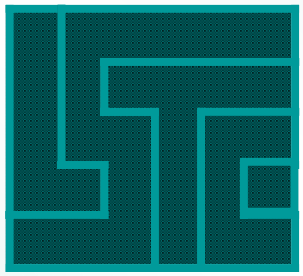
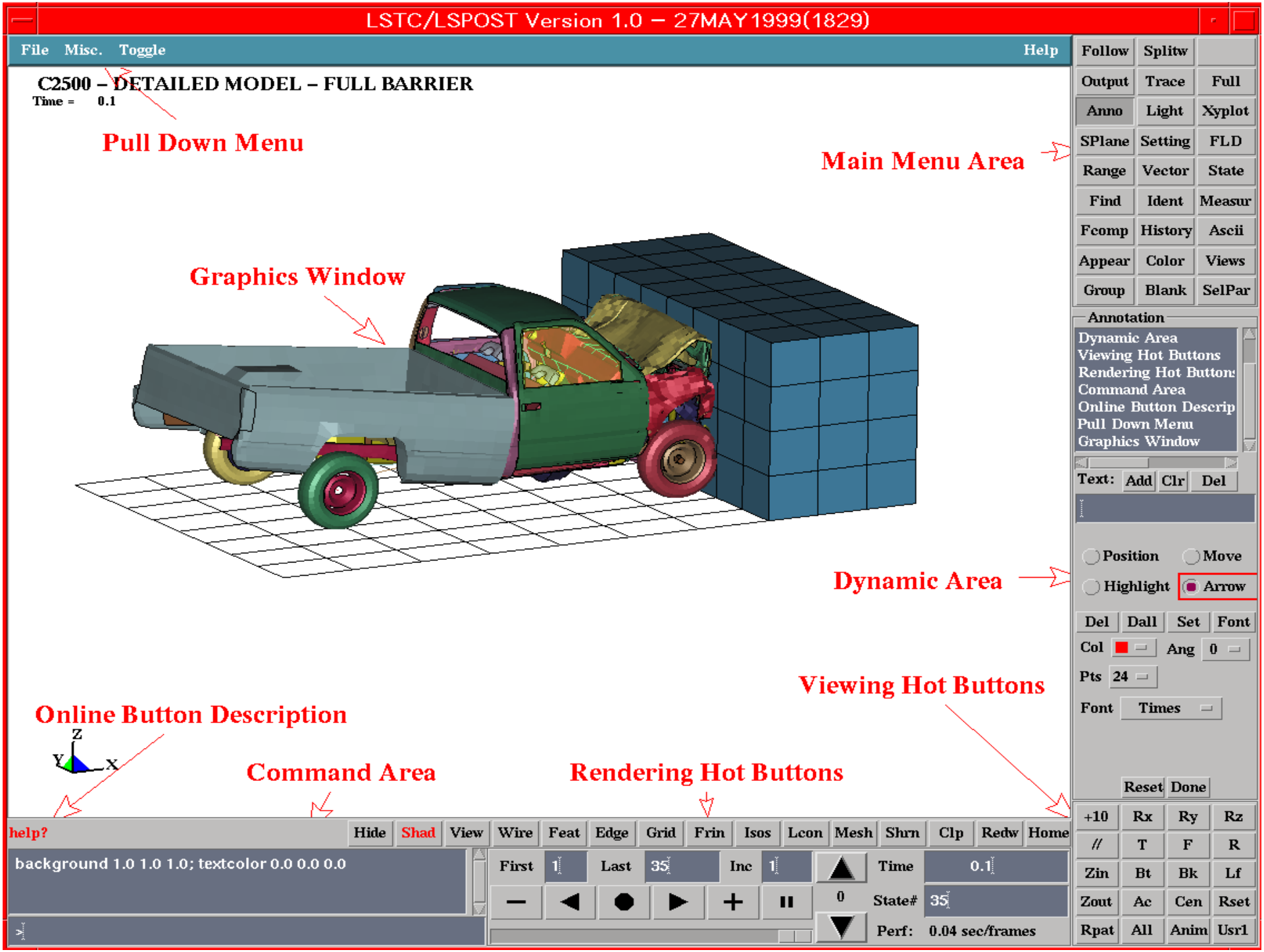


LIVERMORE
SOFTWARE
TECHNOLOGY
CORPORATION

LSPOST
A New Post Processor For LSDYNA

May 1999


LSTC/LSPOST Version 1.0 – 27MAY1999(1829)
File Misc. Toggle
Help
C2500 – DETAILED MODEL – FULL BARRIER
Time = 0.1
Pull Down Menu
Main Menu Area
Graphics Window
Dynamic Area
Online Button Description
Command Area
Rendering Hot Buttons
Viewing Hot Buttons
Follow Splitw
Output Trace Full
Anno Light Xyplot
SPlane Setting FLD
Range Vector State
Find Ident Measur
Fcomp History Ascii
Appear Color Views
Group Blank SelPar
Annotation
Dynamic Area
Viewing Hot Buttons
Rendering Hot Buttons
Command Area
Online Button Descrip
Pull Down Menu
Graphics Window
Text: Add Clr Del
Position Move
Highlight Arrow
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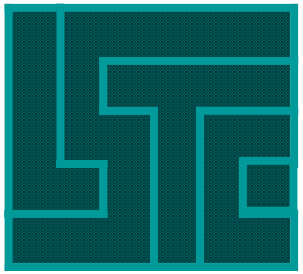
Font Times
Reset Done
help? Hide Shad View Wire Feat Edge Grid Frin Isos Lcon Mesh Shrn Clp Redw Home
background 1.0 1.0 1.0; textcolor 0.0 0.0 0.0
First 1 Last 35 Inc 1 Time 0.1
0 State# 35
Perf: 0.04 sec/frames
+10 Rx Ry Rz
// T F R
Zin Bt Bk Lf
Zout Ac Cen Rset
Rpat All Anim Usr1

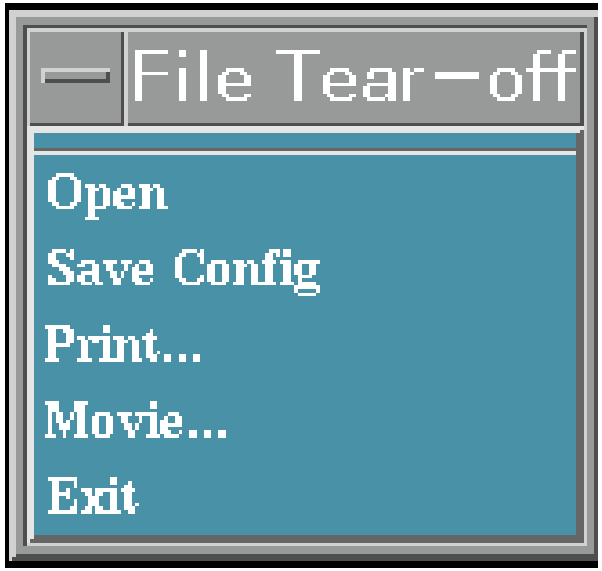


Keyboard and Mouse Operation

- Dynamic Model Operation
  - Rotation - Left mouse button + shift key
  - Translation - Middle mouse button + shift key
  - Scaling - Right mouse button + shift key
- Fast rendering mode - Use control key instead of shift key to render in edge mode
- Single pick - Left mouse button
- Area pick or windowing - Left mouse click and drag
- Polygon pick - Left mouse click, drag and click, right mouse button to terminate

Menus and Buttons Layout

Pull Down Menu



- File
  - Open - file chooser to select and open files
  - Save Config - write configuration file .lspostrc
  - Print - activate print dialog
  - Movie - activate saving movie files dialog
  - Exit - terminate program

Menus and Buttons Layout

Pull Down Menu

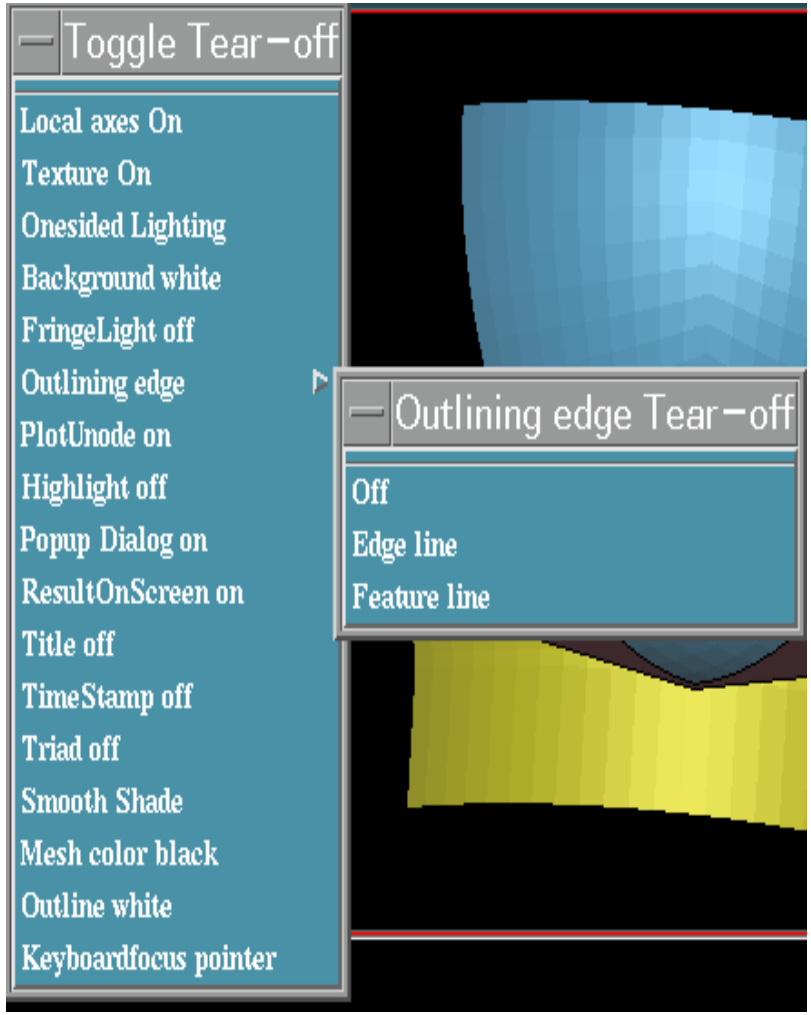
- Misc
  - Reflect - reflect model about a global plane
  - Model Info - give model size information
  - Swap byte on Title - Allow title in different byte order
  - Mesh linewidth - specify mesh line width in pixel
  - Edge linewidth - specify edge line width in pixel

