation Friction

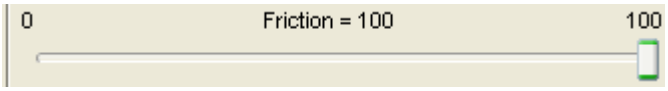

Figure 83: Navigation friction setting

Friction

(slider) Sets the navigation friction value. 0 = minimum friction, 100 = maximum friction

Mouse Navigation Modes

Sets hotkeys for navigating (examining) the 3D object using the mouse (Figure 84).

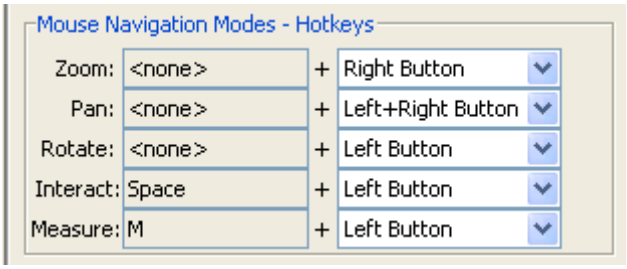

Figure 84: Mouse navigation modes

Zoom

Optionally choose a hotkey, to work in conjunction with the mouse, for zooming the scene. Choose between using the Left Button, Right Button, Left+Right Button or Mouse Move. Works when Navigation Mode Normal is used.

Pan

Optionally choose a hotkey, to work in conjunction with the mouse, for panning the scene. Choose between using the Left Button, Right Button, Left+Right Button or Mouse Move. Works when Navigation Mode Normal is used.

Rotate

Optionally choose a hotkey, to work in conjunction with the mouse, for rotating the scene. Choose between using the Left Button, Right Button, Left+Right Button or Mouse Move. Works when Navigation Mode Normal is used.

Interact

Optionally choose a hotkey, to work in conjunction with the mouse, for interacting with a texture (i.e. when a Texture object has replaced a static texture map). Choose between using the Left Button, Right Button, Left+Right Button or Mouse Move. Works when Navigation Mode Normal is used.

Measure

Optionally choose a hotkey, to work in conjunction with the mouse, for switching to measure mode. Choose between using the Left Button, Right Button, Left+Right Button or Mouse Move.

Keyboard Navigation

Sets hotkeys for navigating (examining) the 3D object using the keyboard (Figure 85).

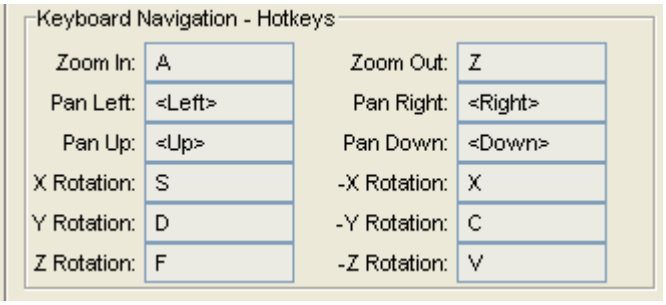

Figure 85: Keyboard navigation settings

Zoom In

Choose a hotkey for zooming in.

Zoom Out

Choose a hotkey for zooming out.

Pan Left

Choose a hotkey for panning left.

Pan Right

Choose a hotkey for panning right.

Pan Up

Choose a hotkey for panning up.

Pan Down

Choose a hotkey for panning down.

X Rotation

Choose a hotkey for rotating around the positive x-axis.

-X Rotation

Choose a hotkey for rotating around the negative x-axis.

Y Rotation

Choose a hotkey for rotating around the positive y-axis.

-Y Rotation

Choose a hotkey for rotating around the negative y-axis.

Z Rotation

Choose a hotkey for rotating around the positive z-axis.

-Z Rotation

Choose a hotkey for rotating around the negative z-axis.

Navigation Modes

Sets hotkeys for switching between navigation modes (Figure 86).

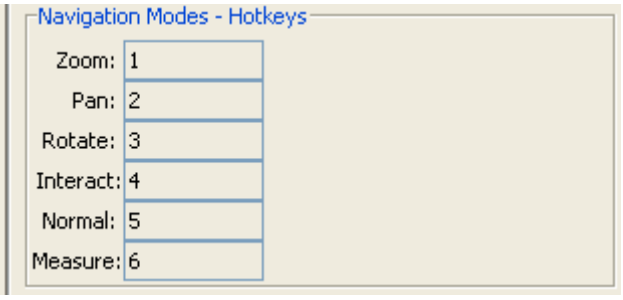

Figure 86: Hotkeys for switching navigation modes

Zoom

Choose a hotkey to use for switching to Zoom mode, where only zooming is possible.

Pan

Choose a hotkey to use for switching to Pan mode, where only panning is possible.

Rotate

Choose a hotkey to use for switching to Rotate navigation mode, where only rotation is possible.

Interact

Choose a hotkey to use for switching to Interact mode. (Used when an interactive Texture object has replaced a texture)

Normal

Choose a hotkey to use for switching back to Normal navigation mode (i.e. where the selected Mouse Navigation Modes for zooming, panning, rotating, and interacting are enabled, see page 56).

Measure

Choose a hotkey to use for switching to Measure mode.

TIP: It is possible to control the navigation by a series of in-ports found in the 3D Scene object (Figure 87). These ports are useful if you want to create a graphical user interface for navigation.

3D Scene > In-ports > Navigation

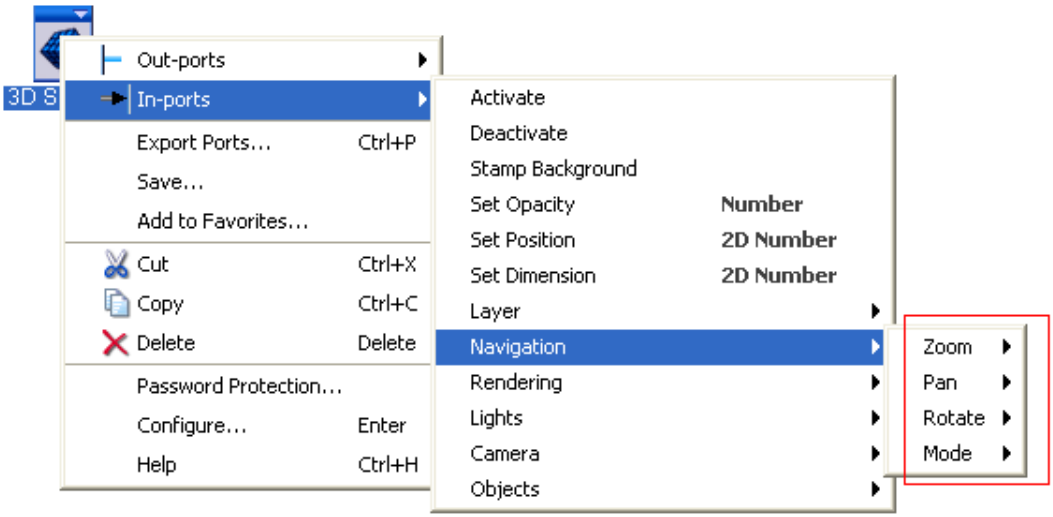

Figure 87: Navigation in-ports

Navigation Panel (3D World mode)

In the Navigation panel you configure and customize navigation modes for different occasions.

NOTE: The Navigation panel exists in two different versions, depending on if you have imported a 3D Object or a 3D World. This section talks about the Navigation panel for 3D World.

Configuration

Allows you to save and load configuration settings (Figure 88).

Figure 88: Save your navigation configurations

Select Configuration

(option) Choose between saved navigation configurations.

Delete

Delete a saved navigation configuration.

Save...

(saving dialog) Save a configuration.

Navigation Speed

Allows you to adjust the navigation speed (Figure 89).

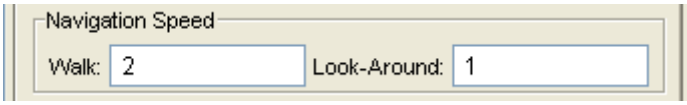

Figure 89: Navigation speed setting

Walk

(number) Sets the walk speed. 0=no motion, higher value=higher speed

Look-Around

(number) Sets the look-around speed. 0=no motion, higher value=higher speed

---

TIP: Negative values invert the motion.

Navigation Friction

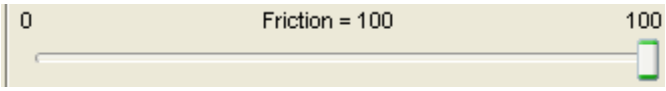

Figure 90: Navigation friction setting

Friction

(slider) Sets the navigation friction value. 0 = minimum friction, 100 = maximum friction

Mouse Navigation Modes

Sets hotkeys for navigating the 3D world using the mouse (Figure 91).

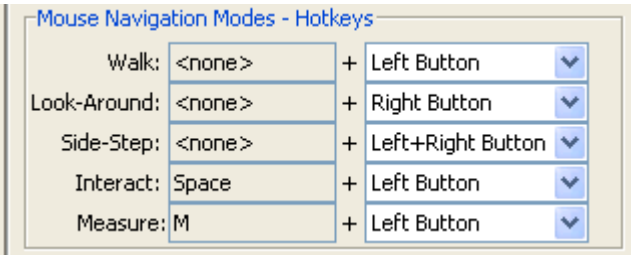

Figure 91: Mouse navigation modes

Walk

Optionally choose a hotkey, to work in conjunction with the mouse, for walking (forward/backward and left/right). Choose between using the Left Button, Right Button, Left+Right Button or Mouse Move. Works when Navigation Mode Normal is used.

