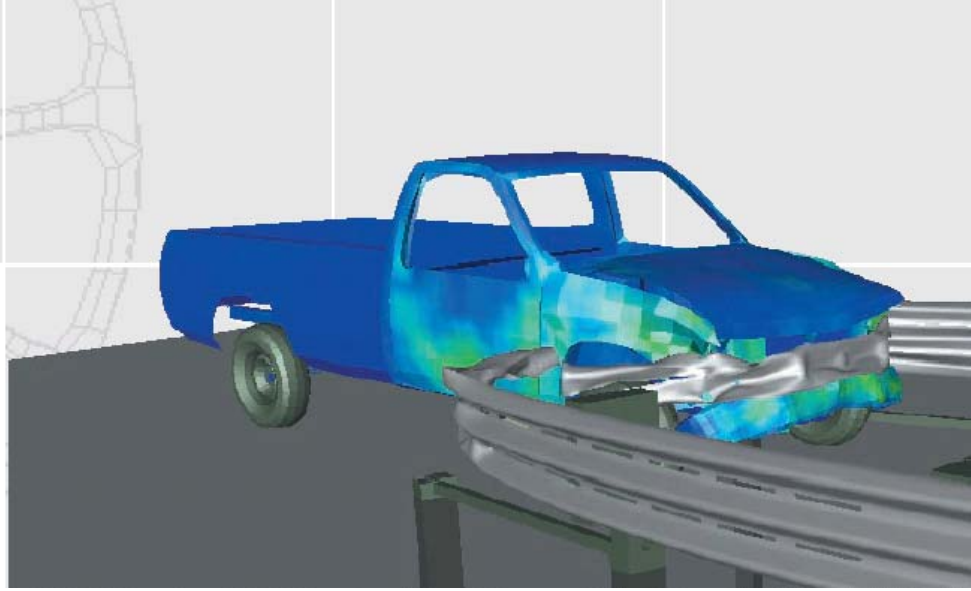


Revised
August
2003



Installation Guide & Tutorial GLview Pro 6.4

Windows NT/2000/XP
Unix/Linux

Advanced visualization technology from

ceetron

www.ceetron.com

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Ceetron believes the information in this leaflet is accurate as of its publication date. The information is subject to change without notice and is subject to applicable technical product descriptions.

Trondheim, Norway, August 2003

1 Introduction

GLview end-user products

GLview Pro

GLview Pro is a powerful post-processor for interactive 3D visualization and animation of results from engineering applications. It can export results to the GLview Express file format and it supports ABAQUS, ANSYS, FEMAP, I-DEAS, LS-DYNA, MSC.Marc, MSC.Nastran, NE/Nastran, and RADIOSS. Available on Windows, Linux, and Unix.

GLview Express (free)

GLview Express is a free add-on stand alone application to GLview Pro. GLview Express reads data sets generated by GLview Pro and can be distributed to customers and clients. The product is ideal for interactive presentations of technical results. Available on Windows and Unix.

GLview 3D Plug-in (free)

The GLview 3D Plug-in is a free add-on plug-in to the GLview environment for presentation of real element models and results. It enables you to present your 3D analysis models interactively in a PowerPoint Presentation and in Internet Explorer. Available on Windows.

GLview developer products

GLview Visualization API

GLview Visualization API is a C++ object-oriented application-programming interface for development of 3D visualization software. It allows the developer to utilize all of GLview Pro's advanced features and rendering techniques and integrate it into another program environment. Available on Windows and Unix.

GLview Express Writer

The GLview Express Writer enables developers of commercial and in-house FEA codes to utilize the free presentation tools GLview Express and GLview 3D Plug-in. By using these products, FEA data can easily be shared across different HW and SW platforms without the need of installing licensed software.

By using GLview Express, the FEA model and results can easily be shared with colleagues, suppliers, partners, and management for review or for further analysis. With the use of GLview 3D Plug-in, the 3D FEA data can be viewed interactively in PowerPoint or Internet Explorer.

Geometry models, result selections, animation settings, and various output options (e.g. draw modes wire frame, points, surfaces) can be conveyed to GLview Express and GLview 3D Plug-in by means of a VTF file. The VTF file format preserves all FEA characteristics such as node and element numbering, element topology, and the original numerical result values.

The VTF file can be distributed to colleagues, sub suppliers, partners, and management for review. Moreover, the VTF file can be read by the full blown post-processor GLview Pro for further interpretation and analysis.

2 Installation guide

Contents of distribution

A commercial version of GLview Pro contains the following items:

User Guide (on paper and as .pdf document)

License and Maintenance Agreement

Installation CD:

- GLview Pro executables:
UNIX (SGI, Digital, Sun, HP, IBM, Linux)
Windows NT/2000/XP
- FEA import filters for commercial solvers, please refer to Chapter 7:
MOVIE.BYU (ASCII and binary)
VTF (ASCII and binary)
- GLview Pro online help
- Demonstration and tutorial data sets

Supported operating systems

Windows NT/2000/XP

SGI IRIX 6.x

Compaq Tru64, Digital OSF/1 4.0. OpenGL operating system option is required.

Sun Solaris 2.7 with OpenGL option installed (OpenGL hardware is optional).

HP HP-UX 10.20. VISUALIZE FX2/4/6 card and an operating systems extension is required.

IBM RS/6000 AIX 4.3 with OpenGL option installed.

Linux kernel 2.4.18-3 or later, GNU GCC runtime environment version 2.96 or later, and XFree86 4.1.0 (for OpenGL).

Installation instructions on UNIX

The GLview Pro installation on UNIX is available in two versions; **GLview** and **XGLview**.

GLview Pro requires OpenGL, the X-version does not require any specific hardware and may be run locally on any machine or remotely from another machine (e.g. a network server). Run the OpenGL version whenever possible.

OpenGL can be installed as an operating system extension on all UNIX platforms supported by GLview. Some UNIX platforms also require an OpenGL supported graphics card to be installed (software emulation not possible). Contact your system administrator or hardware provider for further details.