Menus and Buttons Layout

Pull Down Menu

Toggle

- Local axes on/off
- Texture on/off
- One-sided/two-sided Lighting
- Background white/back
- Fringe Light off/on
- Outlining options
  - ➤ off/edge/feature
- Plot unreferenced nodes on/off
- Highlight off/on
- Results on Screen on/off
- Title off/on

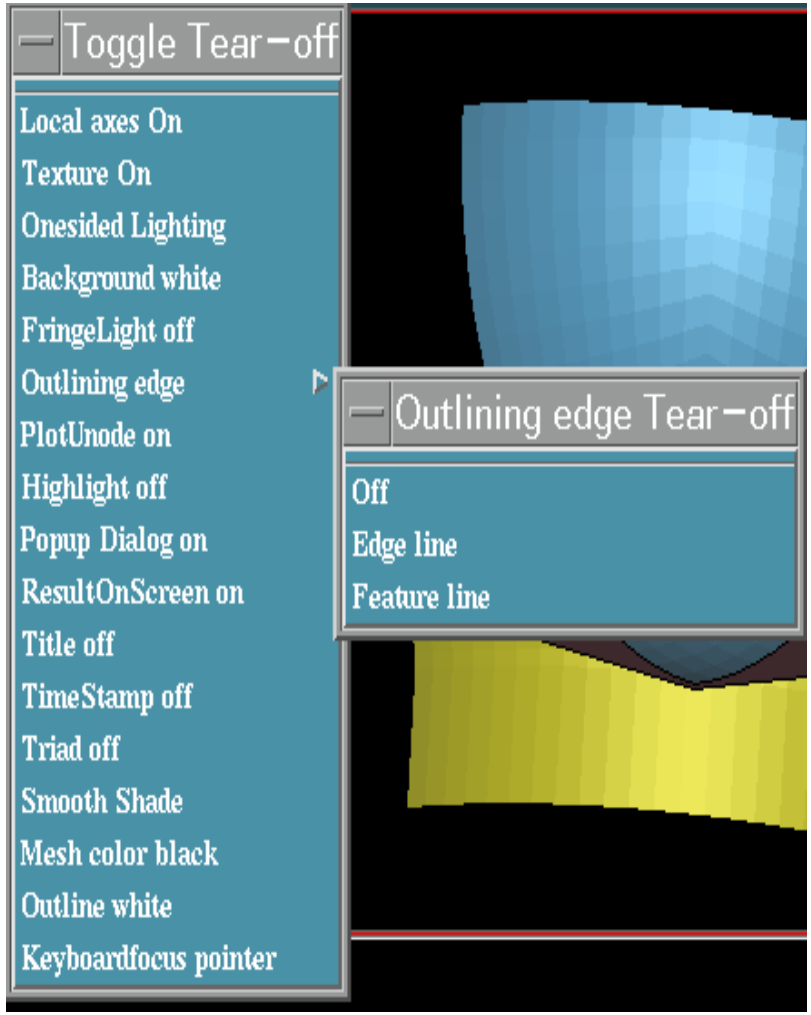


Menus and Buttons Layout

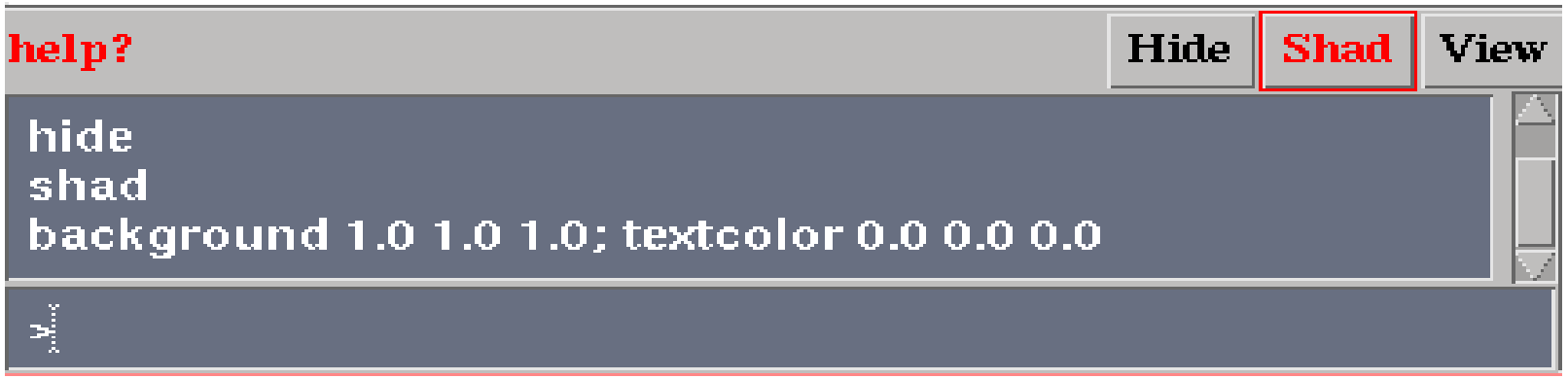
Pull Down Menu

Toggle

- Time Stamp on/off
- Triad on/off
- Smooth/flat shading
- Mesh line color black/white
- Outline color black/white
- Keyboard focus pointer/explicit

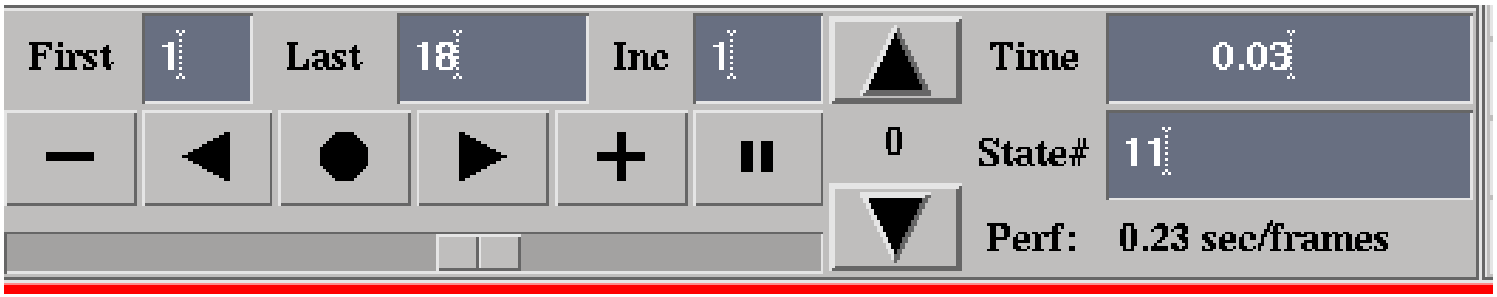


Command and Button Description

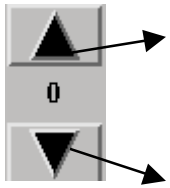


- Command line input - Can be typed in dialog area or graphics area
- help? - One line short description of most buttons and menu
- Session (command) file will be supported in the future

Animation Control



- First, Last, Inc - control first, last and increment of state, must press enter key after input to realize changes
- Time - the time value of the current state
- State# - current state number can be typed to a specified state



Animation speed control

Slider bar control

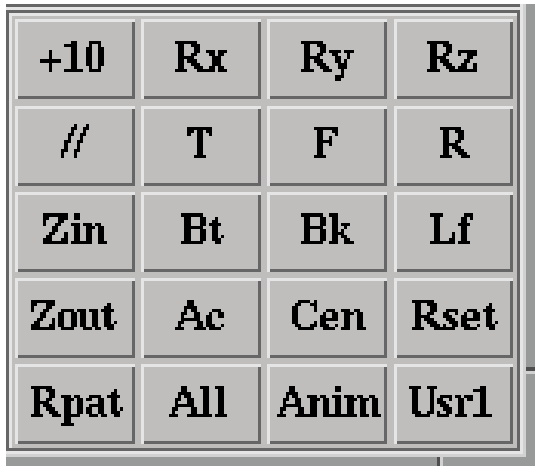
Rendering Hot Buttons

- Hide - hidden line removed
- Shade - color shading mode (flat or smooth)
- View - plain color mode
- Wire - wireframe mode
- Feat - feature line mode (default angle = 30)
- Edge - edge line mode
- Grid - draw nodal point with a color pixel

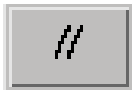
Rendering Hot Buttons

- Frin - color fringe contour
- Isos - iso-surface plot on 3D solid elements
- Lcon - color line contour
- Mesh - overlay mesh line on shade or color plot
- Shrn - draw element in shrunk mode (default = 0.85)
- Clp - clear all picked or highlighted information
- Redw - re-draw current model
- Home - set model in the home position

Viewing Hot buttons

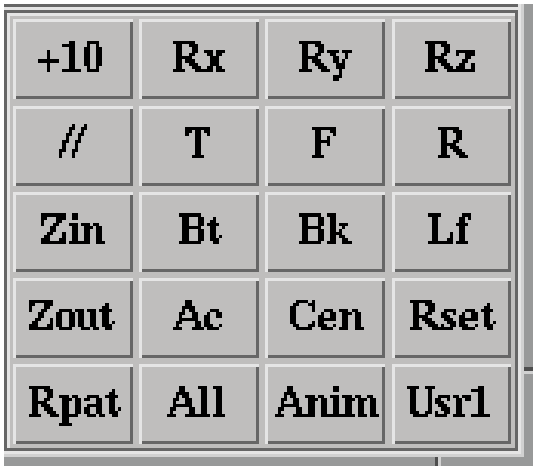


- +10, Rx, Ry, Rz - rotate 10 degrees about the global X,Y,Z, axes respectively
- T,Bt - top and bottom views
- F,Bk - front and back views
- R,Lf - right and left views
- Zin, Zout - zoom in the model using the Left mouse click and drag



