

Autodesk NavisWorks Freedom 2009

User Manual

Autodesk, Inc.

Autodesk NavisWorks Freedom 2009: User Manual

Autodesk, Inc.

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This software is based in part on the work of the Independent JPEG Group.

Contains a modified version of Open CASCADE libraries. See the license file "OpenCascadeLicense.txt" in the NavisWorks installation directory. Source code is available from download.autodesk.com/us/navisworks/OpenCascade.zip.

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Part 1. Welcome to Autodesk NavisWorks Freedom 2009

Autodesk NavisWorks Freedom 2009 is a free 3D viewer for NavisWorks NWD and Autodesk DWF files. It offers an unrestricted interface for real-time navigation of even the largest 3D models complete with textures and materials, as well as animation playback, hyperlinks and saved viewpoints.

In this documentation set you can find information on:

- Installation
- Working with Freedom

Chapter 1. New Features

Autodesk NavisWorks Freedom 2009 contains a number of key enhancements for this release.

Interface Enhancements

- .NET GUI Modernization

Up-to-date look and feel including new icons, improved control bar docking and tabbed control bars.

- The Selection Tree Control Bar

Shows the internal structure of the loaded NWD, allowing direct navigation through the tree list to required elements in the project.

- The Properties Control Bar

Shows all properties of a selected geometry item.

- TimeLiner Playback

Ability to play back a TimeLiner sequence.

- Animation Playback

Ability to play back viewpoint and object animation.

- New Editor for **Global Options**.

A change from complex tabs to a logical tree structure, making finding options much simpler. Also making global options sharable across multiple PCs through import and export.

- Viewable Comments

Ability to view comments recorded in NWD files.

Display Enhancements

- 3D Text Support

The visualization of 3D text brought into other NavisWorks products from AutoCAD and MicroStation, and exported in the NWD.

- Parametric Support

Any parametric data brought into other NavisWorks products and exported in the NWD will be displayed in Freedom. This data increases cylinder accuracy, and dramatically reduces the memory footprint to load and display them.

Operating System Support

- Microsoft Vista Support

Full support for Microsoft's latest operating system.

- 64-bit Support

Support for 64-bit versions of both XP and Vista.

File Formats

- Autodesk DWF support

Freedom is now capable of reading and displaying Autodesk's DWF Design Review format.

Part 2. Installation

This section provides step-by-step installation instructions for Autodesk NavisWorks Freedom 2009. In particular, you will learn how to:

- Prepare for installation
- Install and run NavisWorks Freedom
- Troubleshoot your installation

Chapter 2. Quick Start to Stand-Alone Installation

This section provides step-by-step instructions about how to install Autodesk NavisWorks Freedom 2009 on your system.

How to Prepare for Installation

Before you install Autodesk NavisWorks Freedom 2009, you must review the system requirements, understand administrative permission requirements, and close all running applications. After you complete these tasks, you can install Autodesk NavisWorks Freedom 2009.

Before you can install Freedom, you need to [download](#) the redistributable Freedom installer package to your computer's drive.

System Requirements

Before you install your product on a stand-alone computer, make sure that your computer meets the minimum system requirements. See the following table for hardware and software requirements.

Hardware and software requirements	
Hardware/Software	Requirement
Operating system	Windows®XP® Professional, SP 2 (recommended)
	Windows XP Home, and Professional, SP 2
	Windows Vista Ultimate
	Windows Vista Enterprise
	Windows Vista Business
	Windows Vista Home Premium
	Windows Vista Home Basic
Web browser	Microsoft® Internet Explorer 6.0, SP 1 (or later)
Processor	AMD®Athlon®, 3.0 GHz or faster (minimum)
	Intel®Pentium® IV, 3.0 GHz or faster (recommended)
Memory (RAM)	512 MB (minimum)
	2 GB or greater (recommended)
Display card	128 meg, 1024 x 768 VGA, True Color (minimum)
	256 meg or greater - 1280 x 1024 32-bit color video display adapter, True Color (recommended)
Hard disk	Installation 800 MB
Pointing device	MS-Mouse compliant
DVD-ROM	Any speed (for installation only)

Hardware and software requirements	
Optional hardware	Open GL®-compatible 3D video card
	Printer or plotter
	Modem or access to an Internet connection
	Network interface card

How to Understand Administrative Permission Requirements

To install Autodesk NavisWorks Freedom 2009, you must have administrator permissions. You do not need to have domain administrative permissions. See your system administrator for information about administrative permissions.

To run Autodesk NavisWorks Freedom 2009, you do not need administrator permissions. You can run the program as a limited user.

How to Install and Run NavisWorks Freedom

This section contains information for installing NavisWorks Freedom on a stand-alone computer. You must have administrative permissions to install NavisWorks.

To install Freedom:

1. Double-click the downloaded Freedom installer package.
2. Choose the folder in which Freedom will be installed. The default location is displayed in the **Destination Folder** field. You can change the location by clicking the **Browse** button, and selecting a new location in the **Browse for Folder** dialog.
3. Click the **Install** button.

When all necessary files have been extracted, the Autodesk NavisWorks Freedom 2009 Installation wizard automatically launches in the language that best matches the settings on your computer.

4. In the Installation wizard, click Install Products.
5. Select the product you want to install and click Next.
6. Review the Autodesk software license agreement for your country or region. You must accept this agreement to proceed with the installation. Choose your country or region, click I Accept, and then click Next.

Note:

If you do not agree to the terms of the license and want to terminate the installation, click Cancel.

7. On the Product and User Information page, enter the required information and click Next.

The information you enter here is permanent and is displayed in the Autodesk NavisWorks Freedom 2009 window (accessed by **Help > About**) on your computer. Because you can't change this information later without uninstalling the product, make sure you enter the correct information now.

8. On the Begin Installation page, click Install to begin installation.
9. On the Installation Complete page, select View the Autodesk NavisWorks Freedom 2009 Readme if you want to launch the Autodesk NavisWorks Freedom 2009 Help system.
10. Click Finish.

Running Freedom

Assuming that you've followed the steps in the previous procedure, you can launch NavisWorks and start taking advantage of its new and updated features.

You can start NavisWorks in the following ways:

- **Desktop shortcut icon.** When you install NavisWorks Freedom, a Freedom shortcut icon is placed on your desktop. Double-click the Freedom icon to start Freedom.
- **Start menu.** On the Start menu, click Programs (Windows XP) or All Programs (Windows Vista) Autodesk > Autodesk NavisWorks Freedom 2009 > Autodesk NavisWorks Freedom 2009.

How to Launch NavisWorks in Another Language

To run NavisWorks in another of the supported languages, you need to add one of the language selector arguments to the desktop shortcut.

1. Right-click the NavisWorks desktop shortcut, and click **Properties** on the shortcut menu to open the **NavisWorks Properties** dialog box.
2. On the **Shortcut** tab, enter a space in the **Target** field after **..lroamer.exe"**, and then enter one of the following arguments:

-lang enu	Enter this for English localization
-lang deu	Enter this for German localization
-lang jpn	Enter this for Japanese localization
-lang rus	Enter this for Russian localization
-lang chs	Enter this for Chinese (PRC) localization

3. Click **OK** to save the changes.

Reinstall or Repair Autodesk NavisWorks Freedom 2009

If you accidentally delete or alter files that are required by NavisWorks Freedom, Freedom might not perform correctly, and you might receive error messages when you try to execute a command or find a

file. You can attempt to fix this problem by reinstalling or repairing NavisWorks Freedom. The reinstallation or repair uses the features that were part of the installation type you chose when you initially installed the program.

To reinstall or repair NavisWorks Freedom:

1. In the Control Panel, double-click Add or Remove Programs.
2. In the Add or Remove Programs dialog box, click Autodesk NavisWorks Freedom 2009, and then click Change/Remove in Windows XP or Uninstall/Change in Vista.

The Autodesk NavisWorks Freedom 2009 Installation wizard re-opens in Maintenance Mode.
3. Click Repair Autodesk NavisWorks Freedom 2009.
4. On the Select Repair or Reinstall page, click one of the following, and then click Next:
 - **Repair My Autodesk NavisWorks Freedom 2009 Installation.** This option replaces all registry entries that NavisWorks initially installed and restores Autodesk NavisWorks Freedom 2009 to its default state.
 - **Reinstall My Autodesk NavisWorks Freedom 2009 Installation.** This option repairs the registry and reinstalls all files from the original installation. Use this option if the Repair My Autodesk NavisWorks Freedom 2009 Installation option does not solve the problem.
5. On the Repair Autodesk NavisWorks Freedom 2009 page, click Next to start the process.
6. On the Repair Complete page, you are informed when the repairs have been performed. Click Finish.

Uninstall Autodesk NavisWorks Freedom 2009

When you uninstall Autodesk NavisWorks Freedom 2009, all components are removed. This means that even if you've previously added or removed components, or if you've reinstalled or repaired Autodesk NavisWorks Freedom 2009, the uninstall removes all NavisWorks installation files from your system.

To uninstall Autodesk NavisWorks Freedom 2009:

1. In the Control Panel, double-click Add or Remove Programs.
2. In the Add or Remove Programs dialog box, click Autodesk NavisWorks Freedom 2009, and then click Change/Remove in Windows XP or Uninstall/Change in Vista.

The Autodesk NavisWorks Freedom 2009 Installation wizard re-opens in Maintenance Mode.
3. Click Uninstall.
4. On the Uninstall Autodesk NavisWorks Freedom 2009 page, click Next to remove NavisWorks from the system.

5. When informed that the product has been successfully uninstalled, click Finish.

Chapter 3. Installation Troubleshooting

This section outlines common issues and their solutions that may arise while performing a general installation of your product.

What are the minimum system requirements?

Before you install your product on a stand-alone computer, make sure that your computer meets the minimum system requirements.

Hardware and software requirements	
Hardware/Software	Requirement
Operating system	Windows®XP® Professional, SP 2 (recommended)
	Windows XP Home, and Professional, SP 2
	Windows Vista Ultimate
	Windows Vista Enterprise
	Windows Vista Business
	Windows Vista Home Premium
	Windows Vista Home Basic
Web browser	Microsoft® Internet Explorer 6.0, SP 1 (or later)
Processor	AMD®Athlon®, 3.0 GHz or faster (minimum)
	Intel®Pentium® IV, 3.0 GHz or faster (recommended)
Memory (RAM)	512 MB (minimum)
	2 GB or greater (recommended)
Display card	128 meg, 1024 x 768 VGA, True Color (minimum)
	256 meg or greater - 1280 x 1024 32-bit color video display adapter, True Color (recommended)
Hard disk	Installation 800 MB
Pointing device	MS-Mouse compliant
DVD-ROM	Any speed (for installation only)
Optional hardware	Open GL®-compatible 3D video card
	Printer or plotter
	Modem or access to an Internet connection
	Network interface card

How can I check my graphics card driver to see if it needs to be updated?

It is recommended that you verify and update your graphics card driver to optimize your program. Use the following procedure to identify your current graphics card driver.

To identify your graphics card driver:

1. Start Autodesk NavisWorks Freedom 2009.
2. Click Help > System Info.

The Autodesk NavisWorks Freedom 2009 information dialog box opens.

3. Review the information about your system including the graphics card driver and driver version, and click OK to close the dialog.

Where are my product manuals?

All documentation created for Autodesk products are built in two different formats: PDF and CHM.

CHM files are made available during installation; click the Documentation link in the Installation wizard. To access CHM files after the product is installed, use the Help system in the product.

PDF files are available after the product is installed; they are located in the \Autodesk NavisWorks Freedom 2009\Manuals folder.

CHM files are installed to the \Autodesk NavisWorks Freedom 2009 folder.

Maintenance Issues

This section outlines common issues and their solutions with regards to adding and removing features, reinstalling or repairing your installation, and uninstalling products.

Is it possible to change the installation folder when adding or removing features?

Once your product is installed, you cannot change the installation path from the Add/Remove Features page. Changing the path while adding features results in program corruption, so it is not an option.

When should I reinstall the product instead of a repair?

You should reinstall your product if you accidentally delete or alter files that are required by the program. Missing or altered files adversely affect the performance of your product and cause error messages when you try to execute a command or find a file.

If an attempt to repair an installation fails, reinstalling is the next best option.

Do I need my original disk to reinstall my software?

When performing a reinstall of the product, you do not need to have the original DVD on hand. Installation data is cached locally on your drive and that data is reused when reinstalling.

When I uninstall my software, what files are left on my system?

If you uninstall the product, some files remain on your system such as files you created or edited.

Your license file also stays on your workstation when you uninstall your product. If you reinstall on the same workstation, the license information remains valid and you do not have to reactivate the product.

Part 3. Working with Freedom

Freedom enables you to explore project models without specialist design software or specialist skills. In this section, you will learn how to:

- Manage files
- Use Freedom tools
- Use TimeLiner playback tools

Chapter 4. Overview

The basis of Autodesk NavisWorks Freedom 2009 is its ability to walk through any size model in real time. NavisWorks guarantees a user-defined frame rate using a unique algorithm which automatically calculates which items to render first during navigation, based on the size of items and distance from the viewpoint. Items which NavisWorks does not have time to render are, therefore, sacrificed or "dropped out" in the name of interactivity. These items are, of course, rendered when navigation ceases. The amount of drop-out depends on several factors including: hardware (in particular graphics card and driver performance), as well as the size of the NavisWorks navigation window and the size of the model. If you wish to reduce drop-out during navigation, you have the option to reduce frame rate and, therefore, trade it off against drop-out.

When working with truly large "supermodels" in NavisWorks, you will require a sufficient amount of RAM to load and review the data. NavisWorks employs JetStream technology which optimizes the usage of the available RAM. Before running out of memory, NavisWorks will page unnecessary data to the hard disk, freeing up space for loading to continue. JetStream technology also enables the user to commence navigating the supermodel, before it has completely loaded into memory.

NavisWorks is large address aware, utilizing any additional memory assignment following the 3GB switch available on Windows XP systems.

To start NavisWorks, double-click the NavisWorks icon on the desktop, or go to **Start > Programs > Autodesk > Autodesk NavisWorks Freedom 2009 > Autodesk NavisWorks Freedom 2009**. The following sections will describe the interface in more detail.

NavisWorks contains full context-sensitive Help. Click , and click the toolbar button or menu option to display the appropriate Help topic. Or, alternatively, go to the **Help** menu.

Chapter 5. File Management

To manage files, you can use both the **File** menu and the **Standard** toolbar.



File Menu

The **File** menu includes the following items:

- New
- Open
- Open URL
- Print
- Print Preview
- Print Setup
- Recent Files
- Exit

New Files

This option resets NavisWorks and closes existing files.

To create a new file:

- On the **File** menu, click **New**

or

- Click **New**  on the **Standard** toolbar.

Opening Files

With Autodesk NavisWorks Freedom 2009 you can open .nwd (published NavisWorks Data) and .dwf files.

To open a model file:

- On the **File** menu, click **Open**

or

- Click **Open**  on the **Standard** toolbar.

Note:

The standard **Open** dialog use of **Shift** and **Control** keys allows multiple files to be selected and appended to the current set of models.

Opening Files via URL

With Autodesk NavisWorks Freedom 2009 you can open NavisWorks published .nwd files via the Internet. Having uploaded your .nwd file to a web server, this file can then be opened directly from within NavisWorks. Utilizing JetStream technology, it will not be necessary for the entire file to be downloaded before navigation can commence - between 10% and 50% will be sufficient for this, depending on the file structure. (The greater the hierarchical structure of the model, the closer to 50% will be required for navigation to commence. Similarly, the lesser the hierarchical structure of the model, the closer to 10% will be required).

To open a file via a URL:

- On the **File** menu, click **Open URL**.

Printing

You can print a hard copy of the current viewpoint to any printer or plotter.

Printing the Current Viewpoint

When the print option is selected, it prints the current viewpoint scaled to fit and centered on the page.

Printing the current viewpoint:

- On the **File** menu, click **Print**

or

Click **Print**  on the **Standard** toolbar.

- Check the printer settings are as required, and click **OK** to print the viewpoint or **Cancel** to return to NavisWorks without printing anything.

Note:

The maximum image size is 2048x2048 pixels.

The **Properties** button controls printer-specific ink and paper settings.

Previewing Printouts

Before you print out a copy of the model you are working on, you may wish to see how it will appear.

Previewing a model before printing:

1. On the **File** menu, click **Print Preview**.
2. Use **Zoom In** and **Zoom Out** to do just that with the preview image.
3. Click **Print**, **OK** to confirm and print the image, or click **Close** to return to NavisWorks.

Setting up printouts

This option enables the setting up of paper size and orientation options.

Changing the print setup:

1. On the **File** menu, click **Print Setup**.
The **Print Setup** dialog box is displayed.
2. Make changes as required to the paper, orientation, and click the **Properties** button to change printer-specific settings.
3. Click **OK** to print the image, or click **Cancel** to return to NavisWorks.

Quitting NavisWorks

Quitting NavisWorks:

- On the **File** menu, click **Exit**

Chapter 6. Converting Files

With Autodesk NavisWorks Freedom 2009 you can open .nwd (published NavisWorks Data) and .dwf files.

File Readers

- .nwd
- .dwf

NWD Files

.nwd files are files published by NavisWorks Publisher and are snapshots of the model at a certain time.

DWF Files

Autodesk's DWF (Design Web Format) was specifically developed by Autodesk as a file format for architects, engineers, and GIS professionals to share design data. The NavisWorks file reader reads all 3D geometry, as well as textures and properties. A full list is given below.

Supported Entities

- All 3D geometry
- Texture coordinates
- Colors (per-vertex, per-face)
- Property fields
- Categories

Unsupported Entities

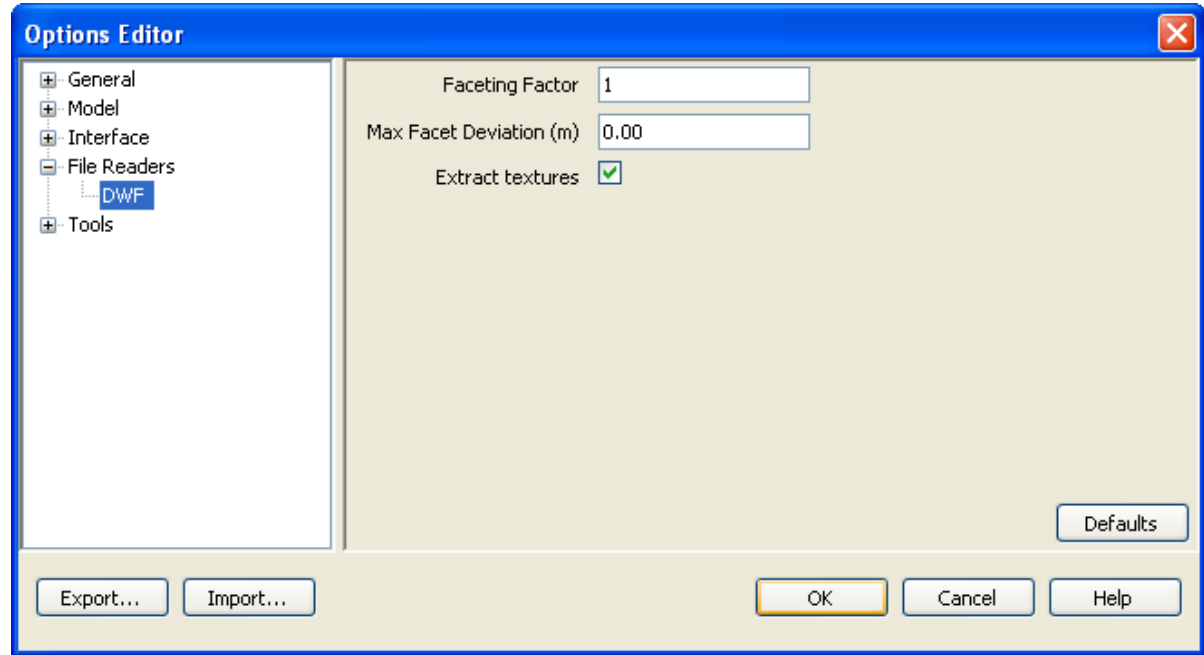
- 2D lines/plot sections
- Thumbnails
- Marked-up sketches
- More than one 3D section per file (any others are ignored)
- NURBS Surfaces
- Cameras

DWF File Reader Options

Setting the .dwf file reader options:

1. On the **Tools** menu, click **Global Options**.
2. Expand the **File Readers** node in the **Options Editor** dialog box, and click the **DWF** option.

The DWF page is displayed.



3. Enter the **Faceting Factor** (the value must be greater than 0). The higher the value, the more NavisWorks will facet rounded entities and therefore the smoother they will appear. See [Faceting Factor](#) for more information.
4. Enter the **Max Facet Deviation**. This will facet entities to within the specified tolerance. See [Max Facet Deviation](#) for more information.
5. Click **OK** to set these options or **Cancel** to exit the dialog without setting them.

Chapter 7. Navigating

NavisWorks enables intuitive and interactive navigation around your 3D models at a guaranteed frame rate. The nine navigation modes give you complete flexibility to navigate around the model in real time. In addition to these navigation modes, there are selection and measuring tools that further facilitate the interrogation of model data.

The navigation tools allow you to do things such as focus on objects and change the view parameters. There are also options to look from predefined views, set the world up vector to a direction different than the one brought through from the CAD model.

Navigation Modes

There are nine navigation modes to control how you move around the main navigation view - six camera-centric modes and three model-centric modes. In a camera-centric mode, the camera moves within the scene, whereas in a model-centric mode, model moves inside the scene. For example, the **Orbit** and **Examine** modes essentially do the same thing, except that **Orbit** moves the *camera* around the focal point and **Examine** moves the *model* around the focal point. Movement in each mode is based on the cursor keys, the **Shift** and **Control** keys and mouse drags. The mouse wheel is also supported, allowing quick and easy zooming or tilting, depending on the current navigation mode.

Note:

Dragging with the left mouse button while holding down the **Control** key performs the same actions as dragging with the middle mouse button, which is useful if you only have a two-button mouse.

The **Shift** and **Control** keys modify the movement, for example holding down **Shift** in **Walk** mode speeds up movement, and holding down **Control** in this mode, glides the camera left/right and up/down.

Note:

Gliding the camera is opposite to panning the model. Gliding is a camera-centric motion and panning is a model-centric motion.

Below is shown the **Navigation Mode** toolbar and the navigation modes available:



Walk 

Look Around 

Zoom 

Zoom Box 

Pan 

Orbit 

Examine 

Fly 

Turntable 

Walking

Walk mode enables you to walk through the model on a horizontal plane ensuring that "up" is always "up".

To walk through a model:

- On the **Viewpoint** menu, click **Navigation Mode > Walk**

or

- Click **Walk**  on the **Navigation Mode** toolbar.

Dragging the left mouse button, or using the cursor keys, spins the camera left and right and moves it forwards and backwards.

Holding down the **Shift** key speeds up this movement.

Holding down the **Control** key glides the camera left and right and up and down. As walk mode is camera-centric, this mode differs from the normal pan mode in that the camera is moved rather than the model.

Spinning the mouse wheel tilts the camera up and down.

Looking Around

Look around mode enables you to look around the model from the current camera position and gives the effect that you are moving your head around.

To look around a model:

- On the **Viewpoint** menu, click **Navigation Mode > Look Around**

or

- Click **Look Around**  on the **Navigation Mode** toolbar.

Dragging the left mouse button, or using the cursor keys, looks left, right, up or down.

Holding down the **Shift** key speeds up this movement.

Holding down the **Control** key rotates the camera around its viewing axis.

Zooming

Zoom mode enables you to zoom into and out of the model. Cursor up zooms in and cursor down zooms out.

To zoom:

- On the **Viewpoint** menu, click **Navigation Mode > Zoom**

or

- Click **Zoom**  on the **Navigation Mode** toolbar.

Dragging the left mouse button up and down, or using the up and down cursor keys, zooms in and out respectively.

Zooming to a Box

The zoom-to-a-box mode enables you to drag a box so that the contents of the box fill the view.

To use the zoom box:

- On the **Viewpoint** menu, click **Navigation Mode > Zoom Box**

or

- Click the **Zoom Box**  on the **Navigation Mode** toolbar.

Dragging a box with the left mouse button over the main navigation view fills the view with the contents of the box.

Holding down the **Shift** or **Control** keys, or spinning the mouse wheel, temporarily puts this mode into normal **Zoom** mode.

Panning

The pan mode enables you to pan the model rather than the camera.

To pan a model:

- On the **Viewpoint** menu, click **Navigation Mode > Pan**

or

- Click **Pan**  on the **Navigation Mode** toolbar.

Dragging the left mouse button pans the model up, down, left and right.

Holding down the **Shift** or **Control** keys, or spinning the mouse wheel, temporarily puts this mode into normal **Zoom** mode.

Orbiting

The orbit mode enables you to orbit the camera around the model, ensuring that "up" is always "up". The camera always orbits around the focal point of the model.

To orbit a model:

- On the **Viewpoint** menu, click **Navigation Mode > Orbit**

or

- Click **Orbit**  on the **Navigation Mode** toolbar.

Dragging the left mouse button, or using the cursor keys, rotates the camera around the model.

Holding down the **Shift** key or spinning the mouse wheel, temporarily puts this mode into normal **Zoom** mode.

Holding down the **Control** key glides the camera left and right and up and down. As orbit mode is camera-centric, this mode differs from the normal pan mode in that the camera is moved rather than the model.

Examining

The examine mode enables you to rotate the model about.

To examine a model:

- On the **Viewpoint** menu, click **Navigation Mode > Examine**

or

- Click **Examine**  on the **Navigation Mode** toolbar.

Dragging the left mouse button, or using the cursor keys, rotates the model about.

Holding down the **Shift** key or spinning the mouse wheel, temporarily puts this mode into normal **Zoom** mode.

Holding down the **Control** key, temporarily puts this mode into normal **Pan** mode.

If the mouse is moving when you let go of the button, the model keeps spinning! Click on it to stop. Holding the **Shift** key allows you to zoom in and out.

Flying

The fly mode enables you to fly around the model like in a flight simulator.

To fly through a model:

- On the **Viewpoint** menu, click **Navigation Mode > Fly**

or

- Click **Fly**  on the **Navigation Mode** toolbar.

Holding down the left mouse button moves the camera forward. As in a flight simulator, the left mouse button banks left/right when dragged left or right and tilts up/down when dragged up or down.

The up and down cursor keys will zoom in and out respectively and the left and right cursor keys will spin the camera left and right respectively.

Holding down the **Shift** key speeds up this movement.

Holding down the **Control** key rotates the camera around its viewing axis, while still moving forward.

