FIELDVIEW

Reading Data into FIELDVIEW

AcuSolve	**.Log**	Direct Reader
AcuSolve	**.fv**	Export to FV-Unstructured Format
ANSYS-CFX	**.fv**	FV-UNS Export
ANSYS-FIDAP	**.uns**	Export to FV-Unstructured Format
ANSYS-FLUENT	**.cas[.h5]/.dat[.h5]**	Direct Reader
ANSYS-FLUENT	**.uns**	Export to FV-UNS
ANSYS-Forté	**[-]**	Direct Reader
ANSYS-Forté	**.uns**	Export to FV-Unstructured Format
ANSYS-Polyflow	**.uns**	Export to FV-Unstructured Format
ARC2D/3D	**[-]**	Export to FV-Unstructured Format
Autodesk Simulation CFD	**[-]**	Export to FV-Unstructured Format
AVL Fire	**[-]**	Contact AVL for FV-UNS Translator
AVUS	**[-]**	Direct Reader
BANFF	**[-]**	Translator to PLOT3D Format
Cart3D	**[-]**	Translator to FV-UNS
CFD-ACE	**[-]**	Translator to PLOT3D Format
CFD++	**.fv, .fvb**	Export to FV-Unstructured Format
CFL3D	**[-]**	Translator to PLOT3D Format
CGNS Structured	**[.cgns]**	Direct Reader
CGNS Unstructured & Hybrid	**[.cgns]**	Direct Reader
COBALT	**.uns**	Export to FV-Unstructured Format
CONVERGE	**[-]**	Translator to FV-Unstructured Format
Craft	**[-]**	PLOT3D Format
Crunch	**[-]**	Export to FV-Unstructured Format
DPLR	**[-]**	Translator to PLOT3D Format
DROP3D	**.uns**	Export to FV-Unstructured Format
elsA	**[-]**	Translator to PLOT3D Format
Ensight Gold	**.(en)case**	Direct Reader
FaSTAR	**[-]**	Export to FV-Unstructured Format
Fine/Marine	**.uns**	Translator to FV-Unstructured Format
Fine/Turbo	**[-]**	Translator to PLOT3D Format
FLOW-3D®	**.flsgrf**	Direct Reader
FrontFLOW	**[-]**	Export to FV-UNS
FUN3D	**[-]**	Export to FV-UNS, VTK, CGNS or Tecplot Binary format
FV-UNS	**[-]**	Native FV Unstructured Format
GASP	**[-]**	Translator to PLOT3D Format
GLACIER	**[-]**	Translator to PLOT3D Format
HAVOC	**.hvc**	Direct Reader
Helios	**[-]**	Translator to FV-Unstructured Format
Kestrel	**[-]**	Translator to FV-Unstructured Format
KIVA	**.uns**	Translator to FV-Unstructured Format
Leslie3D	**[-]**	Translator to PLOT3D Format
Loci/CHEM	**[-]**	Export to FV-Unstructured Format
LS-DYNA	**.d3plot**	Direct Reader
NPARC/WIND	**.cfl/.cgd**	Direct Reader
OVERFLOW	**[-]**	PLOT3D Format
openFOAM	**[-]**	Direct Reader
PATRAN Neutral	**[-]**	Direct Reader
PLOT3D	**[-]**	Formatted, Unformatted, Binary, DP 2D, 3D, Multi-grid, IBlank
PowerFlow	**.uns**	Contact EXA for FV-UNS Translator
PW Common File	**[.restart]**	Direct Reader
RavenCFD	**[-]**	Export to FV-UNS
SC/Tetra, scFLOW & scSTREAM	**.fld/.fph**	Direct Reader
SCRYU	**.uns**	Export to FV-Unstructured Format
STAR-CCM+	**.fvuns**	Export to FV-Unstructured Format
STAR-CD	**.uns**	Export to FV-Unstructured Format
STL	**.plt**	Direct Reader
Surface Sampled Data	**[-]**	Native FV Unstructured Format
Tau	**[-]**	Translator to FV-Unstructured Format
Tecplot binary	**.plt**	Direct Reader
Tetrex	**.uns**	Export to FV-Unstructured Format
ThermoAnalytics	**.uns**	Export to FV-Unstructured Format
UH3D Data/Geometry	**[-]**	Direct Reader
ultraFluidX	**.layout**	Direct Reader
USM3D	**[-]**	Contact IL for more information
VECTIS	**[-]**	Contact IL for more information
VTK Structured	**.vtk, .vts, .vtr, ...**	Direct Reader
VTK Unstructured/Hybrid	**.vtk, .vtu, .vtp,...**	Direct Reader
Xflow	**.cgns**	CGNS Reader
WIND Struct & Unstruct	**[-]**	Direct Reader