parallel and perspective view switch

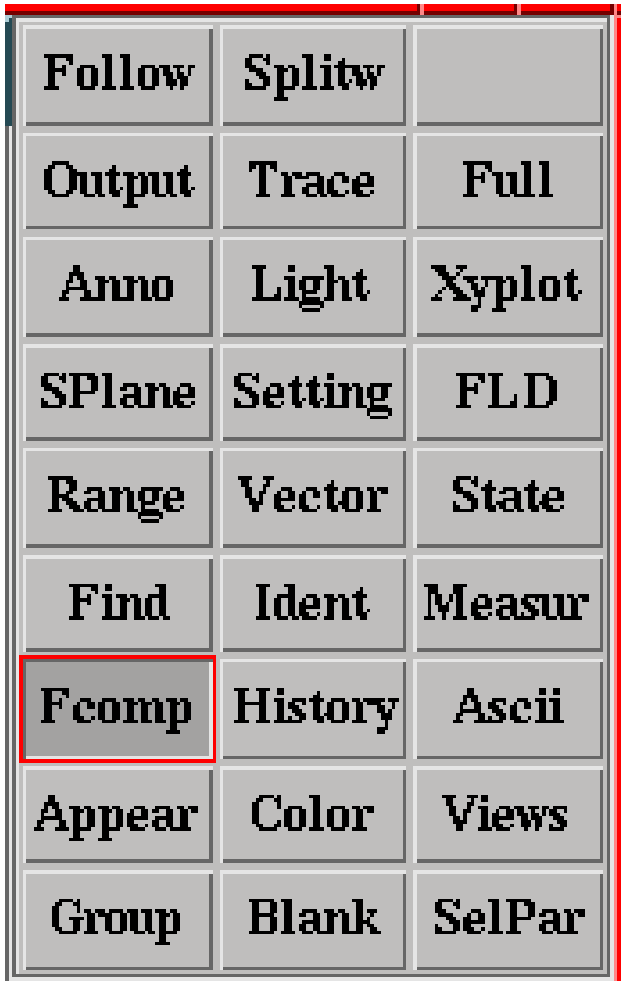
Viewing Hot buttons



- Ac - automatically center the model to fit in window
- Cen - pick a node and move it to center of the window. Also rotation will be about this point
- Rset - reset the model to original setting
- Rpat - restore the last removed part
- Anim - turn on or off animation
- Usr1 - usr defined button (not yet implemented)

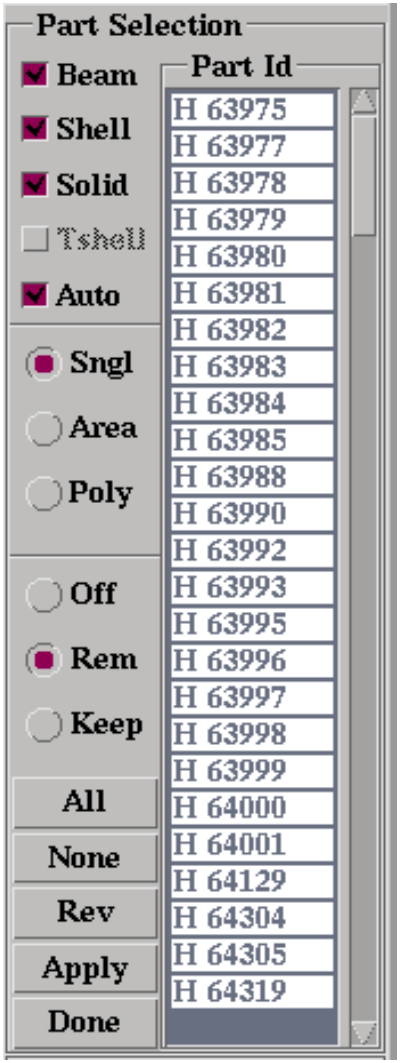
Main Menu Area

- Main Menu Buttons - each button in the main menu area activates a new interface in the dynamic area which is located below the main menu area



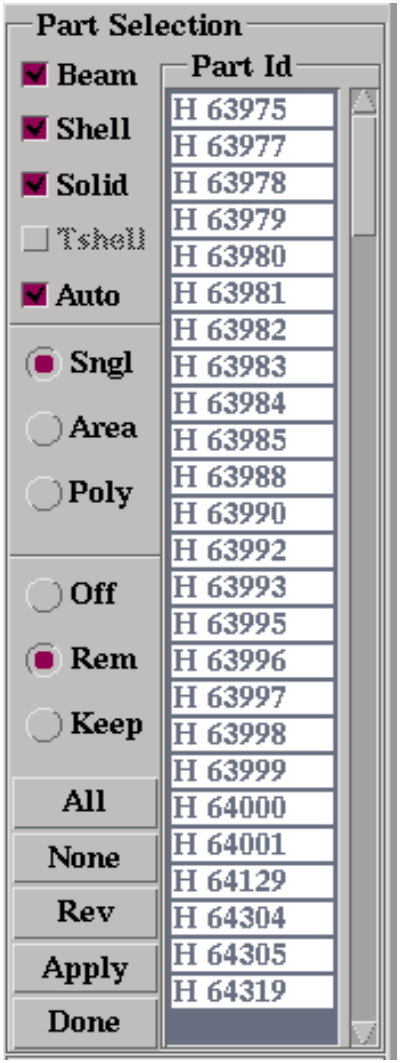
Select Part Interface

- Part - is an unique entity made up of an element type and the material number
- Beam, Shell, Solid, Tshell buttons select or deselect that element type
- Auto - Model will be automatically redraw whenever selection has been made, otherwise need to press "Apply" button to update the window
- Singl - Pick one part with a single left mouse click
- Area - Pick multiple parts in an enclosed window area
- Poly - Pick multiple parts in an enclosed polygon area
- Part Id list - pick and drag for block-select or press down control key for multiple select



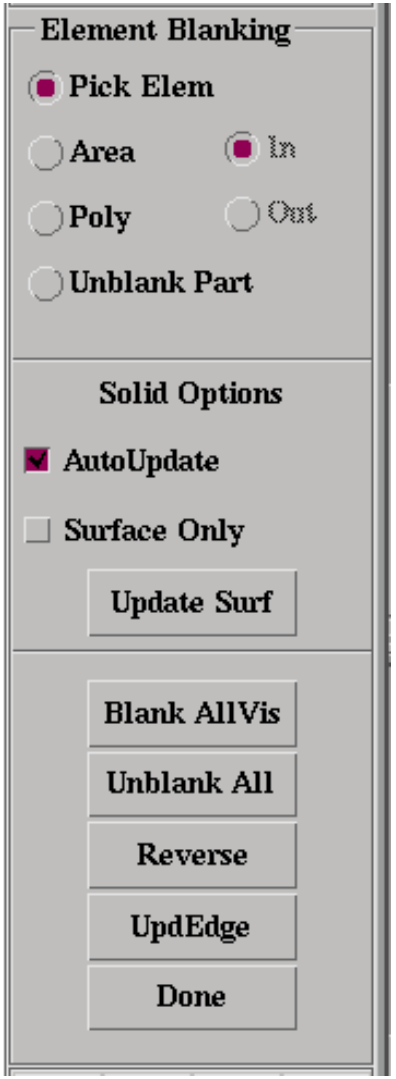
Select Part Interface

- Off - Disable picking
- Rem - Remove part(s)
- Keep - Keep part(s)
- All - Set all parts active
- None - Set all parts inactive
- Rev - Set inactive parts to be active, and active parts to be inactive
- Apply - Use this button to update screen when “Auto” button is off
- Done - Exit Select Part Interface



Element Blanking

- Pick Elem - Blank a single element with pick
- Area - Blank a group of elements with an enclosed window area
- Poly - Blank a group of elements with an enclosed polygon area
- Unblank Part - Unblank an entire part which is partially blanked
- AutoUpdate - Automatically update solid element faces which were not shown due to internal faces elimination
- Surface Only - Blank only the surface layer of the solid elements when using Area or Poly



Grouping

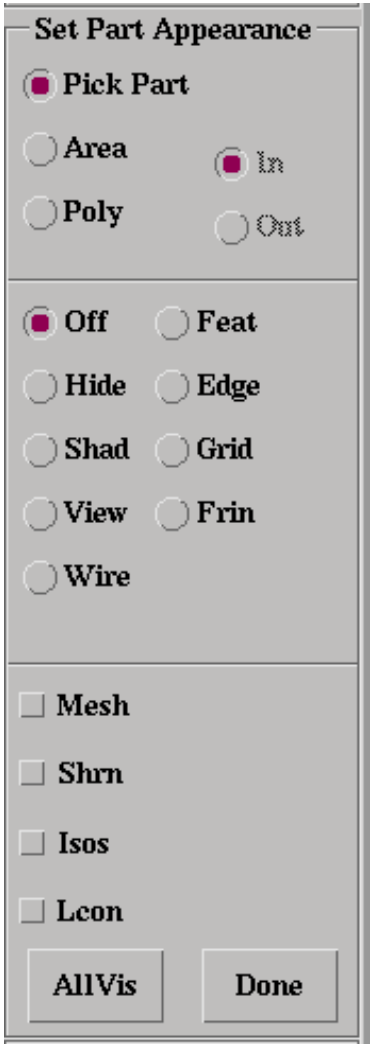
- Group - A collection of parts form a group
- Create - Create a new group with the current active parts (entire part)
- Delete - Delete a highlighted (selected) group
- Rename - Change the group name
- Select - Select a group to be the current active model
- Add - Add a selected group to the current active mode using Or/And/Xor operation

Grouping

- Sub - Subtract a selected group from the current active model using Or/And/Xor operation
- Save - Save the grouping data into a user modifiable file
- Load - Load a saved group data from file into memory
- Done - Exit Group Interface

Set Part Appearance

- Each part can be rendered with a different drawing mode.
- When this interface is active, the global rendering hot buttons are disable
- Pick Part - pick single part
- Area - select by area
- Poly - select by polygon area



Save and Retrieve Views

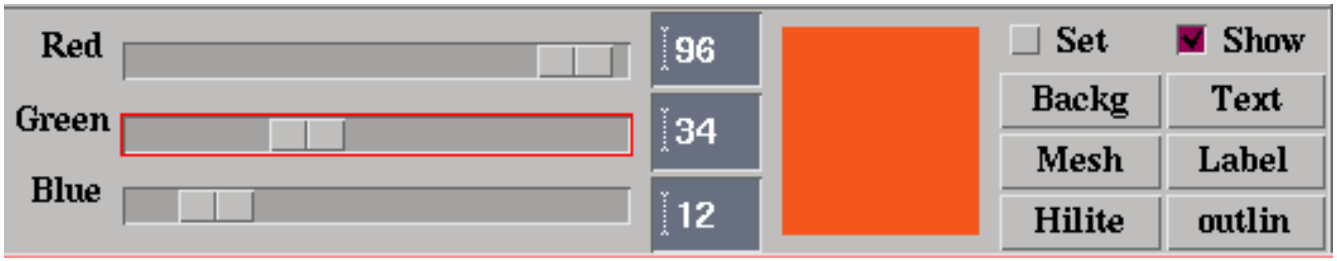
- Save current view - including orientation, drawing mode, color and transparence scheme, part blanking, element blanking.
- Information is saved in database file lspost.db
- Retrieving view can apply to color, appearance, orientation or any combinations of the three
- View name cannot be blank or duplicate previously defined name