Spinning on a Turntable

The turntable mode enables you to spin the model around the up vector. This navigation mode behaves as though the model is sitting on a turntable, ensuring that "up" is always "up".

To use the turntable:

- On the **Viewpoint** menu, click **Navigation Mode > Turntable**

or

- Click **Turntable**  on the **Navigation Mode** toolbar.

Dragging the left mouse button left and right, or using the left and right cursor keys, spins the turntable left and right respectively.

Holding down the **Shift** key or spinning the mouse wheel, temporarily puts this mode into normal **Zoom** mode.

Holding down the **Control** key, temporarily puts this mode into normal **Pan** mode.

Spinning the mouse wheel, or using the up and down cursor keys, tilts the turntable up and down, like the tilt bar.

Navigation Tools

Navigational tools are a number of handy tools for altering, resetting or changing the type of the camera, and the viewpoint displayed. These tools can be accessed from the **Viewpoint > Navigation Tools** menu, or from the **Navigation Tools** toolbar:



Navigation Tools comprises the following functions:

View All 

View Selected 

Focus 

Perspective Camera 

Orthographic Camera 

Collision Detection 

Gravity 

Crouch 

Third Person 

Align With X-Axis 

Align With Y-Axis 



Viewing Everything

This function dollies and pans the camera so that the entire model is in view, which is very useful if you get lost inside a model or lose it completely.

Sometimes on doing a **View All**, you seem to just get a blank view. This is usually because there are items that are very small in comparison to the main model located a long way away from the main model. In these cases, it is best to click on an item in the selection tree and do a **View Selected** to at least find your way back to the model before trying to figure out which items are "lost".

To view everything:

- On the **Viewpoint** menu, click **Navigation Tools > View All**.

or

- Click **View All**  on the **Navigation Tools** toolbar.

Viewing Selected Items

This function zooms the camera so that the selected item fills the main navigation view.

To view a selected item:

- On the **Viewpoint** menu, click **Navigation Tools > View Selected**

or

- Click **View Selected**  on the **Navigation Tools** toolbar.

Focusing

This function puts the main navigation view into focus mode until the next click. Left-click on an item and the view swivels so that the point clicked is in the center of the view. The point clicked becomes the focal point for **examine**, **orbit**, **turntable** navigation modes.

To focus the camera:

- On the **Viewpoint** menu, click **Navigation Tools > Focus**

or

- Click **Focus**  on the **Navigation Tools** toolbar

Perspective Camera

Uses a perspective camera to view with.

To select a perspective camera:

- On the **Viewpoint** menu, click **Navigation Tools > Perspective Camera**

or

- Click **Perspective**  on the **Navigation Tools** toolbar.

Orthographic Camera

Uses an orthographic camera to view with.

To select an orthographic camera:

- On the **Viewpoint** menu, click **Navigation Tools > Orthographic Camera**

or

- Click **Orthographic**  on the **Navigation Tools** toolbar.

Note:

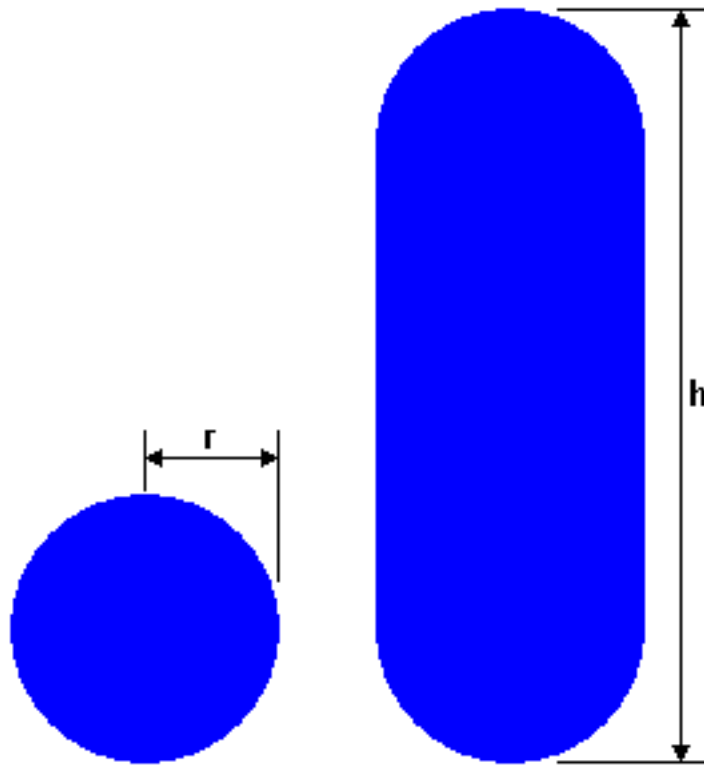
Orthographic cameras are not available with **Walk** and **Fly** navigation modes.

Collision Detection

This function defines you as a collision volume - a 3D object that can navigate around and interact with the model, obeying certain physical rules that confine you within the model itself. In other words, you have a mass and as such, cannot pass through other objects, points or lines in the scene.

You can walk over, or climb over objects in the scene that are up to half the height of the collision volume, thus allowing you to walk up stairs, for example.

The collision volume, in its basic form, is a sphere (with radius = r), that can be extruded to give it height (with height = $h \geq r$). See diagram below:



Collision detection is only available when in either the walk or fly navigation mode.

To activate collision detection:

- In **Walk** or **Fly** navigation mode, on the **Viewpoint** menu, click **Navigation Tools > Collision Detection**

or

- Click **Collision Detection**  on the **Navigation Tools** toolbar.

or

- Press **D** to toggle collision detection on/off.

Note:

When Collision Detection is turned on, rendering prioritization is changed so that objects around the camera or avatar are displayed with much higher detail than normal. The size of the region of high detail is based on collision volume radius and speed of movement (needing to see what is about to be walked into).

Gravity

This function only works in connection with collision detection.

Where collision detection gives you mass, gravity gives you weight. As such, you (as the collision volume) will be pulled downwards whilst walking through the model scene (gravity is only available when in the walk navigation mode).

This allows you to walk down stairs, for example, or follow terrain.

To activate gravity:

- In the **Walk** navigation mode, on the **Viewpoint** menu, click **Navigation Tools > Gravity**

or

- Click **Gravity**  on the **Navigation Tools** toolbar.

or

- Press **G** to toggle gravity on/off.

Crouching

This function only works in connection with collision detection.

When walking around the model with collision detection activated, you may encounter object that are too low to walk under, a low pipe for example. This function enables you to crouch under any such objects.

With crouching activated, you will automatically crouch under any objects that you cannot walk under at your specified height, thereby not impeding your navigation around the model.

If however, you are using collision detection to identify areas of the model that you cannot walk under, (again, using a low pipe for example) then there is also a temporary crouch function to allow navigation to proceed once the obstacle has been identified.

To activate crouching:

- In **Walk** or **Fly** navigation mode, on the **Viewpoint** menu, click **Navigation Tools > Crouch**

or

- Click **Crouch**  on the **Navigation Tools** toolbar.

or, if you only want to temporarily crouch

- Hold down the **Space bar** to turn crouching on. Releasing it will turn it off again.

Third Person View

This function allows you to view from a third person perspective.

When third person is activated, you will be able to see an **avatar** which is a representation of yourself within the 3D model. Whilst navigating you will be controlling the avatar's interaction with the current scene.

Using third person in connection with collision detection and gravity makes this a very powerful function, allowing you to visualize exactly how a person would interact with the intended design.

To view in third person:

- On the **Viewpoint** menu, click **Navigation Tools > Third Person**

or

- Click **Third Person**  on the **Navigation Tools** toolbar.

or

- Press **T** to toggle third person view on/off.

Note:

When Third Person mode is turned on, rendering prioritization is changed so that objects around the camera or avatar are displayed with much higher detail than normal. The size of the region of high detail is based on collision volume radius, speed of movement (needing to see what is about to be walked into) and the distance of the camera behind the avatar (in order to see what the avatar is interacting with).

Preset Viewpoints

The orthogonal viewpoints are preset inside NavisWorks and can be accessed from the **Navigation Tools** toolbar and the **Viewpoints** menu.

Aligning With The X-Axis

This function toggles between **Look From, Front** and **Look From, Back** views.

To align the viewpoint with the x-axis:

- On the **Viewpoint** menu, click **Navigation Tools > Align X**

or

- Click **Align X**  on the **Navigation Tools** toolbar.

Aligning With The Y-Axis

This function toggles between **Look From, Left** and **Look From, Right** views.

To align the viewpoint with the y-axis:

- On the **Viewpoint** menu, click **Navigation Tools > Align Y**

or

- Click **Align Y**  on the **Navigation Tools** toolbar.

Aligning With The Z-Axis

This function toggles between **Look From, Top** and **Look From, Bottom** views.

To align the viewpoint with the z-axis:

- On the **Viewpoint** menu, click **Navigation Tools > Align Z**

or

- Click **Align Z**  on the **Navigation Tools** toolbar.

Looking From a Preset Viewpoint

When this option is chosen the model is displayed from this viewpoint in the main navigation view. This is equivalent to toggling the **Align X**, **Align Y** and **Align Z** buttons on the **Navigation Tools** toolbar.

Looking from a preset viewpoint:

1. On the **Viewpoint** menu, click **Look From**.
2. Choose any direction from **Top**, **Bottom**, **Front**, **Left**, **Back** and **Right**.

Straighten

This function straightens the camera to align with the world up vector when it is already close to the world

up vector.

To straighten the camera:

- On the **Viewpoint** menu, click **Navigation Tools > Straighten**

Set World Up

These functions set the world up vector to align with the selected orientation.

To set the world up vector to the current view:

- On the **Viewpoint** menu, click **Set World Up > Current View**.

Alternatively, to set the world up vector to one of the orthogonal axes:

- On the **Viewpoint** menu, click **Set World Up** and choose one of the pre-defined axes (**+X Axis**, **-X Axis**, **+Y Axis**, **-Y Axis**, **+Z Axis**, or **-Z Axis**).

Using a SpaceBall

Note:

The term **SpaceBall** is used as a generic term for all 3D motion controllers from 3Dconnexion™, including the SpaceBall, SpaceMouse and SpaceTraveler.

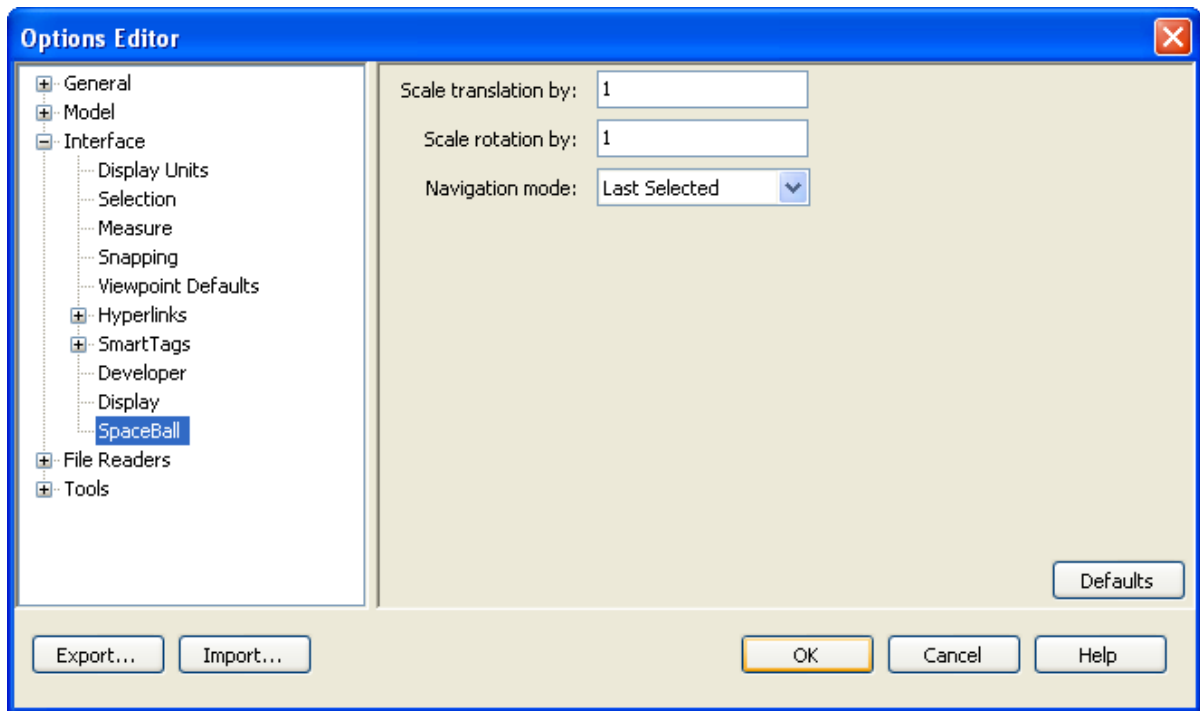
A **SpaceBall** can be used as an alternative to the mouse to move around the main navigation view. The behavior of the SpaceBall corresponds to the currently selected Navigation Mode. If no mode is selected on the **Navigation Mode** toolbar or if the selected mode is not a valid mode for the SpaceBall, then a default navigation mode will be used. This enables the user to navigate with the SpaceBall whilst performing other operations with the mouse. The default navigation mode can be set in the Options Editor dialog box.

The speed of navigation is sensitive to the amount of force applied to the SpaceBall. However, the user can also adjust the speed of translation and rotation by applying a factor to each of these in the **Options Editor** dialog box. These options are offered in addition to the adjustments that can be made using the Control Panel for the device which is supplied by the SpaceBall manufacturer with the installation.

Setting the SpaceBall behavior:

1. On the **Tools** menu, click **Global Options**.
2. Expand the **Interface** node in the **Options Editor** dialog box, and click the **SpaceBall** option.

The SpaceBall page is displayed.



3. Modify the **Scale translation** value if you want to increase or decrease the speed of translation.
4. Modify the **Scale rotation** value if you want to increase or decrease the speed of rotation.
5. Select the **Default navigation mode** from the drop-down list. This will be used when no valid navigation mode is currently selected.

Chapter 8. Selecting Items

With large models it is potentially a very time-consuming process to select items of interest. NavisWorks makes this a much simpler task by providing a range of functions for quickly selecting items both interactively and by searching the model manually and automatically. The main groups of functionality concerned with selecting items are:

- The selection tree
- Interactive selection

In NavisWorks there is the concept of an active selection set (the currently selected items, or the current selection) and saved selections sets. You cannot save any selection or search sets yourself, but you can use the selection or search sets saved in the model.

Below is shown the **Selection Tools** toolbar and the selection modes available:

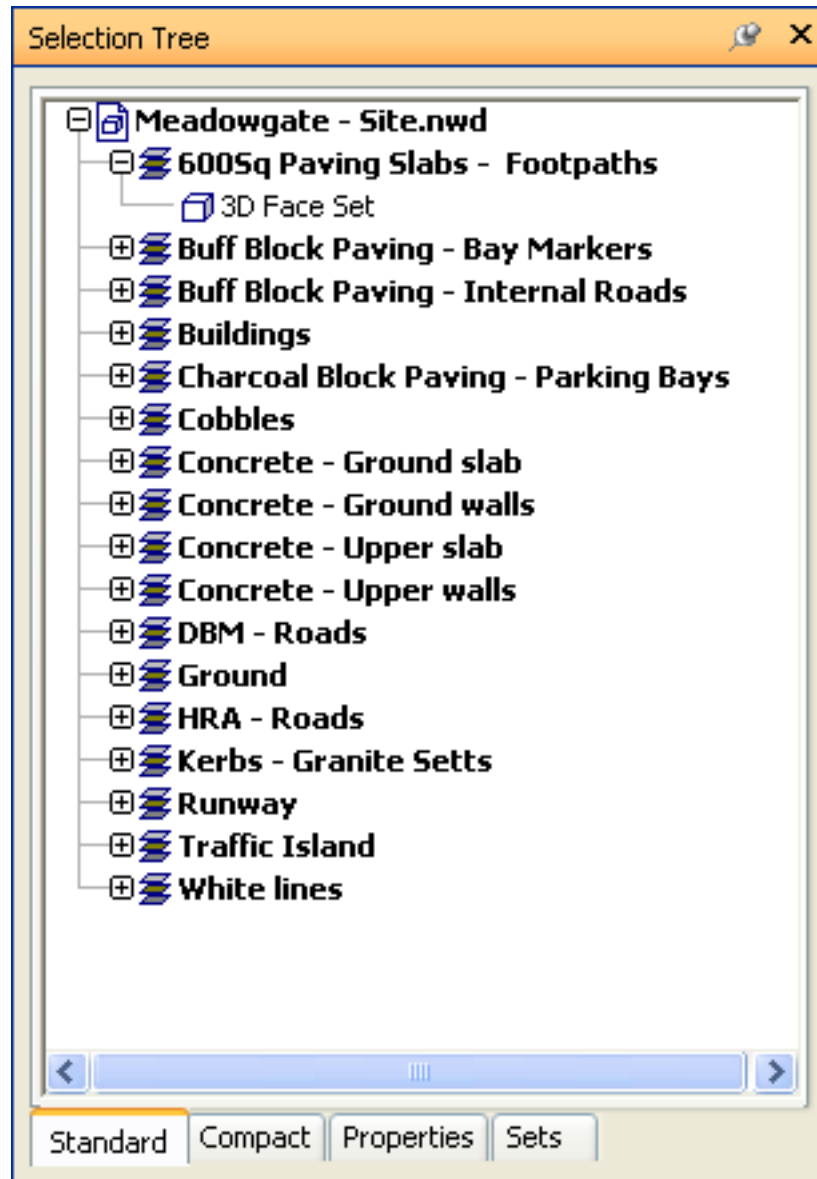


Select 

In addition to the selection modes, you can also use three editing options on the **Selection Tools** toolbar. See [Chapter 10, Editing](#) for more information on the editing tools.

Selection Trees

The selection tree is a tabbed control bar which displays a variety of hierarchical views of the structure of the model, as defined by the CAD application in which the model was created.



By default there are four tabs, called **Standard**, **Compact**, **Properties** and **Sets**:

- "Standard" displays the default tree hierarchy, including all instancing.
- "Compact" displays a simplified version of the "Standard" hierarchy, omitting various items. You can control the level of complexity of this tree using the **Select** options (see "[Selection Options](#)" for more information).
- "Properties" displays the hierarchy based on the items' properties. This enables simple manual searching of the model by item property.
- "Sets" shows selection and search sets saved with the model, if applicable.

Naming of items reflects the names from the original CAD application, wherever possible.

There are several different tree icons representing the types of item that make up the structure of a model:



A model, such as a drawing file or design file.



A layer or level.



A group, such as a block definition from AutoCAD or cell definition from MicroStation.



An instanced group, such as an inserted block from AutoCAD or cell from MicroStation. If in the imported file the instance was unnamed, NavisWorks names the instance to match its child's name.



An item of geometry, such as a polygon.



An instanced item of geometry, such as an instance from 3D Studio.



A composite object. A single CAD object that is represented in NavisWorks by a group of geometry items.



A search. Behind the scenes, NavisWorks is searching the model for all items with a property of this type and sets up the find specification to repeat this search if the selection set is saved. See “[Selection and Search Sets](#)” for more information on this.

Each of these item types can be Hidden (gray), Unhidden (dark blue) or Required (red).

Note:

If a group is selected as Hidden or Required then all instances of that item will be hidden or required. If you wish to operate on a single occurrence of an item then you should make the instanced group (the level above, or the "parent", in the hierarchy) Hidden or Required.

You can use the selection tree in combination with the main navigation window to select items into the current selection, which is highlighted in both the selection tree and the main navigation window.

Note:

Using the **Shift** and **Control** keys while selecting items in a selection tree will do the standard Windows™ multiple selection: **Control** allows multiple selection item by item and **Shift** allows multiple selection between the first and last items selected.

Interactive Selection

NavisWorks provides several methods to interactively select items into the current selection. You can use the tabs in the selection tree, select items in the main navigation window with select mode, and you can select other items with similar properties to an existing selection using the selection commands.

Note:

Pressing **Esc** deselects everything.

Select Mode

As standard, this mode is mutually exclusive to the navigation modes so that when you are selecting, you cannot navigate and vice versa.

Note:

When using a SpaceBall in conjunction with the standard mouse control, the SpaceBall can be configured for navigation and the mouse for selecting. See “ [Using a SpaceBall](#) ” for more information.

Select mode allows you to click on an item in the main navigation window to select it. Once a single item is selected, its properties will be shown in the Properties control bar.

You can select multiple items in the main navigation window using the familiar Windows™ methods of holding down the **Control** key while selecting items. This will add them to the current selection. Alternatively, if the items are already in the current selection, holding down **Control** while selecting them again will remove them from the current selection.

Holding the **Shift** key whilst selecting items in the main navigation window will cycle through the selection resolution, allowing you to get more specific with your selections. See Selection Resolution for more information on this.

To select an item:

- On the **Edit** menu, click **Select > Select**

or

- Click **Select**  on the **Selection Tools** toolbar.

Selection Commands

Selection commands enable you to quickly alter the current selection using logic. You can select multiple items based on the currently selected items' properties, or quickly invert the set, select everything or nothing.

Selecting items with selection commands:

1. On the **Edit** menu, click **Select**.
2. Choose the required selection command.

Standard selections are:

- Select All

All items contained within the model are selected.

- Select None

Deselects everything in the model.

- Invert Selection

Every selected item becomes deselected and vice versa.

- Select Multiple Instances

Selecting an item then selecting **Multiple Instances** will select all instances (sometimes called insertions) of that geometry group that occur in the model.

- Select Same Name

Every item with the same name as the selected item will also be selected.

- Select Same Type

Every item of the same type as the selected item will also be selected.

Selection and Search Sets

Selection sets store a group of items for later retrieval. There is no intelligence behind this set - if the model changes at all, the same items will be selected (assuming they are still available in the model) when recalling the selection set.

Search sets work in a similar way, except that they save search criteria instead of the results of a selection. So, if there are any search sets saved in the model, then you use them in Freedom to run the search and select the resulting objects.

Selection and search sets can be named and contain comments. They can also be highlighted with icons in the main navigation window, so that when you click on one, the selection set is restored to the active set and all the items within it are re-selected.

Recalling Selection and Search Sets

To re-select items from a selection set:

- On the **Selection Tree**, click the **Sets** tab, and click the saved selection or search set from the list.

Note:

On recalling a selection set, all the items that were selected when the set was saved are re-selected into the current selection.

On recalling a search set, the search that was saved into the set is re-run and any items matching the specification are selected into the current selection.

Selection Resolution

Selection resolution affects what geometry you select when selecting items in the main navigation window using **Select mode**.

When you click on an item in **Select** mode, NavisWorks doesn't know what level of item to start selecting at - do you mean the whole model, or the layer, or the instance, or group, or just the geometry? The selection resolution tells NavisWorks what level in the selection tree to start selecting items at by default.

The options are:

- **Model**
Selects the whole model.
- **Layer**
Selects all items on a layer.
- **First Object**
Selects the first item in the selection tree path that isn't a layer.
- **Last Unique**
Selects the most specific item (furthest along the selection tree path) that is unique (not multiply instanced).
- **Last Object**
Selects the most specific item (furthest along the selection tree path) that is marked as a composite object. If no composite object is found, the geometry is selected. This is the **Default** selection resolution setting.
- **Geometry**
Selects the last item in the selection tree path (most specific, but may be multiply instanced).

If you find you have selected the wrong level of item, you can interactively "cycle" through the selection resolution, without having to go to the options dialog or the selection tree. You do this by holding down the **Shift** key when selecting an item. This selects an item one level more specific each time you select the item until the resolution gets to "geometry", at which point it will revert back to "model". The selection resolution remains as set in options for the next selection.

You can set the default selection resolution on the Selection page in the **Options Editor**.

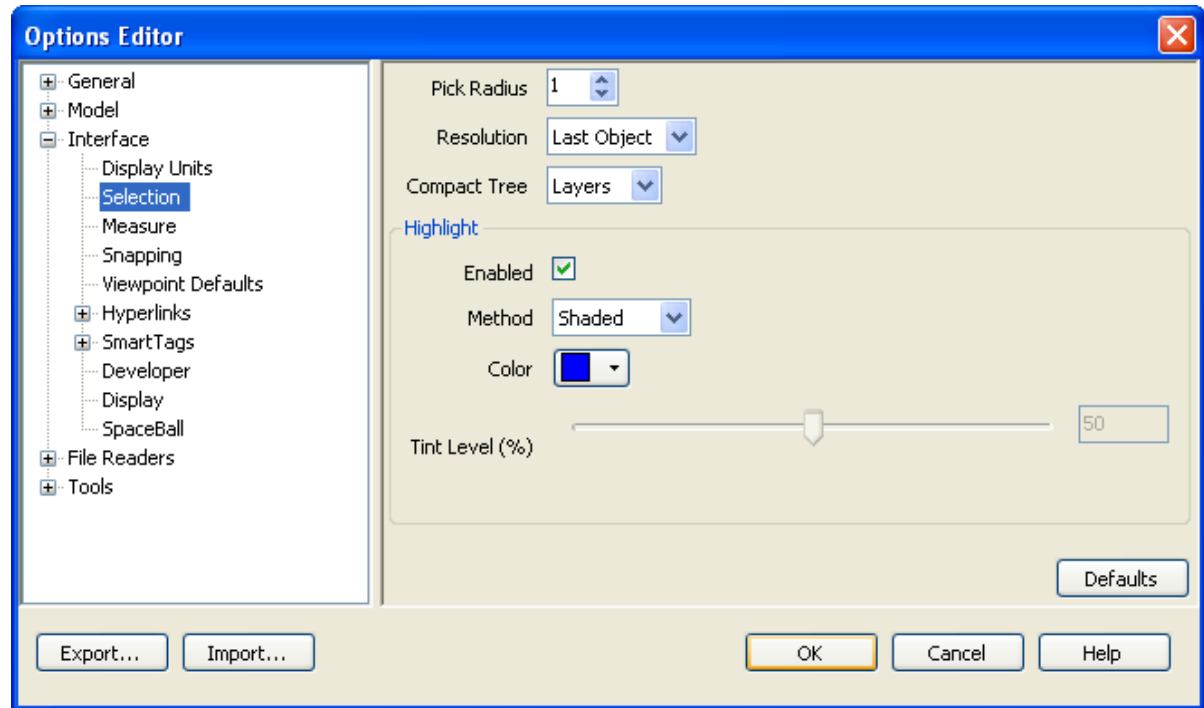
Selection Options

Use the **Selection** options to configure how you select items in the NavisWorks scene. You can set the level at which you select items (selection resolution), the distance from an item you have to be for it to be selected (useful for lines and points) and also the color in which selected items are displayed.