FVX™ FIELDVIEW Extension Language

Reading CFD Datasets with FVX

`read_dataset({tbl})`	Reads a CFD dataset into FIELDVIEW
`print_dataset_table()`	Returns information such as format, grid and geometry ranges
`set_transient({tbl})`	Specifies a time step or solution time for a transient dataset
`sweep_time({tbl})`	Sweeps a transient dataset for a range of steps or solution times

Making Surfaces, Rakes and Annotations

`create_boundary({tbl})`	Creates a boundary surface based on tbl input
`create_comp({tbl})`	Creates a computational surface based on tbl input
`create_coord({tbl})`	Creates a coordinate surface based on tbl input
`create_iso({tbl})`	Creates an iso-surface based on tbl input
`create_streamline({tbl})`	Creates a streamline rake based on tbl input
`read_particle_paths({tbl})`	Reads a particle path data file based on tbl input
`create_text({tbl})`	Creates a text string based on tbl input
`create_arrow({tbl})`	Creates an arrow based on tbl input
`modify(handle,{tbl})`	Modify any surface/rake/annotation created w/ FVX
`delete(handle)`	Delete any surface/rake/annotation created w/FVX

Controlling the Appearance of Surfaces and Rakes

For all surfaces and rakes:	
`geometric_color`	Specifies the geometric color
`show_mesh`	Shows the mesh for a surface (n/a for rakes)
`contours`	Specifies whether to show contour lines (n/a for rakes)
`number_of_contours`	Specifies the number of total contours (n/a for rakes)
`transparency`	Specifies the level of transparency
`visibility`	Specifies visibility as either on or off
`line_type`	Specifies the line type as either thin, medium or thick
`display_type`	Specifies one of the available display types
`scalar_range({tbl})`	Specifies a minimum and maximum or uses local range
`ruled_grid_options({tbl})`	Specifies ruled grid options for coordinate surfaces
`show_legend({tbl})`	Shows legend for a surface or rake
`threshold_range({tbl})`	Specifies a threshold range to apply
`vector_options({tbl})`	Specifies vector options for a surface
`scalar_minmax_options({tbl})`	Specifies display of min and max values on a surface
`set_streamlines_display({tbl})`	Specifies one of the available display types
`set_particle_paths_display({tbl})`	(same as for streamlines)
`set_colortable({tbl})`	Specifies a complete custom color table
`set_color({tbl})`	Defines the RGB values for a single color chip
`get_default_color()`	Returns the default RGB value for a color chip
`create_dynamic_clip({tbl})`	Creates and applies dynamic clip planes, line or box style

Getting Information from CFD Data

`query(handle)`	Returns all information for any surface/rake/annotation
`query_transient()`	Returns all time step & solution time info, transient data
`query_streamline_display()`	Returns all information for global streamline display
`query_particle_paths_display()`	Returns all information for global particle path display
`query_colortable()`	Returns all RGB values for all color chips
`query_default_colortable()`	Returns original RGB values for all color chips
`get_all_boundary_types()`	Returns a table of all boundary types
`get_scalar_functions()`	Returns a table of all scalar functions
`get_vector_functions()`	Returns a table of all vector functions
`get_surface_scalar_functions()`	Returns a table of all face-based scalar functions
`get_surface_vector_functions()`	Returns a table of all face-based vector functions
`get_current_object_handle()`	Retrieves the handle of the current object
`get_all_object_handles()`	Returns handles for all objects
`integrate_all()`	Returns a table of integration results for all surfaces
`integrate_surface(handle)`	Returns a table of integration results for surface handle
`integrate_partial_surface(handle,{XYZ},tol)`	Returns a table of integration results for partial surface
`probe_current_functions()`	Returns probe results for specified XYZ table
`probe_IJK_current_functions()`	Returns probe results for specified IJK table
`probe_IJK_scalar()`	Returns current scalar for specified IJK table