Color and Transparency

- Pick Part, Area, Poly - Standard lspost picking method.
- In - Apply to the inside of the window area or the polygon
- Out - Apply to the outside of the window area or the polygon
- Color - Activate color chooser interface
- Transp - Activate transparency interface
- Editmap - Edit the part color map
- Reset - Reset the part color map to default values
- App_map - Apply the part color map to model

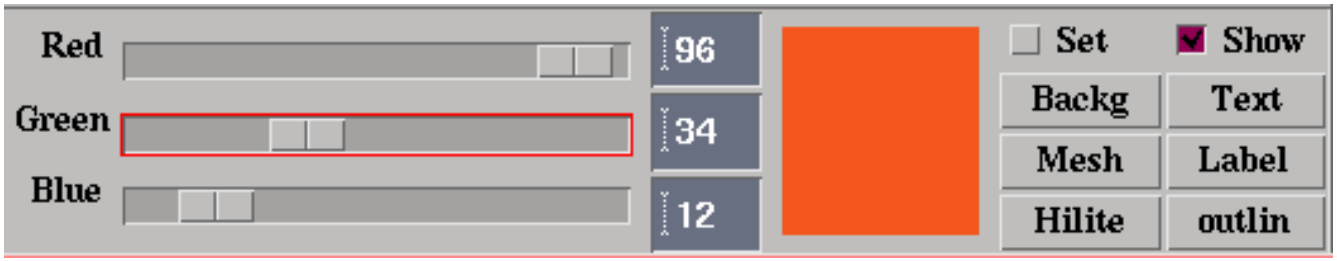
Color and Transparency

- Reset_tran - Turn transparent parts back to opaque
- AllVis - Assign the current color or transparency value to all visible parts
- Red, Green, Blue color sliders - set values for each color component from 0 to 100
- Set - Select to apply current color to parts or other entities
- Show -Select to show part color as current color



Edit Part Colormap

- Click “Editmap” button on
- Click “Show” button on
- Use left mouse to pick a color from the colormap
- Use RGB slider bars to adjust color
- Click “Set” button on
- Click any color box in the Part Colormap to apply the color to that box
- Click “App_map” to apply colormap to model



Set Part Transparency

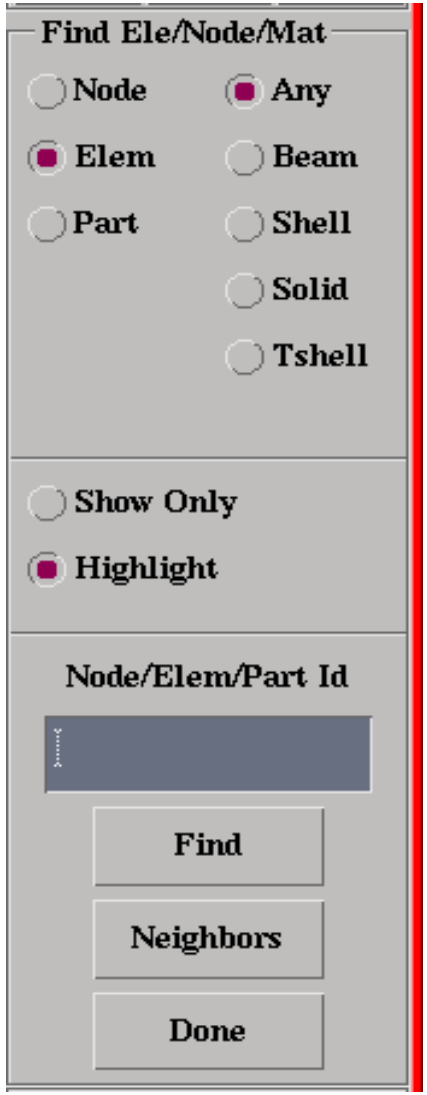
- Click “Transp” button in Set Part Color interface to bring up transparency interface
- Click “Set Transparency” button
- Use left mouse to pick a part to make it transparent
- Selecting a transparent part will make it opaque

Fringe Component Selection

- Fringe components are divided into several categories:
  - Stresses - global stress components and principal stresses
  - Ndv - nodal displacement, velocity
  - Result - resultant forces
  - Strain - strains at different surfaces
  - Misc - temperature, pressure, shell thickness, Internal energy, etc.
  - Infin, Green, Almans - are different type of strains
  - S.Rate - stress rate
  - Residu - Residual strain
  - Apply - Apply the selected component and display the fringe results

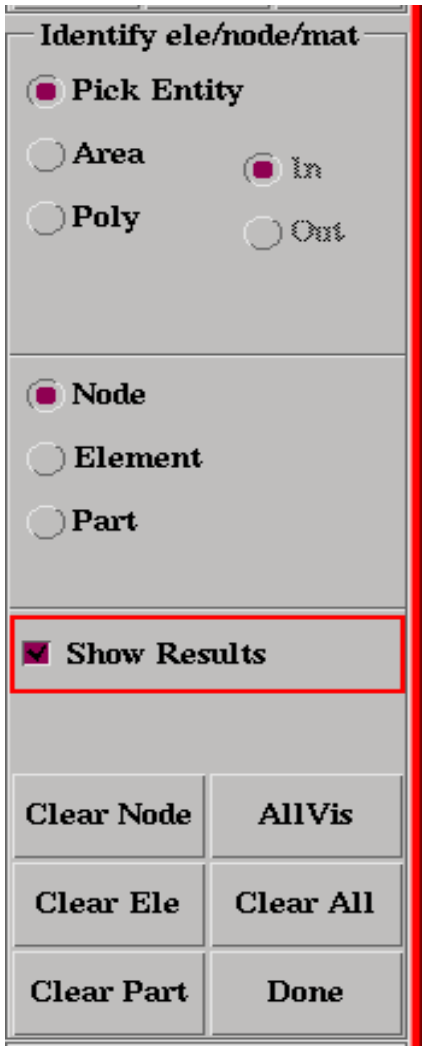
Find Node, Element or Part

- Node - find a node, given a node ID
- Elem - find an element, given an element ID. Specify the element type will speed up the find process, “Any” will match whatever type that have that ID
- Part - find a part, given the material ID
- Show Only - blank all entities except the found entity
- Highlight - highlight the entity
- Find - activate the find process
- Neighbors - find neighbors of the current active entity



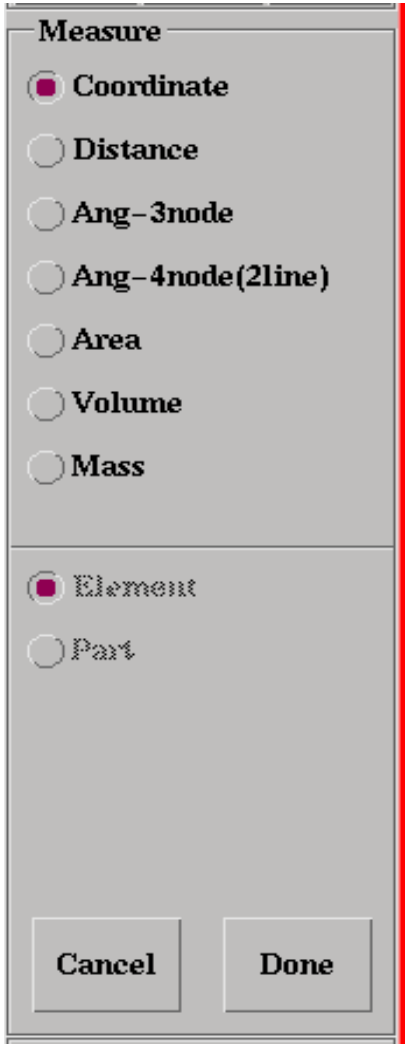
Identify Node, Element or Part

- Node - highlight node(s)
- Element - highlight element(s)
- Part - highlight part(s)
- Pick - single pick top layer in the screen Z coordinate
- Area, Poly - area selection through all layers along the screen Z coordinate
- In/Out - inside or outside the area
- Clear Node, Ele, Part - clear the highlighted entities
- AllVis - highlight all visible entities



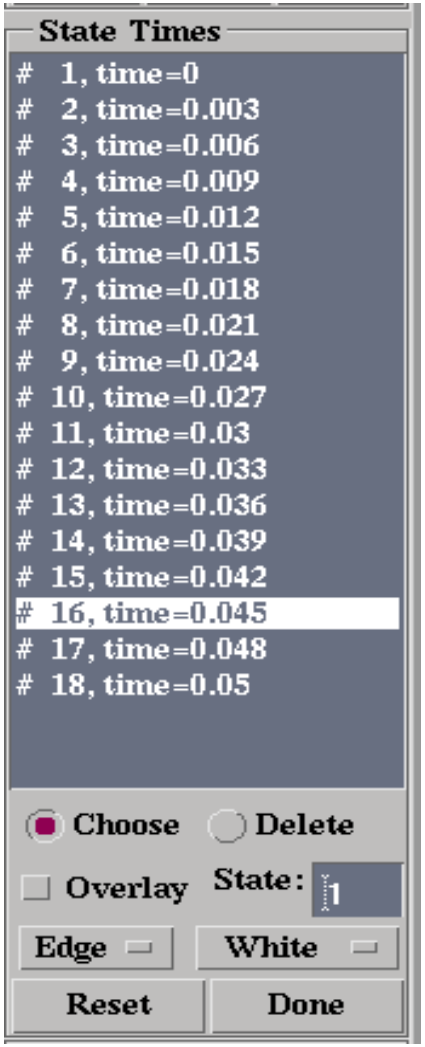
Measure Interface

- Coordinate - report the coordinates of a node by picking a node
- Distance - report the distance between 2 nodes (need to pick 2 nodes)
- Ang-3node - report the angle between 3 nodes (need to pick 3 nodes)
- Ang-4node - report the angle between 2 lines formed by 4 nodes
- Area - report area of an element or a part
- Volume - report volume of an element or a part
- Mass - report mass of an element or part