The following files are included in the distribution:

```
glv_iris.tar: SiliconGraphics IRIX 6.x
glv_osf1.tar: Digital UNIX (OSF/1) 4.0
glv_sun.tar: Sun Solaris 2.7
glv_hpux.tar: HP HP-UX 10.20
glv_aix.tar: IBM RS/6000 AIX 4.x
glv_lin.tar: Linux kernel 2.4.18-3
models.tar: 4 demonstration models and 2 tutorial data sets.
```

Make sure that the GLview Pro CDROM is inserted, and that the CDROM player has been mounted correctly. In the below instructions, it is assumed that the mount point is /CDROM. If this is not the case, please change accordingly.

Change to the directory where you want GLview Pro to be installed.

1. Unpack the selected GLview Pro executable tar archive (e.g. IRIX):

```
% mkdir glview
% cd glview
% tar xvf /CDROM/unix/glv_irix.tar
```

Some systems may require
.../UNIX/... (uppercase)

You need to add to your path the location of the GLview Pro executable. You can make this setting in the shell by typing

```
% set path=(/<...>/glview/bin $path)
```

at a C type (csh/tcsh) shell prompt. For Bourne type shells (sh/bash), type

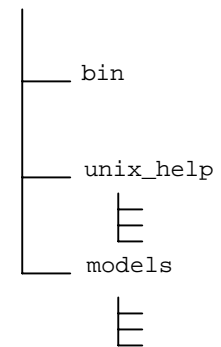
```
$ PATH=/<...>/glview/bin:$PATH; export PATH
```

To make the path setting permanent, add the command to your .login or .cshrc file (for C type shells) or your .profile file (Bourne type shells).

2. Run GLview Pro:

```
% glview (OpenGL version)
% xglview (X-version)
```

Directory structure
after installation:



Troubleshooting

Graphics

Some graphics cards (especially third party hardware) may cause various drawing errors due to OpenGL and driver bugs:

“Holes” in the geometry model

The problem is usually not recognizable but may appear in certain steps of an animation. The problem is caused by a hardware bug and/or a faulty implementation of OpenGL function in the software drivers. Updated drivers from the manufacturer should in most cases fix this problem. If new drivers do not fix the problem, try the following commands in GLview Pro:

Command	Sub command	Description
fix	quad	Enable drawing of quads as polygons
fix	noquad	Disable drawing of quads as polygons

Line drawing error

Mesh lines are on rare occasions drawn more or less “randomly” due to a line-clipping bug in OpenGL or the software driver. If you suspect such problems, try the following commands:

Command	Sub command	Description
fix	lineclip	Enable drawing of lines one at a time to avoid line-clipping bug
fix	nolineclip	Disable line clipping fix

Mesh line, hidden line and shading errors

If mesh lines and hidden lines appear as stippled lines (or partly invisible), try to adjust the meshfactor (vertical distance between mesh and polygon surface) and set polygon offset to on/off.

Two typical settings are:

Command combinations	Description
(1) meshfactor 0.0005 nopolygonoffset	Set distance between mesh lines and polygon surface to 0.0005. Disable use of polygon offset.
(2) meshfactor 0 Polygonoffset	Set distance between mesh lines and polygon surface to 0. Enable use of polygon offset (requires OpenGL 1.1).

Please be aware that the polygon-offset feature is not properly implemented in all OpenGL renderers, thus the last set of commands may not work at all. In this case, use the first command combination (1). The polygon offset requires OpenGL 1.1 or an extension in OpenGL 1.0.

License key and permissions

Entering new license key

If you are unable to enter the license information, the most likely problem is that you do not have permissions to write to the GLview Pro program directory.

The license key resides in the `glview.glk` file. If you still cannot change the license code, you may edit the file directly and type in the key provided by Ceetron.

Example of file content:

```
12018433-CIUH-12331-GGED-CDPPEGBUPO  
User name
```

Number of users exceeded

GLview Pro performs license check on the local area network. If the message “*Number of current users exceeds number of allowed simultaneous users for this GLview license*”, more users than the available number of registered licenses are used at the same time. The license key is issued as a floating license with a maximum number of users that is defined in the license key.

Dongle problems

If you have a dongled version of GLview Pro, please refer to the separate troubleshooting sheet included in the installation package.

Problems with file associations

When running GLview Pro for the first time, a number of file extensions are automatically associated with the program. If several `glview.exe` files are installed on the computer, the `forceregisterfiles` command will automatically associate these files with the currently running GLview Pro

3 GLview Pro main overview

Basic operations

1. Open input files from the menu or via the "Primary Files" icon.

2. Enable color fringes to display scalar values.

Command prompt with list of recent commands.

Open the *Info window* to obtain more information about element type, node/part number, scalar values, etc. Click on selected elements while pressing the **Ctrl**-key

Look for useful information during file loading, command input, etc.

3. Select the desired scalar and vector results to display or to animate.

4. Select inner, middle or outer

5. Set up animation and run!

Enter commands and use the **TAB**-key to complete commands or get hints on available parameters. Type "?" after a command to see available subcommands. Press **F1** to get more help on a command.

GLview Info

#	Node	X coord	Y coord	Z coord
1	389	3.31024	-1.38344	-6.87839
2	241	2.94171	-1.20569	-6.35474
3	249	3.04021	-0.607067	-6.25987
4	390	3.45903	-0.707179	-6.78608

#	Node	Scalar	Vector X	Vector Y
1	389	0.000642765	0.250593	0.0036529
2	241	0.000604158	0.246157	0.00593653
3	249	0.000641102	0.245204	0.00598971
4	390	0.000615474	0.250821	0.00375335


```

Part attributes updated.
> np 2.137 2.145 2.381 2.374
Creating node plot for 4 node(s)
> plt bgcolor 255 255 255
Set plot background color to 255 255 255
> showresultsdialog
Results dialog shown.
> showinfodialog
Enable display of model and results information dialog
> showinfodialog
Enable display of model and results information dialog
    
```

Select LS-DYNA Results

Category: All result types Filter vectors Apply Shell surface: Inner Middle Outer

Scalar: Von Mises Effective Stress Animation...