Setting selection options:

1. On the **Tools** menu, click **Global Options**.
2. Expand the **Interface** node in the **Options Editor** dialog box, and click the **Selection** option.

The **Selection** page is displayed.



3. To set the color that selected items are displayed in, click the **Color** button. The default highlight color is blue. Alternatively, clear the **Enabled** check box to disable selected item highlighting (items won't change color when selected).
4. In the **Pick Radius** box, enter the radius, in pixels, that an item has to be within in order for it to be selected.
5. In the **Resolution** box, choose the level of selection that you wish to use as the default, see selection resolution.
6. In the **Compact Tree** box, choose what level of detail you wish to see in the selection tree. **Models** will restrict the tree to just displaying model files, **Layers** will restrict it down to the layer level and **Objects** will show a similar tree to the **Standard** tree, but without the levels of instancing inserted above an inserted block.
7. Click **OK** to set the options or **Cancel** to exit the dialog box without setting them.

Chapter 9. Finding

You can run simple manual searches of the model by item property. To do this:

- On the **Selection Tree**, click the **Properties** tab, and click the saved property search in the list.

The corresponding model geometry is selected in the main Freedom window.

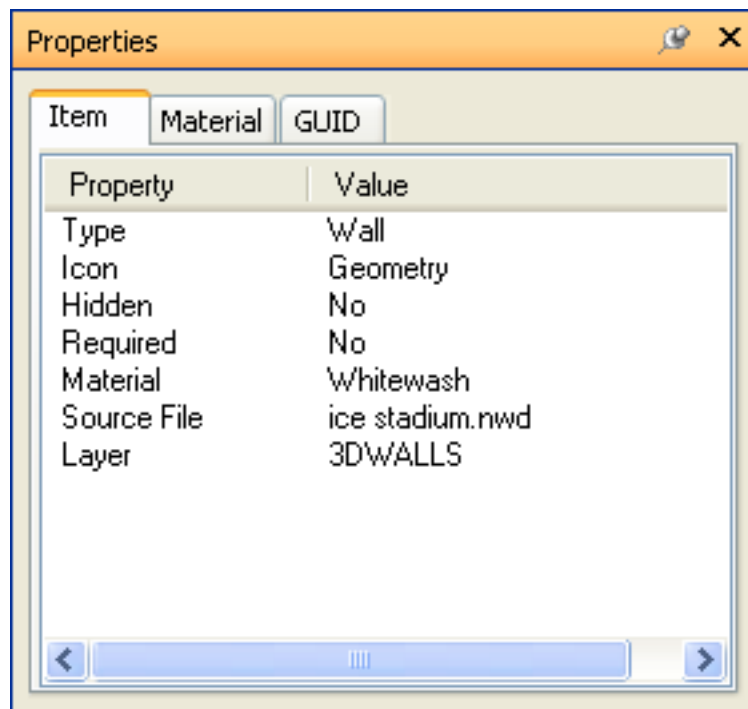
Properties

The **Properties** control bar shows all the properties of a selected item. Properties are categorized into categories such as **Item** and **Material** and this control bar has a tab for each property category of the selected item. Whenever a single item is selected, this control bar will be updated to show the properties of that item.

Note:

If more than one item is selected the **Properties** bar will only show the number of items selected and won't show any property information.

The **Properties** control bar looks like this:



To activate it, click the **Properties** button  on the **Workspace** toolbar.

Every property has a type associated with it, for example, an item's **Name** is a string, and so on. Internal file properties, such as transform and geometry properties, are not shown by default. If you want to view this information, use a developer profile by selecting the **Show Internal Properties** check box on the

Developer page of the **Options Editor** dialog box.

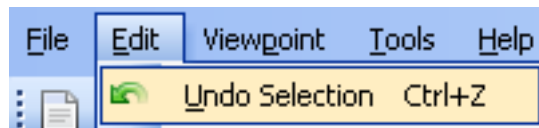
Chapter 10. Editing

Most editing is done from the **Edit** menu, which includes the following items:

- Undo
- Redo
- Select
- Hidden
- Required
- Unselected Hidden
- Reset All

Undo/Redo

You can undo or redo your actions in NavisWorks. The **Edit > Undo** and **Edit > Redo** menu item states what type of action you will undo/redo.



To undo an action:

- On the **Edit** menu, click **Undo**

or

- Press **Ctrl-Z**

or

- Click **Undo**  on the **Standard** toolbar

Repeat as many times as required or your options allow.

To redo an action:

- On the **Edit** menu, click **Redo**

or

- Press **Ctrl-Y**

or

- Click **Redo**  on the **Standard** toolbar

Repeat as many times as required, or your options allow.

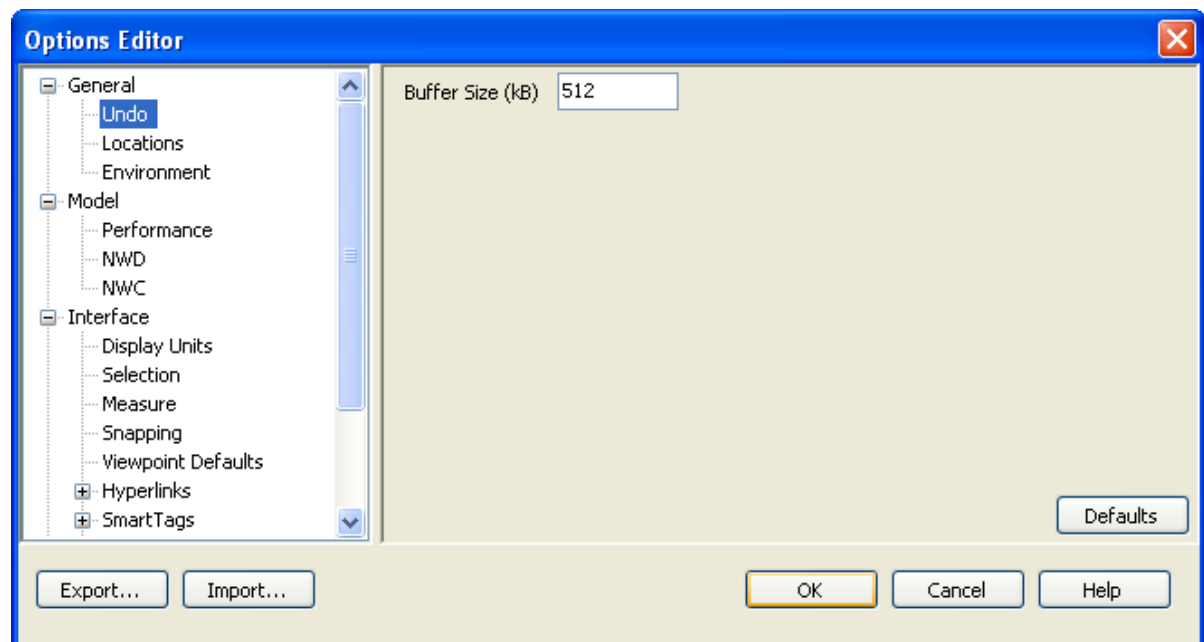
Undo Options

You can set the amount of space you wish to allocate to the undo buffer. The default settings should be adequate for most normal usage.

Setting undo options:

1. On the **Tools** menu, click **Global Options**.
2. Expand the **General** node in the **Options Editor** dialog box, and click the **Undo** option.

The **Undo** page is displayed:



3. Set the amount of space you wish to allocate for saving undo/redo actions.
4. If you want to return to the system default values, click the **Defaults** button.

5. Click **OK** to set these options or **Cancel** to exit the dialog without setting them.

Hiding Items

This command hides the current selection and allows you to hide and reveal items by toggling on and off.

Note:

In the selection tree the object will appear gray when hidden.

Hiding an item:

1. Select the item(s) that you want to hide (see [Chapter 8, *Selecting Items*](#) for more information on how to do this).
2. On the **Edit** menu, click **Hidden**

or

Click **Hidden**  on the **Selection Tools** toolbar.

Making items required

This option makes the current selection required for rendering which means that they will always be rendered during navigation and not drop out. The command allows you to make an item required or unrequired by toggling on and off.

Note:

A *Required* item may also be *Hidden*. In the selection tree the object will appear red when required.

Making an item required:

1. Select the item(s) that you want to make required (see [Chapter 8, *Selecting Items*](#) for more information on how to do this).
2. On the **Edit** menu, click **Required**

or

Click **Required**  on the **Selection Tools** toolbar.

Hiding Unselected Items

This command hides all items except those currently selected so that they are not drawn in the main view. The command allows you to hide and reveal the hidden items by toggling on and off.

Note:

In the selection tree the items will appear gray when hidden.

Hiding all non-selected items:

1. Select the item(s) that you want to remain visible (see [Chapter 8, *Selecting Items*](#) for more information on how to do this).
2. On the **Edit** menu, click **Unselected Hidden**.

or

Click **Unselected Hidden**  on the **Selection Tools** toolbar.

Resetting All Overridden Properties

Once an override has been applied to several items, you can reset them all at once to return them to the values that they had when the file was originally converted from the native CAD file.

Revealing All Items

This option reveals (unhides) all items.

To reveal all items:

- On the **Edit** menu, click **Reset All > Unhide All**.

Making All Items Unrequired

This option makes all items unrequired so that no items are forced to be rendered during navigation.

To make all items unrequired:

- On the **Edit** menu, click **Reset All > Unrequire All**.

Chapter 11. Display Modes

The **Rendering Styles** toolbar controls the appearance of the model in the main navigation window. From here you can control the lighting effect, the rendering type and enable or disable the different types of primitives drawn. Linked with the display options (see “[Display Options](#)” later in this chapter) and file options (see “[File Options](#)”, this enables you to fully control the appearance of the NavisWorks main navigation window.

Rendering Styles

The rendering process interactively draws the scene's items in the main navigation window. You have a choice of one of four interactive lighting modes (full lights, scene lights, head light, or no lights), four rendering modes (full render, shaded render, wireframe or hidden line) and you can individually turn each of the five primitive types (surfaces, lines, points, snap points and text) on and off.

The **Rendering Style** toolbar looks like this:

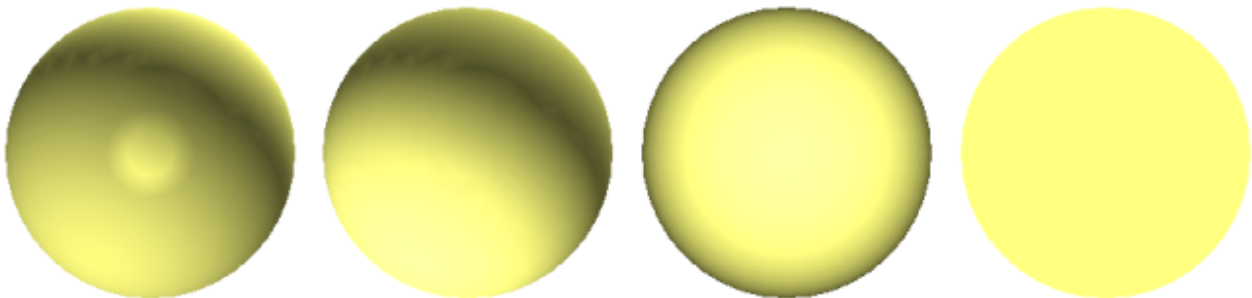


To access it, right-click any toolbar (for example, **Standard**) in the main navigation window, and click **Rendering Style** on the shortcut menu.

Lighting

Lights come through from various CAD file formats as scene lights. The intensity of the head light and scene lights can be set using the **File Options** under the **Tools** menu (see “[File Options](#)” for details on this).

The spheres below demonstrate the effect the lighting styles have on them. In order from the left, these are full lights, scene lights, head light and no lights.



No Lights

This option turns off lighting. The models are shaded with flat rendering.

To turn off all lights:

- On the **Viewpoint** menu, click **Lighting > No Lights**

or

- Click **No Lights**  on the **Rendering Style** toolbar.

Head Light

This option uses a single directional light located at the camera that always points in the same direction as the camera. You can set the head lights properties using Head Light options.

To turn on the head light:

- On the **Viewpoint** menu, click **Lighting > Head Light**

or

- Click **Head light**  on the **Rendering Style** toolbar.

Head Light options

Sliders are available to change the intensity of the scene's ambient light and headlight.

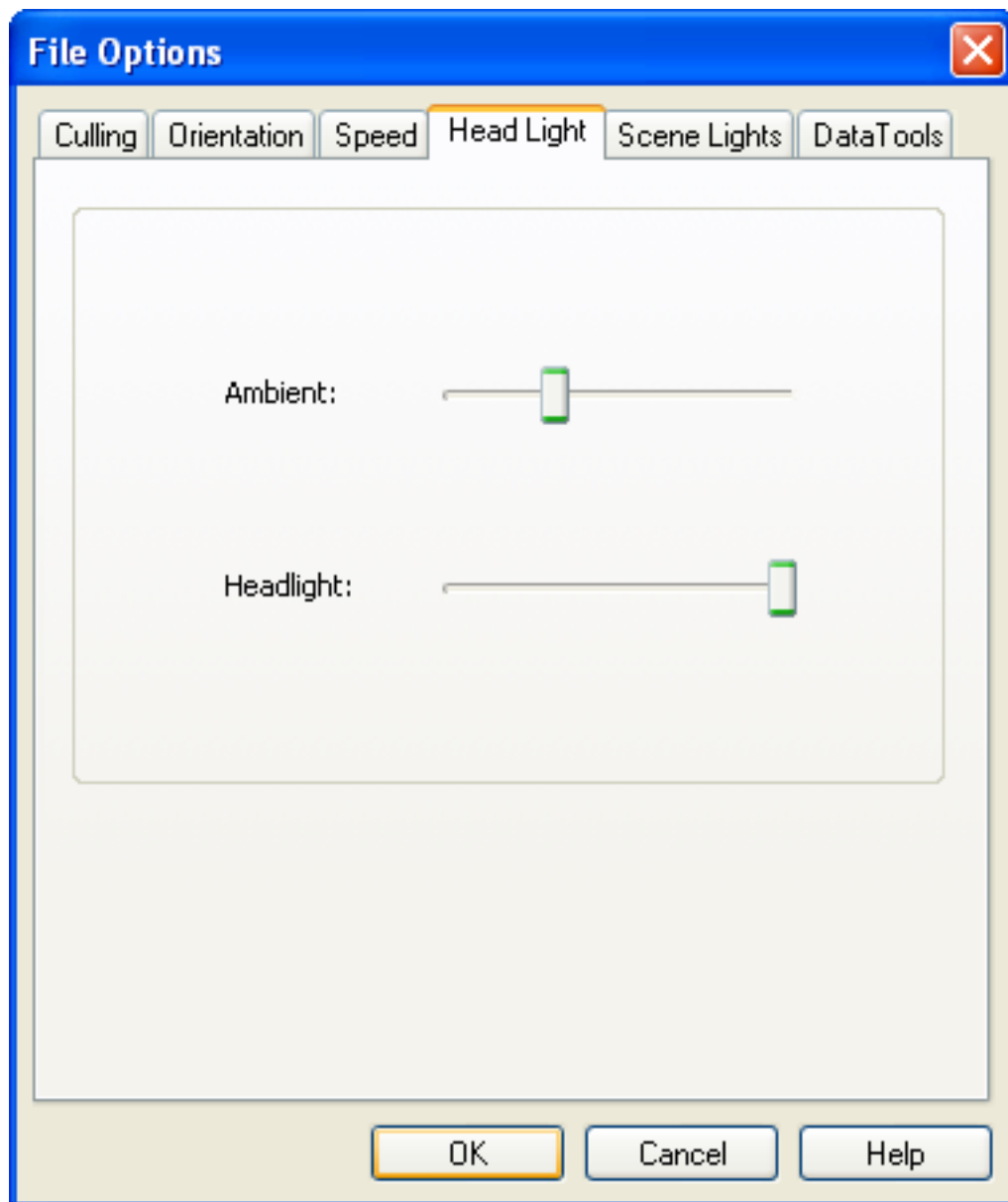
The **Ambient** slider controls the general overall brightness of the scene while the **Headlight** slider controls the brightness of the light located at the viewpoint.

Note:

Changes made in Head Light options will not be visible unless you have selected the **Head Light** rendering style.

Changing head light intensity:

- On the **Tools** menu, click **File Options**.
- In the **File Options** dialog box, click the **Head Light** tab.



3. Move the sliders to affect the ambient and head light intensities. You will see the effect your changes have on the scene in the main navigation window, as long as head light is selected as the rendering style.
4. Click **OK** to set these options or **Cancel** to exit the dialog box without setting them.

Scene Lights

This option uses whatever lights are defined in the model, or two default opposing lights, if none are available. You can set the scene lights properties using Scene Lights options.

To turn on scene lights:

- On the **Viewpoint** menu, click **Lighting > Scene Lights**

or

- Click **Scene lights**  on the **Rendering Style** toolbar.

Scene Lights Options

Sliders are available to change the intensity of the scene's lights.

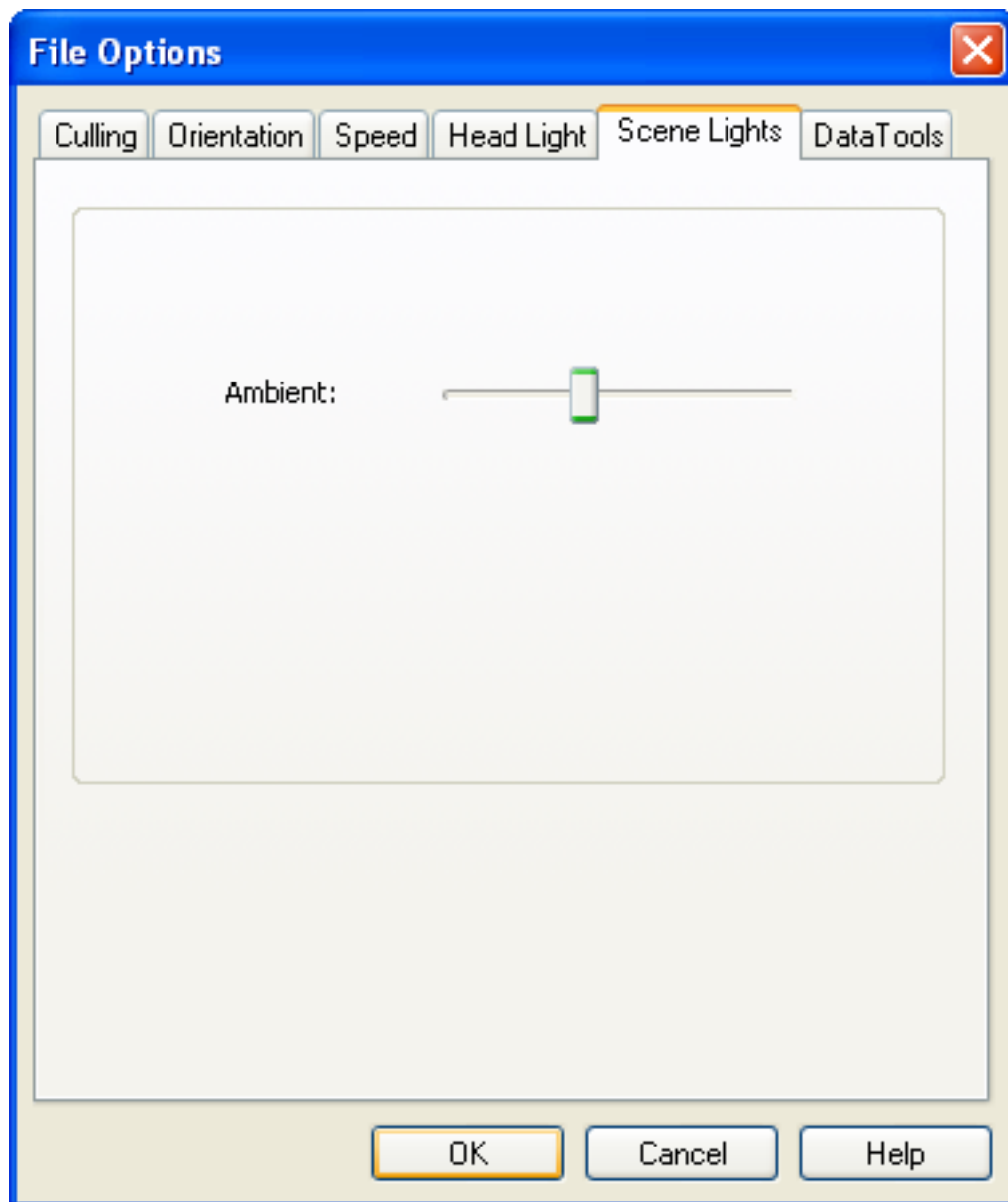
The **Ambient** slider controls the general overall brightness of the scene when scene lights is selected as the rendering style.

Note:

Changes made in Scene Lights options will not be visible unless you have selected the **Scene Lights** rendering style.

Changing scene light intensity:

1. On the **Tools** menu, click **File Options**.
2. In the **File Options** dialog box, click the **Scene Lights** tab.



3. Move the slider to affect the ambient intensity. You will see the effect your changes have on the scene in the main navigation window, as long as scene lights is selected as the rendering style.
4. Click **OK** to set these options or **Cancel** to exit the dialog box without setting them.

Full Lights

This option uses lights that have been defined with the Presenter tool.

To turn on full lights:

- On the **Viewpoint** menu, click **Lighting > Full Lights**

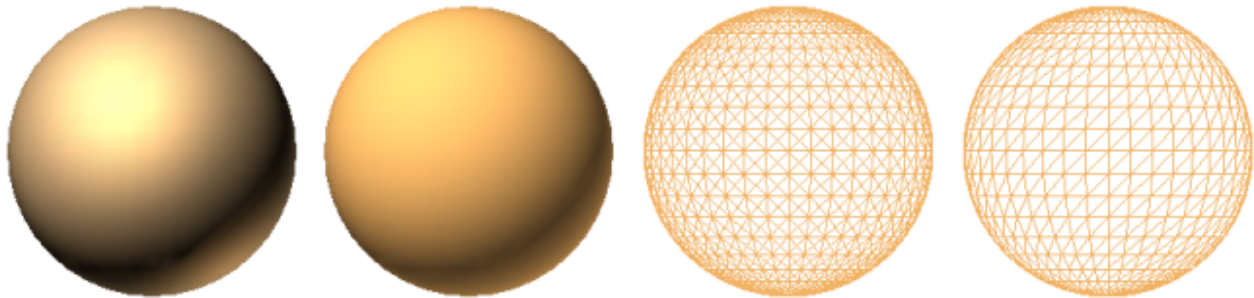
or

- Click **Full lights**  on the **Rendering Style** toolbar.

Render Modes

The four render modes affect how the items are rendered in the main navigation window.

The spheres below demonstrate the effect that the render modes have on their appearance. In order from the left, these are full render, shaded, wireframe and hidden line.



Full Render

This option renders the model with smooth shading including any Presenter materials that have been applied using NavisWorks Presenter or have been brought through from the native CAD file (although NavisWorks does not convert all native CAD file's textures - see [Chapter 6, Converting Files](#) for more details).

To select full render:

- On the **Viewpoint** menu, click **Rendering > Full Render**

or

- Click **Full Render**  on the **Rendering Style** toolbar.

Shaded Render

This option renders the model with smooth shading and without textures.

To select shaded render:

- On the **Viewpoint** menu, click **Rendering > Shaded**

or

- Click **Shaded**  on the **Rendering Style** toolbar.

Wireframe Render

This option renders the model in wireframe. As NavisWorks uses triangles to represent surfaces and solids, all triangle edges are visible in this mode.

To select wireframe render:

- On the **Viewpoint** menu, click **Rendering > Wireframe**

or

- Click **Wireframe**  on the **Rendering Style** toolbar.

Hidden Line Render

This option renders the model in hidden line. This requires a two pass rendering algorithm so is equivalent to rendering shaded and wireframe at the same time. The output is low quality as all the facet edges in the model are visible.

To select hidden line render:

- On the **Viewpoint** menu, click **Rendering > Hidden Line**

or

- Click **Hidden Line**  on the **Rendering Style** toolbar.

Display Primitives

The second part of the rendering style toolbar allows you enable and disable the drawing of surfaces, lines, points, snap points, and 3D text. Points are "real" points in the model, whereas snap points mark locations on other primitives, for example the center of a circle, and are useful for snapping to when measuring.

Surfaces

Surfaces are the triangles that make up the 2D and 3D items in the scene.

To toggle the rendering of surfaces on or off:

- On the **Viewpoint** menu, click **Display > Surfaces**

or

- Click **Surfaces**  on the **Rendering Style** toolbar.

Lines

As well as turning all lines on and off, it is possible to change the width of the lines. See “ [Display Options](#) ” for details on how to do this.

To toggle the rendering of lines on or off:

- On the **Viewpoint** menu, click **Display > Lines**

or

- Click **Lines**  on the **Rendering Style** toolbar.

Points

Points are real points in the model, for example, the points in a point cloud from a laser scan. As well as turning all points on and off, it is possible to change the number of pixels used to draw them. See “ [Display Options](#) ” for details on how to do this.

To toggle the rendering of points on or off:

- On the **Viewpoint** menu, click **Display > Points**

or

- Click **Points**  on the **Rendering Style** toolbar.

Snap Points

Snap points are implied points in the model, for example, the center point of a sphere or end points of a pipe. As well as turning all snap points on and off, it is possible to change the number of pixels used to draw them. See “ [Display Options](#) ” for details on how to do this.

To toggle the rendering of snap points on or off:

- On the **Viewpoint** menu, click **Display > Snap Points**

or

- Click **Snap Points**  on the **Rendering Style** toolbar.

Text

Text is the 3D text saved in the scene.

To toggle the rendering of text on or off:

- On the **Viewpoint** menu, click **Display > Text**

or

- Click **Text**  on the **Rendering Style** toolbar.

Background Color

This option allows you to select or mix a background color for the main view. Setting the background color is equivalent to setting a **Plain Background** on the **Effects** tab of the Presenter dialog box. This option is only available if you have the NavisWorks Presenter tool.

Setting the background color:

1. On the **Tools** menu, click **Background Color**.
2. Select the color from the Windows™ color palette.
3. Click **OK** to set the background color or **Cancel** to exit the dialog box without setting it.

Culling Options

There are three methods of culling objects in NavisWorks: backface, by area, and by near or far plane. All of these options are configurable using the **Culling** tab of the **File Options** dialog box.

Backface culling only draws the front face of every polygon in NavisWorks, which is clearly faster. Sometimes, however, the conversion process mixes up the front and back face of polygons and so you have to tell NavisWorks to draw both sides in order to not see right through some objects.