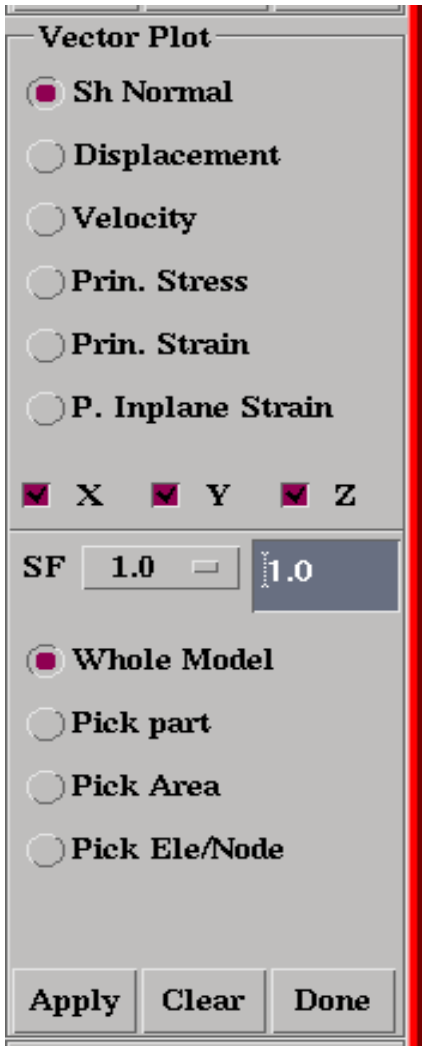
State List and Overlay

- State list - list all time steps in the output
- Choose - quick way to access a state
- Delete - turn a state on or off from rendering
- Overlay - turn overlay mode on, the selected state becomes the overlay state
- Overlay state can also be typed in
- Overlay state can only be drawn in Edge, Feature, or wireframe mode
- Overlay state can have different colors
- Reset button to turn all states on



Vector plot

- Sh Normal - plot shell normals
- Displacement - plot displacement vector
- Velocity - plot velocity vector
- Prin. Stress - plot principal stresses
- Prin. Strain - plot global principal strains
- Prin. Inplane Strain - plot in-plane principal strains
- Options to plot whole model, or pick a single part, or an area or a single element or node
- Must click “Apply” before picking



Fringe Range Setting

- Dynamic Range - ranges calculated based on each individual state
- Static Range - ranges calculated based on all states
- User Defined - user enter the Min. and Max. values for ranges
- Show Range - show only elements that are within the ranges
- Entire Model - ranges calculated based on entire model
- Active part Only - ranges calculated based on the active parts (visible parts)
- No Average - one color per element

Fringe Range Setting

- Blank out of range - blank those elements that are not within the range
- No.of Levels - 6, 10, 20, or 30
- Palette - activate fringe levels color palette
- Use slider bar to adjust color palette
- Click “Apply” to realize palette
- Done - return to previous interface

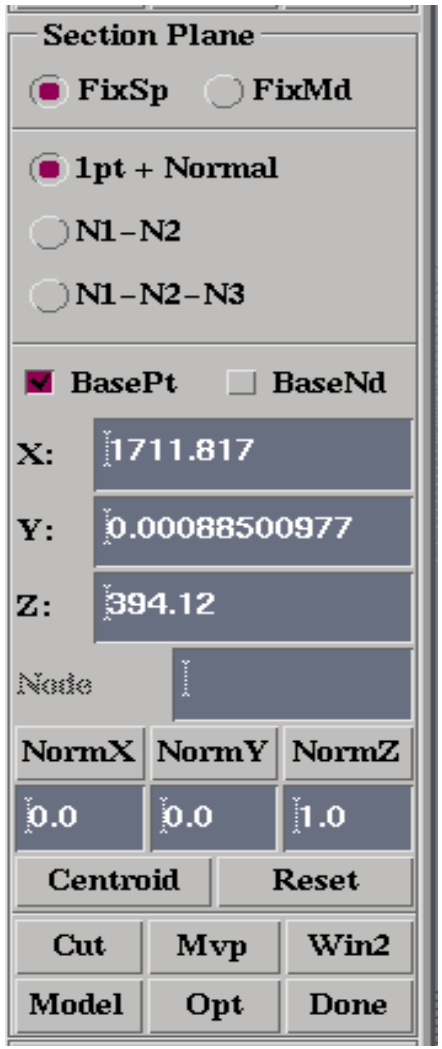
Section Plane

Two kind of section planes

- FixSp - section plane fixed in space
- FixMd - section plane fixed to model

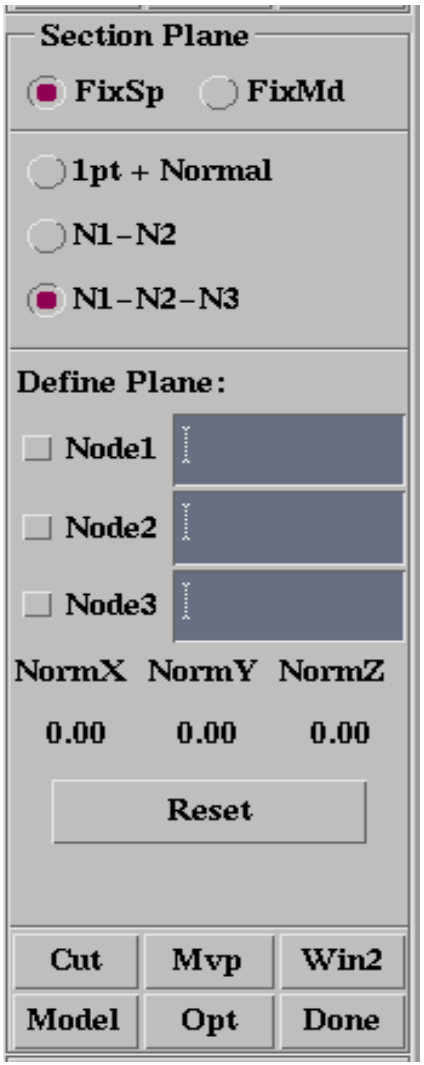
Three ways to define a plane

- 1pt + Normal - 1 point and a normal
  - ➤BasePt - a point defined by X,Y, Z coord
  - ➤BaseNd - a point defined by picking a node or enter a node number (ID)
  - ➤Normal is defined by the 3 components of the direction cosine
  - ➤Centroid - will use the centroid of the active model (AC) as the base point
  - ➤Reset - clear all definitions



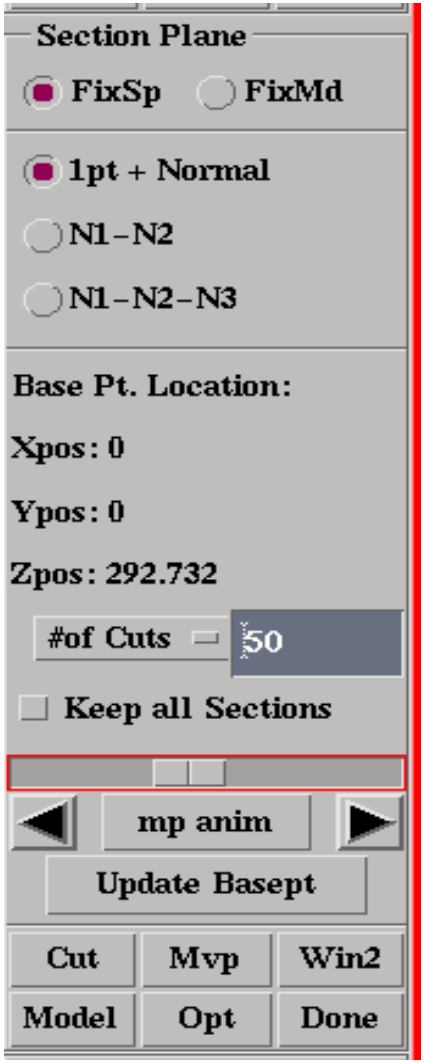
Section Plane

- N1-N2 - Pick or enter 2 nodes to define a plane, N1 is the base point, vector from N1 to N2 is the normal of the plane
- N1-N2-N3 - Pick or enter 3 nodes to define a plane. N1,N2, N3 form a plane, vector N1-N2 cross vector N1-N3 gives the normal of the plane
- Cut - once the plane is defined, “Cut” will display the cross section of the model
- Model - return to the uncut display of the model



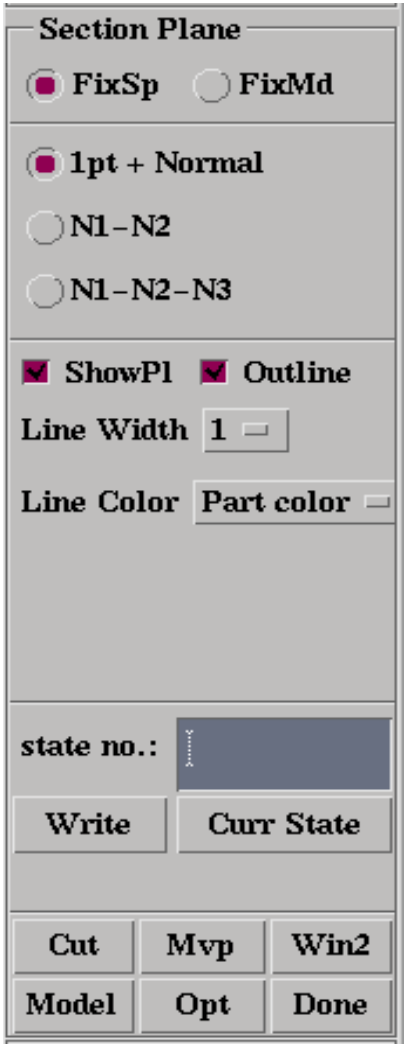
Section Plane

- Mvp - move the cutting plane along its normal direction
- #of Cuts - divide the entire length along the normal direction into N divisions
- mp anim - animate the moving plane along the entire length in the direction of the normal
- Update Basept - take the current plane location and make it the base point