Vector: Displacement Close Dialog

State: 141: Time: 6.99963e+003 Auto apply

Animation Control

1 2 4 6 8 10 12 14 16 18 21

Current Step: 4

Cycle Animation Fixed Viewpoint

Program features

GLview Pro is an effective and compact 3D visualization program handling large quantities of results data. Data originating from applications within structural mechanics, marine hydro dynamics, fluid dynamics, and other scientific analysis, can be animated interactively if time-dependent results are available.

FEA APPLICATION SUPPORT

- Direct file readers for commercial solvers (please refer to Chapter 7 for a complete list)
- Support for separated geometry and results files

USER INTERFACE

- Intuitive, easy-to-use graphical user interface
- Flexible command and scripting language
- On-line documentation
- Drag & drop files with auto-detect functionality
- Advanced picking and elaborate feedback of information on the model, results, part/material, and element properties

INTERFACES, IMPORT/EXPORT

- Generic file format import/export: VTF and MOVIE.BYU
- Output of images to BMP, TIF, IRIS RGB, PostScript (bitmap), PPM, and output to VRML 1 and 2
- Generation of MPEG, AVI, and animated GIF
- Generation of VTF files for GLview Express and 3D Plug-in
- Export of 2D plot data to file
- Import of custom plot data
- Printing of 2D plot or 3D scene
- Direct HTML-export to Internet Explorer

INTERACTIVE ANIMATION

- Time domain and frequency domain (mode shape) animation of scalars, vectors, and displacements
- Particle trace and cutting plane animation
- Viewpoint animation
- Real-time manipulation of models during animation
- Interpolation between time steps during animation

FEATURES

- Display of scalar and vector results
- 2D plotting of nodal/element results
- 2D plotting of scalar results along user defined lines
- Trace lines of vector results (node tracing)
- Extraction of element results through picking
- Rigid body transformations
- Advanced mirroring options with multiple planes
- Contour and legend control
- Logging of commands
- Scaling of model

ELEMENTS AND DATA SUPPORT

- Beams, triangles, quads, tetrahedrons, hexahedrons, pentahedrons, pyramids
- Eroded elements
- Adaptive meshes
- Unstructured grids
- Nodal and element results

RESULTS DISPLAY OPTIONS

- Polygon viewing by surfaces, lines, and points
- Outline, hidden line, outline mesh, overlaid mesh
- Filled contours (textured, plain, or shaded)
- Contour lines
- Vector arrows (with fringe colors) and damping of vectors
- Multiple particle traces of volumetric data results
- Multiple cutting planes
- Iso surface

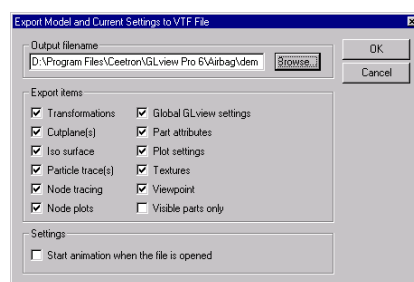
RENDERING

- High performance graphics suited for animation of large models
- Software and hardware rendering support using OpenGL
- Set optional point of rotation
- Perspective/orthographic projection
- Shading, flat and smooth shading (Gouraud shading)
- Lighting, arbitrary colors, multiple light sources and directions
- Texture and environment mapping
- Anti-aliased lines
- Set transparent surfaces independently for each part

Export to VTF files for GLview Express and GLview 3D Plug-in

GLview Express and GLview 3D Plug-in can be downloaded for free at www.ceetron.com!

Quick generation of VTF files



Open a model in GLview Pro, start the animation and set the desired display attributes. Select the menu **File/Export to file/VTF file** to export the model.

You can choose several different **Export items**, and among these the **Visible parts only** is important to remember to reduce the size of your VTF file. Also **Start animation when the file is opened** will save the receiver time by starting the animation automatically.

Generation of VTF files (detailed)

To generate a VTF file you must have GLview Pro installed. Load the results database, select scalar/vector results, select a number of steps to animate and load the animation. Set the desired display attributes (e.g. fringes, displacements, colors, and eye point) and export the current animation to a VTF file. The file is now ready for GLview Express and GLview 3D Plug-in.

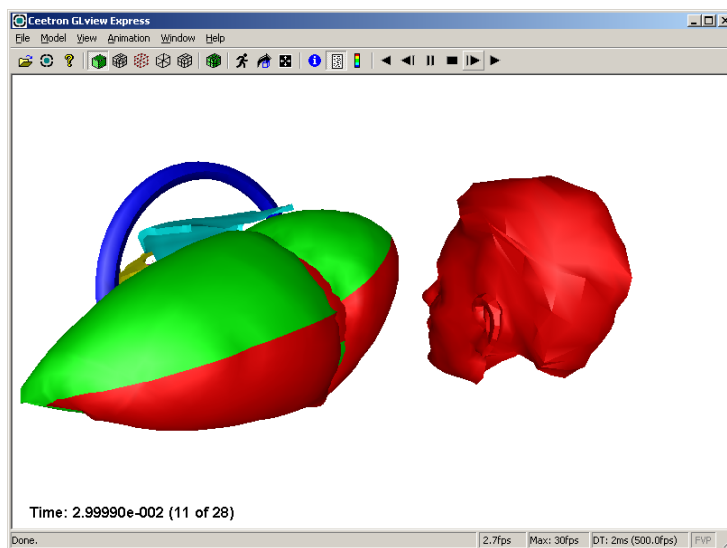
If the initial results database is very large, you should not worry too much about the final file size of the VTF file since GLview Pro extracts only the geometry, one scalar and one vector result. Despite the smaller file size, element information or the results will not be manipulated or reduced in any way!

Distribution of results

The VTF files are usually of a size that allows e-mail and FTP distribution. Compress the files in a zip-archive, send the files and have the other party unpack the files and install GLview Express. 2 minutes and the animations should be running!

What does GLview Express do?

GLview Express enables you to generate attractive interactive technical reports containing 3D animations and technical documents describing your analysis cases.



GLview Express is ideal for presentation for clients on a laptop PC or workstation. Complete file sets can be distributed to you customers via email, FTP or CD-ROM. The program can even work as your own archive containing extracts of previous simulations.

Supported file type

GLview Express supports VTF files generated by GLview Pro:

VTF files containing a 3D animation of the element model and with a limit of one scalar and one vector results set per file.