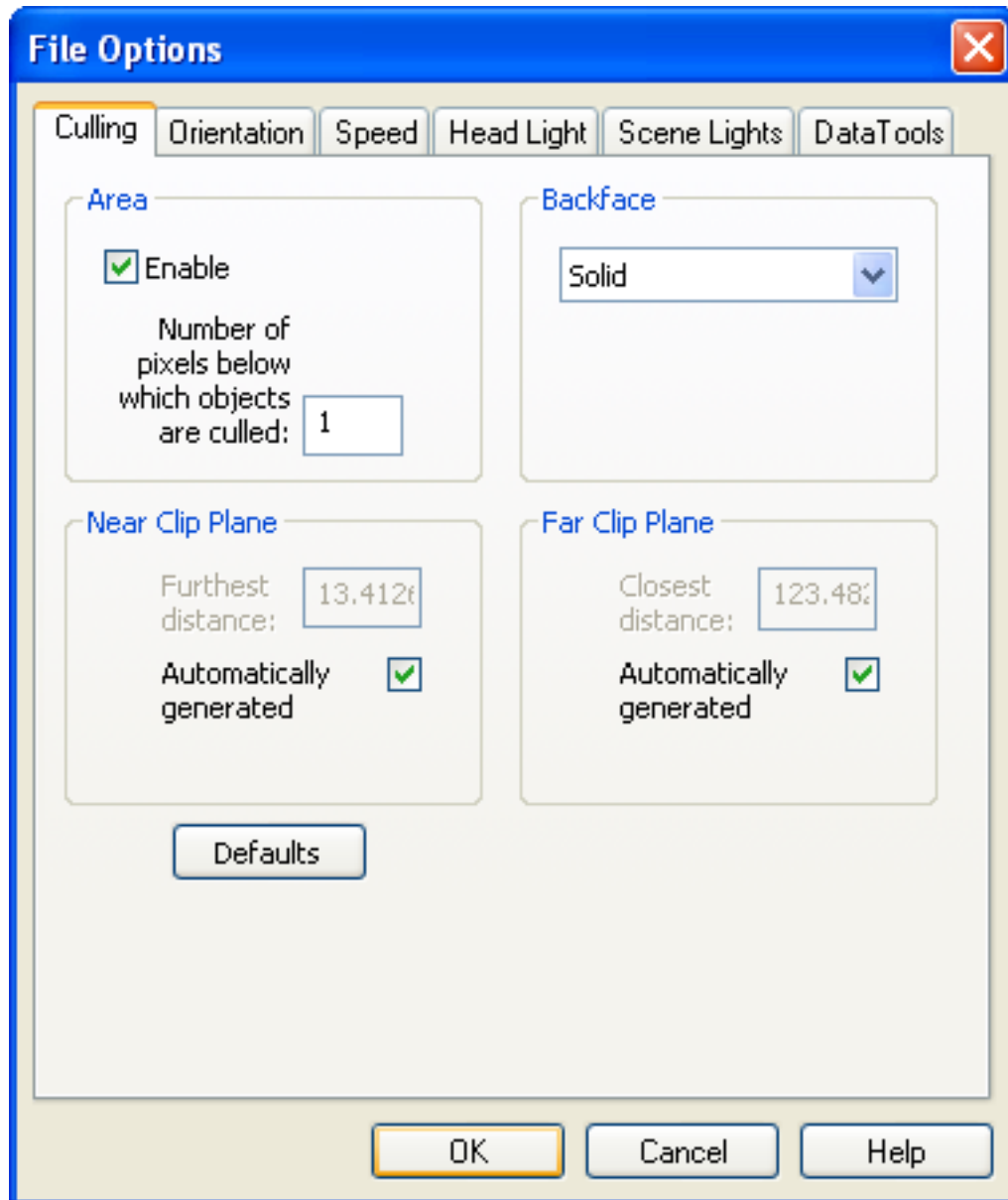
Area culling options allow you to set the size of objects within a model that will not be displayed. For example, if you were to set the value to 100 pixels any object within the model that would be drawn less than 10x10 pixels in size will not be displayed.

Culling options by near and far plane allows some degree of control over the resolution of the axis

perpendicular to the screen. NavisWorks uses the near and far clip plane to maximize the resolution of the model on screen. The near and far clip plane boxes dictate constraints for the near and far culling planes.

Setting culling options:

1. On the **Tools** menu, click **File Options**.
2. In the **File Options** dialog box, click the **Culling** tab.



3. Select the **Enable** check box under **Area** to enable the definition of the screen area (in pixels) below which objects are culled and type in the number of pixels in the box.

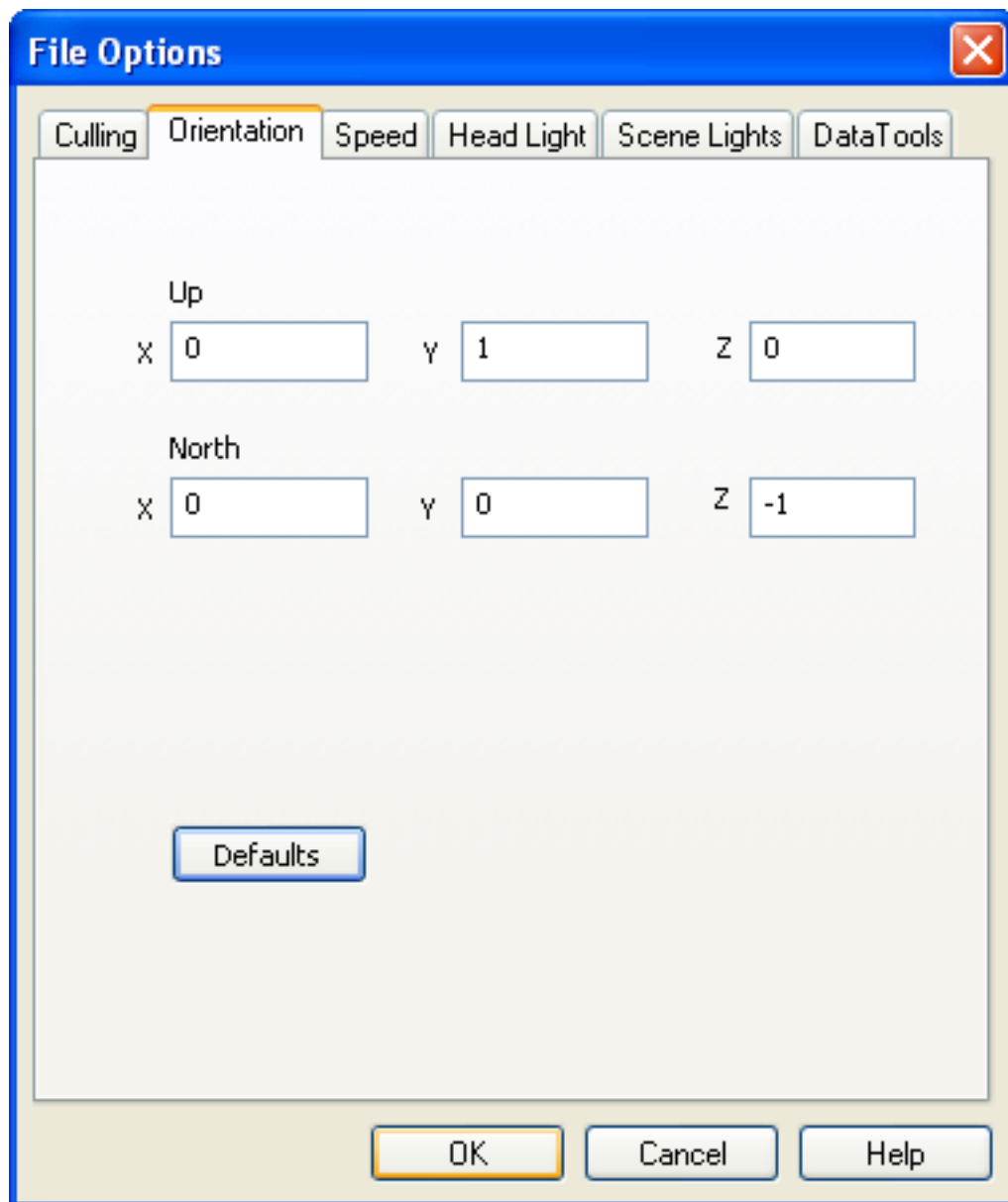
4. In the **Near Clip Plane** area, check the **Automatically generated** check box to tell NavisWorks to constrain the near plane to give the best view of the model it possibly can. Alternatively, uncheck this box to manually constrain the near clip plane. NavisWorks will put the near clip plane no further than the value you type into the **Furthest distance** box.
5. Similarly, in the **Far Clip Plane** area, select the **Automatically generated** check box to tell NavisWorks to constrain the far plane to give the best view of the model it possibly can. Alternatively, clear this check box to manually constrain the far clip plane. NavisWorks will put the far clip plane no closer than the value you type into the **Closest distance** box.
6. From the **Backface** drop-down list, select **On** to enable backface culling of all objects. Select **Solid** to cull the backface of solid objects only. This is the **default** option and that which you are most likely to require. If you find that parts of items are missing in the NavisWorks scene, you might want to disable this option, by selecting **Off**.
7. Click **OK** to set these options or **Cancel** to exit the dialog box without setting them.

Orientation Options

NavisWorks has a concept of orientation and provides a heads up directional display. For this to work effectively, it is essential that the current model is orientated correctly.

To orientate the model:

1. On the **Tools** menu, click **File Options**.
2. In the **File Options** dialog box, click the **Orientation** tab.



The defaults take the positive Z-axis as **Up** and the positive Y-axis as **North**.

3. If the models orientation is different to the defaults, enter XYZ values to correctly position the Up and North directions.
4. Click **OK** to accept your changes, or **Cancel** to return to NavisWorks without accepting them.

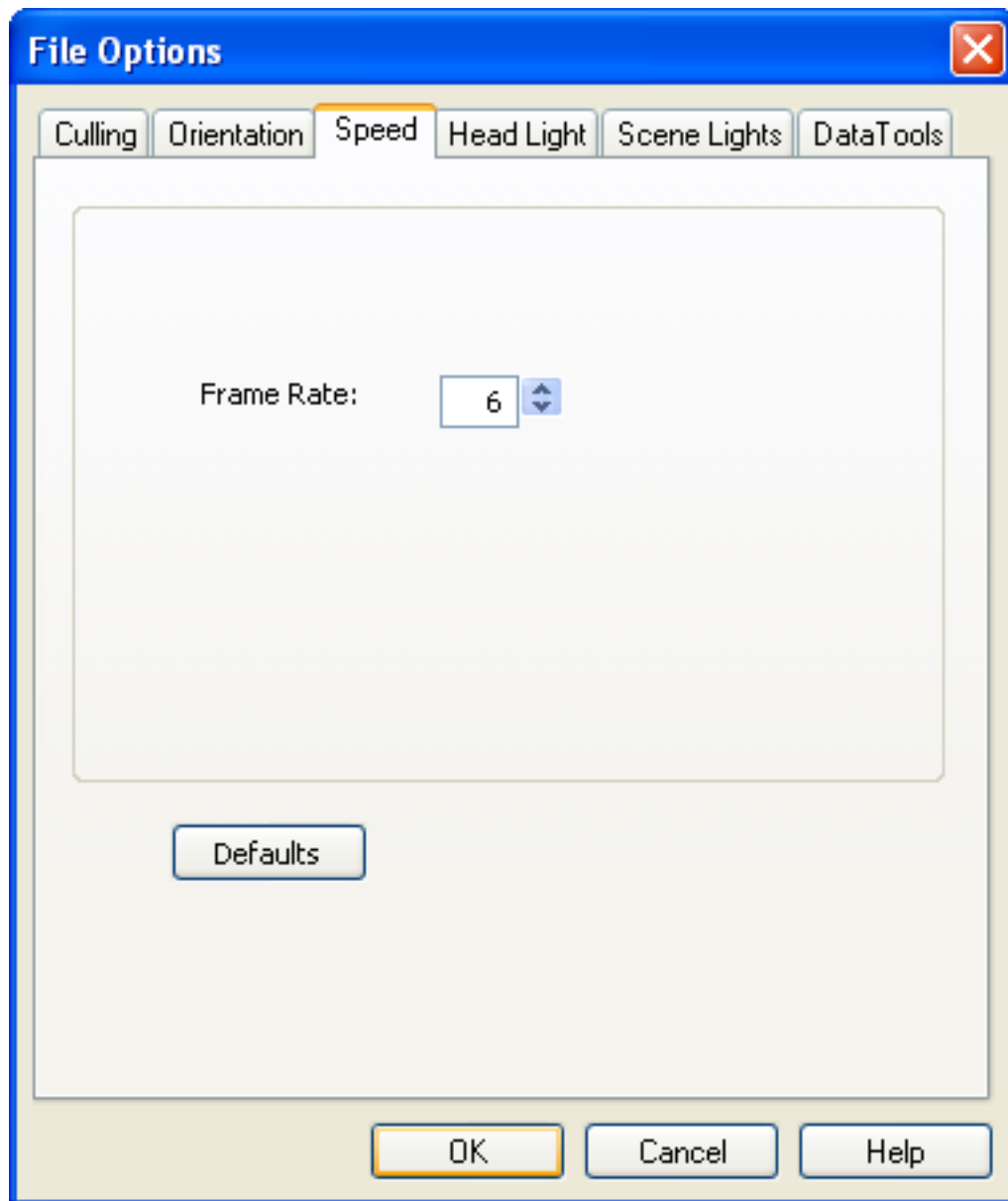
Speed Options

The basis of NavisWorks is its ability to walk through any size model in real time. NavisWorks guarantees a user-defined frame rate using a unique algorithm which automatically calculates which items to render first during navigation, based on the size of items and distance from the viewpoint. Items which

NavisWorks does not have time to render are therefore sacrificed or "dropped out" in the name of interactivity. These items are, of course, rendered when navigation ceases. The amount of drop-out depends on several factors including: hardware (in particular graphics card and driver performance), as well as the size of the NavisWorks navigation window and the size of the model. If you wish to reduce drop-out during navigation, you have the option to reduce frame rate and therefore trade it off against drop-out. You can set the frame rate anywhere between 1 and 60 frames per second.

Setting the frame rate:

1. On the **Tools** menu, click **File Options**.
2. In the **File Options** dialog box, click the **Speed** tab.



3. Select the number of frames per second to be applied to the rendered display of the model.
4. Click **OK** to set these options or **Cancel** to exit the dialog box without setting them.

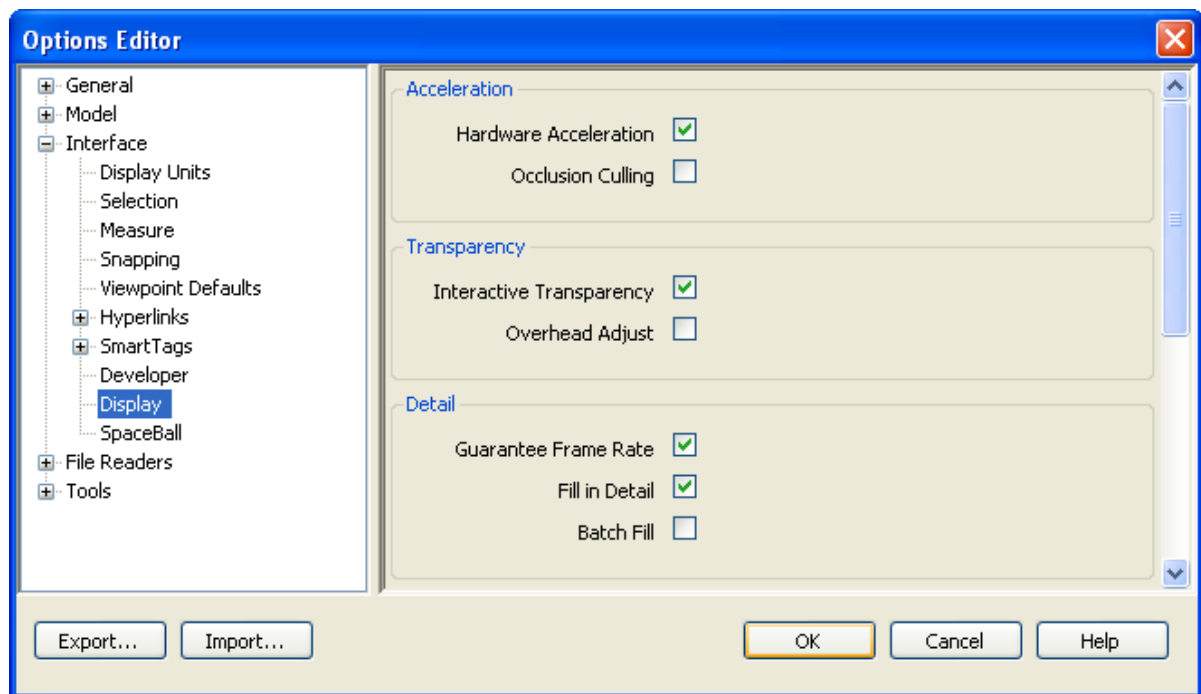
Display Options

Use these options to control several aspects of the NavisWorks main navigation window display to suite your preferences and setup.

Setting display options:

1. On the **Tools** menu, click **Global Options**.
2. Expand the **Interface** node, and click the **Display** option.

The Display page opens.



3. Select the **Hardware Acceleration** check box to allow NavisWorks to utilize any available OpenGL hardware acceleration on your video card. If your video card drivers do not function well with NavisWorks, then you may wish to disable this option. This option is grayed out if your video card does not support OpenGL hardware acceleration.
4. Select the **Occlusion Culling** check box to have NavisWorks only draw visible objects, i.e. ignores objects that are behind other objects. This option will improve the display performance when much of the model is not visible. For example, when you're walking down the corridor of a building. Occlusion culling can only be utilized on a machine with an OpenGL 1.5 compliant graphics card.
5. Select the **Interactive Transparency** check box to allow the rendering of transparent items during

interactive navigation. This may have an effect on performance - especially if your video card does not support hardware accelerated OpenGL - and so by default transparent items are only drawn when interaction has ceased.

6. Select the **Guarantee Frame Rate** check box to enable the NavisWorks engine to maintain the user defined frame rate set on the **Speed** tab of the **File Options** dialog box (see “ [Speed Options](#) ”). By default the target rate is maintained while moving. When movement stops the complete model is rendered. If the **Guarantee Frame Rate** check box is cleared, the complete model is always rendered during navigation, no matter how long it takes.
7. Select the **Fill In Detail** check box if you want NavisWorks to fill in any discarded detail when navigation has ceased.
8. Select the **Batch Fill** check box if you want NavisWorks to fill in detail in chunks rather than gradually. By default this is disabled as gradual rendering is generally better but some video cards may work better with batch fill enabled.
9. In the **Point Size** box, enter a number between 1 and 9 to set the size (in pixels) of points drawn in the main window. See “ [Points](#) ” for more information on points.
10. In the **Line Size** box, enter a number between 1 and 9 to set the width (in pixels) of lines drawn in the main window. See “ [Lines](#) ” for more information on lines.
11. In the **Snap Size** box, enter a number between 1 and 9 to set the size (in pixels) of snap points drawn in the main window. See “ [Snap Points](#) ” for more information on snap points.
12. Select the **Enable Parametric Primitives** check box to allow the dynamic rendering of parametric models during interactive navigation. When this check box is selected, the level of detail will be changed depending on the distance from the camera. When the check box is cleared, a default representation of the primitive is used, and the level of detail does not change. Modifying this option requires a restart of NavisWorks to take effect.
13. From the **Mode** drop-down list, select **XYZ** to turn on the XYZ indicator, or **Compass** to turn on the north-south indicator, or **Off** to display neither.
14. Select the **Show Position** check box to show the absolute X, Y, Z position of the camera (or the avatar's eye position if the avatar is visible). These position coordinates are shown at the bottom left of the main view, and can be shown with or without the other Heads Up elements.

Note:

See Orientation Options for more information on correctly orientating your model file.

15. Click **OK** to set these options or **Cancel** to exit the dialog box without setting them.

Performance Options

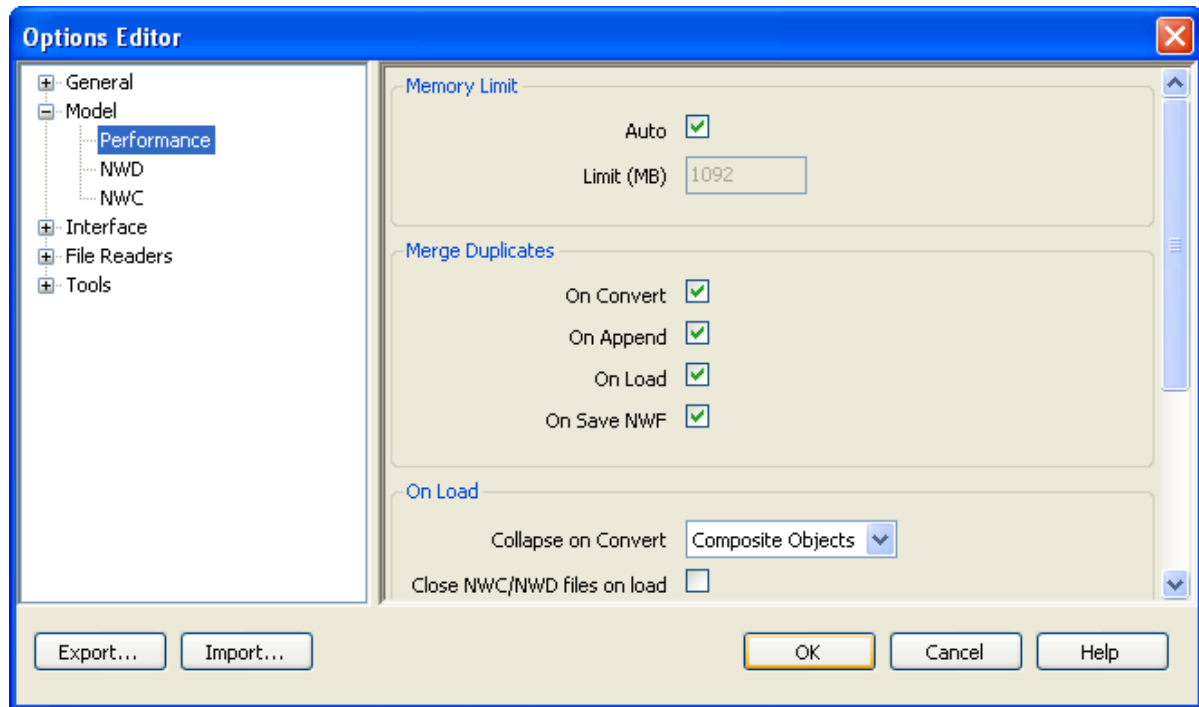
Use these options to customize the performance of NavisWorks.

Setting Performance options:

1. On the **Tools** menu, click **Global Options**.

- Expand the **Model** node, and click the **Performance** option.

The Performance page is displayed:



- Memory.** Select the **Auto** check box for NavisWorks to automatically calculate the maximum memory that may be used. This will take the lowest of your available physical memory or address space, less that required for your Windows operating system.

Alternatively, clear this option and manually enter the limit.

- Merge Duplicates.** These options improve performance by multiply instancing matching items. Rather than storing every item in memory, if any items are the same, NavisWorks can store one instance of them and 'copy' that instance into other positions. This is of particular benefit on larger models, where there are significant numbers of these duplicate geometries.

The options available determine when NavisWorks should perform this merging process:

- **On Convert.** Merge duplicates when converting a CAD file.
- **On Append.** Merge duplicates when a new file is appended to the current scene.
- **On Load.** Merge duplicates when loading a file into NavisWorks.

- On Load.** The **Collapse on Convert** box can be set to alter layers shown in the Selection Set window on loading native CAD model files. Each type collapses the Selection Set tree up to the specified level. So **None** does not collapse the tree, **Composite Objects** collapses the tree up to the level of composite objects, etc. This enables performance to be prioritized over structure/properties and has the added benefit of improving streaming by cutting down the logical structure.

It should be noted that whilst NavisWorks will try to collapse items to the fewest number possible, it may be necessary to prevent collapsing in some cases to preserve model fidelity. For example if an

item has properties or materials unique to itself, then collapsing would endanger this information, and therefore it will not be collapsed.

Select the **Create Parametric Primitives** check box to enable creation of parametric models (models described by formulae not vertices). Using this option allows you to get better looking visuals, faster rendering, smaller memory footprint (especially when loading DGN and RVM files that contain significant amounts of parametric data that will no longer need to be converted into vertices in NavisWorks. Modifying this option will take effect when you next load or refresh file.

6. **Temporary File Location.** Select the **Auto** check box for NavisWorks to automatically select your user Temp directory. Alternatively, if you prefer to select another location, clear this option and enter the path accordingly.

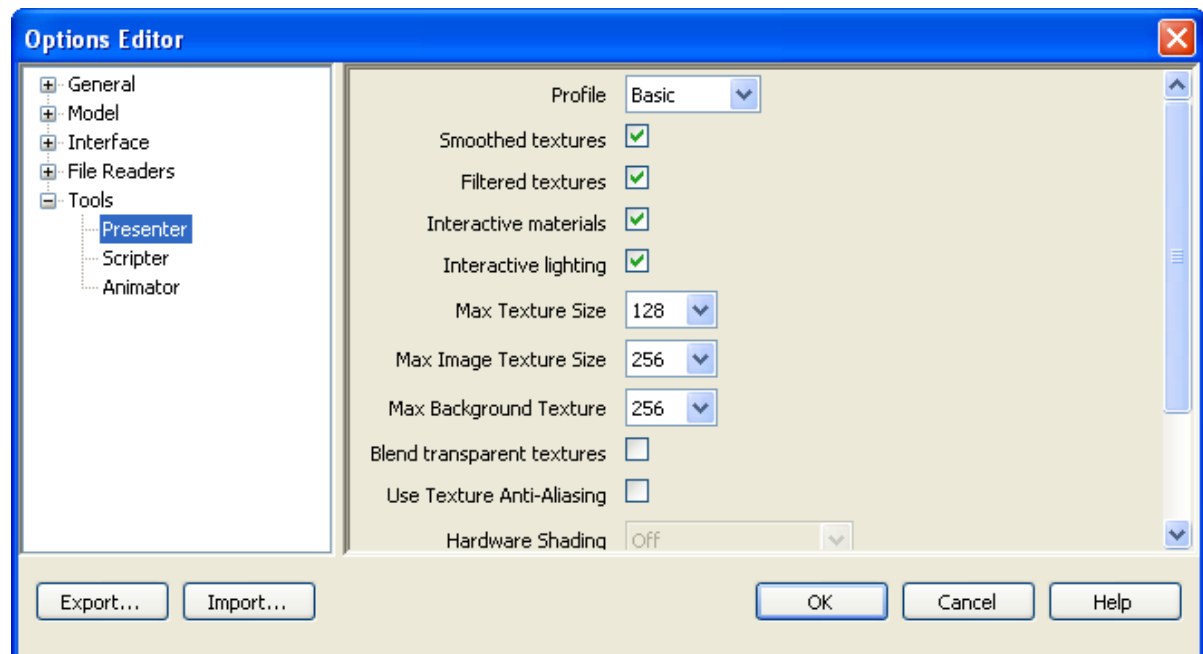
Presenter Options

Use these options to control the appearance of Presenter materials in the main navigation window during navigation. You may want to adjust these settings to get optimum performance from your graphics card when navigating around heavily textured scenes.