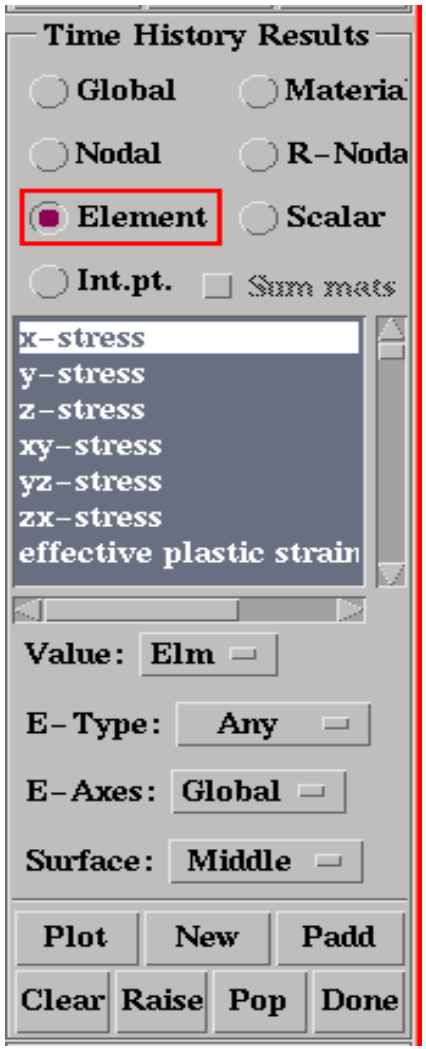
Section Plane

- Opt - active option dialog menu
- ShowPl - turn on or off the semi-transparent plane in the model view
- Outline - turn on or off the outlining of the solid parts when the section plane cuts through the parts
- Line width of the cross section can be from 1 to 5 pixel wide
- Line color - default each part uses its material color for the cut section, or choose one color for the entire cross section
- Write - write out the cross section in beam (from shell) or shell (from solid) element



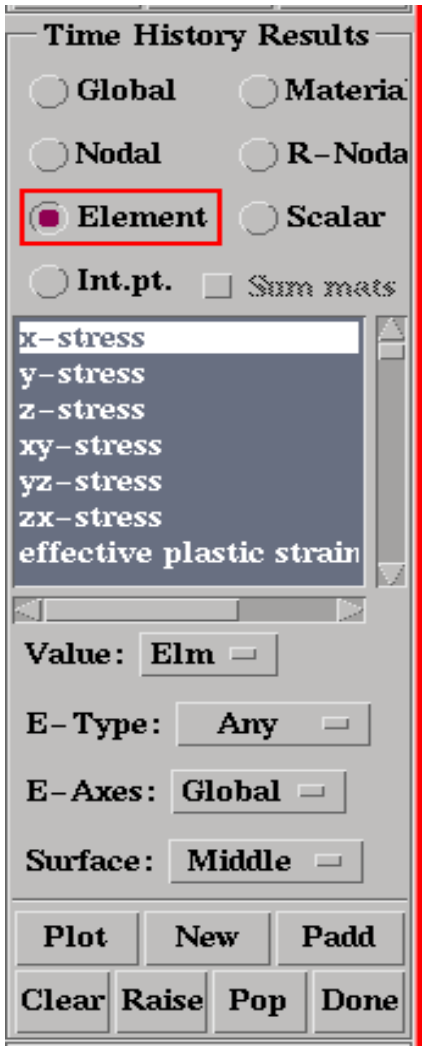
Time History Data

- Global - global variables such as internal energy, kinetic energy, rigid body displacement, velocity, acceleration; rigid wall forces, etc.
- Nodal - nodal coordinates, displacement, velocity, acceleration, etc.
- Element - element stresses/strains
- Material - material (part) energies, and rigid body displacement, velocity, acceleration, etc.
- Scalar - scalar value that was selected in the “Fcomp” interface



Time History Common Interface

- Plot - plot the selected data in the current xy graph window
- New - plot the selected data in a new xy graph window
- Padd - add the selected xy data to the current window
- Clear - clear selection
- Raise - raise all xy graph windows from behind the main graphics window
- Pop - popup those closed xy graph windows
- Done - exit the Time History Interface

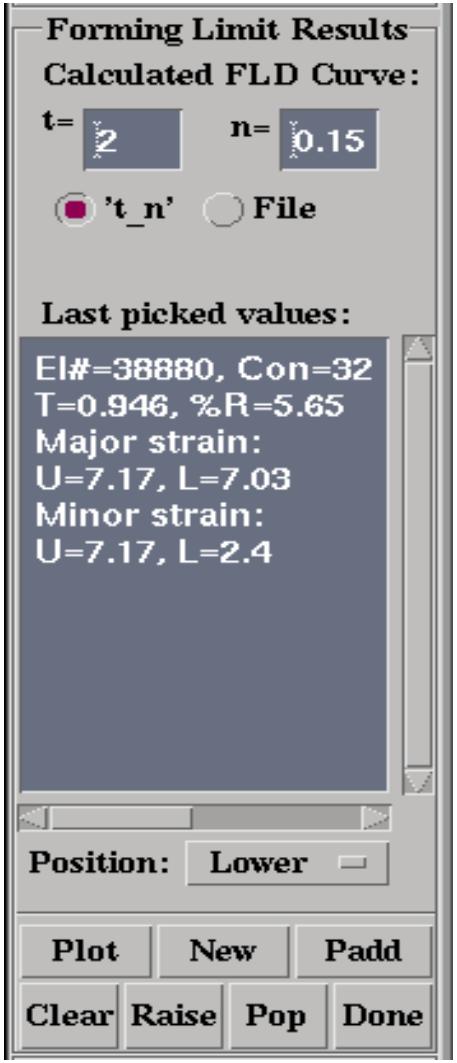


FLD Interface

- ‘t_n’ - construct FLD curve based on t and n values
- File - user supplied FLD curve data
- t - shell thickness in mm
- n - FLD criteria formula index

To plot FLD data:

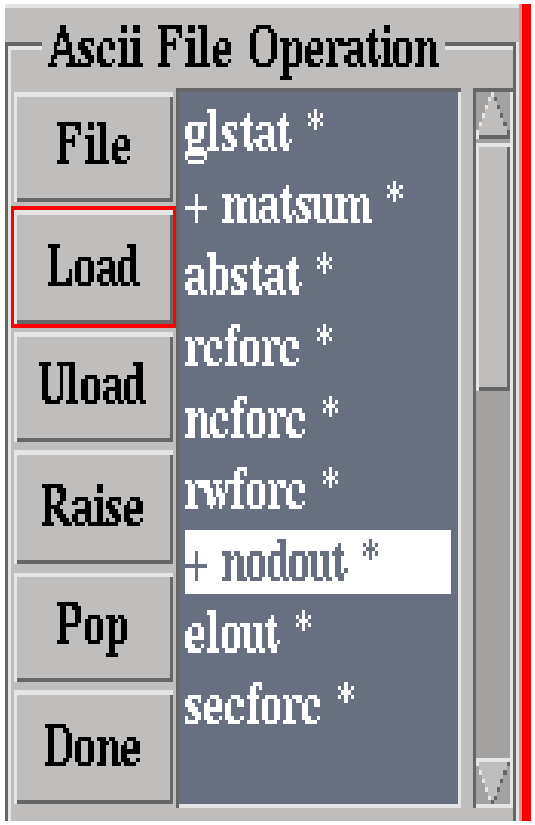
- Enter values for t and n
- Click “Plot” to general FLD curves
- Choose shell surface for FLD results
- Pick an element to show the values



ASCII Data Files Interface

The ASCII file list contains the names of the 22 ascii database output by LS-DYNA

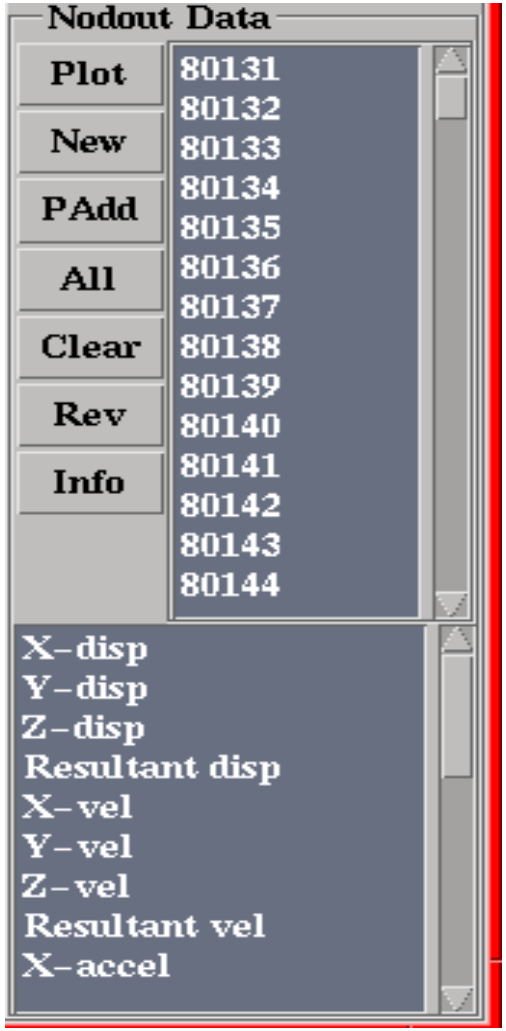
- A name with an asterisk (*) means the file exists in the current directory
- A name with a plus (+) sign means the data of this file is already loaded into memory
- File - use file selection box to enter the file name to be open
- Load - open and load the ascii data, when the name has an asterisk (*) with it
- Uload - unload data from memory
- Raise - raise all obscured xy graph windows
- Pop - popup all closed xy graph windows
- Done - exit ASCII Interface



ASCII Data File Interface

To plot ascii file data:

- Select one of the ascii name in the list
- Click “Load” if this name has (*), else click “File” to bring up the file selection box
- After data is loaded, select one or several component(s) from the component list
- Select one or several data entities from the data list
- Click “Plot” or “New” to plot the data



The XY Graph Window

The XY Graph Window

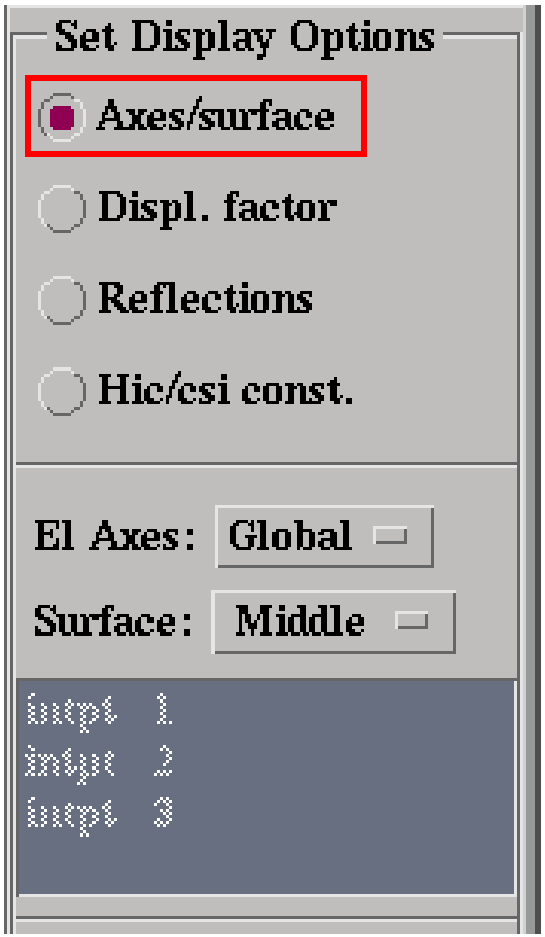
The XY Graph windows contain XY plots and buttons for changing various parameters of the plot