How to use the 3D Plug-in in Internet Explorer

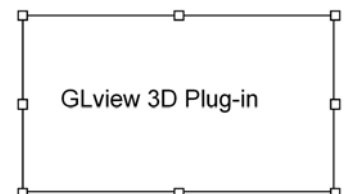
Adding the Plug-in to a website:

- When you have set all settings in GLview Pro, and are ready to export to a VTF file, you choose instead “File/ Export To File/ HTML Page ...”.
- Choose file name of HTML page and location.
- Also check “VTF settings ...”.
- Click “OK”.
- The 3D Plug-in will now open the VTF file at the website you defined.

How to use the 3D Plug-in in PowerPoint

Adding the Plug-in to a PowerPoint presentation:

- Create a new presentation in PowerPoint.
- Open the “Control Toolbox” (View/ Toolbars/ Control Toolbox).
- Click the “More Controls” button.
- Select “GLview 3D Plug-in” from the list that appears (if you are unable to find it, the Plug-in is not installed on your computer.)
- Drag a rectangle over the area you want the Plug-in to cover.
- The Plug-in should now look something like the figure to the right.



Using and Customizing the Plug-in

When you have added the Plug-in to your slide, you may start setting its properties and add buttons to load VTF files into the Plug-in. There are two ways to make the Plug-in load VTF files:

- FileURL property (Easy Usage)
- Open () method (Advanced Usage)

Easy Usage of the Plug-in using the FileURL property

If you right-click the Plug-in and select “Properties”, you will get its property window.

Write the name of a VTF file for the FileURL property, and close the property window.

View the slide show. The Plug-in will now open the VTF file immediately when the sheet/ slide containing the Plug-in appears!

Advanced Usage of the Plug-in using the Open () method

The Plug-in has a method called Open (). This method takes a filename as argument, and opens it if it is a VTF file.

You have to specify an action that causes the Open () method to be executed. The most obvious way to do this is to add a button to the slide, and implement this button’s OnClick () method, which is executed when the button is clicked.

To add a button, select “Command Button” from the Control Toolbox, and drag a button into the document/ slide. The button will look something like this:



If you right-click the button and select “View Code”, you’ll see the code that handles the click of the button:

```
Private Sub CommandButton1_Click()  
End Sub
```

Add a code line that calls the Open () method of the Plug-in, with a VTF filename as argument, for instance:

```
Private Sub CommandButton1_Click()  
GLview3DPlugIn1.Open("test.vtf")  
End Sub
```

Select “File/Close and Return to Microsoft Word/ PowerPoint” in the menu. Now, if you in Word click “Exit design mode” or in PowerPoint view the slide show, the Plug-in will open the specified VTF file when the button is clicked!

Important:

Please note that newer versions of Microsoft Office applications have the security level for macros set to “high”. This means that macros are not run at all and no message about this is given. If you want to create a PowerPoint presentation where you want to click a button to open a VTF file with GLview 3D Plug-in, macros must be enabled.

We recommend setting the security level to “medium”. If the document or the presentation has macros, then you’ll get a warning message telling that the document contains macros when you open it, and you’ll get the opportunity to enable or disable macros. To change the security level, select “Tools/ Macro/ Security...” in the menu, and select the wanted security level.

Additional properties

The “FileURL” property has been described already. There are two other properties that may be set just like you set the “FileURL” property.

The “TOOLBAR” property

This property may be either “ON” or “OFF”, depending on whether or not you would like the toolbar to be available initially. Default is “ON”.

The “SWRENDERING” property

This property may be either “ON” or “OFF”, depending on whether or not you would like the Plug-in to use software rendering of OpenGL graphics. Default is “OFF” (hardware accelerated OpenGL).

4 Getting started

Introduction

This chapter provides an instructional tour through GLview Pro by highlighting some key features. A large number of additional commands, functions and settings are available and is listed in the online help.

For useful hints when using GLview Pro, please see Chapter 5 for tips and hints.

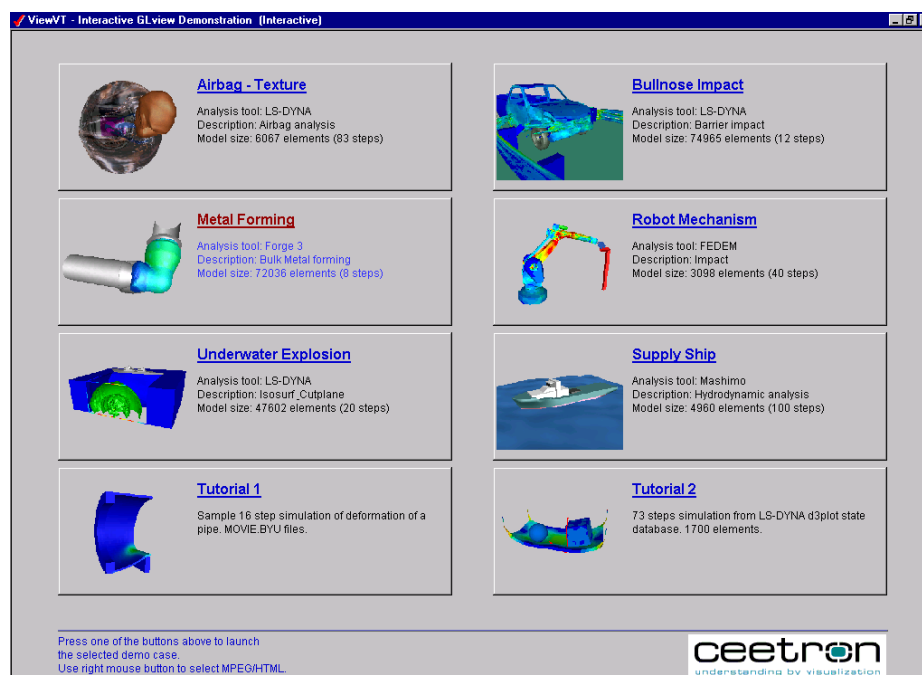
Tutorial examples

- **Tutorial 1:** MOVIE.BYU files. Cyclic deformation of a pipe. 16 steps.
- **Tutorial 2:** LS-DYNA d3plot files. Two objects are hitting a plate. 73 steps.