Setting Presenter options:

1. On the **Tools** menu, click **Global Options**.
2. Expand the **Tools** node, and click the **Presenter** option.

The **Presenter** page is displayed



3. Use the **Profile** drop-down list to adjust the Presenter to your level of knowledge. Select **Advanced** to use the advanced Presenter features (e.g., extra materials, lights, render styles and so on). By

default, the Basic profile is used.

4. Select the **Smoothed Textures** check box if you want textures to look smooth but take longer to render. Clear it if you want textures to appear pixelated but render faster.
5. Select the **Filtered Textures** check box if you want to turn on mipmapping. This will improve the appearance of textures in the distance.
6. Clear the **Interactive Materials** check box if you want to turn off texture display during navigation. The materials reappear automatically when navigation ceases, as long as the **Full Render** rendering style is on. Clearing this check box will ease the load on less capable graphics cards and give less drop out in heavily textured scenes.
7. Clear the **Interactive Lighting** check box if you want to turn off Presenter lights during navigation. The lights reappear automatically when navigation ceases, as long as the **Full Lights** lighting style is on. Clearing this option will ease the load on less capable graphics cards and give less drop out in heavily lit scenes.
8. Use the **Max Texture Size** drop-down list to set the maximum size that any texture can be (in pixels, e.g. 128 is 128 pixels x 128 pixels). The higher the value, the more MB in memory will be taken and thus performance could be affected on less capable graphics cards.
9. Use the **Max Image Texture Size** drop-down list to set the maximum size that any texture image can be (in pixels, e.g. 256 is 256 pixels x 256 pixels). The higher the value, the more MB in memory will be taken and thus performance could be affected on less capable graphics cards.
10. Similarly, use the **Max Background Texture** drop-down list to set the maximum size that the background texture can be (in pixels, e.g. 256 is 256 pixels x 256 pixels). The higher the value, the more MB in memory will be taken and thus performance could be affected on less capable graphics cards.
11. Select the **Blend Transparent Textures** check box if you want better quality but slower rendering of transparent items in the main navigation window. With this option off, items with transparency of more than 50% are treated as completely transparent and not rendered at all.
12. Select the **Use Texture Anti-Aliasing** check box if you want procedural materials (such as some bricks and tiles - you can tell a procedural material in Presenter because it has a ball style preview icon) to be rendered using anti-aliasing. With this option on, it will take longer to open files containing procedural textures, but the quality will be better.
13. **Hardware Shading** can only be utilized on machines with OpenGL 1.5 compliant graphics cards.

From the **Hardware Shading** drop-down list, select:

- **Interactive Shadows.** Select this option to enable lights and shadows whilst navigating.
 - **Passive Shadows.** Select this option to disable lights and shadows whilst navigating, then turn them on when navigation ceases.
 - **Lighting.** Select this option to turn lighting on with no shadows.
 - **Off.** Select this option to have no hardware shading enabled.
14. Select **Hardware Bump Maps** check box to display bump map textures interactively, whilst navigating. This can only be utilized on a machine with an OpenGL 1.5 compliant graphics card. Hardware Shading also needs to be enabled.

15. Select **Hardware Marble** check box to display hardware rendered marble materials in realtime. This can only be utilized on a machine with an OpenGL 1.5 compliant graphics card. Hardware Shading also needs to be enabled.
16. Click **OK** to set the options or **Cancel** to exit the dialog box without setting them.

Chapter 12. Viewpoints

Viewpoints are snapshots taken of the model as it is displayed in the scene. Viewpoints may include a variety of comments and redline tags, which have been previously added to a viewpoint. You cannot create viewpoints in Freedom, but you can use any of the viewpoints and viewpoint animations saved in the model. Viewpoint animation typically contains both the user movement through the model and views of the model.

Recalling Viewpoints

To return to a viewpoint

- Click **Viewpoint > Saved Viewpoints**, and choose the saved viewpoint from the list.

or

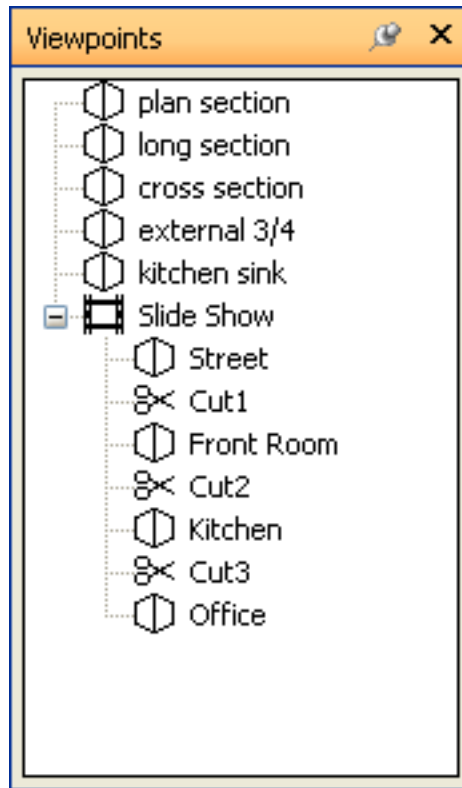
- In the **Viewpoints** control bar, simply click on the viewpoint from the list.

Note:

On recalling viewpoints the navigation mode that was active when the viewpoint was created will be re-selected. Any redlines and comments associated with the viewpoint will also be reinstated.

The Viewpoints Control Bar

Viewpoints allow you to keep a record of all the different views of a model so that you can jump to preset viewpoints without having to navigate each time to reach an item. Viewpoint animations are also saved with the viewpoints, as they are simply a list of viewpoints treated as keyframes.



The **Viewpoints** control bar is shown above. To open it,

- Click **Viewpoints**  on the **Workspace** toolbar.

Icons are used to represent different elements:

 represents a folder which may contain all other elements (including other folders).

 represents a viewpoint saved in orthographic mode.

 represents a viewpoint saved in perspective mode.

 represents a viewpont animation clip.

 represents a cut inserted into a viewpoint animation clip.

You can select more than one viewpoint by either holding down the **Control** key and left-clicking, or by left-clicking on the first item, and then clicking on the last item while holding down the **Shift** key. You can drag viewpoints around the **Viewpoints** control bar, but you cannot save any changes.

Editing Viewpoints

You can edit by hand any current viewpoints attributes, including camera position, field of view, and speed of motion. All entries are measured in scene units (see “[Units](#)”).

Editing a viewpoint

1. To edit the current main navigation viewpoint, go to **Viewpoint > Edit Current Viewpoint**.

The **Edit Viewpoint** dialog box is displayed.

Edit Viewpoint - Current View

Camera

	X	Y	Z
Position (m):	2110.13	-10645.2	3967.94
Look At (m):	1586.49	-6695.19	2535.86
Vertical Field Of View (°):			61.47
Horizontal Field Of View (°):			81.46
Roll (°):			0.00

Motion

Linear Speed (m/sec):	553.49
Angular Speed (°/sec):	45.00

Saved Attributes

☐ Hide/Required

☐ Override Material

Collision Detection

Settings...

OK Cancel Help

2. Set the camera position's x-, y- and z- coordinates using the **Position** boxes.
3. Set the focal point's x-, y- and z- coordinates of the camera using the **Look At** boxes.

4. Enter the **Vertical Field Of View** and **Horizontal Field Of View**. If the units are set to degrees, then these numbers should be between 0.1 and 90 and if in radians, between 0.002 and 3.124. See [Field Of View](#) for more details on what field of view means.
5. Enter the **Roll** of the camera about its viewing axis. This value is not editable where the world up vector stays upright (i.e. in walk, orbit and turntable modes).
6. Enter the speed of motion in a straight line for the viewpoint in the **Linear Speed** box (the minimum value is 0 and the maximum is based on the size of the scene's bounding box).
7. Enter the speed of turning for the viewpoint in the **Angular Speed** box.
8. Click the **Settings** button to open the **Collision Detection** dialog box:

Collision Detection

☒ Collision Detection
☐ Gravity
☐ Auto Crouch

Viewer

Radius (m) 0.25
Height (m) 1.70
Eye Offset (m) 0.15

Third Person

☒ Enable
☒ Auto Zoom

Avatar Human 1
Angle (°) 15.00
Distance (m) 4.00

Defaults OK Cancel

- Select the **Collision Detection** check box to activate collision detection.
- Select the **Gravity** check box to activate gravity.
- Select the **Auto Crouch** check box to activate crouching.
- In the **Viewer**, **Radius** text box, enter a value for the radius of the collision volume. See “[Collision Detection](#)”.

- In the **Viewer, Height** text box, enter a value for the height of the collision volume. See “ [Collision Detection](#) ”.
 - In the **Viewer, Eye Offset** text box, enter a value for the distance below the top of the collision volume, where the camera will focus upon when **auto zoom** is activated.
 - Select the **Third Person, Enable** check box to view from a third person perspective.
 - Select the **Auto Zoom** check box to automatically zoom from third person view into first person view, whenever the line of vision is obscured by an item in the model scene.
 - From the **Third Person, Avatar** drop-down, select the avatar you wish to represent yourself as. See “ [Third Person View](#) ”.
 - In the **Third Person, Angle** text box, enter the angle at which you wish to look at the avatar. For example, zero degrees will be directly behind and 15 degrees will be looking down on the avatar at a 15 degree angle.
 - In the **Third Person, Distance** text box, enter the distance behind the avatar, from which you wish to view from.
 - Click **OK** to accept the settings, or **Cancel** to return to the **Edit Viewpoint** dialog without changing the settings.
9. Click **OK** to set the viewpoint or **Cancel** to exit the dialog without setting it.

Chapter 13. Animation

In NavisWorks there are two types of animation:

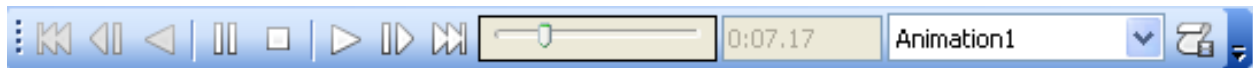
- Object animation
- Viewpoint animation

Viewpoint animation contains pre-recorded user and camera movements in the model. Object animation contains pre-recorded object movements in the model. You cannot record any animation in Freedom, but you can play back animations saved with the model. If there are any animation scripts, you can switch them on and interact with animated objects.

The Animation Toolbar

The **Animation** toolbar in Freedom enables you to play viewpoint animations. It can also be used to play back object animations and enable/disable interactive animation scripts.

The **Animation** toolbar is shown below.



To open it, right-click anywhere in the toolbar area of the screen, and click **Animation** on the shortcut menu.

Rewind  - rewinds the animation back to the beginning.

Step Back  - steps back a single keyframe.

Reverse Play  - plays the animation backwards.

Pause  - pauses the animation at the frame you press it at. You can then look around and wonder off in the model, or step forwards and backwards through the animation. To continue playing from where you paused, just press **Play** again.

Stop  - stops the animation playing and rewinds it back to the beginning.

Play  - plays the currently selected animation.

Step Forward  - steps one keyframe forwards.

Fast Forward  - fast forwards the animation to the end.

Animation Position slider  - controls the current playback position.

Animation Position - indicates the current playback position in seconds.

Available Animations  - allows you to choose the animation to play.

Toggle Scripts  - enables/disables animation scripts in your file.

Playing Back Animations

You can play back both pre-recorded object animation and viewpoint animation in the main navigation window. The animation plays in real time; this means that the NavisWorks engine is still attempting to maintain the guaranteed frame rate so some drop-out may still occur, just as in real-time navigation.

Playing back an animation:

1. Select the animation you wish to play back from either the **Viewpoints** control bar, or from the **Available Animations** drop-down list on the **Animation** toolbar.
2. You can use the **Animation Position** slider to quickly move forwards and backwards through the animation. Full left is at the beginning and full right is at the end. The text box next to the slider shows the point in time (in seconds) through the animation that the camera is. You can type a number into this box to set the camera at a certain point in the animation and play back from that point.
3. For viewpoint animations, you may notice that the frame in the animation in the **Viewpoints** control bar is highlighted when the animation is playing. You can click on any frame to set the camera to that point in time in the viewpoint animation and continue playing back from there.
4. Use the VCR buttons on the Animation toolbar to step and play forwards and backwards through the animation.

Enabling Scripting:

- To enable animation scripts in your file, click the **Toggle Scripts**  button on the **Animation** toolbar.

You can now interact with your model. For example, if there is a script to open a door on pressing a specific key on the keyboard, pressing this key will open the door.

Chapter 14. Reviewing

The reviewing tools available in NavisWorks are:

- Commenting
- Hyperlinks
- Smart Tags

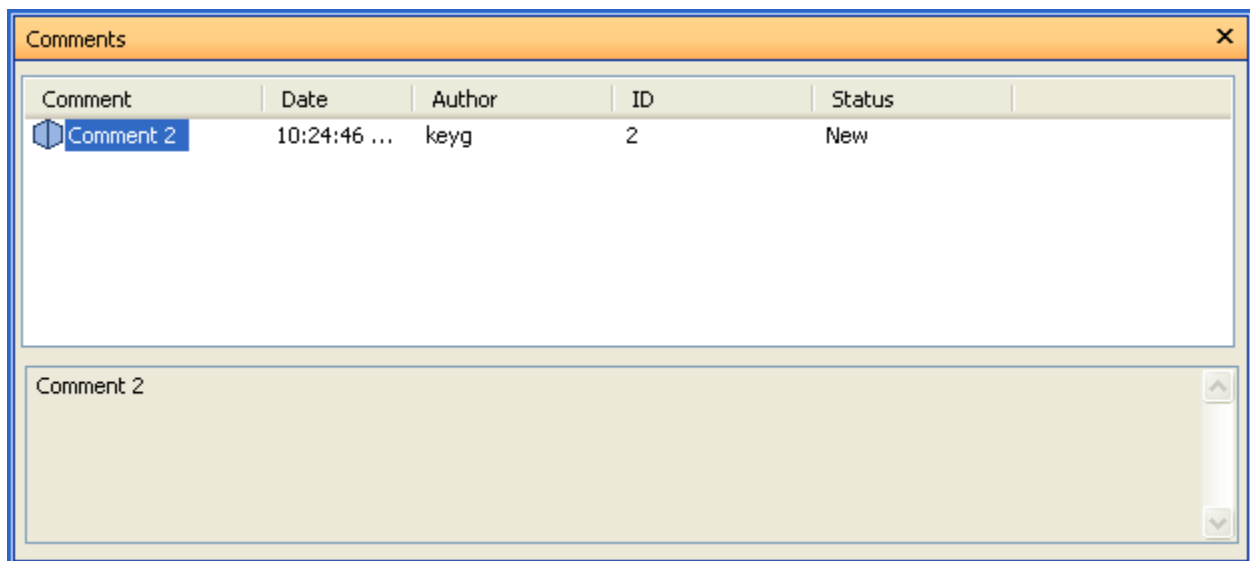
Commenting

Multiple comments can be attached to any item in the **Viewpoints** control bar (see “[The Viewpoints Control Bar](#)”), or to any item in the **Selection Sets** control bar (see “[Selection and Search Sets](#)”).

You cannot record any comments yourself in Freedom.

The **Comments** control bar allows you to view all comments attached to one of these sources.

To open it, click  on the **Workspace** toolbar.



When the source of the comments is recalled, such as a viewpoint, all comments attached to it appear in the **Comments** control bar, showing the time and date, author, ID and status of each comment. The icon on the far left represents the source type:

 - selection set.

 - search set.

 or  - viewpoint.

 or  - viewpoint animation.

 - tag.

Hyperlinks

Hyperlinks are an extremely useful review tool to allow you to access non-graphical information through the graphical interface of NavisWorks.

Hyperlinks are categorized so that you can switch them on and off by category, and they can be anything internal (such as a viewpoints or selection set) or external (such as a web page, script, or spreadsheet) to NavisWorks. By turning on hyperlinks in the main navigation window, you can simply click on the link to activate it. Hyperlinks can be displayed as a text description, or as an icon and can also optionally have leader lines pointing to points on the item to help you identify which item has the link attached.

To turn on hyperlinks:

- Click **Hyperlinks**  on the **Workspace** toolbar

or

- On the **Tools** menu, click **Hyperlinks**.

Hyperlinks Categories

Hyperlinks can be categorized so that you can group them to distinctly display or not display in the main navigation window at one time. The seven default categories are:

- Hyperlink**
- Tag**
- Viewpoints**
- Selection sets**
- Redline tags**

You can customize the display of both standard and user-defined categories in the **Options Editor**.

Displaying Hyperlinks

To turn on hyperlinks:

- Click **Hyperlinks**  on the **Workspace** toolbar

or

- Click **Tools > Hyperlinks** on the menu bar.

Following Hyperlinks

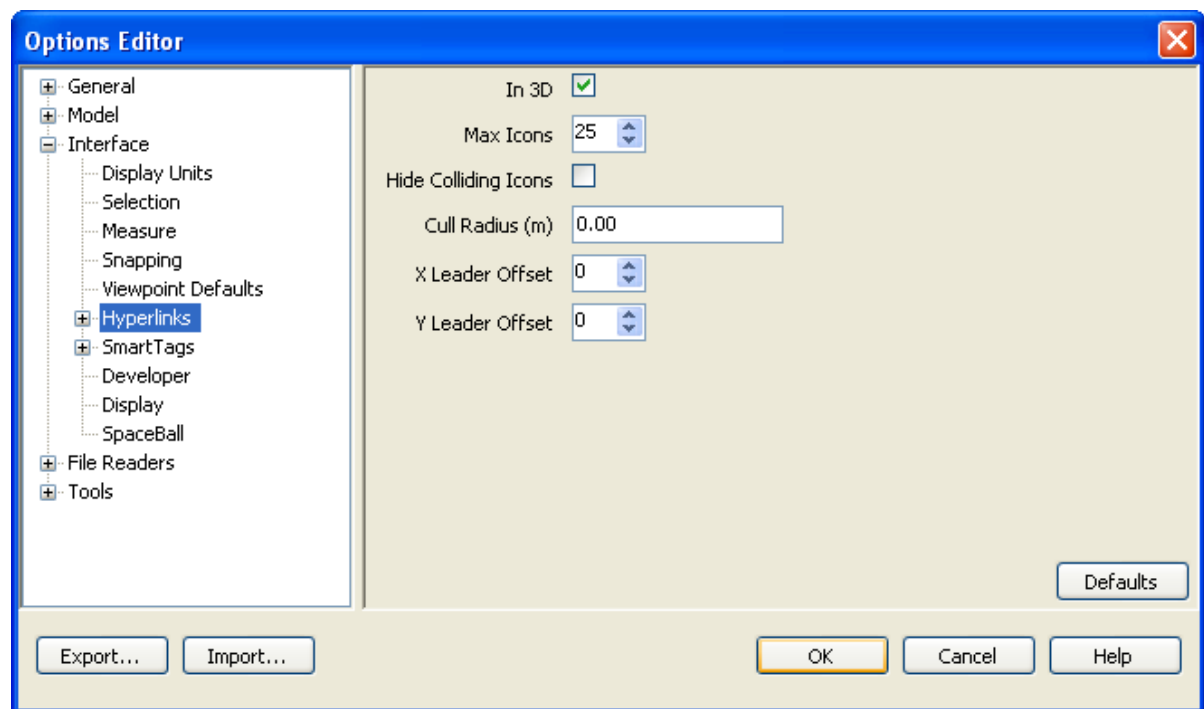
To follow a hyperlink, simply click on it in the main navigation window. If multiple hyperlinks are attached to an item, the default hyperlink will be followed.

Hyperlinks Options

Setting hyperlinks options:

- On the **Tools** menu, click **Global Options**.
- Expand the **Interface** node, and click the **Hyperlinks** option.

The Hyperlinks page is displayed:



- Icons that appear overlapped in the main view can be hidden if the **Hide Colliding Icons** check box is selected.
- Enter the distance in the **Cull Radius** box for how close hyperlinks have to be in order to be drawn in the main view. Any hyperlinks further away than this distance will not be drawn. The default value of 0 means that all hyperlinks will be drawn.
- Select the **In 3D** check box if you want to draw the hyperlinks icons in 3D in the main view. They then

float in 3D space just in front of their attachment points to the items. If this box is unchecked, then all hyperlink icons are drawn in 2D over the top of the all geometry.

Note:

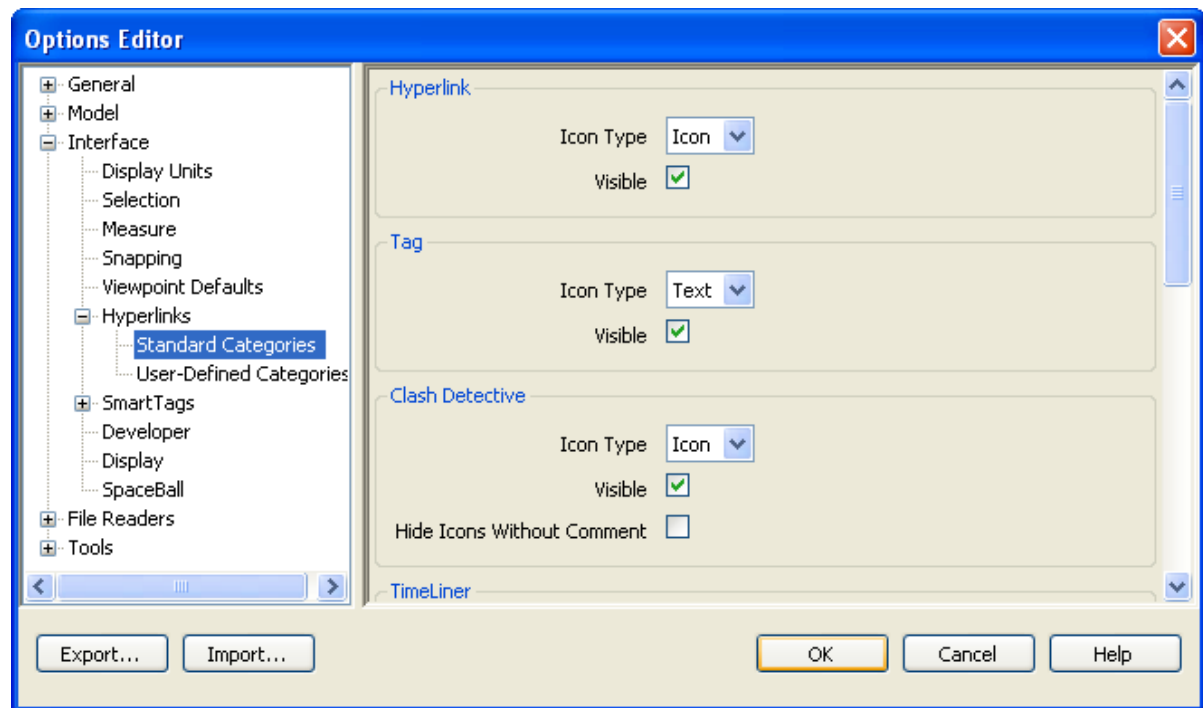
In 3D mode hyperlinks can become hidden by other objects in the scene when you are navigating.

6. Enter the maximum number of icons to draw in the main view in the **Max Icons** box.
7. Hyperlinks can be drawn with leader lines (arrows) pointing to the attachment point on the item that the hyperlink is attached to. Enter the X- and Y- distance in **Leader Offset** for the number of pixels to the right and up that these leader lines will use.
8. Click **OK** to set the options or **Cancel** to exit the dialog without setting them.

Configuring standard hyperlinks categories:

1. On the **Tools** menu, click **Global Options**.
2. Expand the **Interface** node, expand the **Hyperlinks** option, and click **Standard Categories**.

The Categories page is displayed:



3. Each hyperlink is a member of a category. This enables you to easily manage sets of hyperlinks. Use the **Visible** check box to switch a category on or off in the main view. Some categories also have comments associated with them. Use the **Hide Icons Without Comments** check box, if available, to

do exactly that - only draw hyperlinks that have a comment attached to it, so that you can see any areas of issue in the model. See “ [Commenting](#) ” for more information on comments.

4. Use the **Icon Type** field to specify how to display the hyperlink.

Select **Icon** to use a default hyperlink  icon in the main view.

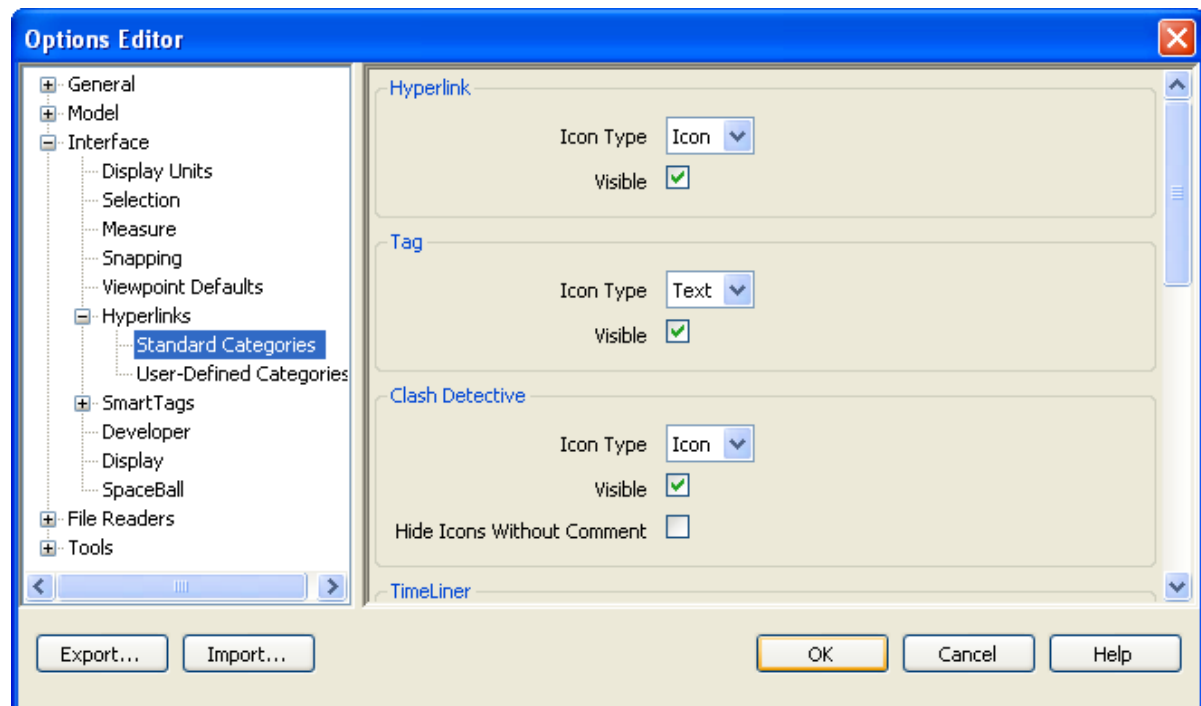
Select **Text** to use the hyperlinks description as a tooltip style text box in the main view instead of an icon.