Look-Around

Optionally choose a hotkey, to work in conjunction with the mouse, for looking around (left/right and up/down). Choose between using the Left Button, Right Button, Left+Right Button or Mouse Move. Works when Navigation Mode Normal is used.

Side-Step

Optionally choose a hotkey, to work in conjunction with the mouse, for sideways movements. Choose between using the Left Button, Right Button, Left+Right Button or Mouse Move. Works when Navigation Mode Normal is used.

Interact

Optionally choose a hotkey, to work in conjunction with the mouse, for interacting with a texture (i.e. when a Texture object has replaced a static texture map). Choose between using the Left Button, Right Button, Left+Right Button or Mouse Move. Works when Navigation Mode Normal is used.

Measure

Optionally choose a hotkey, to work in conjunction with the mouse, for switching to measure mode. Choose between using the Left Button, Right Button, Left+Right Button or Mouse Move.

Keyboard Navigation

Sets hotkeys for navigating the 3D world using the keyboard (Figure 92).

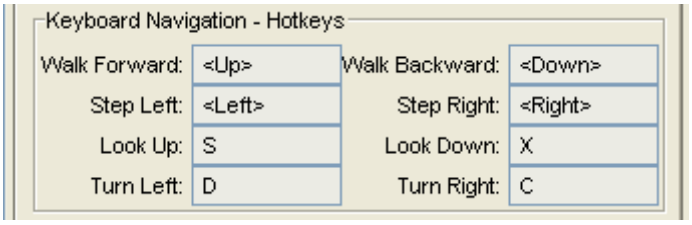

Figure 92: Keyboard navigation settings

Walk Forward

Choose a hotkey for walking forward.

Walk Backward

Choose a hotkey for walking backward.

Step Left

Choose a hotkey for sideways movement to the left.

Step Right

Choose a hotkey for sideways movement to the right.

Look Up

Choose a hotkey for looking up.

Look Down

Choose a hotkey for looking down.

Turn Left

Choose a hotkey for rotating to the left.

Turn Right

Choose a hotkey for rotating to the right.

Navigation Modes

Sets hotkeys for switching navigation modes (Figure 93).

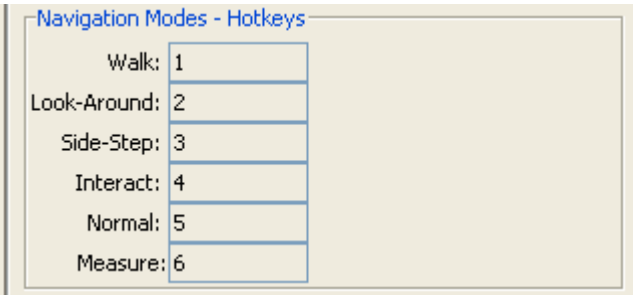

Figure 93: Hotkeys for switching navigation modes

Walk

Choose a hotkey to use for switching to walk mode, where only walking is possible.

Look-Around

Choose a hotkey to use for switching to look-around mode, where only looking around is possible.

Side-Step

Choose a hotkey to use for switching to sideways movement mode, where only sideways movements is possible.

Interact

Choose a hotkey to use for switching to interact mode. (Used when an interactive Texture object has replaced a texture.)

Normal

Choose a hotkey to use for switching back to normal navigation mode (i.e. where the selected Mouse Navigation Modes for walk, look-around, side-step, and Interacting are enabled, see page 62).

Measure

Choose a hotkey to use for switching to Measure mode.

TIP: It is possible to control the navigation by a series of in-ports found in the 3D Scene object (Figure 94). These ports are useful if you want to create a graphical user interface for navigation.

3D Scene > In-ports > Navigation

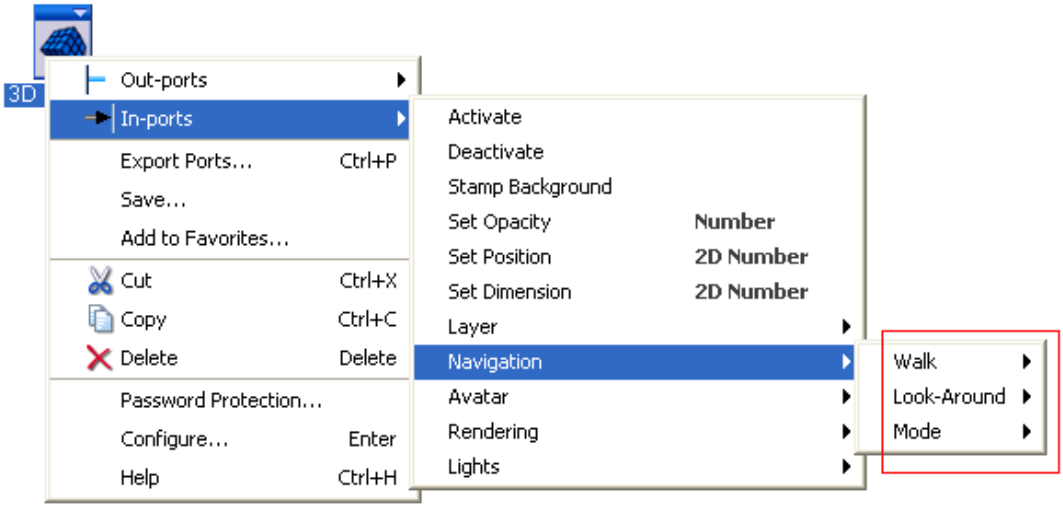

Figure 94: Navigation in-ports

Measure

In the Measure panel you make settings for the 3D measurement.

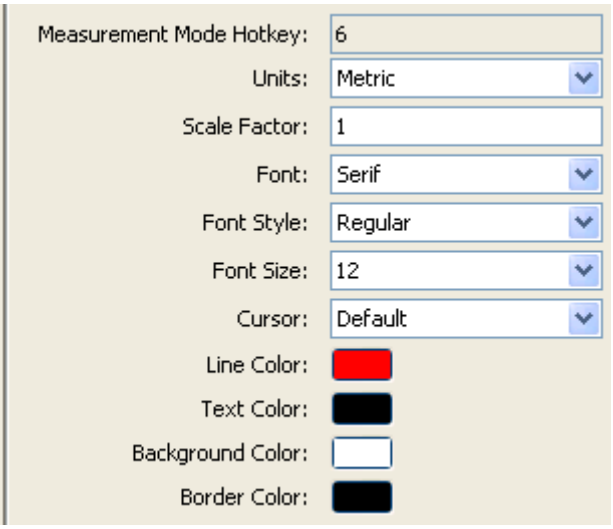

Figure 95: Measure settings

Measurement Mode Hotkey
Choose a hotkey to use for switching to measure mode.

Units
(choice) Select the unit to display the measuerment. Choose between the metric and imperial system.

Scale Factor
(number) Sets the scale factor to calibrate the measurement.

Font
(choice) Choose a font.

Font Style
(choice) Choose a font style.

Font Size
(number) Sets the font size.

Cursor
(choice) Choose a cursor.

Line Color
(color) Sets the line color.

Background Color
(color) Sets the background color.

Border Color
(color) Sets the border color.

Loading

In the Loading panel you control the streaming and the compression of the 3D model.

Streaming

When streaming a 3D model, you can control the order the objects (shapes) should be streamed by using up and down arrows (Figure 96).

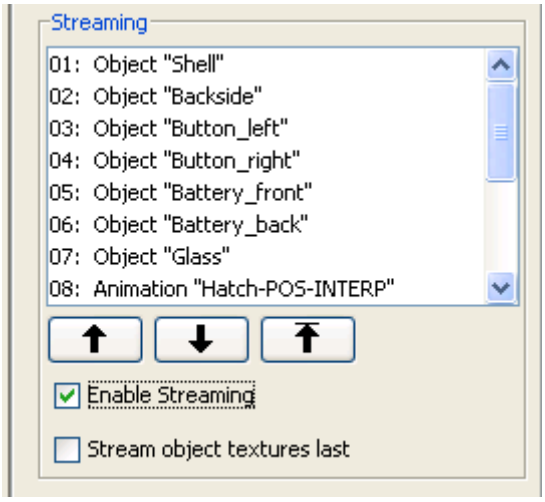

Figure 96: Streaming settings

Enable Streaming

(checkbox) Mark this checkbox to enable streaming of the model. The objects and animations will be streamed in the listed order. To reorder the objects, mark an item and then click the up and down arrows.

Stream object textures last

(checkbox) Mark this checkbox to have the textures streamed last, after the objects have been loaded. If not checked, each texture will be streamed together with its corresponding object.

Compression

You can set the compression ratio for your model (Figure 97). All 3D data are compressed; mesh data, texture coordinate data and vertex animation data. Generally, a file size compression of 90-95 % is achieved compared to the original (uncompressed) 3D file format.

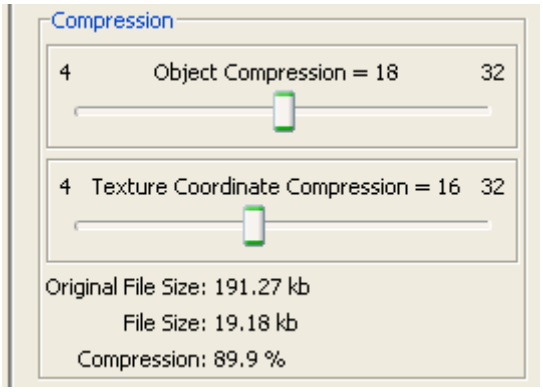

Figure 97: Compression settings and information

Object Compression

(slider) Sets the object coordinates precision. Lower values=smaller files (lower quality). The default settings are normally the best.