Demo models

- **Airbag - Texture:** Analysis tool: LS-DYNA. Description: Airbag analysis. Model size: 6067 elements (83 steps).
- **Metal Forming:** Analysis tool: Forge 3. Description: Bulk metal forming. Model size: 72036 elements (8 steps).
- **Underwater Explosion:** Analysis tool: LS-DYNA. Description: Isosurf cutplane. Model size: 47602 elements (20 steps).
- **Bullnose Impact:** Analysis tool: LS-DYNA. Description: Barrier impact. Model size: 74965 elements (12 steps).
- **Robot Mechanism:** Analysis tool: FEDEM. Description: Impact. Model size: 3098 elements (40 steps).
- **Supply Ship:** Analysis tool: Mashimo. Description: Hydrodynamic analysis. Model size: 4960 elements (100 steps).

MPEG video sequences of all the six simulations are included in each model folder for use with an MPEG player. File names: demo .mpg.

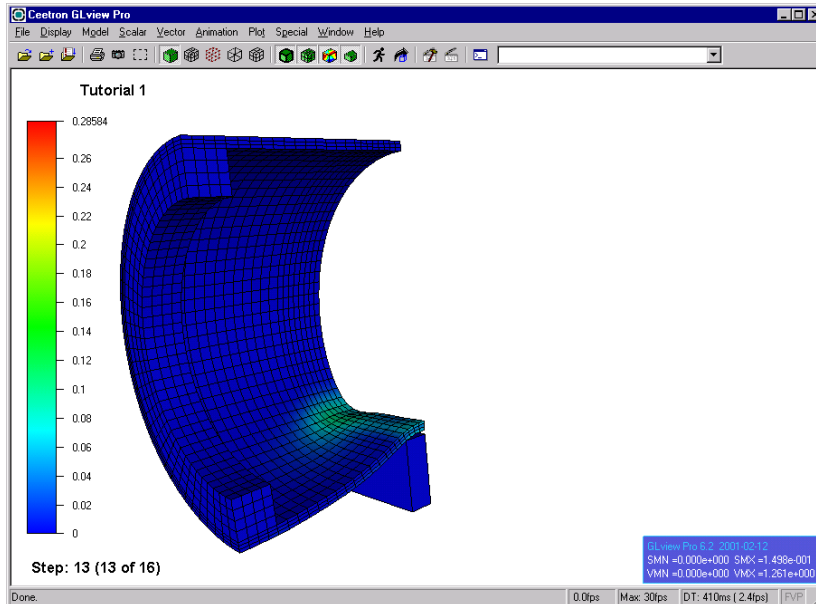


ViewVT lauch pad for Windows (not available on UNIX).

Tutorial 1: Main program features

Start GLview Pro by selecting Start menu/Program Files/Ceetron/GLview Pro from the Start menu.

Select Open Primary Files from the File menu and select the Tutorial1 directory and the Dyna.res file. The data set contains a MOVIE.BYU data set with a geometry, scalar and vector file.



Sample model with displacements and fringes enabled.

Pan, rotate, and zoom

“Study” navigation mode

Use the mouse as a *Virtual Trackball* when in “study” mode:

Pan: Left mouse button.

Rotate: Right mouse button (it is like touching and moving a glass ball containing the model).

Zoom: Both mouse buttons (or middle button if present).

“Walk” navigation mode

Enable “walk” mode from the toolbar:

Walk: Left mouse button.

Rotate: Right mouse button.

Roll: Both mouse buttons (or middle button if present).

Please note the change in cursor appearance while you navigate the models.

Model display modes

The appearance of the model geometry model can be changed by selecting different options from the **Model** menu:

Show as surface: Default is to draw the model as surface polygons.

Show as lines: Display model as wire frame (grid).

Show as points: Display node points only.

Show as outline: Display models as simple “sketch” lines representing the outer edges of the model.

Show as hidden lines: Display model as lines, but only the closest surface.

Show mesh: Draw mesh on top of the geometry (requires surface mode).

Smooth lines: By utilizing anti-aliasing techniques, the grid model can be smoothed.

Smooth shading: This option uses Gouraud shading techniques to smoothen the model.

Mirror model: Select **Mirror Model/X-axis** to mirror the model around the YZ-plane ($x=0$).

Scalar results representation

The options available from the **Scalar** menu applies to all parts unless other is specified by the user:

Color fringes: Filled contours. The color spectrum consists by default of five colors and indicates the distribution and levels of e.g. stress components.

Contour lines: Iso-lines. Indicates value levels; results along one line have the same value.

Textured fringes: Use 16 distinctive colors rather than the five colored spectrum. Textured is more exact in the presentation of the parameter levels.

Fringe shade: Fringe shade is enabled by default. This option creates a 3D look and shading including the use of built-in artificial “lights” in GLview Pro.

Set scalar ranges: Ranges for filled contours and contour lines may be set independently. Default values are minimum and maximum of a step, or min/max of a time sequence.

Vector results representation

The options available from the **Vector** menu applies to all parts unless other is specified by the user:

Displacements: Displays model deformations.

Vector Arrows: Displays vector arrows.

Show undeformed model: The initial, undeformed geometry can be viewed as points and dots while the animation is running.

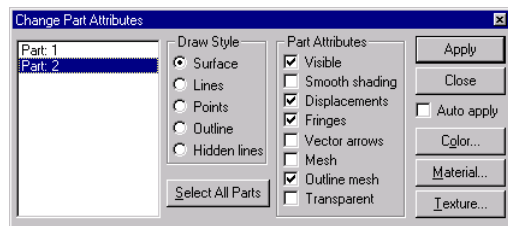
Vector Settings: Change the vector scaling factor (Default=1.0) and the arrow head size (Default=1.0).
Auto scale: Automatic setting of scaling factor in correspondence with model extent.

Part selection and change of attributes

All display settings or the representation of scalar and vector values may be set independently for each part of the model from the menu entry Model/Change Part Attributes.

Select part by clicking on the desired part within the graphics window while pressing the Ctrl-key.

Alternatively, highlight the part from the display list in the dialog.