Writing and Displaying Results with FVX

`openfile(filename,mode)`	Opens a file for reading ("r"/"r+"), writing ("w"/"w+"), appending ("a"/"a+"). Use "b" for binary format.
`closefile(handle)`	Closes a file, recommended practice
`remove(filename)`	Deletes a file
`rename(oldname,newname)`	Renames a file
`format(string,arg,...)`	Returns formatted version based on arg,...
`read(handle,format...)`	Reads numbers ("*n"), words ("*w"), line ("*l"), entire file ("a") or "nnn" for string of nnn characters from file handle
`readfrom(filename)`	Reads from default system input, optionally filename
`write(handle,arg,...)`	Writes strings or numbers to file handle
`writeto(filename)`	Writes to default system output, optionally filename
`appendto(filename)`	Appends to default system output, optionally filename
`graph({tbl})`	Creates a 2D XY Plot or histogram based on tbl input
`postscript_output()`	Creates a postscript (PS) version of the current graph.

Other FVX Commands

`dofile(filename)`	Executes filename as a standard FVX program
`dostring(cmd_string)`	Executes the cmd_string as a standard FVX program
`dump(tbl)`	Dumps summary information for tbl to console
`dumpall(tbl)`	Dumps detailed information for tbl to console
`execute(cmd)`	Executes an operating system cmd
`fv_script(script_cmd)`	Executes a FV SCRIPT cmd (enclosed in " ")
`getn(tbl)`	Returns the number of entries in tbl
`make_panel({tbl})`	Creates a user defined GUI based on text input, buttons & sliders
`match_one_entry(tbl,match)`	Find the first instance of match in a tbl (ie get_scalar_functions)
`match_multiple_entries(tbl,match,...)`	Find all instances of match in a tbl (ie get_all_boundary_types)
`print(arg,..)`	Prints the value of arg,...
`redraw()`	Refreshes the FV graphics window when called
`self:set()`	Sets input arguments for the make_panel function fields
`self:get()`	Returns user input arguments for the make panel function fields
`set_auto_redraw()`	Forces graphics window refresh after each FVX command
`set_preserve_globals()`	Changes default to make variables global instead of local
`set_view({tbl})`	Creates a view RESTART file
`strfind(string,pattern,...)`	Finds instance of pattern in original string
`stop()`	Explicit stop of FVX script and entry into debug mode
`tinsert(tbl, pos, value)`	Inserts an element *value* into *tbl* at position, pos
`tonumber(string[,base])`	Converts a string to a number using optional base
`tostring(number)`	Converts a number to a string
`tremove(tbl, pos)`	Removes an element from *tbl* at position *pos*
`type(arg)`	Returns the type of arg

FVX Debugging Commands

`assign`	Evaluate arg immediately	`find`	Find reference
`brk or b`	breakpoint set at current	`goto or g [line]`	Execute to line
`brk or b [line]`	breakpoint set at [line]	`list [start][number][filename]`	defaults are 1 20 current
`brk or b [function]`	breakpoint at [function]	`next or n`	Single step, skip functions
`call`	Evaluate arg immediately	`print or p`	Print value of local var.
`clear`	Clear all breakpoints	`quit or q`	Exit FVX script
`cont or c`	Continue execution	`return`	Complete func and break
`cont to [line]`	Continue exec to [line]	`step or s`	Single step, into functions
`dbrk [breakpoint]`	Delete [breakpoint]	`stop at [line]`	Stop at [line]
`delete all`	Delete all breakpoints	`stop in [function]`	Stop at [function]
`dump(tbl)`	Displays all entries in tbl	`view or v [start][number][filename]`	defaults are 1 20 current
`dumpall(tbl)`	Displays all entries in all nested tables	`where`	Display current stack call

FV SCRIPT COMMANDS

3DPDF_WRITE filename Exports the current window as a 3D PDF format file.

ALIGN +X/+Y/+Z/-X/-Y/-Z Align the dataset one arg for nominal direction, three for isometric view

ANIMATE *cycles* Animate curved vector display types, filament & growing, for specified cycles.

ANTIALIAS ON/OFF Turns antialias ON or OFF when rendering in graphics window.

AXIS_MARKER ON/OFF Turns axis markers ON or OFF when rendering in graphics window.