5. Click **OK** to set the options or **Cancel** to exit the dialog without setting them.

Configuring user-defined hyperlinks categories:

1. On the **Tools** menu, click **Global Options**.
2. Expand the **Interface** node, expand the **Hyperlinks** option, and click **User-Defined Categories**.

The Categories page is displayed:



Only the custom hyperlink categories are shown here. The padlock  icon indicates that you cannot add or remove categories directly from here.

3. Choose the way categories are shown in the **Options Editor**:



to display categories in a tabular format.

Click **List View**  to display categories in a list format (the same way as the standard categories are shown).

Click **Records View**  to display categories as records.

4. Use  and  to navigate between the categories. If you selected **Records View**, this is the only way to move between the records.
5. Use the **Visible** check box to switch a category on or off in the main view.
6. Use the **Icon Type** field to specify how to display the hyperlink.

Select **Icon** to use a default hyperlink  icon in the main view.

Select **Text** to use the hyperlinks description as a tooltip style text box in the main view instead of an icon.

7. Click **OK** to set the options or **Cancel** to exit the dialog without setting them.

Smart Tags

Smart tags pop up information on the item hovered over by the cursor in a tooltip style window, without having to select the item itself. The smart tag will disappear after a few seconds. This is a useful way to quickly get information about an item in the main navigation window when navigation has ceased. The default information shown is the name and type of the item, but you can define which properties to show using the smart tags options.

Note:

If the item hovered over doesn't have the property requested, smart tags will search up the selection tree for a parent that does, so maximising the useful information you get.

To turn on smart tags:

- Click **Smart Tags**  on the **Workspace** toolbar

or

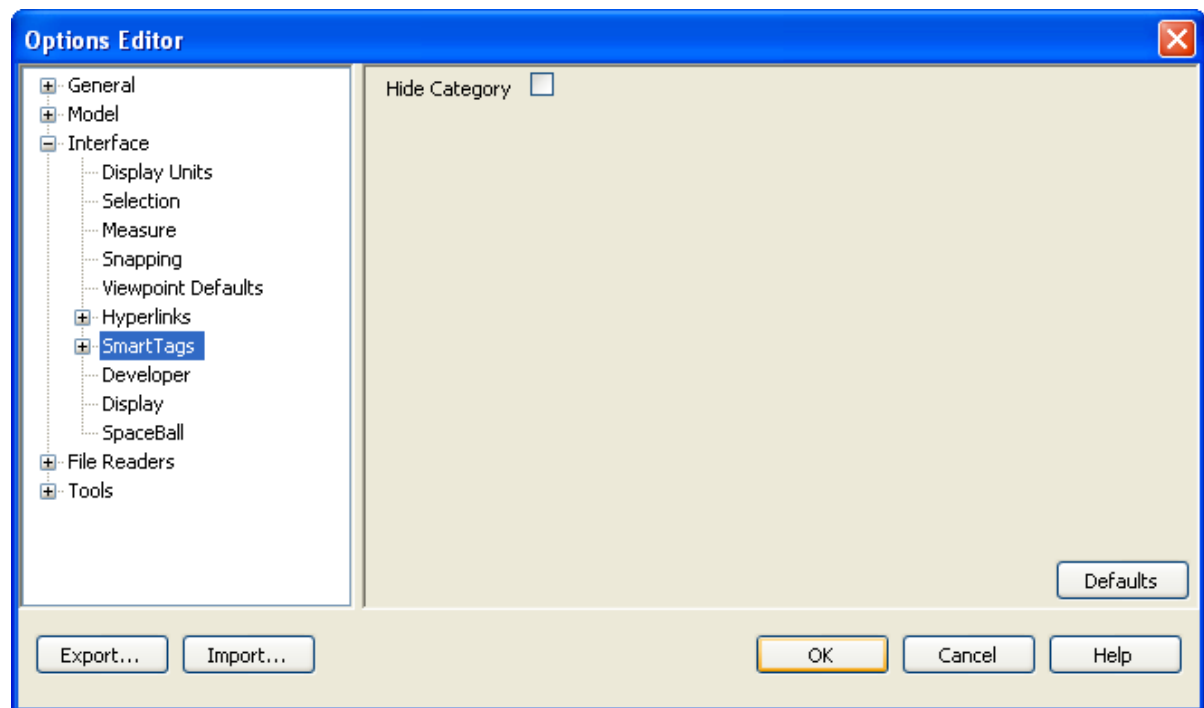
- On the **Tools** menu, click **Smart Tags**.

Smart Tags Options

Setting smart tags options:

1. On the **Tools** menu, click **Global Options**.
2. Expand the **Interface** node, and click the **Smart Tags** option.

The Smart Tags page is displayed.



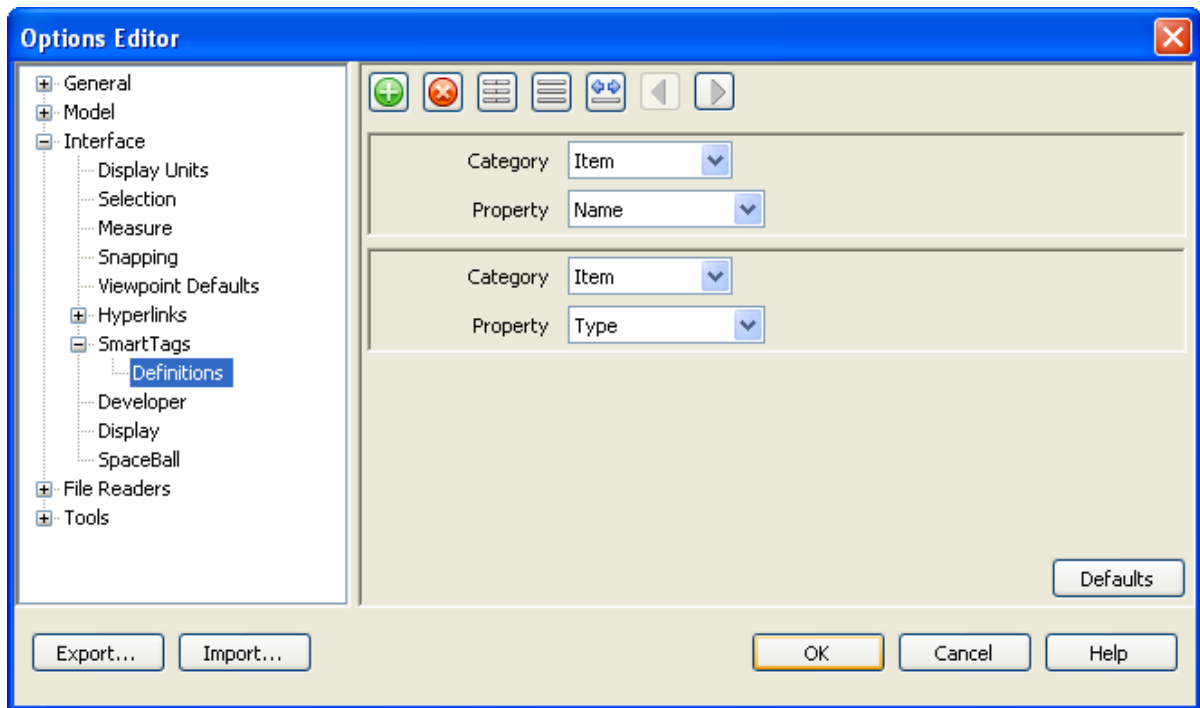
3. Select the **Hide Category** check box if you do not want to see category names included in the smart tags tooltip.
4. Click **OK** to set the options or **Cancel** to exit the dialog without setting them.

The default information displayed is the name and type of the item, but the actual information displayed can be customized.

Customizing smart tags:

1. On the **Tools** menu, click **Global Options**.
2. Expand the **Interface** node, expand the **Smart Tags** option, and click **Definitions**.

The Definitions page is displayed.



3. Choose the way smart tag definitions are shown in the **Options Editor**:

Click **Grid View**  to display definitions in a tabular format.

Click **List View**  to display definitions in a list format.

Click **Records View**  to display definitions as records.

4. Use  and  to navigate between the definitions. If you selected **Records View**, this is the only way to move between the records.
5. For every smart tag definition, you can change the **Category** and **Property** by clicking on the item and choosing the relevant entry from the drop-down list.
6. To add a smart tag definition, click .
7. To delete a smart tag definition, select it, and click .
8. Click **OK** to set the options or **Cancel** to exit the dialog without setting them.

Chapter 15. Object Manipulation

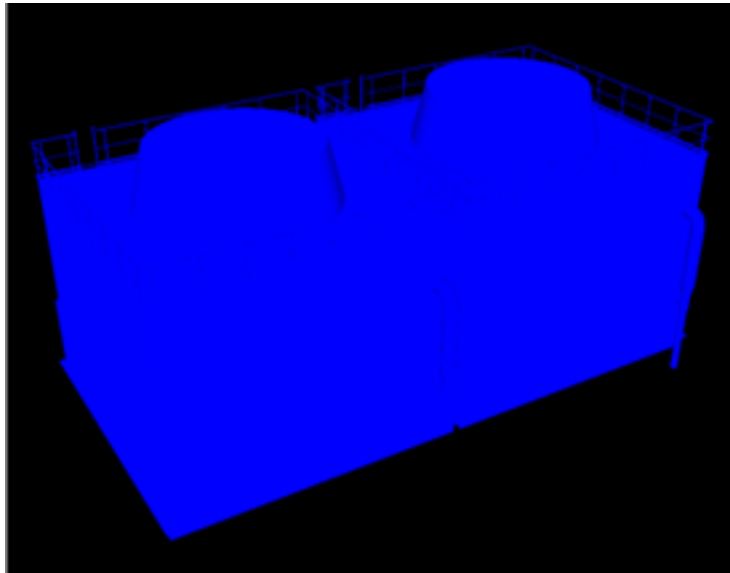
You cannot modify object properties in Freedom but you can adjust the way currently selected objects are highlighted in the main navigation window.

Highlighting Objects

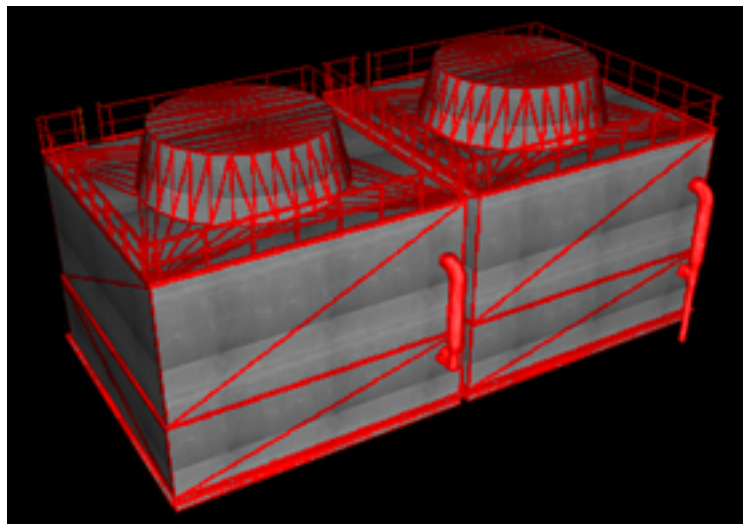
To get a clearer view of geometry objects in the main NavisWorks window, you can use the **Options Editor** to adjust the way in which the current selection is highlighted.

You can use three different highlighting methods:

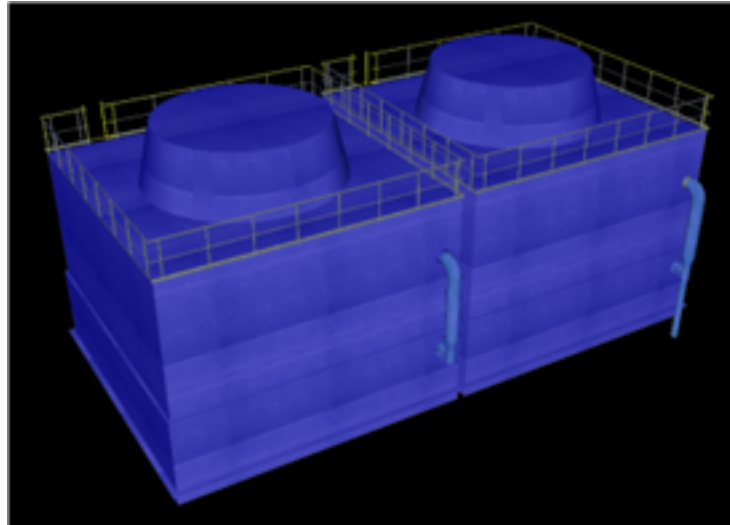
- Shaded



- Wireframe



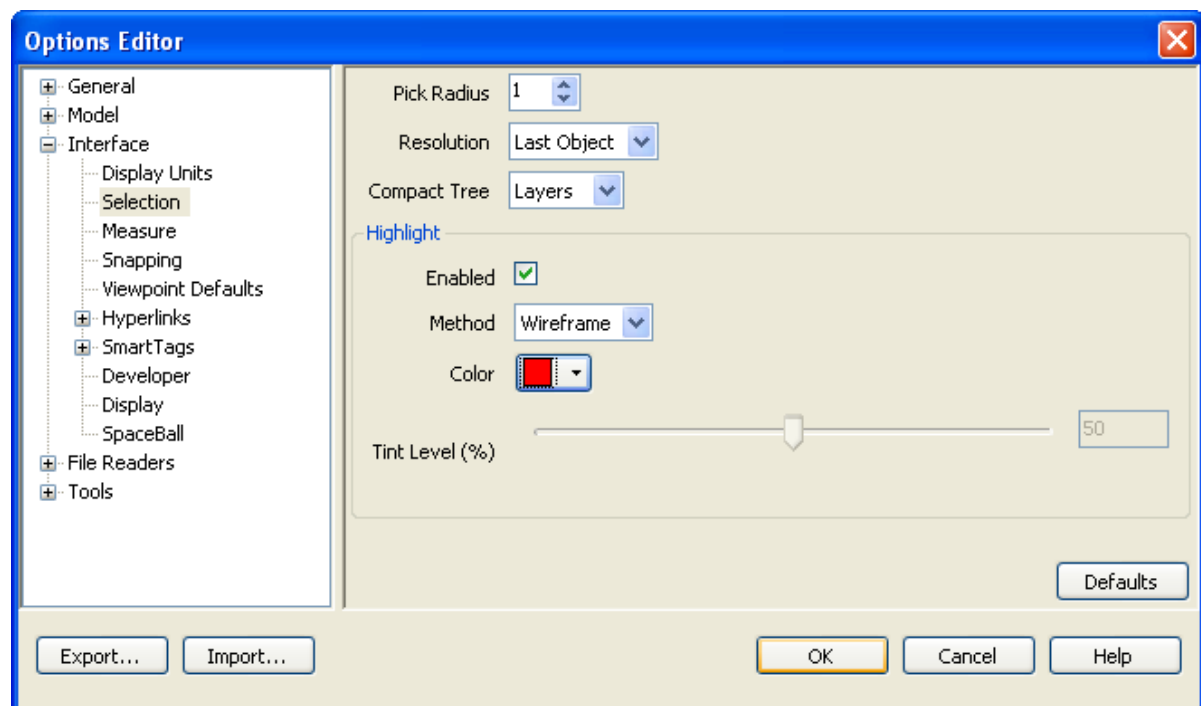
- Tinted



To adjust highlighting:

1. On the **Tools** menu, click **Global Options**.
2. Expand the **Interface** node in the **Options Editor** dialog box, and click the **Selection** option.

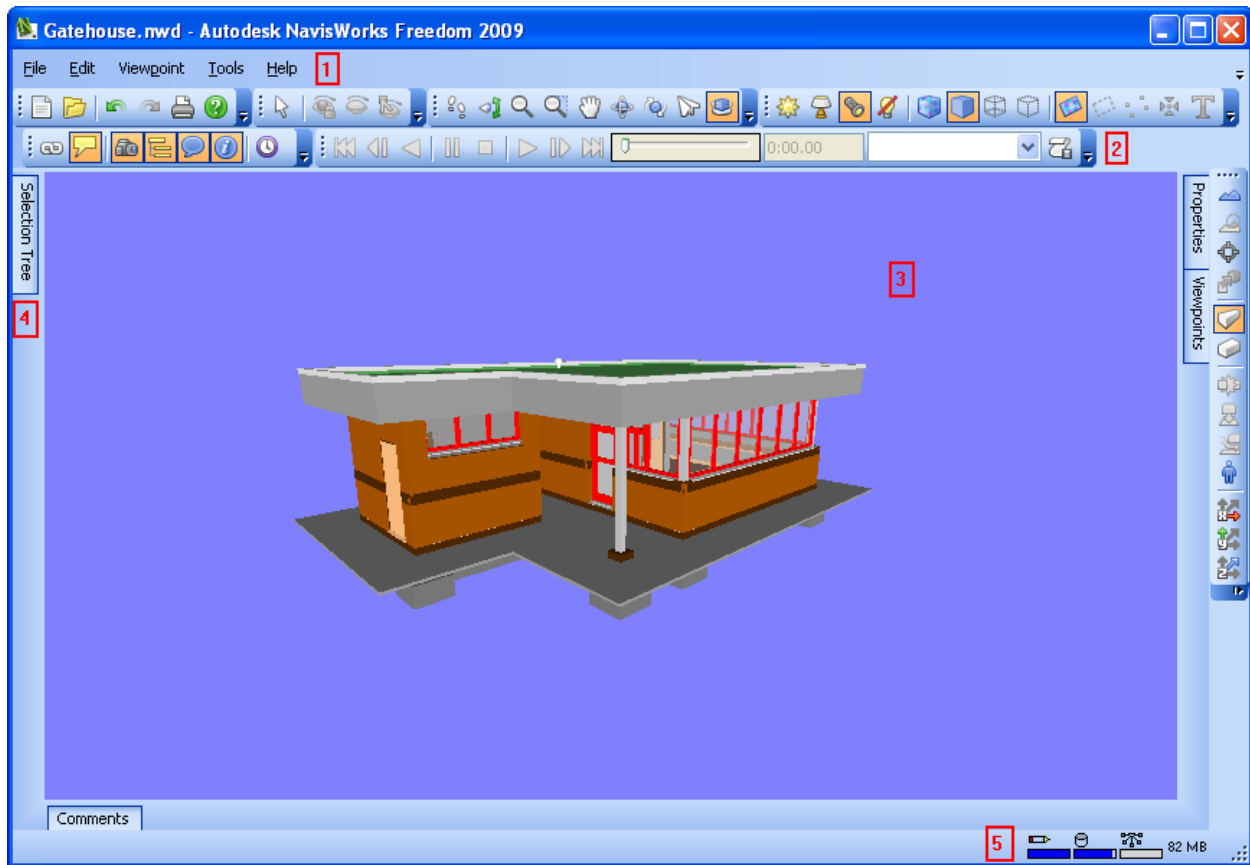
The Selection page is displayed.



3. Locate the **Highlight** area, and select the **Enabled** check box to turn on highlighting of the selected items.
4. Use the **Method** drop-down list to select the type of highlighting you want (Shaded, Wireframe or Tinted).
5. Click the **Color** button to select the highlight color.
6. If you selected **Tinted** in the **Method** box, use the slider to adjust the **Tint Level**.
7. Click **OK** to set these options or **Cancel** to exit the dialog box without setting them.

Chapter 16. Interface

The NavisWorks interface is intuitive and easy to learn and use. It contains a number of traditional Windows elements, such as toolbars, control bars, and dialog boxes.



- 1 - Menu bar
- 2 - Toolbars
- 3 - Navigation window
- 4 - Control bars
- 5 - Status bar

The Main Interface Components

This section briefly describes the main interface components.

The Menu Bar

The **Menu** bar contains all commands available in NavisWorks, grouped together by similar or 'like' functionality.

When a menu has a right-pointing arrow, such as , there is a submenu associated with that choice.

When a menu item is followed by a series of dots, such as , there is a dialog box associated with that choice.

The Toolbars

NavisWorks toolbars provide quick access to frequently used commands. Every button on a toolbar includes a tooltip, which describes the function the button activates. Placing the mouse over a button displays a brief instruction on how to use this feature in the **Status** bar.

You can rearrange, open and close toolbars:

- To move a toolbar, click the dotted line at the edge of the toolbar, and drag it to a different location.
- To open or close toolbars, right-click an empty area next to the last toolbar on the screen, and choose from the list of available toolbars on the shortcut menu.

Some toolbar buttons enable you to choose a program mode. For example, to look around your model, you need to be in look around mode. To rotate the model, you need to be in examine mode and so on. NavisWorks remains in the selected mode until instructed otherwise. To identify the mode you are in, look at the buttons. If a button is highlighted and has a dark blue boarder around it, the corresponding mode is currently active.



To leave the mode, either click the same button again or choose a different mode.

Some buttons are used to toggle the display of control bars, and window panes (for example, the TimeLiner window). Again, if a button is highlighted and has a dark blue boarder around it, it means that the corresponding display element is currently open.

As you open more toolbars on the screen, or resize the NavisWorks window, the toolbars may get overlapped with each other to reduce the screen clutter. When this happens, some buttons will be hidden under the overlaps. To quickly access the entire set of commands on a toolbar, click the chevron  button at the right end of the toolbar. The remaining commands available for that toolbar will appear.

The Main Navigation Window

The main navigation window (also referred to as 'main NavisWorks window' and 'main 3D navigation view') is used to interact with 3D models.

The Control Bars

Some features are accessible from the control bars (also referred to as 'palettes'). To display a control bar, click the desired control bar button on the **Workspace** toolbar.

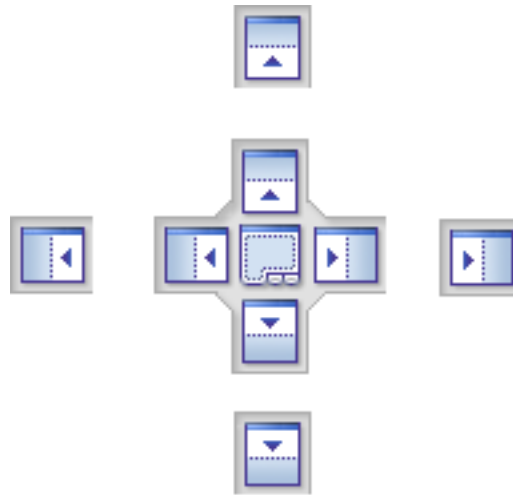
All control bars are dockable and resizable, and will automatically lock to specific locations near to where they are moved.

Note:

Holding down the CTRL key when moving a control bar prevents it from auto docking.

Using the Docking Tool

When you drag a control bar or a window pane from its current location towards a new destination on the interface, a docking tool appears.



The docking stickers point towards the four edges of the interface.

When the control bar you are dragging is close to the place where you want it to dock, move the mouse over the corresponding area of the docking tool. You will see an outline of the control bar appear on the interface. To dock the control bar there, release the mouse button.

Tiling Control Bars

You can tile control bars and window panes on the interface. To do this, drag a control bar you want to tile over the control bar where you want it to be placed. When a rectangular outline appears, release the mouse button.

Auto Hiding Control Bars

You can **auto hide** control bars and window panes; this keeps the control bars active while maximizing the amount of available screen space. If auto-hide is active, the body of the control bar disappears when you move the cursor out of it, leaving only the title bar visible. Move the cursor over the title bar to display the entire control bar again.

To switch auto-hide on, click  on the title bar. To switch auto-hide off, click  on the title bar.

The Status Bar

The **Status** bar appears at the bottom of the NavisWorks screen.

The left-hand corner of the **Status** bar is used to display short instructions on how to use the NavisWorks features.

In the right-hand corner of the **Status** bar there are four performance indicators, that give you constant feedback as to how NavisWorks is performing on your machine.



- The progress bar under the left hand icon (pencil) indicates how much of the current view is drawn, i.e. how much drop-out there is in the current viewpoint. When the progress bar is at 100%, the scene is completely drawn, with no drop-out. The icon will change color when it is working. Whilst the scene is being drawn, the pencil will change to yellow. If there is too much data to handle and your machine cannot process this quickly enough for NavisWorks, then the pencil will change to red, indicating a bottleneck.
- The progress bar under the central icon (disk) indicates how much of the current model is loaded from disk, i.e. how much is loaded into memory. When the progress bar is at 100%, the entire model, including geometry and property information, is loaded into memory. The icon will change color when it is working. Whilst data is being read, the disk will change to yellow. If there is too much data to handle and your machine cannot process this quickly enough for NavisWorks, then the disk will change to red, indicating a bottleneck.
- The progress bar under the right hand icon (web server) indicates how much of the current model is downloaded, i.e. how much has been downloaded from a web server. When the progress bar is at 100 %, the entire model has been downloaded. The icon will change color when it is working. Whilst data is being downloaded, the web server will change to yellow. If there is too much data to handle and your machine cannot process this quickly enough for NavisWorks, then the web server will change to red, indicating a bottleneck.
- The field to the right of the icons reports the amount of memory currently being used by NavisWorks. This is reported in Megabytes (MB).

Units

NavisWorks has the concept of what unit the scene is presented in. There is a single scene unit that is set from the **Global Options** dialog and this unit is used throughout the interface whenever appropriate.