Deselect parts by clicking on the desired parts inside the graphics window or in the display list. Deselect all highlighted parts by clicking elsewhere than the model while pressing the Ctrl-key.

The model consists of two parts. Highlight *Part 1* in the list. Uncheck the *Visible* box in the appearance options and press *Apply*. The pipe becomes invisible.

Highlight *Part 2* and check *Hidden lines* option to display the part as a mesh with hidden lines removed. Press *Apply*.

Select both parts and make them visible again. Uncheck the *Displacements* options to disable the deformation and uncheck *Fringes*. *Part 1* is red and *Part 2* is green. Open the *Color dialog* to change these initial color settings.

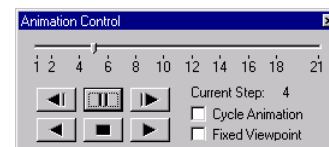
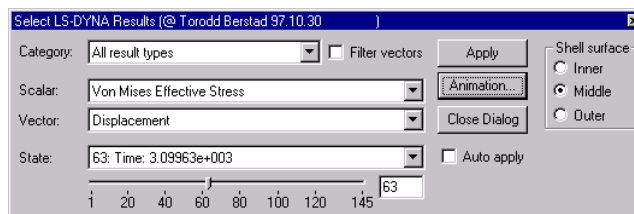
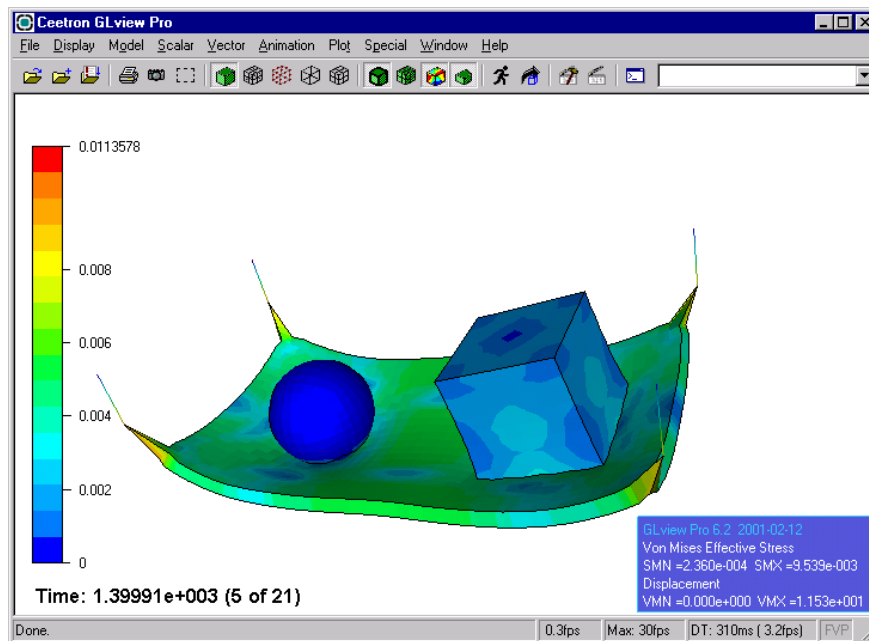
Tutorial 2: Advanced features

Select results

Select **Open Primary Files** from the **File** menu and select the **Contact** directory and the **d3plot** file. The geometry model becomes visible and the **Select LSDyna Results** dialog lists the available scalar and vector results for this simulation case.

- Select a scalar results type, e.g. “Von Mises” and an arbitrary step. Press *Apply*.
- Enable *color fringes* (filled contours) from the **Scalar/Color Fringes** menu option.

The results should look similar to the below screen image:



Animation of a LS-DYNA data set

Setting up an animation

Press the *Animation* button from the **Select LSDyna Results** dialog. By default, all available time steps are selected. If memory is low, GLview Pro will suggest a *Skip by* value to prevent the use of swap space. Press *OK* to close the **Animation Setup** dialog. From the **Animation Control** dialog you can pause and play the animation, or browse through the simulation step by step.

Fixed viewpoint animation

Enable the *Fixed Viewpoint* mode in the **Animation Control** dialog to speed up the animation. This option enables polygon reduction based on the first animation cycle. If you rotate the model, the animation is set back to the initial performance.

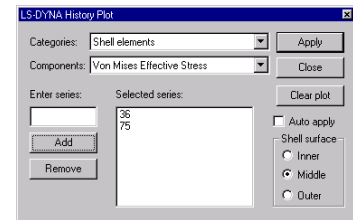
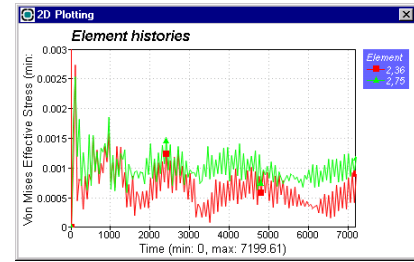
2D plotting

LS-DYNA Time History files

GLview Pro can plot variables from the LS-DYNA Time History file (d3thdt). Open a time history file from the menu **File/Open Files/LSdyna Time History file**.

Select the desired plot variables from the plot dialog, e.g. the *Category* “Shell Elements”, then “Von Mises Effective Stress”.

From the list box, select one or more elements. Press *Apply* to display the plot. To display the XY-plot in a separate window, select the menu option **Plot/Show Plot In Separate Window**. In this mode, the plot window may be enlarged and scaled. You may also want to change the axes and colors of the plot by selecting the **Plot/ Format Plot** menu entry.

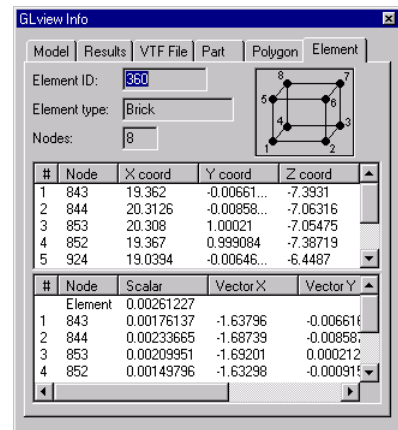


2D Plotting - set-up dialog and plot dialog.