BACKGROUND position-type filename
Position type is one of Center, Fit, Stretch, filename is background image.

BACKGROUND color n Sets background color to colorchip defined by n

CENTER [XX YY ZZ] Center at the Object: World transform level or set Center with optional args

DATASET_SAMPLING results target sampled_dataset_name
results target is dataset number of results dataset
sampled_dataset_name will be created
sampled_dataset_name will be created

DUPLICATION dataset TRANSLATE axis1 total_copies1 delta1 [axis2 total_copies2 delta2 [axis3 total_copies3 delta3]]
Duplicate datasets linearly along any or all axes. Each axis specified must have *number of copies* and *delta* specified. FieldView will default to Dataset extent by using '*' for delta field.

DUPLICATION dataset MIRROR axis1 [axis2 [axis3]]
Mirror dataset around any or all model axes, specified as **X**, **Y** or **Z**.

DUPLICATION dataset ROTATE axis total_copies total_sweep
Make rotational copies of a dataset around specified axis.

EXIT Script will end and **FieldView** will exit.

EXPORT *surf* filename ***surf*** is one of:
COMP/ISO/COORD/BOUNDARY/STREAM/PLOT/VCORE

FIT Applies **CENTER** then zooms & translates to best fit current window.

INTEGRATE [current|all|sweep] filename
Computes the integral of current scalar over current surface.

INTERPOLATE steps view-restart
Interpolates number of steps between current and view-restart.

KEYFRAME [start end [inc]] filename
Play the keyframe animation with optional limits and increment.

LIGHTINGVALUES ambient-light diffuse-light
Controls lighting parameters.

LINKED_SURFACE_SWEEP ON/OFF
Turns the linked surface mode on or off.

MAXIMIZE ON/OFF Causes graphics window to become full-screen / original size.

OUTLINE ON/OFF Toggles dataset outline ON or OFF

PANELS ON/OFF Shuts off display of any subsequent panels or updating of panels.

PAUSE Causes display of PAUSE dialog box. Must press OK to continue.

PERSPECTIVE ON NN/OFF Turns perspective ON using NN or OFF when rendering in graphics window

PLOT Brings up a line plot of the current Computational Surface.

PLOT_SIZE width height Resizes 2D Plot window to specified width and height.

PRESENTATION ON/OFF Turns Presentation Rendering on or off.

PRINT GRAPHICS|WINDOW PS/EPS [BACK/NOBACK][SEND/NOSEND][GRAY/NOGRAY] filename
Creates postscript (PS) or encapsulated postscript (EPS) for the graphics window. Options include BACK (use white background), SEND (directly to printer) and GRAY (use gray background)

PRINT GRAPHICS|WINDOW *type* filename
Creates hardcopy file of type: **BMP/JPEG/PNG/TIFF/EMF**

PRINT PLOT PS/EPS [SEND/NOSEND] filename
Creates postscript (PS) or encapsulated postscript (EPS) for the 2D Plot window.

PRINT PLOT *type* filename Creates hardcopy file of type: **BMP/EMF/PNG**

PRINT USER [SEND/NOSEND] filename
Calls the user-defined print option. The output filename is optional.

PROBE file-format dataset-number x y z This form will open the Point Probe panel but not create a file.

PROBE file-format dataset-number file1 file2 This form taks input from file1, and makes output file 2

RECORD ON [GRAPHICS|WINDOW] [MP4|AVI||PNG|JPEG|BMP|TIFF] [FRAME RATE] filename
Turns flipbook recording on, saving animation or images to filename.

RECORD OFF Turns off flipbook recording.

RESET Resets graphic window to starting viewing direction & perspective defaults.

RESTART *type* restart-name
SAVE *type* restart-name Causes restart file to be read or saved where ***type*** is one of:
ALL/ALL_CURRENT_WINDOW/ALL_NO_DATA_READ BOUNDARY/COLOR/COMP/COORD/CURRENT_DATASET/DATA DYNAMIC_CLIP/FORMULA/ISO/LINE/MULTI_WINDOW_LAYOUT PATHS/PLOT/PREF/PRESENTATION/STREAM/TITLES/VIEW VCORE

SELECT *type* number Makes type for the specified number current where ***type*** is one of:
WINDOW/ISO/STREAM/PATHS/TITLES/BOUNDARY /LINE/ COORD/VCORE

FV SCRIPT COMMANDS

SELECT COMP grid-number surface-number
Makes comp surface for the specified grid and surface number to be current.