Texture Coordinate Compression

(slider) Sets the texture coordinates precision. Lower values=smaller files (lower quality). The default settings are normally the best.

Original File Size

(info) Indicates the original 3D file size in kilobytes.

File Size

(info) Indicates the new and compressed file size in kilobytes.

Compression

(info) Indicates the compression ratio between the original file and the compressed file.

Info

In the Info panel you get information about your 3D scene (Figure 98).

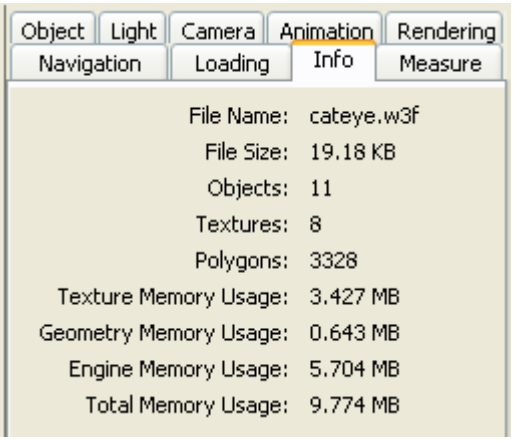

Figure 98: Information about your 3D scene

File Name

Shows the 3D file name.

File Size

Shows the 3D file size, after the WireFusion lossless compression.

Objects
Shows the number of individual objects in your 3D scene.

Textures
Shows the number of individual texture files in your 3D scene.

Polygons
Shows the total number of polygons 3D scene consists of.

Texture Memory Usage
Shows how much system memory that is consumed by textures.

Geometry Memory Usage
Shows how much system memory that is consumed by geometry.

Engine Memory Usage
Shows how much system memory that is consumed by the 3D engine.

Total Memory Usage
Shows how much system memory that the total 3D scene is consuming.

Dynamic Textures

Most Web3D technologies today are only capable of handling static textures, or possibly, replace a static texture with another texture. WireFusion, on the other hand, has an advanced and dynamic texture architecture that allows you to easily replace and animate textures. You can replace any texture with a GIF animation, MPEG movie, Adobe Flash® animation, or, with another WireFusion presentation. You can even have interactive textures, allowing users to e.g. paint and write on your textures.

Texture Array Object

There is a special object in WireFusion dedicated for easy switching of static textures on your 3D models, it is called Texture Array. The Texture Array object, as the name implies, stores an array of images, which can be sent to a 3D Scene object and replace any texture map. You can choose to replace a diffuse color map, an opacity map, a bump map, a glossiness map, or even a reflection map.

Normally the Texture Array object is used when creating configurators where the users can switch between collections of textures for a specific object. For example, it could be used to change textures on a sofa (Figure 99) or to change colors on a mobile phone.

Figure 99: Different textures on a sofa

User Interface

The Texture Array is an easy object to use. Images are loaded in an array where each image is associated with an index number. The first image in the array has index 0, the second image has index 1, the third image has index 2, and so on (Figure 100).

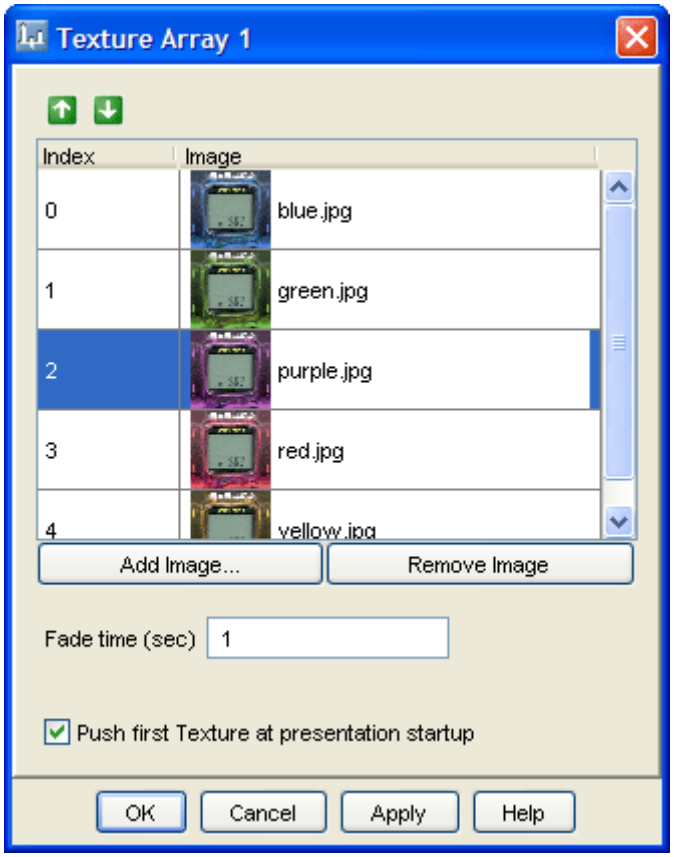

Figure 100: Texture Array dialog

Add Image...

(loading dialog) Adds a new image to the array. Supported formats are JPEG, GIF and PNG. Use the Up and Down arrows to sort the loaded images. All texture images have a unique Index number, found in the left column, which is used when requesting the texture. To replace an image, double click the small preview image.

Remove Image

Removes a texture image from the array. Select an image and click the Remove Image button to delete it.

Fade time (seconds)

(number) Sets the fade time for the image transitions in seconds. 0=default.

Push first Texture at presentation startup

(checkbox) Fires the "Texture Pushed" out-port at presentation startup. The first texture image in the array, i.e. with index 0, will be sent.

TIP: Instead of pre-loading all textures added to the Texture Array object, use the Loading Manager (Project > Loading Manager) to stream the textures you believe will not be needed directly at presentation startup. By doing this you will speed-up the presentation startup significantly.

Exercise: Switch Textures

We illustrate the process of adding a collection of textures to an object with this exercise.

We want to be able to switch between five different colors (textures) on a bicycle computer, using a Texture Array object.

Step 1

Insert a 3D Scene, choose 3D Object, and load the bicycle computer (Figure 101).

[Path]/My Documents/WireFusion/resources/3d_models/bicycle_computer/cateye.wrl

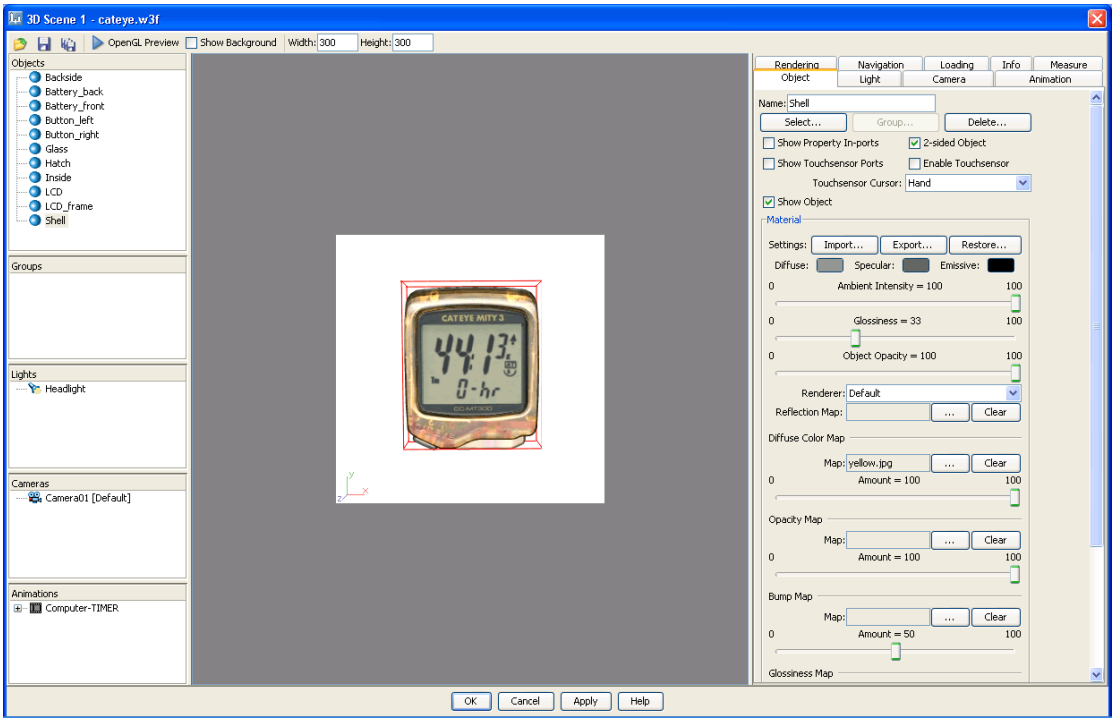

Figure 101: 3D Scene dialog with bicycle model loaded

Step 2

In the Object panel, mark the Show Property In-ports checkbox for the 'shell' object (Figure 102). Click OK to close the dialog.