- Global - old style dialog interface (will be obsolete soon)
- Title - change title of the graph
- Scale - change min/max, offsets, and scale of the graph
- Attr - change attributes of xy graphs such as color, line width, symbol, and style
- Filter - provides filtering to xy graph using SAE, Butterworth, and Fir filtering scheme
- Print - print the xy graph window in various format
- Save - save the xy data into a file
- User - load user xy data (ascii format only)
- Hide - hide interface buttons

Setting

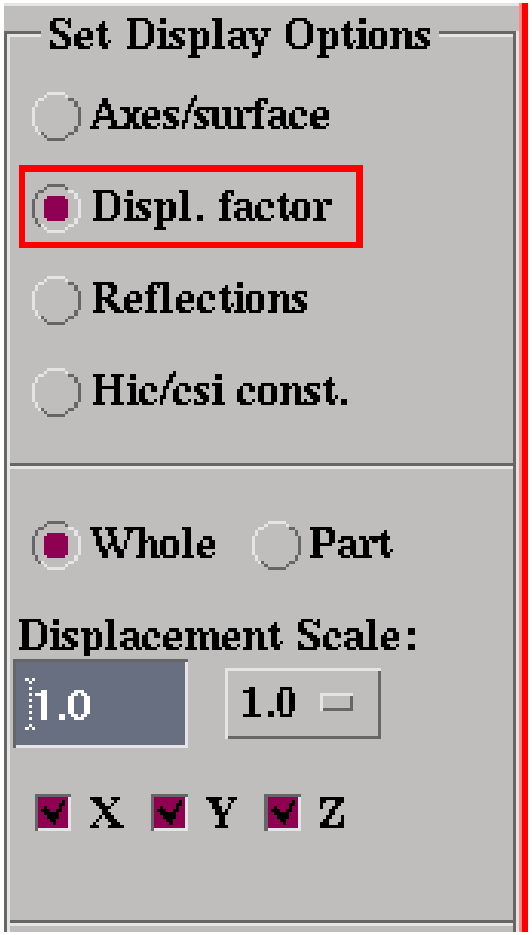
The current interface provides 4 different options:

- Axes/surface - to define element axes (global or local) and surface location (top, middle, bottom, maxima, or integration points)
- Displ. Factor - to define displacement scaling factors
- Reflections - to reflect the model with a global plan, using the whole model or part of the model
- Hic/csi const - to define the Head Injury Criteria constants



Displacement Scaling

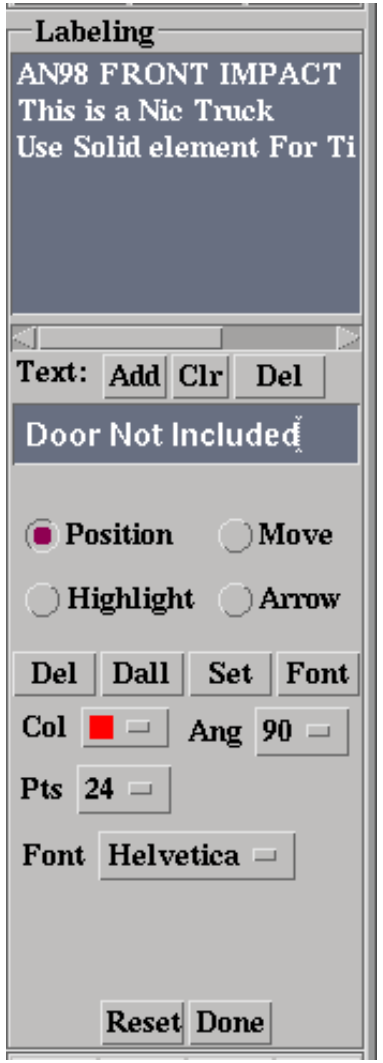
- Displacement scale factor can be applied to the whole model or a single part.
- Scale factor can be typed in or choose from a preset list
- Scale factor can apply to any combination of the global X,Y,Z direction



Annotation Interface

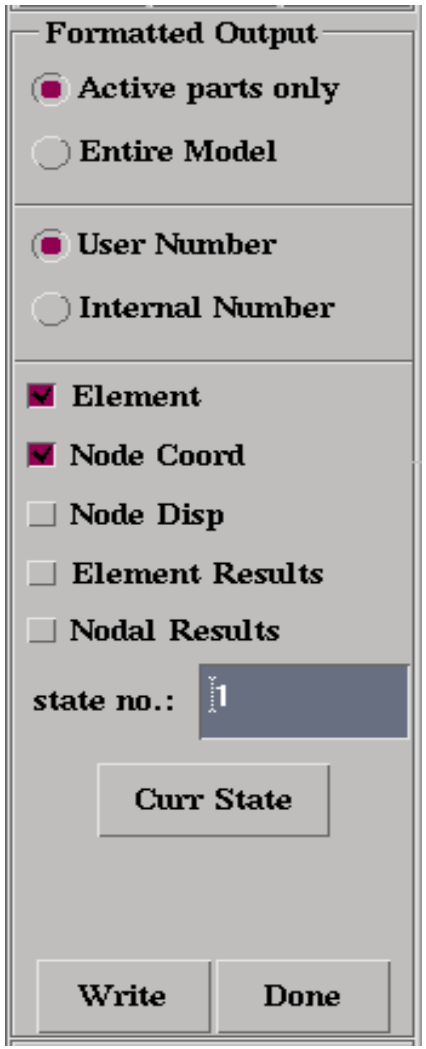
Annotation allows users to put labels and arrows on the graphics window

- First enter the labeling text in the text field and press return or click “Add” button
- Select the text from the list
- Select label size from “Pts” button
- Select label color from “Col” button
- Select rotation angle if it applies
- Click “Position” and use the left mouse to position the text on the graphics window
- Click “Move” and use the left mouse to click the label to move it
- Click “Highlight” then use left mouse to click the label, a box will surround the text, you may delete a highlighted label



Output Formatted Data

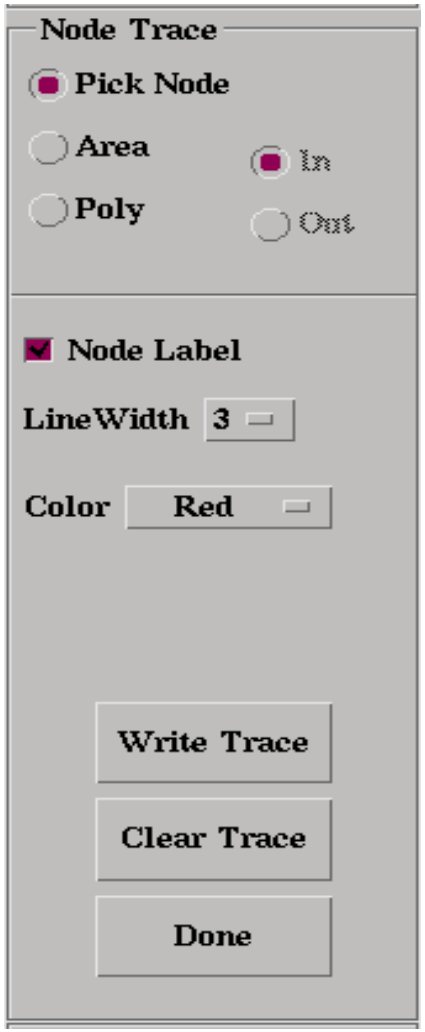
Output allows user to write geometry and result data to a file. The user can select which type of output to save: element connectivity, nodal coordinates, nodal displacements, element or nodal results. The element and nodal results are defined by the component selected in the “Fcomp” interface. The user can also write data for the entire model or just the active (visible) parts in either the user’s numbering system(model) or internal numbering system(LS-DYNA).



Node Trace

Trace - a node or a group of nodes can be activated to show their travelling path during the deformation of the model.

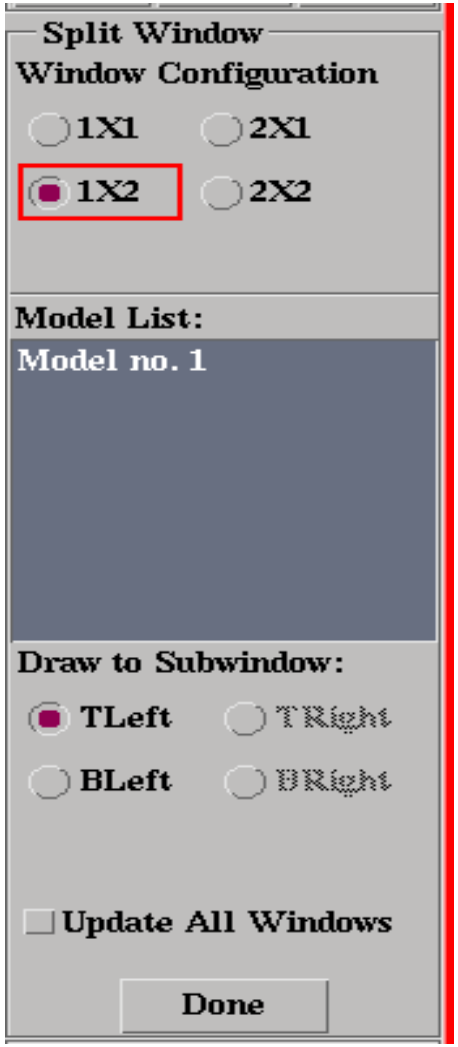
- Trace lines can have a width from 1 to 5 pixels wide. They can be drawn in 8 different colors.
- The user can also write the nodal deformation path data to a file.