SELECT PLOT plotnum [pathnum]
Makes 2D Plot for the specified plotnum current. Optional path permits selection of specific pathnum within current 2D plot.

SELECT WINDOW window-number
Makes window-number current in a multi-window layout.

SHINE ON/OFF *type* Sets Presentation Rendering property, shine for type of: **BOUNDARY/COMP/COORD/ISO/STREAM/PATHS/VCORE**

SHINEVALUES intensity highlight_size
Controls shine parameters.

SIZE width height Specifies size of graphics window.

SLEEP number-of-seconds Suspends script. Permits panel manipulations during sleep.

SPIN number-of-steps Spins the dataset. One step is equal to 0.1 radians.

STEP OS-command
UNSTEP Identical to SYSTEM command below, but command is executed after every graphics window update.

SWEEP cycles
SWEEP BOUNCE/DOWN/UP/DATASET cycles Sweeps the current surface, dataset, or animate the current rake.

SWEEP TIME cycles [SKIP] [streak_exp_filename]
Performs a transient sweep & saves streaklines to filename

SWEEP TIME LOOP cycles loops [SKIP] [streak_exp_filename]
Sweeps a periodic transient dataset for the given number of loops.

SYSTEM OS-command Allows you to submit commands to the operating system.

TIME STEP dataset current [begin end]
Specifies a time step and range for a transient sweep.

TIME SOLUTION dataset current [begin end]
Specifies a solution time and range for a transient sweep.

TIME SET DELTATIME delta-time
Specifies the delta-time for PLOT3D or FV-UNS transient data.

TIME SET MERGEDTIMES ON/OFF
Creates a merged timeline for multiple transient datasets.

WRITE [text] Prints blank lines or quoted strings to standard output (xterm for UNIX and the "console" window for Windows).

XDB_WRITE xdb-filename [THRESHOLD/NOTHRESHOLD] [title [notes]]
Writes an Extract Database (XDB) file with optional Maintain Thresholded Surfaces toggle, title string, and appended notes text file.

XDB_ENABLE xdb-filename [THRESHOLD/NOTHRESHOLD] [title [notes]]
Writes a 'swept' Extract Database (XDB) file with optional Maintain Thresholded Surfaces toggle, title string, and appended notes text file.

COMMAND LINE OPTIONS

-batch :displaynum[:screennum] Runs FV in batch mode

-fvb*N* Use batch-only licensing, batch mode forced
N refers to the number of parallel processes which can be run in batch-only mode and can be set to 8, 16, 32 or 64

-conn_to *value* Sets time-out in value seconds for Client-Server

-create_exterior_fvbnd Generates a .FVBND file, but only if used with -pN cmd line

-create_wall_fvbnd Generates a .FVBND file, but only if used with -pN cmd line

-f *name* Executes the RESTART *name* upon starting FV

-fc Uses PLOT3D/FAST mouse button controls

-fvx *name* Executes the FVX script *name* upon starting FV

-gamma *value* All PLOT3D formulas corrected for gamma=value

-gasconstant *value* All PLOT3D formulas corrected for gasconstant=value

-hrg, -srg Use **h**ardware or **s**oftware **r**emote **g**raphics for running interactively on non-Windows remote systems

-pfv8/16/32/64 Selects FV Parallel license; specifies max. no of processes

-pN, N=0,1 or 2 Generates preprocess files using DataGuide feature
0: only grid preprocess file (.fvpre) created
1: grid preprocess (.fvpre) and short results file (.fvres) created
2: grid preprocess (.fvpre) and full results file (.fvres) created

-port N1[:N2]|none] Sets explicit port number, a range of numbers or none

-python *name* Executes the python script *name* upon starting FV

-s *name* Executes the SCRIPT, name, upon starting FV

-silent Suppresses all warning pop-ups during FVX or script runs

-size=<xdim>x<ydim Sets graphics window to specific pixel dimensions upon start-up

-software_render Force software rendering when **-batch** argument is used.

ENVIRONMENT VARIABLES

FVEXP_NUM_LOCAL_PARALLEL Adjusts no. of controller processes used in Local Parallel mode. Also impacts the amount of HWUs being drawn.