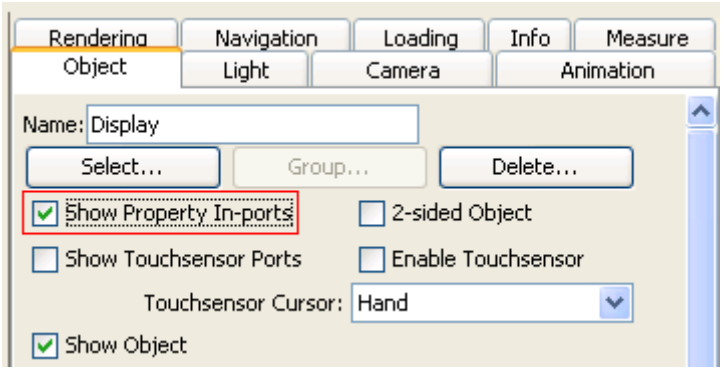

Figure 102: Making in-ports visible

Step 3

Insert a Texture Array object. When the dialog opens, load five textures: 'blue.jpg', 'green.jpg', 'purple.jpg', 'red.jpg' and 'yellow.jpg' (Figure 103).

[Path]/My Documents/WireFusion/resources/3d_models/bicycle_computer/shell-colors/

Set the fade time to 1 second. Click OK to close the dialog.

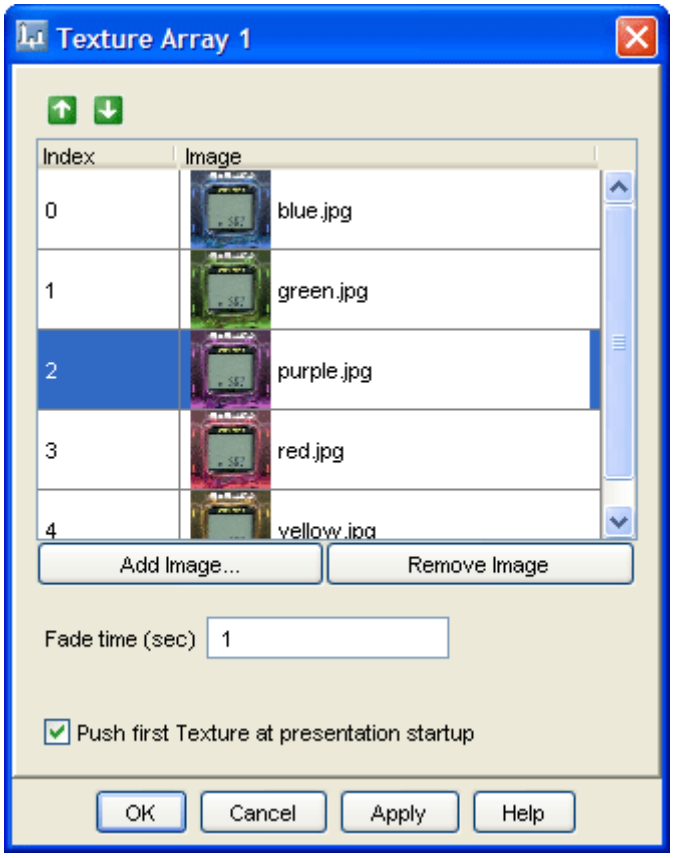

Figure 103: Textures added to the TextureArray

Step 4

Connect:

'Texture Array 1', Out-ports > Texture Pushed [Texture]

to

'3D Scene 1', In-ports > Objects > 'Shell' > Texture [Texture]

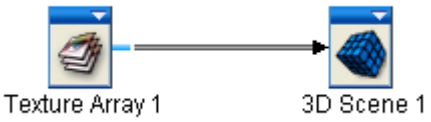

Figure 104: Texture Array connected to the 3D Scene

Step 5

We will use JavaScript to send index numbers from an HTML page into the presentation in order to switch between the different textures stored in the Texture Array.

Insert an External Link object (found in the Environment folder). Name the Link Name to 'ShellColor' (Figure 105). Click OK to close the dialog.

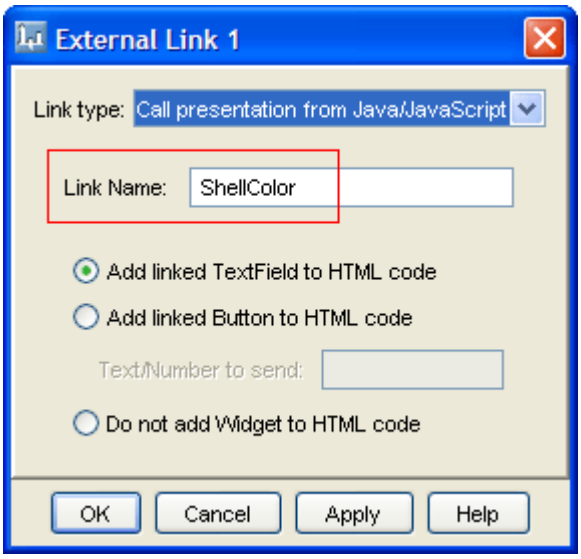

Figure 105: ExternalLink object

Step 6

Connect:

'External Link 1', Out-ports > Number received from JavaScript [Number]

to

'Texture Array 1', In-ports > Push Texture [Number]

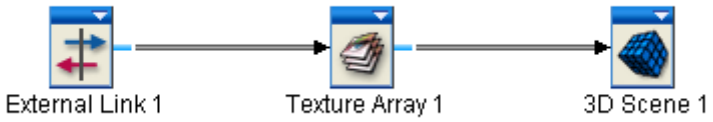

Figure 106: External Link object connected to the Texture Array object

Step 7

Press CTRL+F7 on your keyboard to preview the presentation in the browser (which is required as JavaScript communication is used).

Enter a number between 0 and 4, which are the index numbers for the images stored in the Texture Array, and then click the *Send to ShellColor* button to send the value to the presentation (Figure 117).

Figure 107: Switching textures using Texture Array and JavaScript

Animated and Interactive Textures

Imagine that you would like to create a digital watch in 3D that has a working digital display. A digital display that can show working time, has a working stopwatch, working alarms etc. Or, you would like to create a television in 3D, which is capable of displaying movies on the different channels. All this is possible with WireFusion.

Shortly, this is how it works:

- Suppose you want to create a handheld computer (PDA) with a working touch screen (Figure 108).

Figure 108: An iPAQ with working calculator and (interactive) touch screen

- You create your 3D model in your 3D authoring tool, as usual. Make sure that the PDA model has a separate "Display" object with a texture mapped to the display (Figure 109).

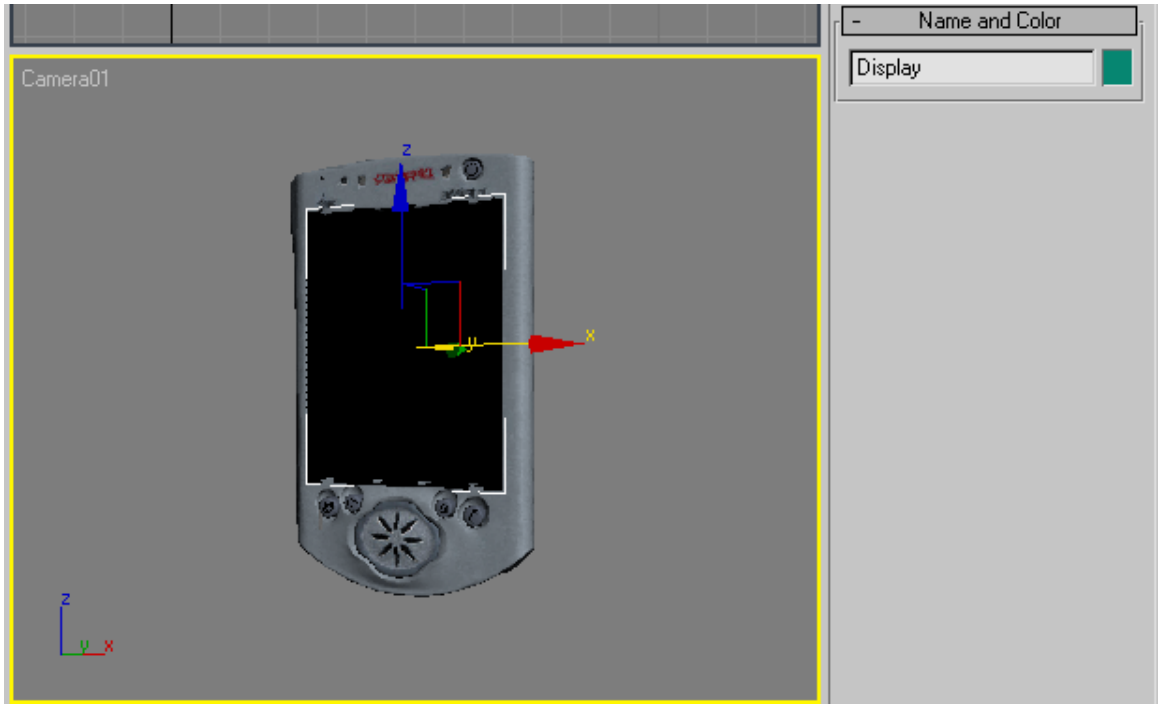

Figure 109: Making a separate object of the display and mapping a texture to it

- After importing the 3D model to WireFusion, in the 3D Scene object, make the in-ports for the "Display" object visible by marking the Show Property In-ports checkbox (Figure 110).

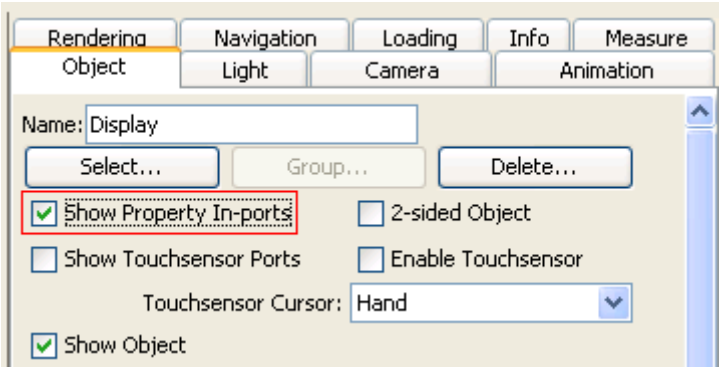

Figure 110: Exporting ports

- Then insert a Scene object to your project (found in the Misc category). When dropping the Scene object, choose to not have a Target Area. On the Scene object's Stage, create the graphics, logics and interactivity you would like to be shown on your PDA display (Figure 111).