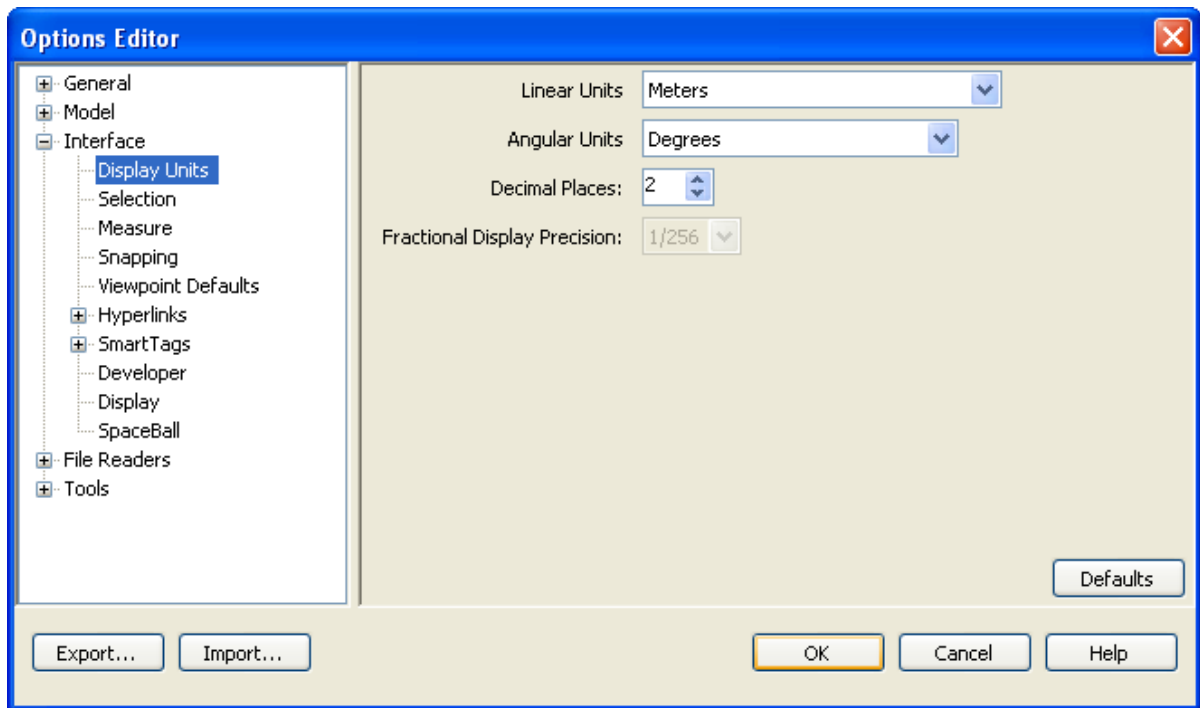
There is a default unit setting for each file type so that when files are opened, they are scaled appropriately to the scene's units. They can, of course, be rescaled after if the units turn out to be wrong for the scene.

Units Options

Setting units options:

1. On the **Tools** menu, click **Global Options**.
2. Expand the **Interface** node in the **Options Editor** dialog box, and click the **Display Units** option.

The Display Units page is displayed.



3. Choose the **Linear Units** from the list. You should be able to choose the exact format you wish.
4. Choose the **Angular Units** from the list.
5. Enter the number of decimal places you want to see throughout the interface for your units in the **Decimal Places** box. If the unit chosen is a fractional unit, rather than decimal unit, then you have the choice of what level of fraction to display the units from the **Fractional Display Precision** drop-down list.
6. Click **OK** to set the options or **Cancel** to exit the dialog without setting them.

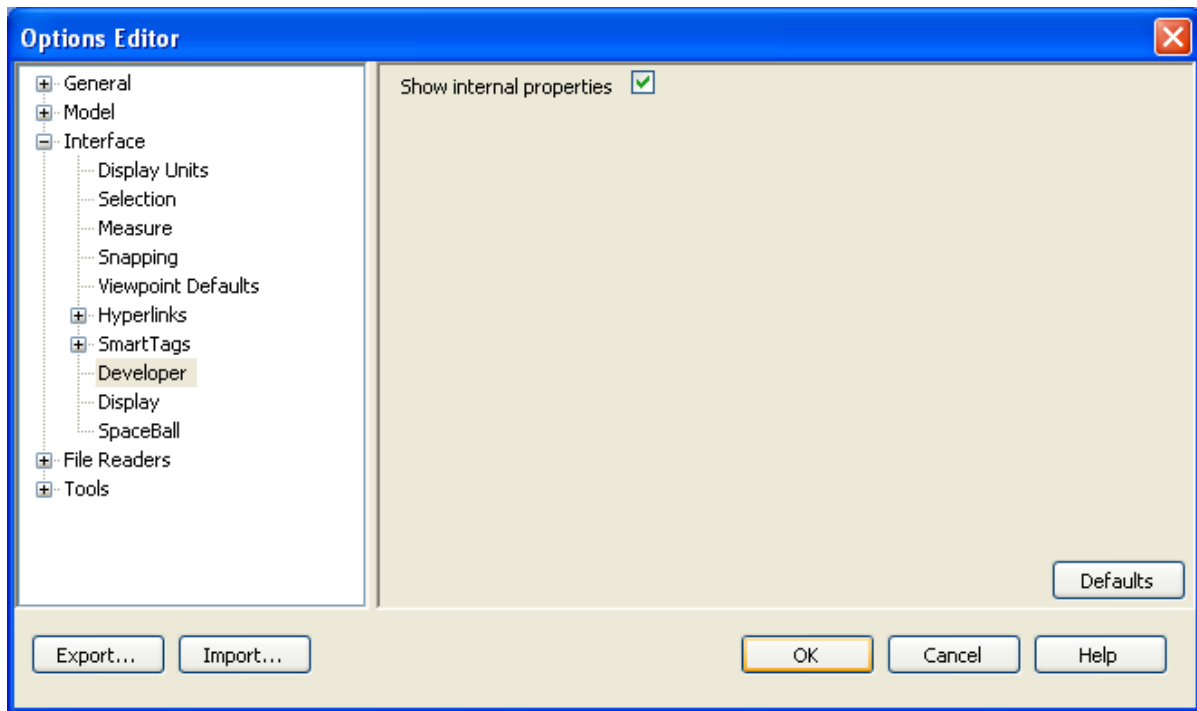
Profiles

NavisWorks can be adjusted to your level of CAD technical knowledge. By default, a standard profile is used. If necessary, you can use a developer profile to display additional object properties.

Using a developer profile:

1. On the **Tools** menu, click **Global Options**.
2. Expand the **Interface** node, and click the **Developer** option.

The Developer page is displayed



3. Select the **Show Internal Properties** check box to display additional object properties.

Note:

Now the **Geometry** tab and **Transform** tab will be shown in the **Properties** control bar for the associated models and items.

4. Click **OK** to set the profile or **Cancel** to exit the dialog box without setting it.

Search Directories

NavisWorks searches for a variety of configuration files in subdirectories of three standard directories. These files can be overridden on a per user, all users or per installation basis. The search directories are :

- Application Data\Autodesk NavisWorks Freedom 2009 within the current user profile. Usually C:\Documents and Settings\user\Application Data\Autodesk NavisWorks Freedom 2009 where user is the name of the current user.
- Application Data\Autodesk NavisWorks Freedom 2009 within the all users default profile. Usually C:\Documents and Settings\All Users\Application Data\Autodesk NavisWorks Freedom 2009.
- Within the NavisWorks install directory. Usually C:\Program Files\Autodesk NavisWorks Freedom 2009.

Chapter 17. Tools

The **Tools** menu in NavisWorks gives access to a series of useful tools and options.

The **Tools** menu includes the following items:

- TimeLiner Playback
- Hyperlinks
- Smart Tags
- Animation
- Background Color
- File Options
- Global Options

Chapter 18. Options

There are two types of options: File Options and Global Options. These are both accessed from the **Tools** menu. File options are saved in NavisWorks files (.nwf or .nwd) and reinstated when opening it. Global options, on the other hand, are set for *all* NavisWorks sessions.

File Options

To get to the File Options dialog, go to **Tools, File Options**. You will get a tabbed dialog box offering one of the following five file options:

- Culling. See “ [Culling Options](#) ”.
- Orientation. See “ [Orientation Options](#) ”.
- Speed. See “ [Speed Options](#) ”.
- Head light. See “ [Head Light options](#) ”.
- Scene lights. See “ [Scene Lights Options](#) ”.

These options are predominantly concerned with the appearance of the model and the speed of navigation around it. Any changes that you make are temporary, and the options are reverted back to default when you exit Freedom.

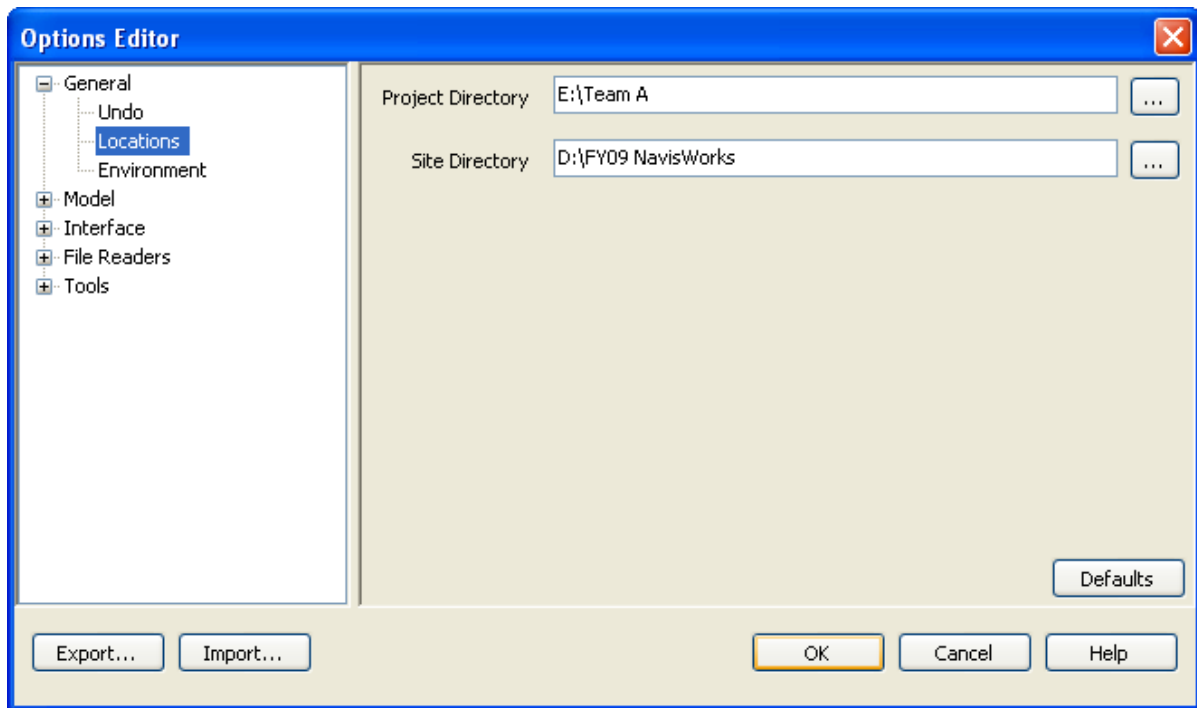
Location Options

These options enable centralized sharing of global NavisWorks settings, workspaces, datatools, avatars, Clash Detective rules, Presenter archives, custom Clash Detective tests, object animation scripts etc. The settings can be shared across an entire project site, or across a specific project group depending on the required level of granularity.

Setting location options:

1. On the **Tools** menu, click **Global Options**.
2. Expand the **General** node in the **Options Editor** dialog box, and click the **Locations** option.

The Locations page is displayed:



3. In the **Project Directory** field, browse to the directory that contains the NavisWorks settings specific to your project group.
4. In the **Site Directory** field, browse to the directory that contains the NavisWorks settings standard across the entire project site.
5. Click **OK** to save the changes or **Cancel** to exit the dialog without saving them.

Note:

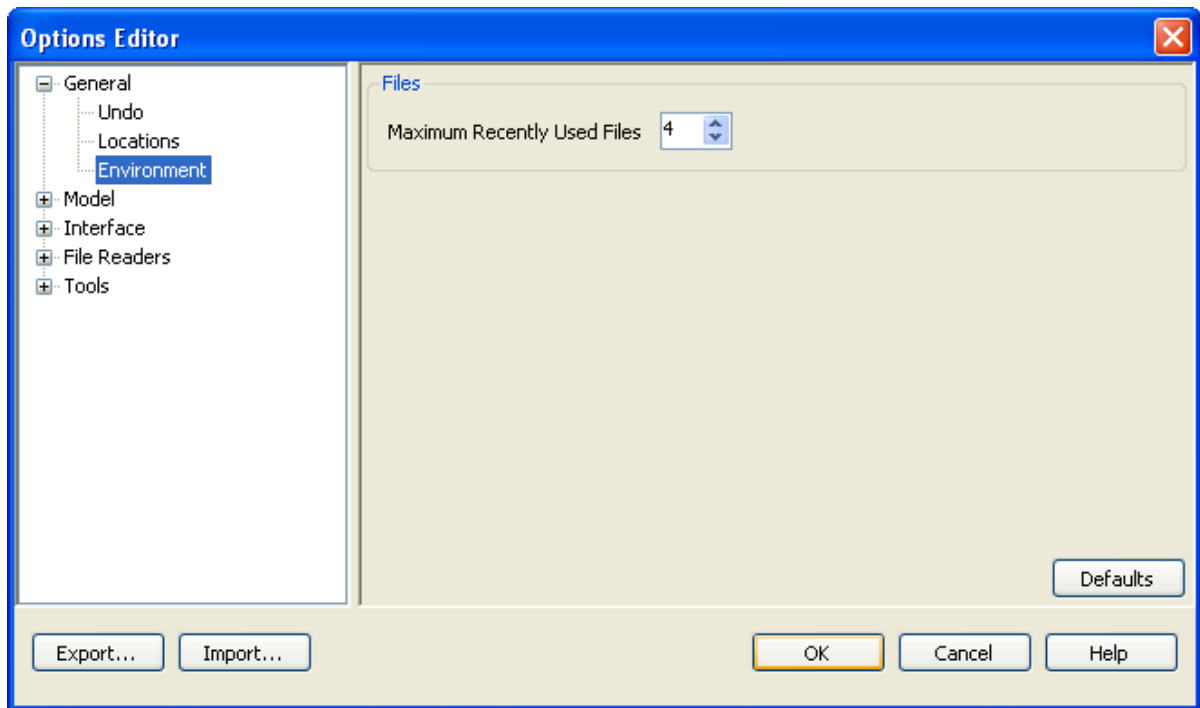
When you run NavisWorks for the first time, the settings are picked up from the installation directory. Subsequently, NavisWorks examines the current user profile and the all users profile on the local machine, and then checks the settings in the **Project** directory and the **Site** directory. The files in the **Project** directory take precedence.

Environment Options

Setting environment options:

1. On the **Tools** menu, click **Global Options**.
2. Expand the **General** node in the **Options Editor** dialog box, and click the **Environment** option.

The Environment page is displayed:

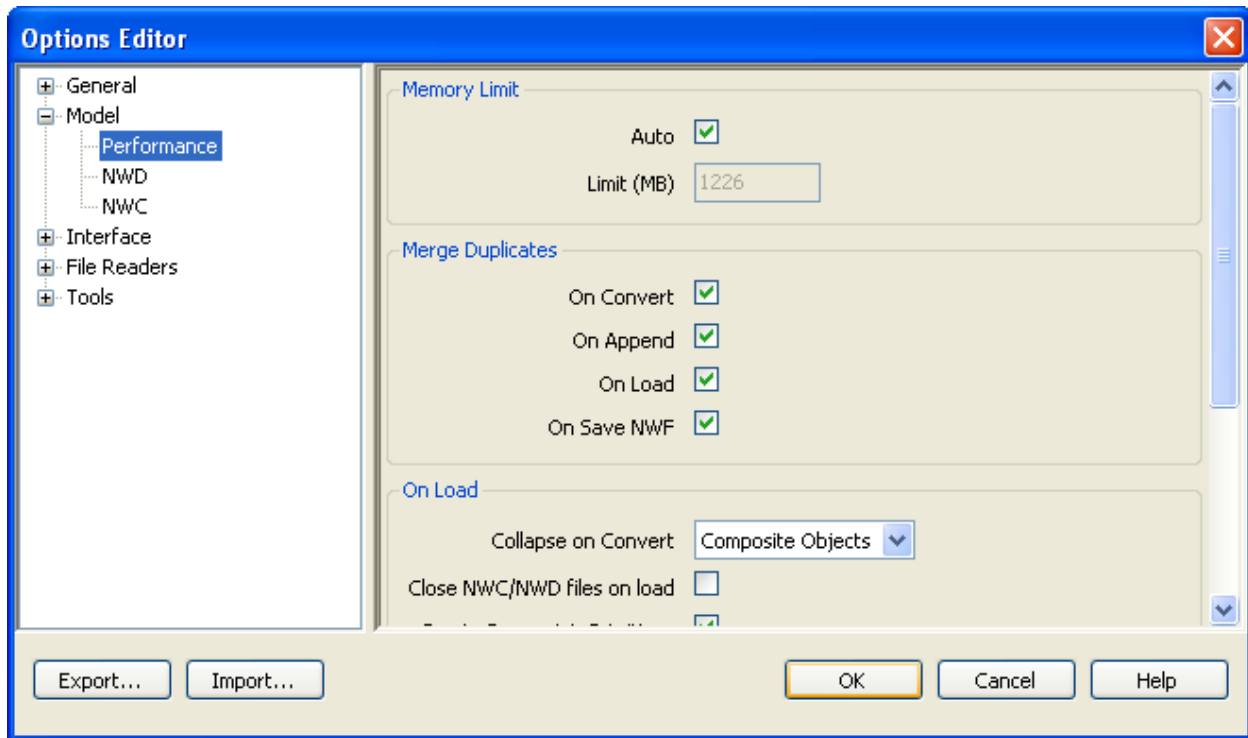


3. Enter the desired number into the **Maximum Recently Used Files** to specify how many file shortcuts NavisWorks can remember. By default, shortcuts to the 4 most recently opened files can be displayed.
4. Click **OK** to save the changes or **Cancel** to exit the dialog without saving them.

Global Options

These options are persistent across NavisWorks sessions and are not saved into NavisWorks files.

The **Options Editor** can be accessed via the **Tools** menu, or it can be launched as a separate application. To do this, go to **Start > Programs > Autodesk > Autodesk NavisWorks Freedom 2009 > Options Editor**. The options are grouped together, and presented in a tree structure, making it quicker to find and change them.



Options can be exported and imported, making it quick and easy for project managers, or systems administrators, to ensure the NavisWorks settings on all machines are identical.

Configuring Global Options

The options are presented in the dialog box in a hierarchical tree structure. The following categories are available:

- General
- Model
- Interface
- File Readers

General Options

You can configure:

- Buffer Size. See “[Undo Options](#)”.
- File Locations. See “[Location Options](#)”.
- Number of Recent File Shortcuts to Store. See “[Environment Options](#)”.

Model Options

You can configure:

- NavisWorks Performance. See “ [Performance Options](#) ”.

Interface Options

You can configure:

- Display Units. See “ [Units Options](#) ”.
- Selection and Highlighting Parameters. See “ [Selection Options](#) ”, and “[Highlighting Objects](#)”.
- Hyperlinks. See “ [Hyperlinks Options](#) ”.
- Smart Tags. See “ [Smart Tags Options](#) ”.
- Profiles. See “ [Profiles](#) ”.
- Display Parameters. See “ [Display Options](#) ”.
- SpaceBall Parameters. See “ [Using a SpaceBall](#) ”

File Readers Options

You can configure:

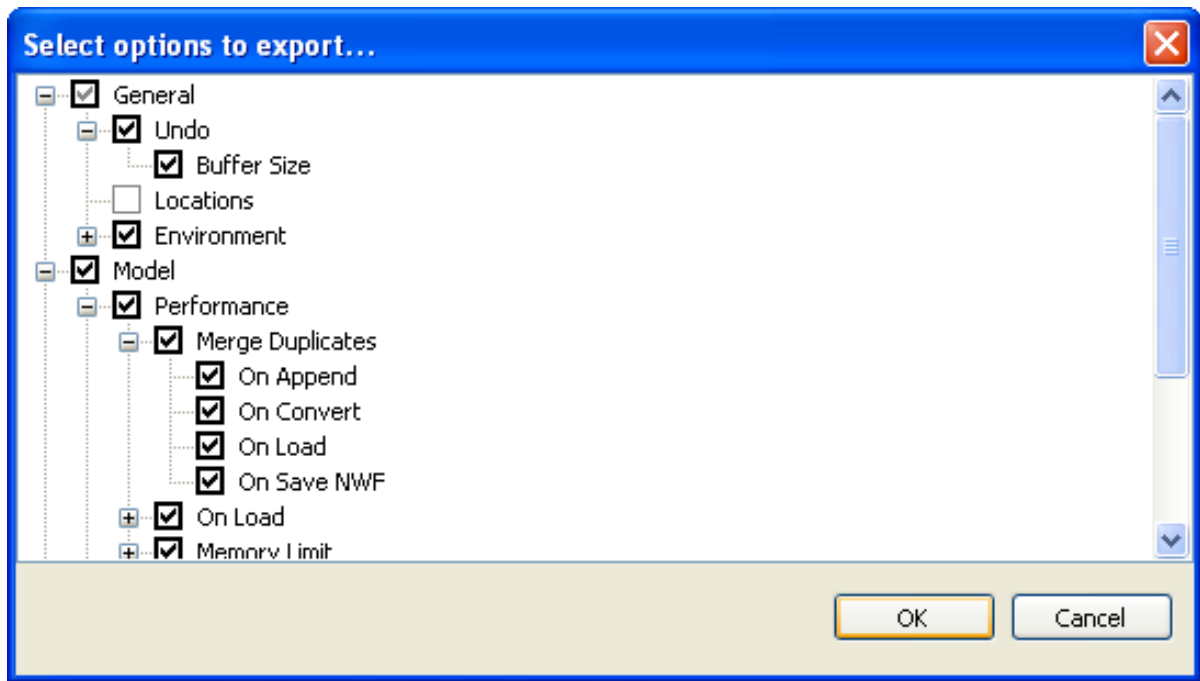
- DWF. See “ [DWF File Reader Options](#) ”.

Importing and Exporting Global Options

To export Global Options:

1. On the **Tools** menu, click **Global Options**.
2. In the **Options Editor** dialog box, click the **Export** button.

The **Select Options to Export** dialog box is displayed:

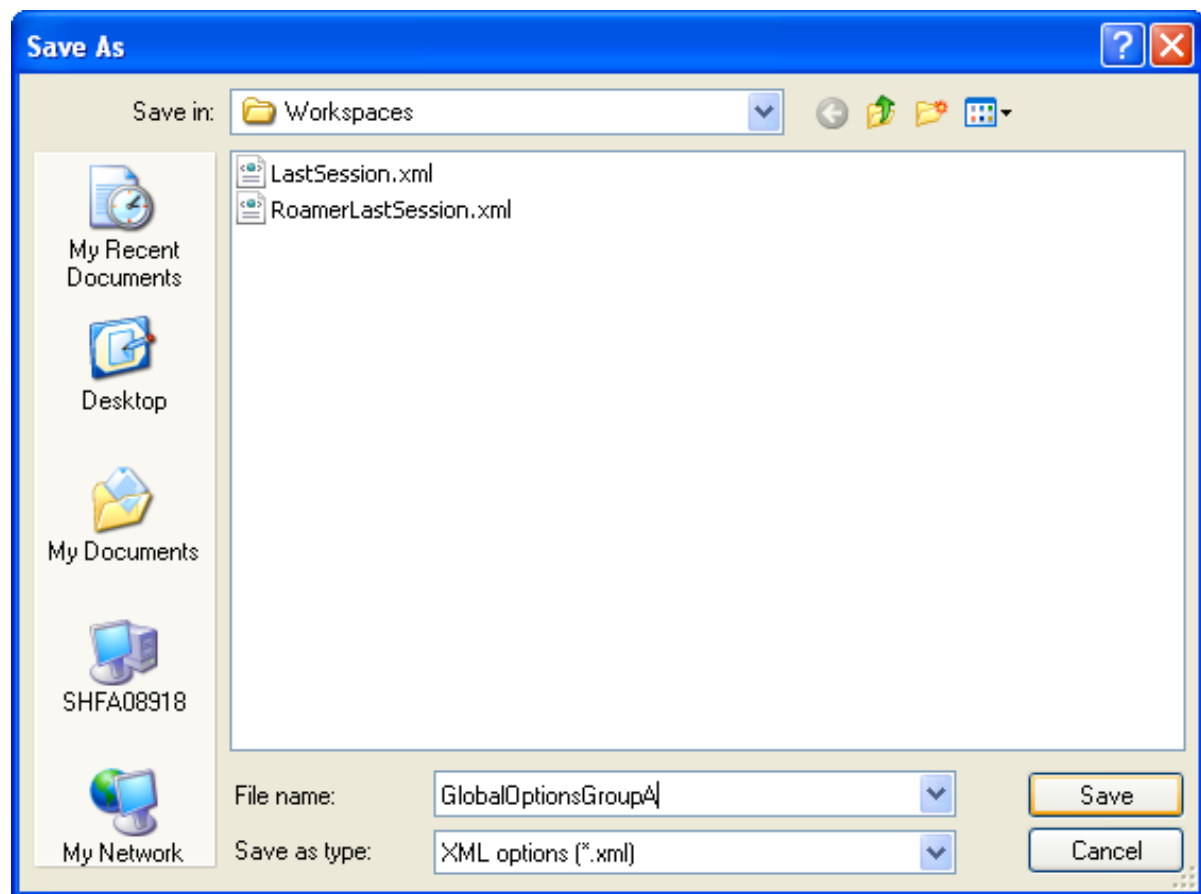


3. Select the check boxes for all options you want to be exported (or 'serialized'). If an option cannot be exported, it is greyed out.

Note:

To quickly select/deselect all options for a given category, use the top-level check boxes. For example, selecting the **General** check box, instantly selects all options under this node.