Split Graphics Windows

Split Window allows multiple views of the same model or different models to be viewed at the same time. There are 4 different configurations:

- 1x1 - single window
- 1x2 - window divided into top and bottom
- 2x1 - window divided into left and right
- 2x2 - window divided into 4 quadrants
- Multiple models will be implemented soon
- Use right mouse click to activate a window or click the corresponding button
- Update All Windows - draw all windows for rotation or animation



Follow Node or Plane

- View Ref. Point - pick a nodal point and make it the stationary point at the center of the window. Click “Apply” to activate the follow command
- Camera Position - not yet implemented
- View Up Vector - not yet implemented

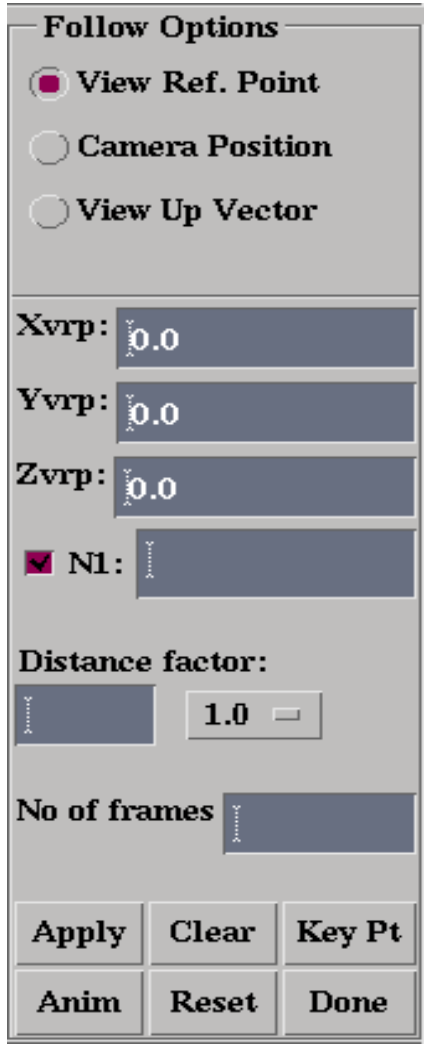
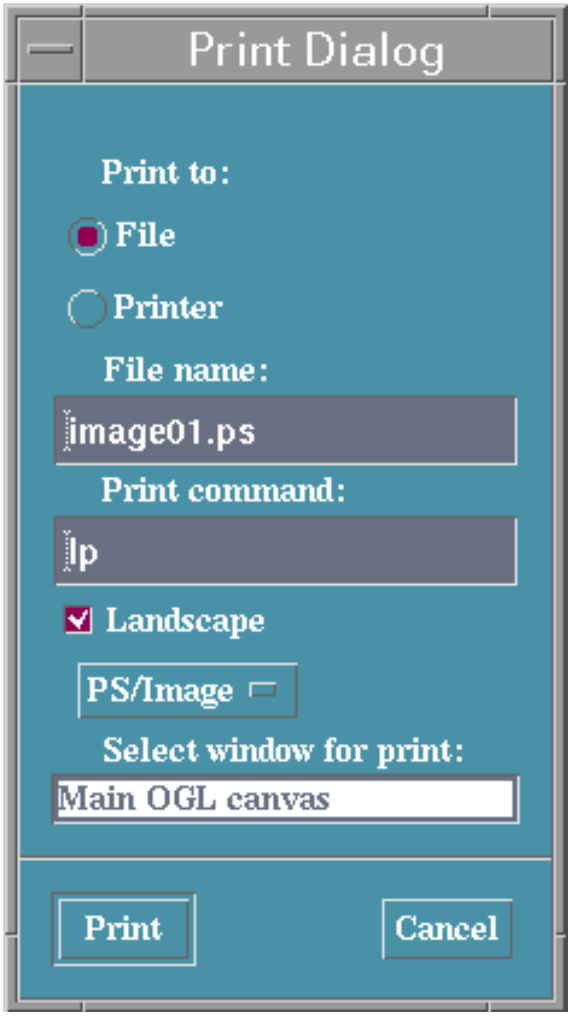


Image Printing

Graphical images can be printed to a file or printer in the following formats:

- PS/image - postscript image
- PS - postscript vector plot
- TIFF
- PPM
- Pict
- GIF
- JPEG
- BMP
- VRML2



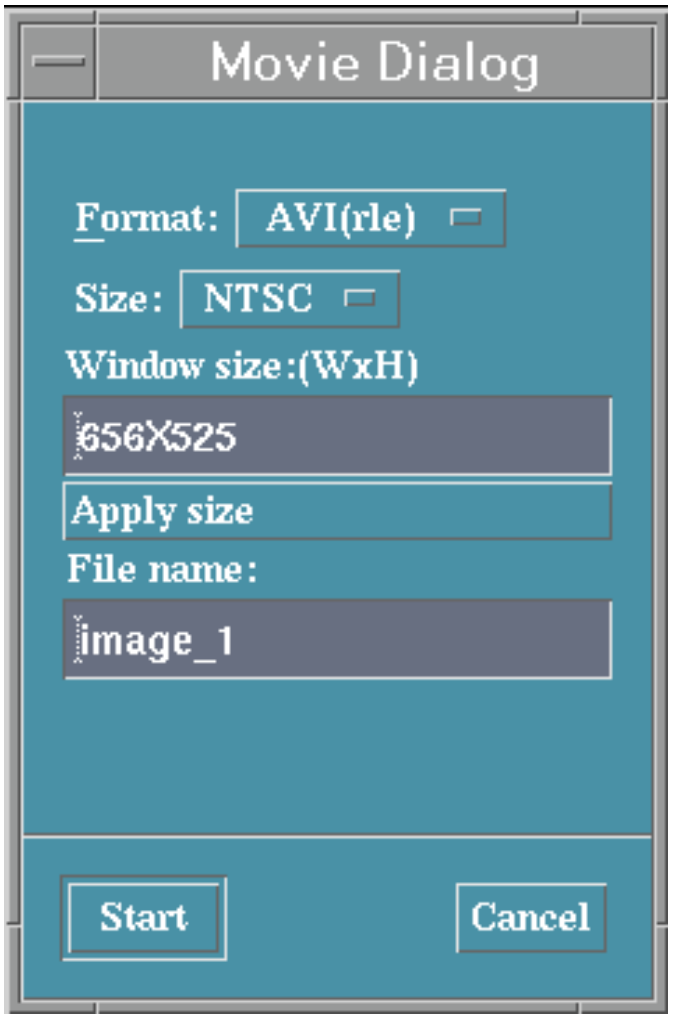
Making Movie

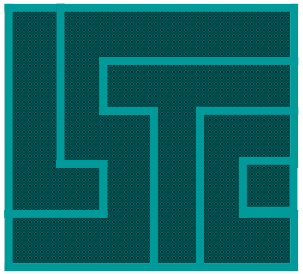
Animation sequence can be generated using the Movie Dialog. The supported formats are:

AVI (rle) - avi file with run length encoded

AVI(24bits) - avi file with 24bit color

MPEG - this is a public domain version which may not work well





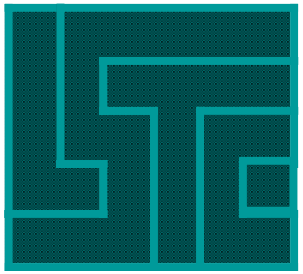
Configuration Parameters

Configuration file (.lspostrc):

- Format - Keyword followed by equal sign (=) and parameters (values). Parameters can be separated by blanks or comma
- Order is not important
- Not all parameters have to be defined
- Comment lines start with an asterisk (*)
- Search path:
  - Current directory
  - User's home directory ($HOME)
  - LSTC_FILE directory ($LSTC_FILE)
- The best way to customize the configuration file is to modify the one that is written by lspost

Configuration Parameters (1)

```
*
* LSPOST configuration
*
texture = off
twoside_lighting = on
background_color   =    0.000,    0.000,    0.000
text_color         =    1.000,    1.000,    1.000
mesh_color         =    0.000,    0.000,    0.000
label_color        =    1.000,    1.000,    1.000
hilite_color       =    0.500,    0.500,    0.500
outline_color      =    0.000,    0.000,    0.000
triad_color =    1.000,    1.000,    1.000
edgelwidth = 1
meshlwidth = 1
fringe_light = on
plotunode = off
outlining = edge
shade_mode = flat
highlight_node = off
result_onscreen = off
```



Configuration Parameters (2)

highlight = on

popup_dialog = off

mat_ambient = 0.100000

mat_diffuse = 0.200000

mat_specular = 0.700000

mat_shininess = 20.000000

light_ambient.1 = 0.300, 0.300, 0.300

light_ambient.2 = 0.300, 0.300, 0.300

light_diffuse.1 = 0.700, 0.700, 0.700

light_diffuse.2 = 0.700, 0.700, 0.700

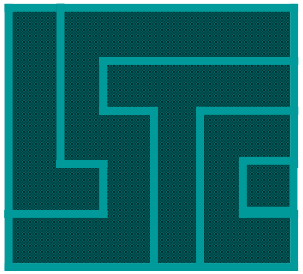
light_specular.1 = 0.500, 0.500, 0.500

light_specular.2 = 0.500, 0.500, 0.500

light_position.1 = 0.000, 0.000, 1.000

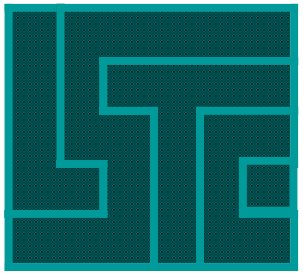
light_position.2 = 0.000, 0.000, -1.000

transparency_value = 0.850



Configuration Parameters (3)

mat_color.1 = 0.769, 0.004, 0.110
mat_color.2 = 0.251, 0.635, 0.843
mat_color.3 = 0.153, 0.510, 0.271
mat_color.4 = 0.824, 0.804, 0.000
mat_color.5 = 0.604, 0.333, 0.137
mat_color.6 = 0.761, 0.000, 0.227
mat_color.7 = 0.129, 0.102, 0.376
mat_color.8 = 0.200, 0.624, 0.376
mat_color.9 = 1.000, 0.922, 0.404
mat_color.10 = 0.659, 0.502, 0.310
mat_color.11 = 0.788, 0.161, 0.243
mat_color.12 = 0.659, 0.824, 0.847
mat_color.13 = 0.153, 0.604, 0.404
mat_color.14 = 0.808, 0.847, 0.106
mat_color.15 = 0.851, 0.643, 0.388
mat_color.16 = 0.667, 0.329, 0.525
fringe_level = 10



Configuration Parameters (4)

vect_plotscale = 1.000
shrink_factor = 0.800
rotate_angle = 10.0
feature_angle = 30.0
default_light = 0.300, 0.700, 0.400
help_label = off
mainmenu_on = right
fld_tvalue = 2.000000
fld_nvalue = 0.150000
mainwindow_x = 1125
mainwindow_y = 900
plotwindow_x = 0
plotwindow_y = 0
xyplotlegend = on
init_path =