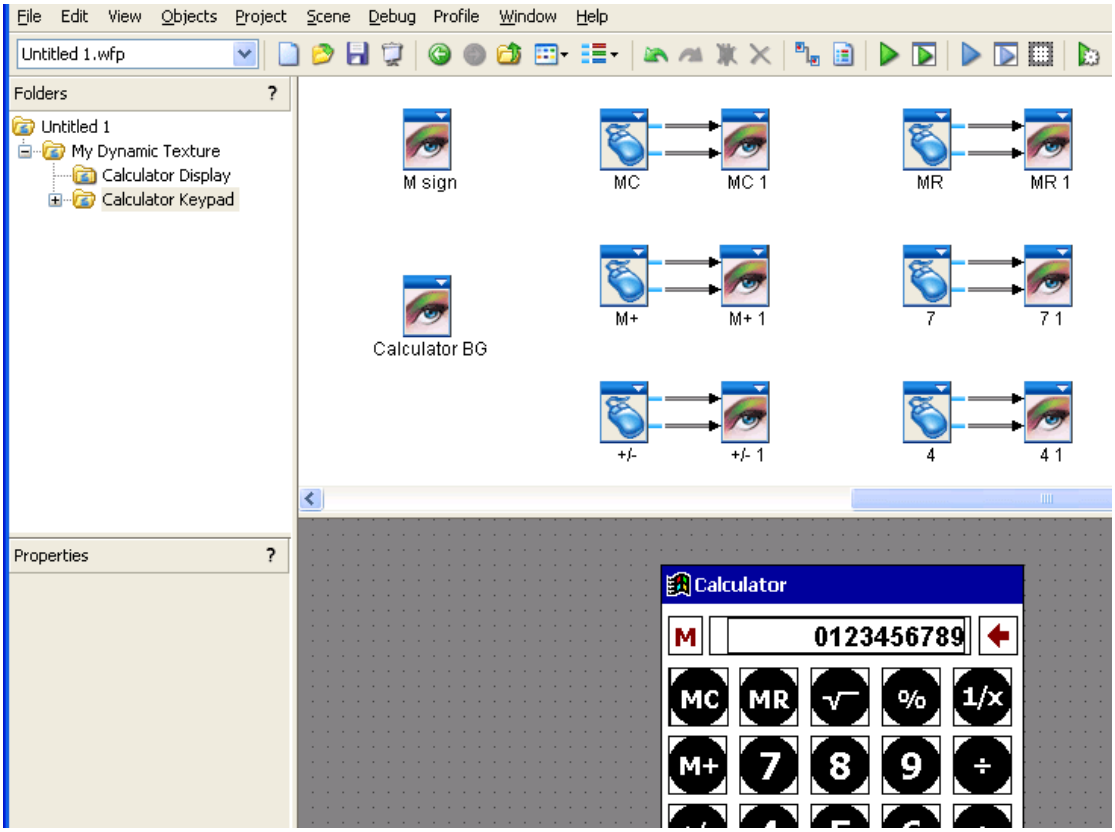

Figure 111: Logics in the Scene object

- Connect the Scene object to the 3D Scene in-port "Display" > Set Diffuse Color Map (Figure 112).

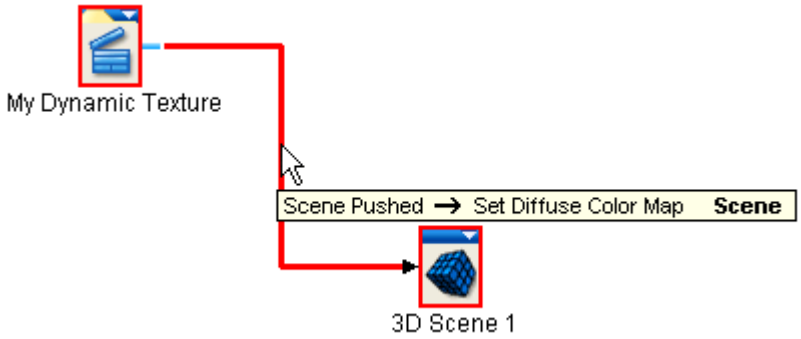

Figure 112: Connecting the Scene object

- The presentation on the Scene object's Stage will now be visible on the PDA display, instead of the initial static texture that was mapped in the 3D authoring tool. Done!

Scene Object

The Scene object is a container object. It groups objects and has its own Script Area, Work Area and Stage (Figure 113).

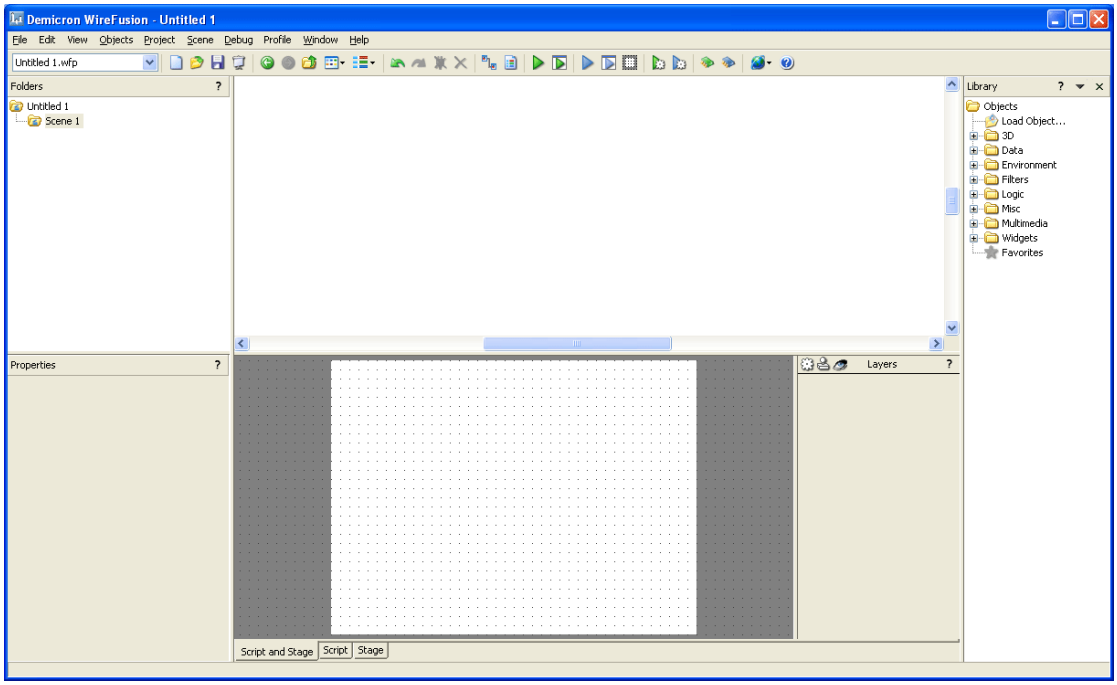

Figure 113: Inside a Scene object

To access the Scene object's Script Area, choose Explore from the Scene object local menu (Figure 114), double-click the Scene icon, or click your way down in the Folders view (Figure 99).

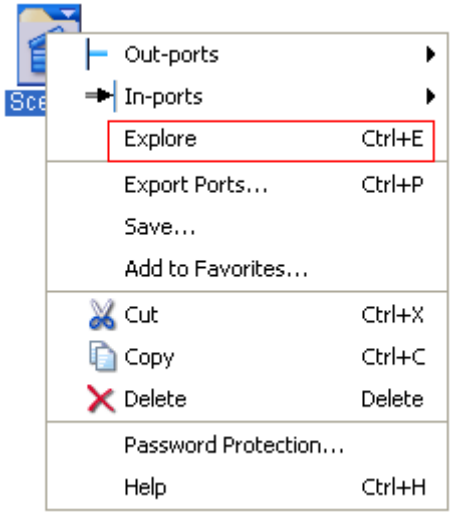

Figure 114: Scene object's local menu

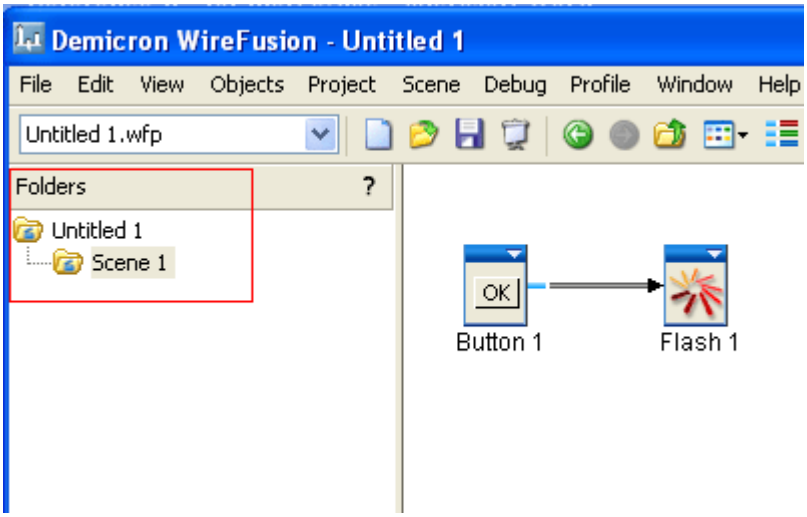

Figure 115: Navigating to the Scene stage using the Folders view

Everything you create in the Scene object is rendered to the Scene object's local Stage. To replace your static texture with the Scene object Stage, you have to connect the Scene object to the 3D Scene object.