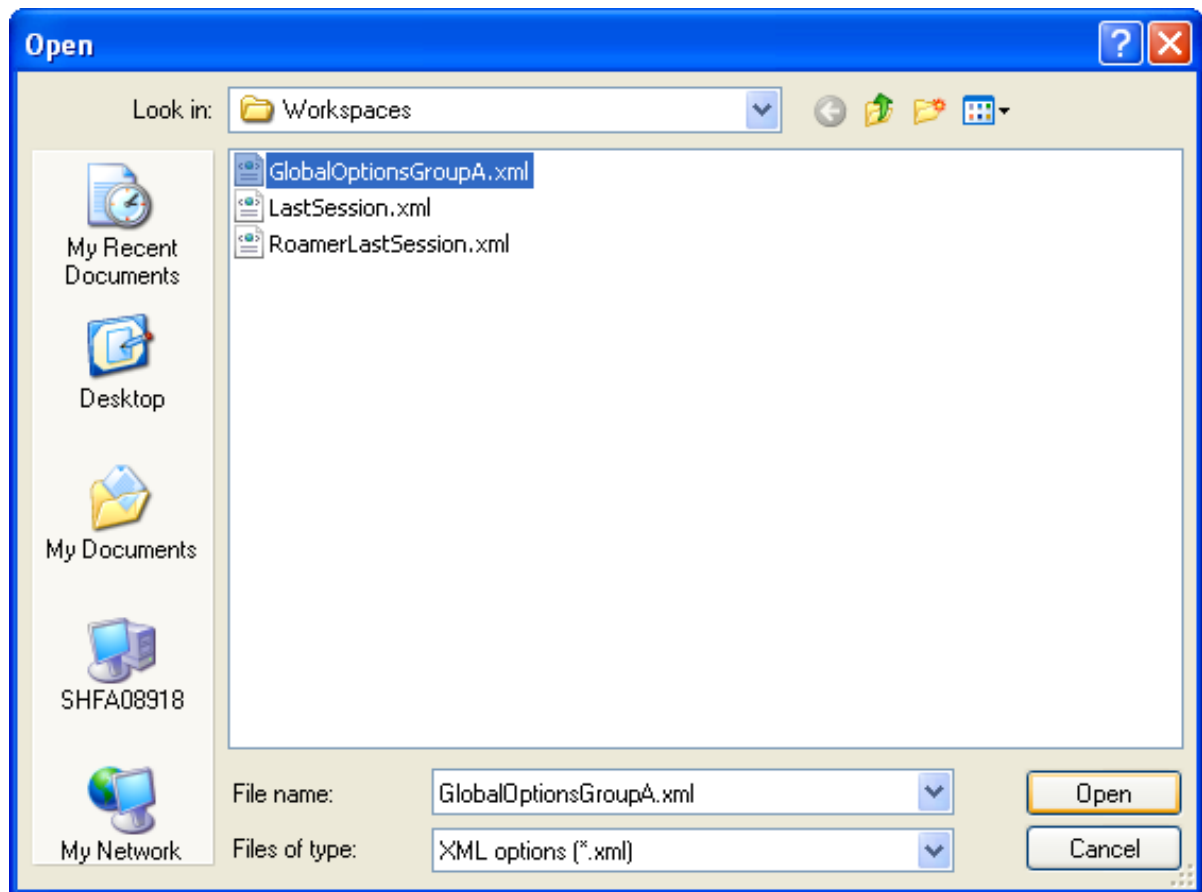
4. Click **OK** to export the settings.
5. In the **Save As** dialog box, enter a name for the settings file. You can also select the name of an existing settings file to overwrite it with your modified configuration.



6. Click **Save**.
7. Click **OK** to close the **Options Editor**.

To import Global Options:

1. On the **Tools** menu, click **Global Options**.
2. In the **Options Editor** dialog box, click the **Import** button.
3. In the **Open** dialog box, browse to the folder containing the settings file, select it, and click **Open**.



4. Click **OK** to close the **Options Editor**.

Chapter 19. Getting Help

The **Help** menu gives you access to useful resources about your system, your product and the documentation. NavisWorks comes with full context-sensitive help as well as user guides in Adobe Acrobat™ .pdf format. The **Help** menu contains:

- Help Topics
- What's This?
- NavisWorks on the Web
- Customer Involvement Program
- System Info
- About NavisWorks

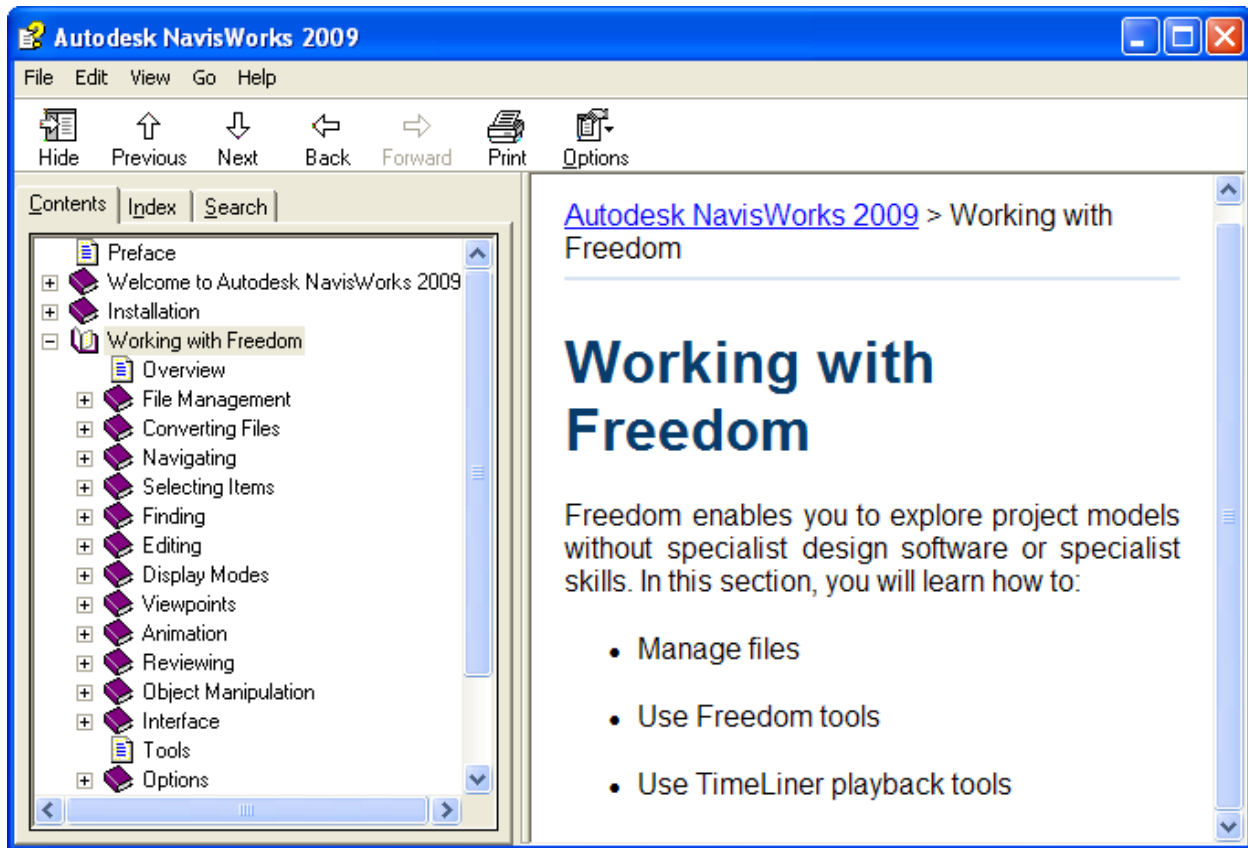
If the online documentation and help does not answer your query, try www.autodesk.com/support. If the website does not help answer your problem, you should contact the reseller from whom you purchased the software.

Help Topics

NavisWorks contains full help documentation. This is structured in chapters, sections and procedures which can be easily navigated on the **Contents** tab.

To open the NavisWorks help documentation, click **Help > Help Topics** on the menu bar.

The **NavisWorks** help window is displayed:



In the **Contents** tab, select an item to view its contents. Expand and contract the chapters and sections (identified with a book icon) using the plus and minus icons to the left of them. The contents of the selected item will be displayed in the right hand pane.

The **Index** tab has a full index of all NavisWorks help topics. Select the topic you are interested in learning more about from the list, then click **Display**. The selected topic will be displayed in the right hand pane.

Should you not be sure of the topic name that you are interested in learning more about, use the **Search** tab to search on any keyword. Enter the keyword to be found, then click **List Topics**. Any topics within the NavisWorks help containing the keyword you entered, will be listed. Select the topic you are interested in and then click **Display**. The selected topic will be displayed in the right hand pane.

You can enclose a phrase in quotation marks to search on that exact phrase.

What's This?

NavisWorks contains full context-sensitive help. If you want to find out more about any item in the interface. Click  and click over the toolbar button, window or menu command that you want to know more about. The appropriate **Help** topic will then be displayed.

NavisWorks on the Web

To visit the NavisWorks pages on the Internet, click **Help > NavisWorks on the Web** on the menu bar.

Customer Involvement Program

The Customer Involvement Program (CIP) is a program that dramatically improves the way Autodesk designs software and measures performance and quality. It lets customers be involved in helping make Autodesk products better meet their needs and the needs of the larger community of users.

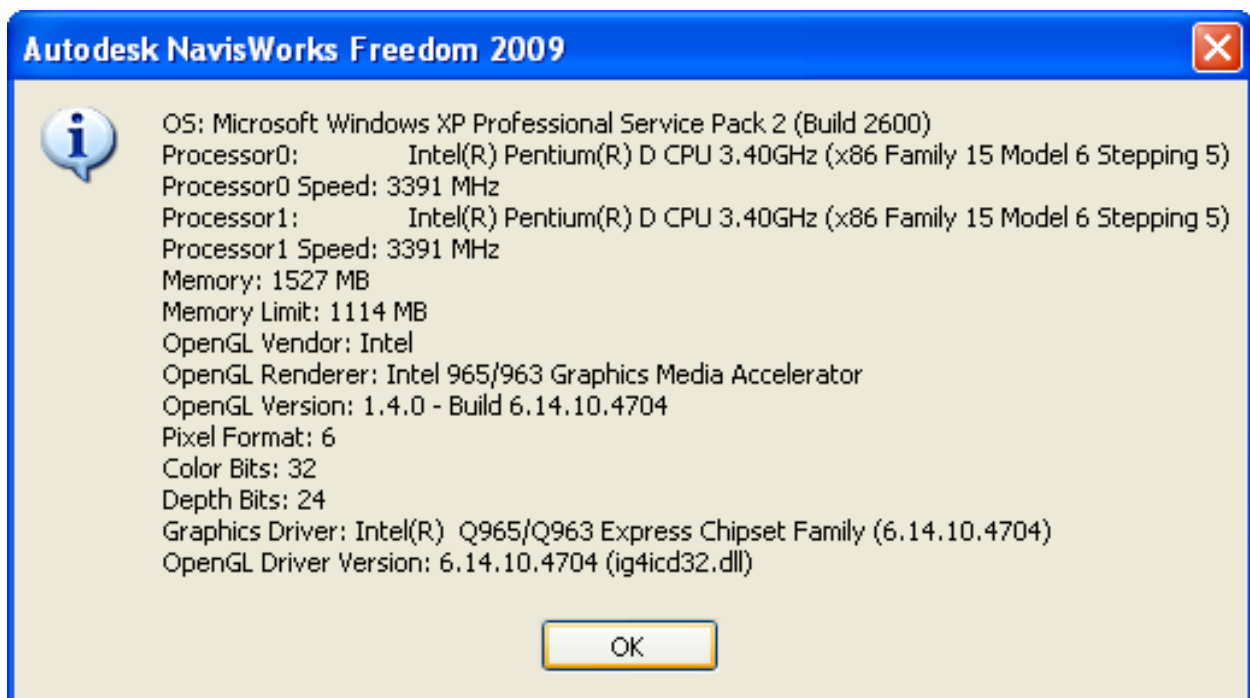
CIP automatically collects information about software features usage, system configuration and software errors from those customers that choose to participate. About once a day, a small file containing CIP information is sent to Autodesk's servers. The CIP program DOES NOT send actual design information to Autodesk so it is not possible for Autodesk to replicate your actual drawings or design information using the CIP information.

If you'd like to join the Customer Involvement Program, click **Help > Customer Involvement Program** on the menu, select the participation option in the dialog box, and click **OK**.

You can stop your participation in the CIP program at any time by accessing the CIP dialog box again.

System Info

Opens a dialog giving you detailed information about your system, which can be helpful in support situations.



About NavisWorks

Opens a dialog giving you information about your product, including version and build number, which can be helpful in support situations.

Part 4. Using TimeLiner Playback

In this section you will learn how to play back a TimeLiner construction sequence in Freedom.

Chapter 20. Overview of TimeLiner

The TimeLiner tool adds 4D schedule simulation to Autodesk NavisWorks Freedom 2009.

In NavisWorks, TimeLiner has a playback-only option, allowing any externally created project data to be simulated, but no changes to be made to that data.

Working with the TimeLiner Window

By default, the TimeLiner window floats in the main NavisWorks window. Like all other floating windows, TimeLiner window is dockable and resizable, and will automatically lock to specific locations near to where it is moved. You can prevent it from docking while you drag it, by holding down Ctrl.

Note:

You can quickly dock and undock any floating window by double-clicking the window's control bar.

To open the TimeLiner window, select **TimeLiner** from the **Tools** menu.

The TimeLiner window contains the following:

- Simulate tab - enables you to set up and play simulations.

The Task Status

The Status Icons

Each task has its own **Status** identified by an icon, representing planned against actual relationships. Each icon shows two bars. The top bar represents the **Planned** dates, and the bottom bar represents the **Actual** dates. If the Actual start and finish dates are the same as the Planned start and finish dates, the bars are displayed in green. Any variations between Planned and Actual dates are displayed in red. Missing Planned or Actual dates are shown in grey.



Actual start and end dates equal Planned start and end dates.



Actual end date before Planned start date.



Actual start date after Planned end date.



Actual start date before Planned start date and Actual end date after Planned end date.



Actual start date before Planned start date and Actual end date equals Planned end date.



Actual start date equals Planned start date and Actual end date after Planned

end date.

 Actual start date equals Planned start date and Actual end date before Planned end date.

 Actual start date after Planned start date and Actual end date equals Planned end date.

 Actual start date before Planned start date and Actual end date before Planned end date.

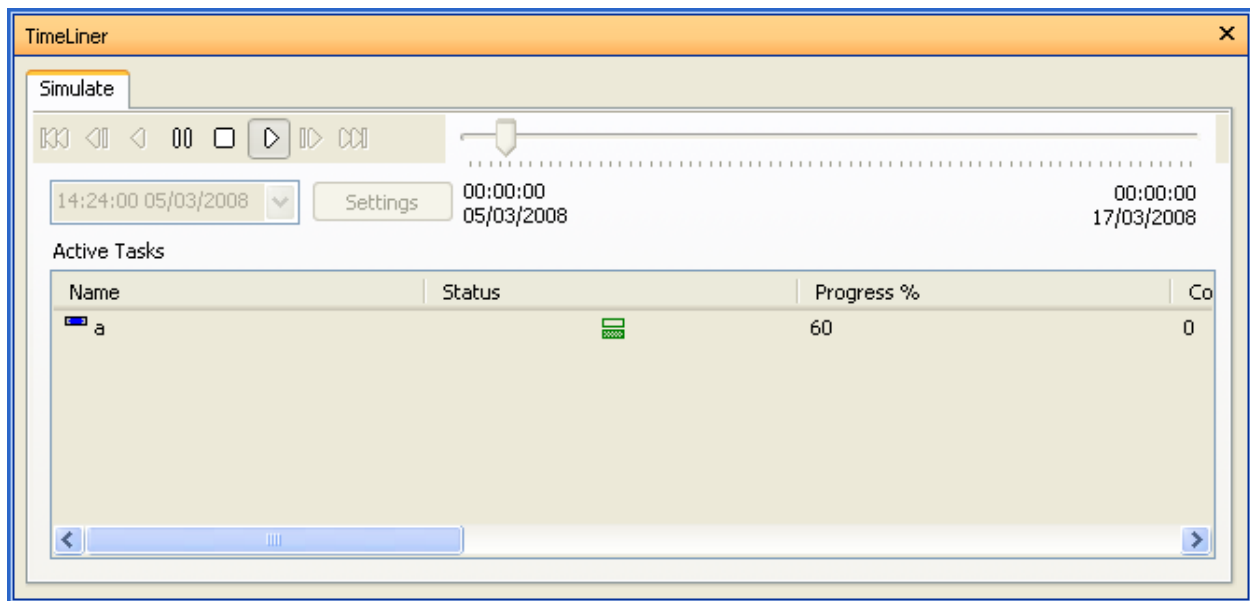
 Actual start date after Planned start date and Actual end date after Planned end date.

 Actual start and end dates only.

 Planned start and end dates only.

The Simulate Tab

The **Simulate** tab enables you to simulate your TimeLiner sequence throughout the duration of the project schedule.



The Playback Controls

Use the standard VCR buttons to step and play forwards and backwards through the simulation:

Rewind  will rewind the simulation back to the beginning.

 will step back a single step size.

Reverse Play  will play the simulation backwards.

Pause  will pause the simulation at the time you press it at. You can then look around and interrogate the model, or step forwards and backwards through the simulation. To continue playing from where you paused, just press **Play** again.

Stop  will stop the simulation playing and rewind back to the beginning.

Play  will play the simulation from the currently selected time.

Step Forwards  will step forwards a single step size.

Forward  will fast forward the simulation to the end.

You can use the **Simulation Position** slider to quickly move forwards and backwards through the simulation. Full left is at the beginning and full right is at the end.



The **Date/Time** box below the VCR buttons shows the point in time through the simulation. You can click on the drop-down icon to the right of the date to display a calendar, from which you can select a date to 'jump' to.

The Active Tasks

You can view the current simulation time for each of the active tasks, and how close to completion they are (**Progress** is displayed as a percentage). The **Status** of each active task is also displayed as an icon. For simulations where Planned and Actual dates are available, the status provides a visual representation as to whether there is any variance between the planned and actual dates. See TimeLiner task status for more information.

Playing Simulations

To play a simulation:

1. If the TimeLiner window is not already open, select **Tools > TimeLiner** from the menu bar.
2. Click the **Play**  button.

The TimeLiner window displays the tasks as they are carried out, and the main NavisWorks window shows the sections of the model added or removed over time, in accordance with the task types.

Glossary

Glossary of technical terms relating to Autodesk NavisWorks Freedom 2009.

Display Terminology

Average Frame Rate

This shows the current measured frame rate, averaged over the last second.

Average Frame Time

This shows the time taken to render the last frame.

Average Triangle Rate

This shows the rate at which triangles are being rendered and is a measure of how well your graphics card is working.

Culling

Culling is a process for determining items *not* to draw during the render of a scene. NavisWorks does a level of prioritized culling with the drop-out method of rendering interactive scenes, but you have a certain level of control over other aspects of culling such as backface, near and far planes.

Drop-Out

In order to maintain interactivity and guarantee a user-defined frame rate, NavisWorks only renders what it can in the fraction of a second it has. The remainder is "dropped out", or not rendered. However, NavisWorks prioritizes what is rendered and what is dropped out based on size of the item's bounding box, distance from viewer and size on screen, so only the less significant items in the scene are dropped out. Once navigation has ceased, the scene continues rendering until all items are visible.

Frame Rate

The frame rate is the number of frames per second (FPS) that are rendered in the main navigation window. NavisWorks guarantees a user-defined frame rate in order to maintain interactivity.

Export Terminology

These are terms specific to NavisWorks that are used in relation to exporting.

Codec

Codec stands for "COmpression-DECompression" and is a program that compresses and decompresses animations when creating and playing back .avi files. Codecs are installed independently of NavisWorks and are available when installed on your Windows™ system and the same codec that was used to create an .avi file is required to play it back.

File Terminology

.nwc Cache Files

When any native CAD file is opened or appended, NavisWorks creates a cache file (.nwc) if the write cache option is set. When the file is next opened or appended, NavisWorks will read data from the corresponding cache file rather than re-converting the original data if the cache is newer than the original file. If the original file is altered, NavisWorks will re-create the cache file when it is next loaded. Cache files speed up access to commonly used files. They are particularly useful for models made up of many files of which only a few are changed between viewing sessions. Cache files can also be exported from some CAD applications where a native file reader is not available with NavisWorks. Cache options can be edited from the **Global Options** dialog box under the **Tools** menu.

.nwd Published Data Files

Published .nwd files are useful when wanting to take a snapshot of the model at a certain time. All the geometry and review information is saved into the .nwd file and cannot then be changed. Published .nwd files can also contain information about the file, as well as being able to be password protected and time-bombed for security. These files are also very small, compressing the CAD data by up to 80% of the original size.

Published .nwd files are useful when issuing models for viewing by others with the NavisWorks Freedom free viewer, as well as being appendable themselves into NavisWorks to build up a larger scene.

.nwf Review Files

Review files are useful when using the native CAD files appended into NavisWorks. They store the location of the appended files, along with any design reviews made in NavisWorks, such as comments, redlines, viewpoints, animations and so on.

If a group of files is appended into a NavisWorks scene, and saved as an .nwf file, then on re-opening this .nwf file later, once the original CAD files have been changed, the updated CAD files will be loaded into the scene for review.

External References

External references (sometimes called reference files or "XRefs") are shown in NavisWorks selection tree as an inserted group. NavisWorks looks for the externally referenced files in the same place as AutoCAD or MicroStation would.

If the **Unresolved XRef** dialog box is shown, then this link has somehow been broken and the referenced files need to be relocated to where AutoCAD or MicroStation would expect them to be.

If these XRefs are not important for the current session, then you can **Ignore** the reference and the file will load without that XRef inserted. Similarly, **Ignore All** will load the file without any unresolved XRefs.

You can also use the **DWG/DXF** and **DGN** options in the **Tools, Global Options** dialog to set whether external references are loaded or not, giving you more control over file appending into NavisWorks.

Faceting Factor

During an export from a CAD package to .nwc, or while NavisWorks is reading a native CAD file, decisions must be made as how a curved

surface is reduced to flat facets. For most applications and file formats, you have control over the level of faceting that takes place.

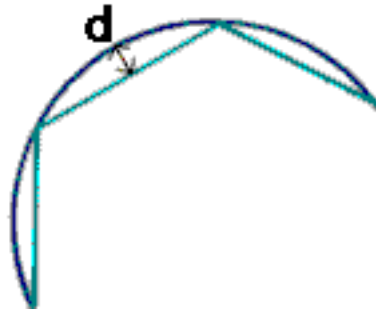
All items, no matter what their size, will use the same faceting factor and so have the same number of sides to curved entities. Therefore, you need to experiment a little with different values to account for the size that these items will appear on screen.

The faceting factor must be greater or equal to 0, where 0 results in the faceting factor being turned off. The default value is 1, if you double the value you get twice the number of facets, if you halve the value you get half as many facets. Larger faceting factors will result in more polygons to a model and larger NavisWorks files. There is little point having a large faceting factor if these curved entities are golf balls viewed from 200 yards!

For AutoCAD exports, the faceting factor is set from the NWCOPT command, MicroStation's faceting factor is set from **Options**, which is available from the NWCOUT export dialog, and the option to set the faceting factor on reading CAD files is found by choosing **Tools, Global Options**, and the relevant options tab.

Max Facet Deviation

Maximum facet deviation is used in conjunction with faceting factor to ensure that larger objects, with too large a deviation from the original, have additional facets added. If a difference greater than the entered value is found in a model it adds more facets. The values are measured in the model units.



Where d is greater than the maximum faceting deviation value, more facets are added to the object.

If the max faceting deviation is set to 0, then this function is ignored and just the faceting factor is used.

Shape Merge Threshold

MicroStation shapes are polygons that can have 3 or more vertices. They're often used to model more complex objects which can waste memory. So, NavisWorks merges all shapes on the same level or in the same cell and with the same color into a "Shape Set" if these shapes have less than or equal to the number of vertices given by the *Shape Merge Threshold*.

Selection Terminology

These are terms specific to NavisWorks that are used in relation to selecting items.

Composite Objects

A composite object is a group of geometry that is considered a single object in the selection tree. For example, a window object might be made up of a frame and a pane. If a composite object, the window object would be both the frame and the pane and be selected all at once.

Instances

An instance is a single object, which is referred to several times within a model, for example a tree. This has the advantage of cutting down on file size by not unnecessarily repeating an object.

Item Name

The original CAD or NavisWorks assigned identifier. Any item can have a name and this name will usually come from the original CAD package that the model was created in.

Item Type

Every item in NavisWorks has a type. Examples of types are reference files, layers, instances (sometimes called inserts) and groups. Every CAD package also has a number of geometry types, for example, polygons, 3D Solids and so on.

Selection Resolution

The selection resolution is the level in the selection tree you start selecting at. You can cycle through items in the tree by holding down the shift key during a selection.

User Name and Internal Name

Each category and property name has two parts - a user visible string which is localized and an internal string which isn't and is mainly used by the API. By default when matching names in the Smart Tags and Find Items dialogs, both parts must be the same, but you can use the flags to match only on one part. You might use **ignore user name** if you wanted to match something irrespective of which localized version was being used.

Viewpoint Terminology

Angular Speed

The speed that the camera moves when turning right and left in any navigation mode.

Aspect Ratio

Aspect ratio is the proportion of x-axis to y-axis size. For example, in exporting a bitmap of a viewpoint, maintaining the aspect ratio would keep the proportion of the view even if the number of pixels was different.

Anti-aliasing

Anti-aliasing improves image quality by softening the jagged edge appearance of sharp lines. 2x to 64x refers to the extra number of frames that are required for the anti-aliasing process. The greater the number of frames, the finer the effect, (with the consequent increase in rendering

	time).
Camera-Centric	Navigation modes in which the camera is moved around the model (c.f. model-centric).
Field of View	The field of view of a camera is the angle that the camera can see. A large field of view will fit more into the view, but will look distorted and a small field of view will tend to make the view more flat, tending towards an orthographic view. There are two fields of view in NavisWorks - vertical and horizontal. Editing one will change the other and the two are related by the viewpoint's aspect ratio.
Focal Point	The focal point is the position in 3D space that the camera will rotate around or zoom into in examine, orbit, turntable and zoom modes.
Model-Centric	Navigation modes in which the model is moved in front of the camera (c.f. camera-centric).
Roll	The roll of the camera is its angle around the viewing axis. This cannot be edited in a navigation mode where the world up vector stays upright (walk, orbit and turntable).
Saved Attributes	Each viewpoint can optionally save the state of its hidden and "required" items, as well as any material (color and transparency) overrides. Then, on recalling the viewpoint, those same items are re-hidden, re-made required, and the materials reinstated. This can be useful in the creation of animations when dragging on viewpoints onto an empty animation.
Tilt Angle	This is indicated in the scene's units below (negative) or above (positive) horizontal (0) at the base of the tilt bar.
World Up Vector	The direction that NavisWorks considers "up" is called the "world-up vector". This is maintained in the walk, orbit and turntable modes.

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