Plotting of selected nodes and elements

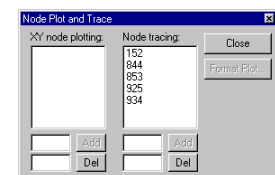
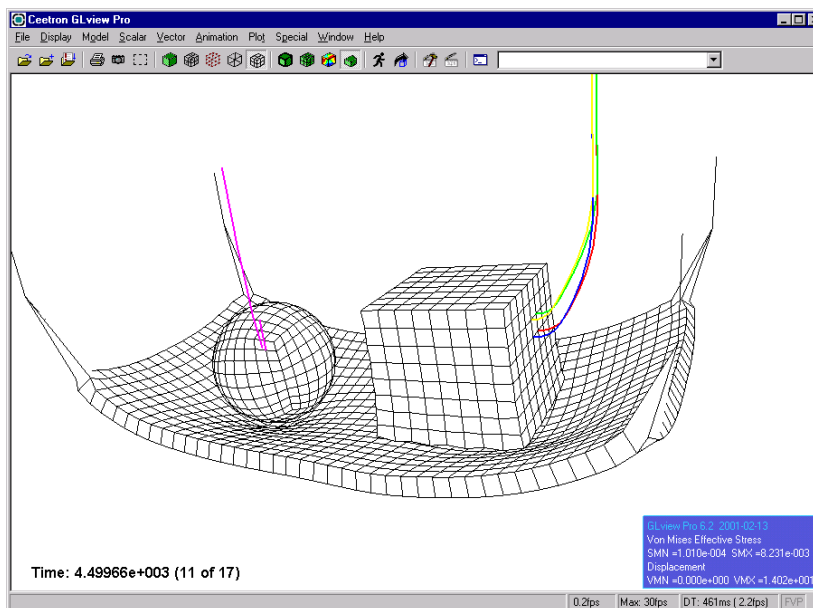
From the **Plot** menu, select **XY Node Plot**. Enter one or more nodes on the format <part,node>. You may want to use the *pop-up menu* to set up plots directly (right click on element while pressing **Ctrl**-key).

To find the proper part and node number of the element, move the cursor over the desired element while pressing the **Ctrl**-key. The information is printed in the **Statusbar**. For additional info (including scalar and vector values for each element), open the **Info window** and obtain the information by clicking on the element while pressing the **Ctrl**-key. To deselect a highlighted polygon, simply do the picking procedure elsewhere than on the model.



Node tracing

Draw *trace lines* (the node’s trajectory) for one or more specified nodes on the format <part,node>. Access the **Node plot and Trace** dialog from the **Vector/Trace Nodes** menu. You may want to use the *pop-up menu* to set up traces directly (right click on element while pressing **Ctrl**-key).

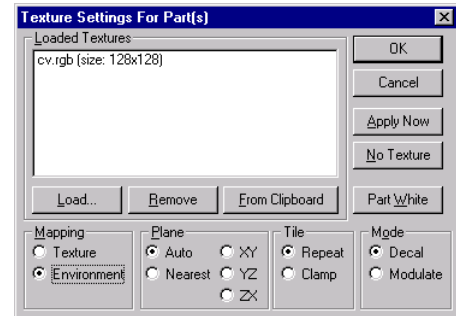


Tracing of selected nodes. Hidden lines view

Texture mapping

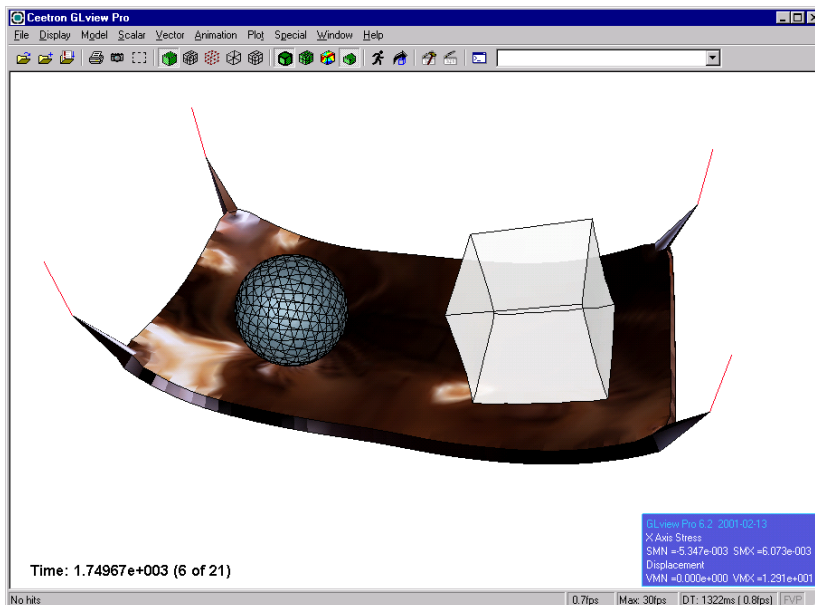
A special *texture image* can be applied to the model in order to display it with a shiny “metal” look. GLview Pro accepts true color (24 bit) images on BMP, IRIS RGB and TIFF formats. The texture file `cv.rgb` is used in this example.

- Stop the animation. Make sure all parts of the model is visible and displayed as surface.
- From the **Parts Attributes Dialog**, select *Part 4* (Mat:#4 ID 4).
- Open the **Texture Settings for part(s)** dialog by clicking the *Texture* button.
- Click the *Load Texture* button and load the file `cv.rgb`.
- Enable *Environment* mapping and *OK*.
- Enable *Smooth Shading* from the menu or the Parts Attributes Dialog.
- Restart the animation again.



Texture Settings dialog

The texture feature is very resource demanding and slows down the graphics performance if no OpenGL graphics board with texture memory is installed.



Environment texture mapping.

5 Tips and hints

Menus and user interface

Command and Message window

The window displays all commands entered from the command prompt with messages and additional information. All menu and dialog actions are printed as commands.

- Tab completion of commands: Use the **TAB**-key to complete a command entered in the command prompt. If the entered text string is not unique, all matching commands are listed. When the command is unique, available parameters and a brief explanation of the command is printed.
- Help on sub commands: Type “?” after a command to see available sub commands (e.g. `plt ?`).
- Command help: Press **F1** to get more help on a typed command.