TIP: To preview your work in the Scene object, press F8 on your keyboard, or choose Scene > Preview Scene from the WireFusion main menu.

Once the Scene object is connected to the 3D Scene object you can choose when and how to replace the static texture. In the Scene object's Properties view you can choose to push the Scene contents at the presentation startup by choosing True (Figure 116), or you can choose to push it at any given time by triggering the in-port Push Scene (Figure 117).

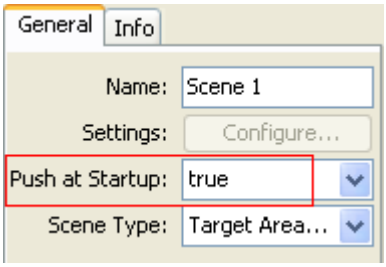

Figure 116: Texture Properties view

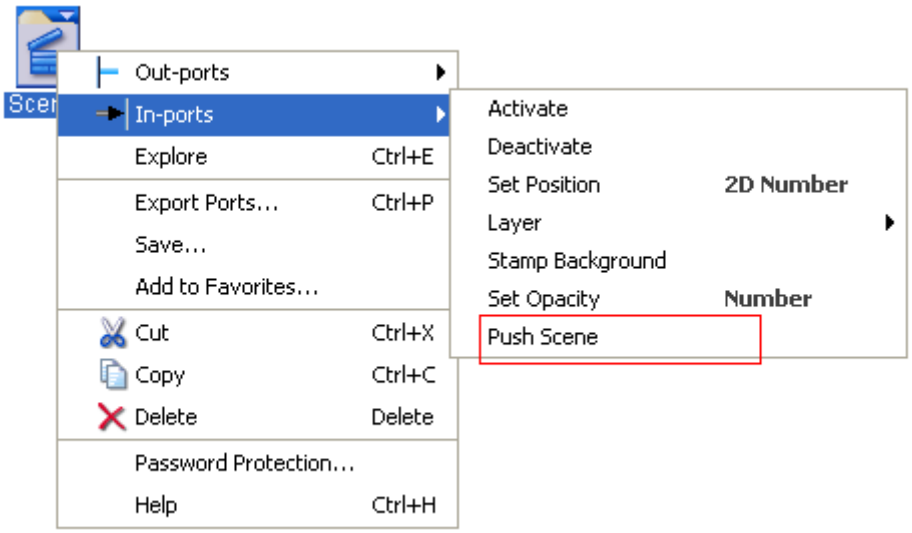

Figure 117: Scene in-port

Exercise: Interactive Texture

We illustrate the process of creating an interactive texture with this simple exercise.

We will replace the static texture of a 3D box with a Scene object, on which we will be able to write a text.

Step 1

Insert a 3D Scene object, choose 3D Object, and load a 3D box with a texture on it (Figure 118).

[Path]/My Documents/WireFusion/resources/3d_models/boxes/box.wrl

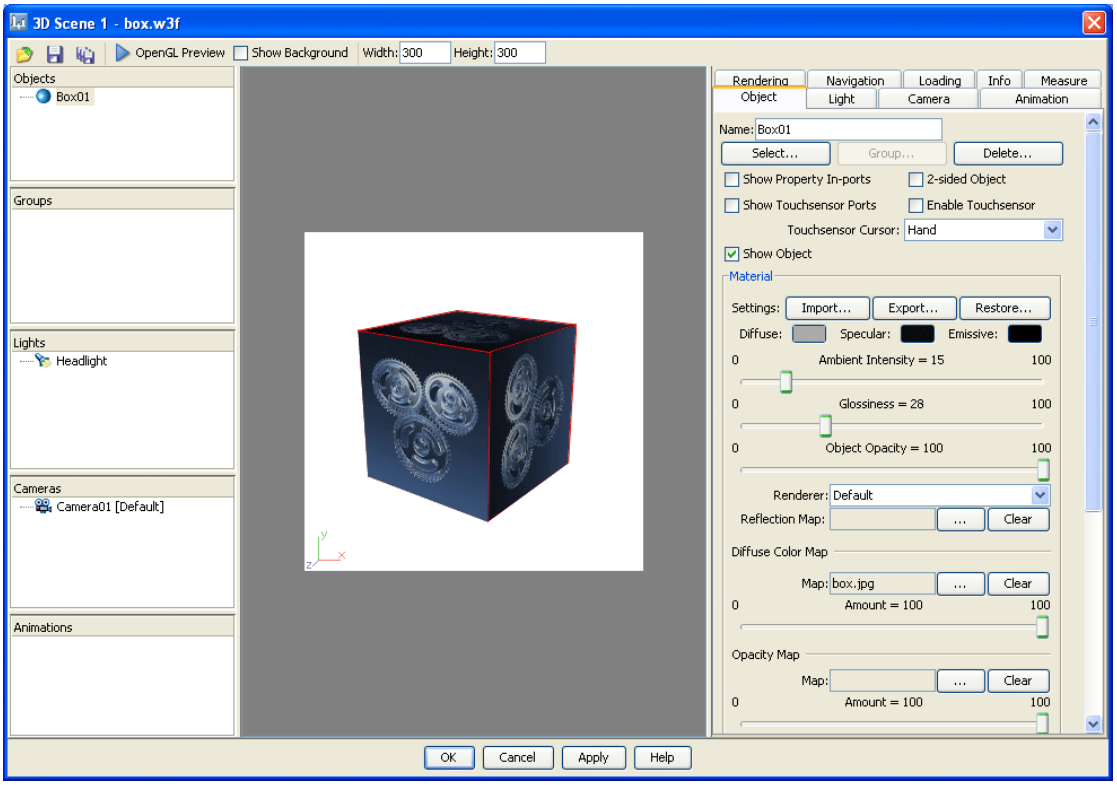

Figure 118: A 3D box loaded

Step 2

In the Object panel, mark the Show Property In-ports checkbox for the box object (Figure 119). Click OK to close the dialog.

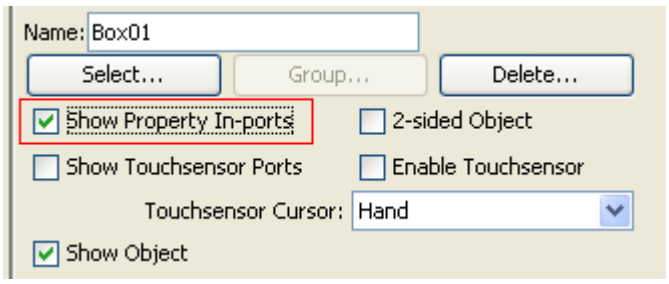

Figure 119: Making in-ports visible

Step 3

Insert a Scene object.

Connect:

'Scene 1', Out-ports > Scene Pushed [Scene]

to

'3D Scene 1', In-ports > Objects > 'Box01' > Set Diffuse Color Map [Scene]

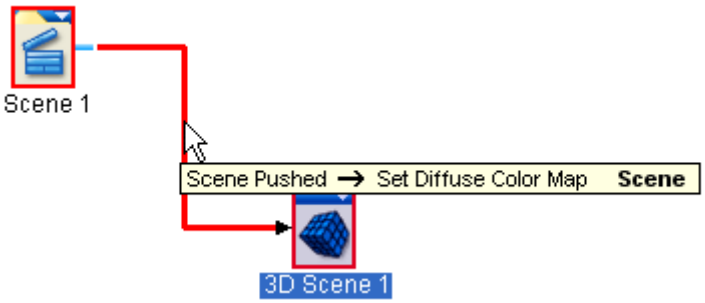

Figure 120: Scene object connected to the 3D Scene object

Step 4

Open the Scene object's local menu and choose Explore to jump to the Scene Stage (Figure 121).

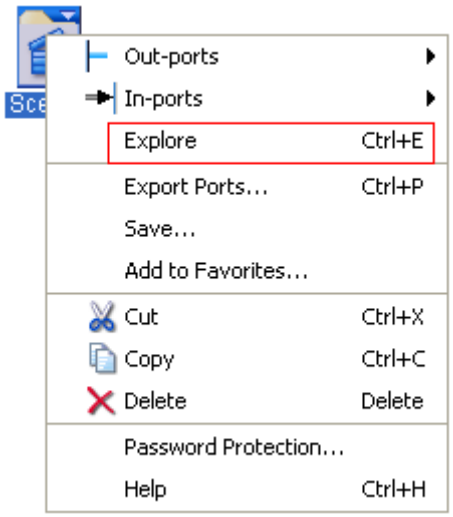

Figure 121: Explore Scene

Step 5

In the empty Scene Stage, insert a Keyboard object (found in the Environment folder) and a Text Window object (found in the Widgets folder).

In the Text Window dialog, choose font size 20. Click OK to close the dialog.

Set the Text Window Target Area to the same size as the Stage dimension by selecting its icon and by pressing Alt+S on your keyboard.

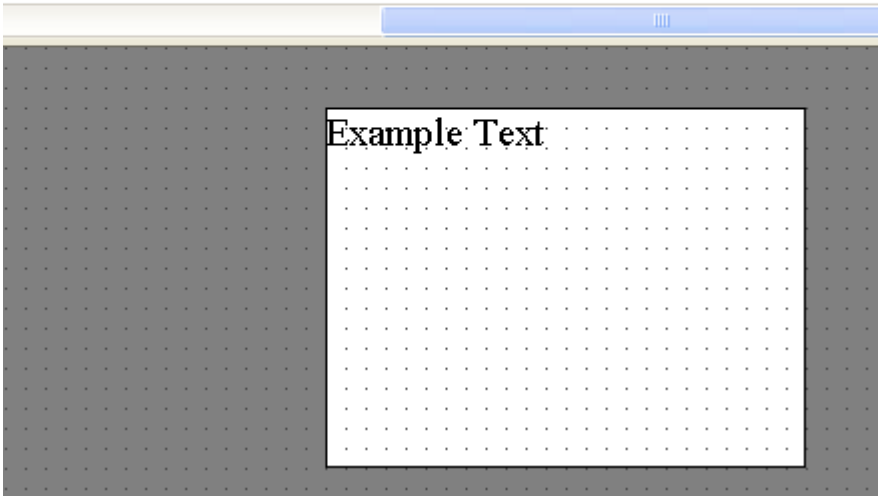

Figure 122: Keyboard and Text Window added to the Scene script area

Step 6

Connect:

'Keyboard 1', Out-ports > Key Pressed [Text]

to

'Text Window 1', In-ports > Append Text [Text]

Figure 123: Keyboard object connected to the Text Window object

Step 7

Press F7 on your keyboard to preview the presentation. You can now enter/edit the text on the cube by writing on your keyboard (Figure 124).

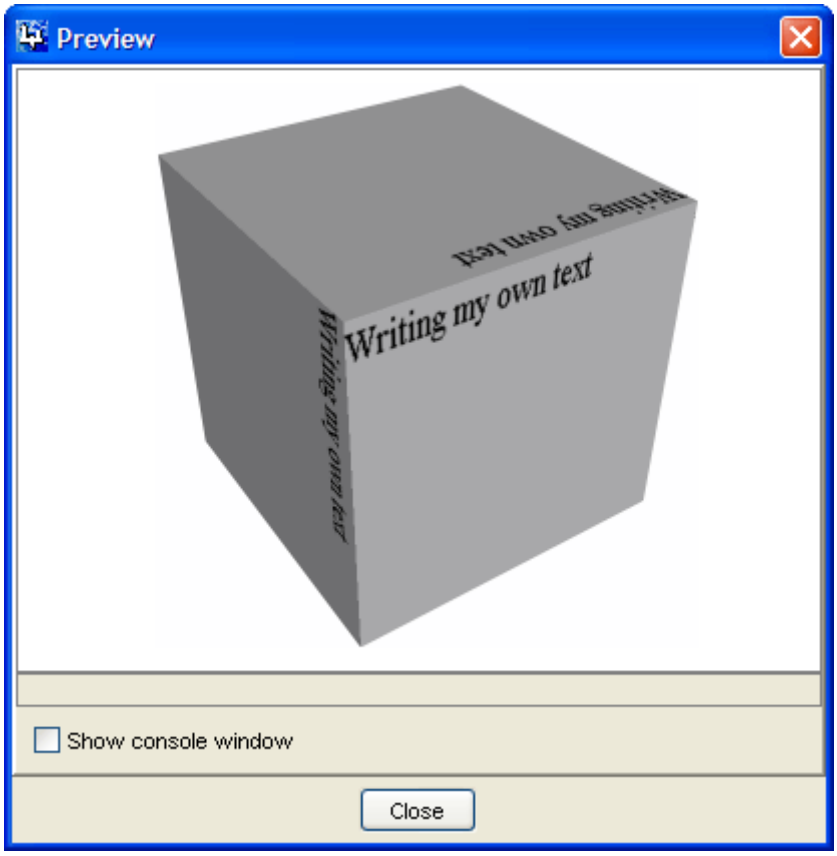

Figure 124: Previewing the cube

TIP: In the 3D Scene > Navigation panel, you can choose hotkeys for toggling between Interact mode and Normal navigation mode.

Optimization Tips

The performance of your 3D presentation can differ a lot, depending of how you optimize it. There are several aspects to consider while developing your 3D presentation. Some have already been mentioned above, but we will enlighten the most important issues here and also give some general tips.

NOTE: Make sure to read the section Optimizing Your Presentation in the WireFusion Reference Manual, which deals with some general optimization tips for WireFusion presentations.

NOTE: Make sure to read the section Optimizing, found in the 3D Modeling guide.

Here are some tips on what to consider after you have imported your 3D model to the Wire-Fusion 3D Scene object.

- Reduce and repair polygons with Simplygon either before importing the 3D model to WireFusion or directly from inside the 3D Scene dialog.
- Use Crease Angle to give your low polygon models a smoother look.
- For better quality, use generated normals instead of the Crease Angle function.

NOTE: Using generated normals result in larger final file size.

- In most cases the anti-aliasing option Auto is best suited.
- Use Edge Anti-Aliasing for smoother edges.
- Use Bilinear Filtering for smooth textures and reflections.
- Use MIP Mapping for smoother textures at different distances.
- Use the MIP Activation Level to trim the MIP Mapping for your 3D model.
- In the Navigation panel, adjust the speed for zoom, rotation and pan, and use the Friction slider for a smoother navigation and hence a better user experience.
- In the Camera panel, add camera restrictions for easier navigation and hence better user experience.
- In the Streaming panel, enable streaming to have the presentation started quicker.

Appendix

Features

The 3D player (3D render engine) included with WireFusion is very small in size and includes the following features.

Rendering Features

- Software rendering – High quality rendering capabilities that requires no special hardware or software drivers.
- OpenGL rendering – High performance hardware rendering.
- Bilinear Filtering — Interpolates between the bitmap pixels to create a smoother non-pixelated view of close-ups of textures mapped on 3D objects. This way you can use smaller textures and still retain a high visual quality of the texture objects. Works on both textures and reflection maps.
- MIP Mapping — Removes aliasing artifacts on textures. The artifacts occur because the texture can contain more detail (pixels) than the display monitor is capable of displaying in that give space. MIP mapping helps alleviate this problem by precomputing scaled versions of the texture and letting the distance between object and camera decides which version to use.
- Bump Mapping – A technique to simulate more details in a 3D model by using a bluescale heightmap.
- Glossiness Mapping – A technique to achieve partial glossiness on a 3D model by using a bluescale map.
- Real-time Shadows — Realistic object drop shadows are calculated in real-time. Capability to set light source height, shadow color, shadow opacity, shadow blur, shadow quality, height intensity and height to the shadow plane. The real-time shadows are automatically updated during object animations, mesh animations, and object opacity animations.
- Anti-Aliasing — Aliasing is caused by the sampling of smooth data onto a screen consisting of discrete pixels. The result is the visible stair stepping or jaggies at the edges of the object polygons. Anti-aliasing is the method used to remove this and results in smoother edges and sharper images.
- 256 Levels of Transparency
- Overlapping Transparent Surfaces — When two transparent surfaces are overlapping they will be correctly combined on the screen. This means transparent objects like glass cups are correctly displayed.
- 32 bit Color Depth Rendering — Ensures high image quality.
- True 32 bit z-Buffer — The z-buffer method is a way that ensures that only the closest objects are displayed by preventing background objects from overwriting foreground objects on the screen. 32 bit precision ensures that virtually all scenes are correctly displayed.
- Backface Culling — A way of making sure that parts of the object that face away from the observer is not processed, which speeds up the rendering.
- 3D Clipping — Clips objects against the 3D view frustum, which is the pyramid-shaped view created by looking at the 3D world 'through' a screen. This means any detail not in view, including detail virtually seated in front of the screen and behind a certain far distance, is removed. Most importantly, it also makes sure that detail halfway inside and halfway outside the view will be correctly displayed.
- Multiple Colored Dynamic Light Sources — Two types of light sources are handled; Directional and Omni, which both can be dynamically changed (position, color, intensity) during runtime.

Shading

- Reflection — By mapping a texture with a view of the virtual surrounding onto 3D objects, using a reflection vector calculated from the surface normals and the camera position, you simulate the reflections of the surrounding from the objects. This can be used to increase the metallic feel of glossy objects, and also provides a way of lighting the objects without specifying light sources. The following features are supported for reflection maps:
- Bilinear Filtering — Interpolates between the bitmap pixels to create a smoother non-pixelated view of close-ups of the seen reflections. This way you can use smaller textures and still retain high quality reflections.
- 8 bit or 24 bit High-Resolution Bitmaps — Use GIF, PNG or JPEG images with any width and height.
- Dynamic Reflection Maps — Replace a reflection map with a WireFusion Texture and modify (animate) it in real-time. (Not supported in Standard edition.)
- Per-Object Specification of Reflection Map — Each individual object can have its own map specified, which allows you to make sure every object receives the right material feeling.
- Combine Standard Texture Mapping with Reflection Map — The reflection maps are added on top of the standard textures.
- Phong Shading — Performs shading calculations for each screen pixel. This shading correctly shows highlights on glossy objects and generally gives the object a smoother look compared to the Gouraud shading.
- Gouraud Shading — Calculates the lighting for each polygon vertex. The resulting colors are interpolated over the polygon surface to give it a smooth appearance.
- Wireframe — A wireframe representation of the 3D model (no textures are displayed).
- Contour — Only the contour of the 3D model is displayed (textures are displayed).
- Constant Shading — No lighting is performed.
- Flat Shading — Calculates the lighting for each facet and gives it a constant color.
- Individual Rendering — A default renderer and an optional default reflection map are applied to the scene, but individual shading methods and reflection maps can be specified and applied for each individual object.
- Navigation Renderer — The optional navigation renderer allows one to choose a different renderer than your default renderer while navigating your 3D models or 3D worlds.