Please note that some commands will not work until the required information or mode is present; e.g. iso-surface is not available when volume data is not loaded.

Info dialog

Open the **Info window** from the Window menu to obtain more information about element type, node number, part number, scalar/vector values, etc. Click on selected elements while pressing the **Ctrl**-key to see the information in e.g. the “Element” sheet of the Info dialog.

- Selection of parts: To select an individual part, click while pressing the **Shift**-key. To select a set of parts, make the selection by clicking while pressing the **Ctrl**-key.
- Continuous picking: Select the menu option **Special/Show Continuous Picking Info** to obtain a continuous display of element info. While pressing the **Ctrl**-key, move the mouse cursor over the elements to get more information.

Status bar information

Look for useful information in the status bar:

- Part/element/node information: Place the mouse cursor over a polygon/element and wait one second to see additional information.
- Command information: Available command parameters and a brief explanation is printed in the status bar when using the command prompt.
- File loading progress bar: When loading files and setting up e.g. an animation, the file loading progress may be observed and cancelled.

Right-click mouse menu

Open the *pop-up menu* by pressing the **Ctrl**-key and clicking the right mouse button while the cursor is positioned on the selected part. Please remember to *always* select a polygon or part (by using left mouse button while pressing the **Ctrl**-key) *before* using the right-click feature! From this menu you can:

- Show information of the model.
- Hide/display the selected part(s).
- Set up node plots and node traces if time-dependent data is loaded.
- Change the model’s rotation point to other than the center of the total model (default).

Drag & drop files

Any files associated or supported by GLview Pro can be opened directly by dragging the file inside the graphics window or GLview Pro icon. Please note that files must be opened in certain orders, e.g. a file containing the geometry description must be loaded before a view-file or certain command files.

Context sensitive menus

The entries in the menus will change after a geometry file or a results database have been loaded. This feature is implemented in order to make the file access procedure more logic and user-friendly. To override this, change the “Auto” setting in the file open dialog to another choice.

Change part attributes

Set draw styles (display settings) and other attributes for each part (e.g. Material IDs in LS-DYNA) from the **Change Part Attributes** dialog (**Model** menu).

Select part(s) directly from the dialog, alternatively, select a part by clicking on the desired part in the graphics window while pressing the **Ctrl**-key. The selected part(s) will be outlined by a bounding box.

- Color dialog: Set color for selected part(s)/materials
- Material dialog: Set material properties for selected parts/materials.
- Texture dialog: Load and assign texture images for selected parts/materials.

Using GLview Pro without hardware graphics

If graphics hardware supporting OpenGL 3D acceleration is not installed, the graphics performance of GLview Pro is solely dependent on the processor speed and the amount of installed RAM. The performance will be poor when visualizing large models and results.

However, there are ways to get around these limitations and—to some extent—increase the graphics speed (or at least make it easier to manipulate the models).

How to increase graphics performance

Outline: Move model as *outline* (**Model/Move As/Outline**) or *bounding box*.

Animation:

- Skip steps (e.g. load every tenth step) when loading large results databases.
- Use the *Fixed Viewpoint* animation mode (select this option from the **Animation Control** dialog).
- Load one analysis step at the time (one by one) from the **Results** dialog.

Hide parts: Hide selected parts of the model when examining large geometries.

The above listed features cannot be applied to all models, but it may be useful to be aware of them.

Settings that decrease graphics performance

The below menu settings increases response time heavily when displaying large model files without OpenGL graphics hardware:

- Texture and environment mapping
- Textured fringes (show scalars as textured fringes)
- Vector arrows and polygon normals
- Node numbers
- Contour lines
- Smoothed points (anti-aliased points)
- Smooth shading (gouraud shading)
- Smooth lines (anti-aliased lines)
- Fringe shade

6 Commands

Please refer to the GLview Pro on-line help for a complete reference.

Command line options

GLview Pro can be executed from a Unix/Linux shell, from a DOS prompt or via a Windows shortcut with several command line options.

Example: File open

```
% glview d3plot
```

This assumes that the LS-DYNA statedatabase file `d3plot` is located in the GLview Pro directory. If other location, enter the full or relative path name.

Example: Set window size and position

```
% glview -pos 100 100 640 480
```

Positions the window at position (100,100) and with 3D viewport size 640x480.

In Windows you may include these parameters in the Windows shortcut's properties (*Target* field).

Commands

GLview Pro has over 600 commands. In the online help these are grouped in the below categories.

Command groups:

File handling commands	Display commands
Model commands	Material properties commands
Polygon commands	Object transformations commands
Point and line commands	Animation commands
Complex results commands	Text and drawing commands
Scalar commands	Viewing and clipping commands
Vector commands	Model information commands
Volume commands	Texture and environment mapping commands
Boundary conditions commands	Plotting and tracing commands
Background commands	Miscellaneous commands

7 FEA file readers

Import filters for commercial codes

GLview Pro features direct file reading of:

- **ABAQUS:** Binary post file (.fil, .odb) (ODB support for Windows only)
- **ANSYS:** Binary results files (.rst, .rth and .rfl)
- **LS-DYNA:** State Database (d3plot), Time History File (d3thdt), ASCII plot files
- **I-DEAS:** ASCII universal file (.unv)
- **MSC.Nastran:** Binary Output 2 files (.op2)
- **MSC.Marc** ASCII (.t19) & binary (.t16)
- **RADIOSS:** Binary ModAnim file
- **NE/Nastran:** Binary Output 2 files (.op2) and bulk data
- **FEMAP:** ASCII neutral file (.neu)

Please refer to the GLview Pro on-line help for a complete reference on supported formats.

Import filters for GLview internal file formats

- **MOVIE.BYU:** ASCII and binary.
- **Open VTF format:** ASCII and binary. Only GLview Pro can read the open format, which can be written by GLview Express Writer or your own code. The format description available on Ceetron's web-site.
- **Encrypted VTF format:** Binary. GLview Pro, GLview Express and 3D Plug-in can read the encrypted format. Encrypted files can be generated by GLview Pro, or a licensed version of GLview Express Writer.



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