Anti-Aliasing

- Full Scene Anti-Aliasing — Aliasing is caused by the sampling of smooth data onto a screen consisting of discrete pixels. The result is the visible stair stepping or jaggies at the edges of the object polygons. Anti-aliasing is the method used to remove this and results in smoother edges and sharper images. Two modes of anti-aliasing are supported; On/Off and Auto (automatic switching between On and Off).
- Edge Anti-Aliasing — Fast real-time edge anti-aliasing for smooth edges, even when moving the model or running object and texture animations.

Material

Material settings can be applied and saved to the objects. Groups of objects can have the same material applied, simplifying material adjustments.

The following material properties can be specified:

- Diffuse Color
- Specular Color
- Emissive Color
- Ambient Intensity
- Glossiness
- Object Opacity
- Texture Opacity
- Renderer
- Reflection Map
- Glossiness Map
- Bump Map

Texture

- UV Texture Mapping — Polygon vertices are assigned coordinates in the texture, which in turn will be interpolated over the surface to assign a texture value to a screen pixel. This is the most flexible way of mapping.
- Bilinear Filtering — Interpolates between the bitmap pixels to create a smoother non-pixelated view of close-ups of textures mapped on 3D objects. This way you can use smaller textures and still retain a high visual quality of the textured objects. Works on both textures and reflection maps.
- MIP Mapping — Removes aliasing artifacts on textures. The artifacts occur because the texture can contain more detail (pixels) than the display monitor is capable of displaying in that give space. MIP mapping helps alleviate this problem by precomputing scaled versions of the texture and letting the distance between object and camera decides which version to use.
- Texture Opacity — Defines how much the texture will contribute to the color of the object (256 levels).
- Alpha Channel — An alpha channel image (GIF, PNG or JPEG) can be used to control the shape of the texture. The alpha channel has 256 levels of transparency.
- Dynamic Texture Architecture— Unique object architecture allows textures to contain video, Adobe Flash animations, interactive 3D and 2D, and built-in logic. Even alpha channels can be animated, programmed and interactive. (Not supported in Standard edition.)
- Perspective Correction — Perspective correction increases realism by taking into account the depth of an object when applying the texture map. This provides the appearance that texture details near the viewer are larger than the detail found further away, and ensures that parallel lines such as railroad tracks converge in the far distance.
- Sub-Pixel Precision — Sub-pixel precision of the texture mapping ensures the texture is more correctly placed on a 3D object, which is noticeable when changing the view by e.g. rotating the object.
- 8 bit or 24 bit High-Resolution Bitmaps — Use GIF, JPEG or PNG images with any width and height.

Animation

- Full Control over the Animation — Animations can be time driven, but there is also the possibility to fully control the fractional progress of the animation.
- Matrix Animations — Animation of the position, rotation and scale of objects.
- Vertex Animations — Animation of each vertex position (morphing).

- Dynamic Normals — When an object is morphed, using vertex animations, you need to recalculate the vertex normals in real-time to make sure the lighting is correctly displayed.
- Material Properties Animation — Specify animations for any material property, e.g. opacity, object color, glossiness etc.
- Light Animation — Specify animations for light source direction, position, color and intensity.
- Camera Animation — Specify animations to move the camera views, or animate between existing view and a predefined camera view.
- Hierarchical Animation Control — When animations are specified for an object consisting of a hierarchical object structure the animations are separately controllable for each sub-object.

Smoothing

- Crease Angle – Object smoothing can be achieved using a built-in crease angle function.
- Generated Normals – Generated shape normals, from your 3D authoring tool, can optionally be used for individual objects.

Streaming

- Object Streaming – Objects can be streamed into the presentation and appear according to a defined streaming order.
- Texture Streaming — You can choose to let the textures start streaming after all objects have finished loading or start streaming when its associated object is loading.
- Animation Streaming — Have animations' objects streamed into the presentation.
- Streaming Order – The order of streamed objects and animations are fully controllable.

Navigation

- Examine Mode — Study an object by rotating, zooming and panning it.
- Walk Mode with Collission Detection — Walk in virtual 3D rooms and 3D worlds. Support for collision detection between avatar and surroundings (walls).
- 5 Different Modes of User Interaction — You can allow the user to interact in any of the following modes: Zoom, Pan, Rotate, Interact and Normal.
- Keyboard Controlled Navigation — Specify hotkeys for Zoom, Pan and Rotation.
- True 6 DOF (Degrees Of Freedom) — No restrictions as to where and how you translate camera positions and object positions.
- Configurable Mouse Navigation — Use left, right or both mouse buttons to navigate. Add optional hotkeys.
- Navigation Renderer — The optional navigation renderer allows one to choose a different renderer than your default renderer while navigating your 3D models or 3D worlds.
- Navigation Friction — Capability to add adjustable friction to the navigation, giving a smoother user experience. Works for both mouse and keyboard navigation.
- Camera Restrictions — Optional camera rotation restrictions and zoom-in and zoom-out restrictions.
- Two Camera Rotation Modes – Choose to rotate cameras around the world axis or the local camera axis.
- Multiple Cameras — Specify multiple cameras and let the user switch between their viewpoints. Can optionally be animated and have configurable animation speed.

Miscellaneous

- 3D API — A 3D API allows advanced users to control parameters (X3D/VRML nodes and fields) in a 3D model, using the Java object. 3D objects can also be dynamically added/removed to a running scene. (Not supported in Standard and Professional edition)
- 3D Measurement — Measure point-to-point distances on 3D models.
- Encryption — Encrypts the 3D model to protect from unauthorized alterations.
- Compression Features — All 3D data are compressed, generally achieving 90-95% file size compression compared to the original X3D/VRML-file format.
    - Compresses mesh data
    - Compresses texture coordinate data
    - Compresses vertex animation data

X3D and VRML Support

WireFusion supports the two open ISO standard 3D formats X3D and VRML (2.0/97). Both X3D and VRML are file formats for describing interactive 3D objects and 3D worlds. They were designed for the use on the Internet, intranets, and on local client systems. A very brief description of how X3D and VRML work would be to say that the formats consist of a set of nodes, where the nodes are the fundamental components of the 3D file. Nodes are abstractions of various real-world objects and concepts. Examples include spheres, lights, and material descriptions. Nodes contain fields and events. Messages may be sent between nodes along routes.

NOTE: You need no knowledge about X3D or VRML in order to use or create 3D contents for WireFusion. You only need to know how to export to X3D and VRML from your 3D authoring tool. For those who are interested to know more about X3D and VRML, please visit the Web3D Consortium (www.web3d.org).

The X3D format is the successor to VRML and is a considerably more mature and refined standard than its predecessor. The VRML format, and soon also the X3D format, is included in most 3D tools today, making it possible for you to work and create your 3D contents in your favorite 3D tool before entering WireFusion.

Supported Nodes

The X3D and VRML support in WireFusion is not complete. The nodes supported are a subset of the nodes in X3D and VRML.

The following X3D and VRML 97/2.0 nodes are supported in WireFusion:

Anchor	Appearance	Color	ColorInterpolator
Coordinate	CoordinateInterpolator	DirectionalLight	Group
ImageTexture	IndexedFaceSet	IndexedLineSet	Inline
LOD	Material	NavigationInfo	Normal
NormalInterpolator	OrientationInterpolator	PixelTexture	PointLight
PointSet	PositionInterpolator	ScalarInterpolator	Shape
Switch	TextureCoordinate	TextureTransform	TimeSensor
TouchSensor	Transform	Viewpoint	

The following X3D Event Utility Nodes are supported in WireFusion:

BooleanFilter	BooleanSequencer	BooleanToggle	BooleanTrigger
IntegerSequencer	IntegerTrigger	TimeTrigger	

- The ROUTE formalism is supported. All ROUTEs between two supported nodes are handled.
- The PROTO statement is supported.
- The DEF keyword and USE statement is supported.

Unsupported Nodes

Nodes that are not supported in WireFusion:

AudioClip	Background	Billboard	Box
Collision	Cone	Cylinder	CylinderSensor
ElevationGrid	Extrusion	Fog	FontStyle
MovieTexture	PlaneSensor	ProximitySensor	Script
Sound	Sphere	SphereSensor	Spotlight
Text	VisilibitySensor		

OpenGL Limitations

The OpenGL support in WireFusion is under ongoing development and the ambition is to have the same functionality and connectivity with the rest of the WireFusion environment as with the software engine, and also to support at least the same rendering features as found in the software engine.

Below is a list of limitations in the OpenGL implementation found in WireFusion 5.0.0.

- OpenGL accelerated Java Applets, Java Components and Java Applications in full-screen are not supported
- The Reflection and Phong renderers are not supported in OpenGL mode
- Line Color, Filled Faces and Fill Color not supported in the Wireframe and Contour rendering modes
- Bump mapping is not supported
- Glossiness mapping is not supported
- Shadow plane is not supported
- Navigation Renderer is not supported
- 3D measurement is not supported
- MIP mapping is not supported
- Anti-aliasing Off/Auto/Edge is not supported (always On)
- Diffuse Color Map Amount is not supported
- Opacity Map Amount is not supported
- 2-sided transparent objects might get artifacts
- Streaming of individual 3D objects is not supported
- Animated textures is not supported
- Interactivity on textures (diffuse color maps) is not supported
- Filter functions on top of 3D is not supported

Index

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