FV_2D_TO_3D Extrude binary FV-UNS 2D cases in Z direction for probing/plotting

FV_ACUSOLVE_GRAD Enable reading of gradients for AcuSolve Direct Reader

FV_CARTESIAN Treats all structured grids as Cartesian

FV_DATA_CHECK Checks veracity of PLOT3D/FV-UNS files

FV_DEBUG Returns general diagnostic information (Cust Support may ask)

FV_DEBUG_AUTOSTART Set this to help understand Client-Server startup problems

FV_DEBUG_STARTUP Prints info related to system limits (non-Win only)

FV_DEFAULT_PORT Set an alternate for client-server port (colon separated port range)

FV_DPI Specifies dots per inch for PS, EPS output formats

FV_HQ_AVI Use the high quality option with AVI files on Windows systems

FV_IGNORE_WALLS Ignores wall marking for stream- & streakline calcs

FV_MP4_COMPRESSION_FACTOR MP4 Quality - range 0 (lossless) to 51 (lowest quality, size)

FV_MULTISAMPLE_ENABLE Turns on full screen antialiasing for graphics & 2Dplot window

FV_NO_BNDRY_FILE FVBND file not written for NPARC/WIND data

FV_NO_DATA_CHECK Skips checking on boundary & element numbers

FV_NO_GRID_JUMP Turns off streamline grid jumping (except IBlank)

FV_NO_OUTLINE Turns off outline drawing

FV_NO_PREFERENCES Does not read or write the preferences file FieldView.ini

FV_NO_STREAK Turns off automatic streakline calc. for transient sweeping

FV_NUM_THREADS Set maximum number of threads for multi-threaded features

FV_OF_NO_INIT_COND Ignore initial time step for OpenFOAM results

FV_OLD_BROWSER_BEHAVIOR Does not use file browser locations saved in FieldView.ini

FV_OPENFOAM_NO_PROC_BND Ignore partition boundaries when reading OpenFOAM results

FV_PLUGINS Specifies the location of user defined reader plugins

FV_PRINT_DIR Specifies temp location for intermediate print files

FV_PRINT_NO_AA Turns off antialiasing for PS, EPS, emf output

FV_PROBE_PERFORMANCE Adjust the performance for probing operations

FV_PROBE_SAVE_MEM Lowers memory requirement (decreases probing performance)

FV_PROTO_QUICK_XDB Skip encryption (increasing performance) of XDB exports

FV_RF_GRAPHICS Enable reduced functionality graphics

FV_SCREEN_GRAB Save images directly from the screen; save-under disabled

FV_SELECT_FUNCTIONS_ONLY Limits functions created by optional DataGuide

FV_SERVER_CONFIG_DIR Specifies the location of Client-Server config files

FV_SHOCK_MIN_NODES Sets minimum nodes for a connected shock region

FV_SHOCK_PRESSURE_CHANGE Sets dimensionless pressure change for a shock region

FV_SHOW_WALLS Creates a new boundary type showing streamline walls

FV_SINGLE_FILE_STREAKLINES Use STREAKLINE format for streakline export

FV_SSLINES_EXPORT Disables sampling of scalars during Surface Streamline export

FV_ST_STREAMLINES Disables multi-threading for Streamlines

FV_ST_FORMULA Disables multi-threading for Formulas

FV_ST_VCORE Disables multi-threading for Vortex Core / Surface Flow Objects

FV_TRANSP_LAYERS Set the number of layers for GPU-based transparency (def=6)

FV_USE_FV13_XDB_FORMAT Use original XDB format when export XDB files

FV_USE_FV14_GL_MODE Use pre FieldView 15 rendering mode

FV_USE_OLD_RESTARTS_MENU Use Restart File selector as it was prior to FieldView 2022

FV_USE_LONGEST_PATH Sets length fraction for streamline filament calculation

FV_USER_HELP_ENTRY Help menu text to display instead of FV_USER_HELP_URL

FV_USER_HELP_URL Custom URL for Help menu (text string, max 33 character display)

FV_VOLUME_PROBE Use interpolated volume-based probing on surfaces

FVREG_ACUSIM_OFF Disable support for regions for AcuSolve Direct Reader

MOUSE/KEYBOARD OPERATIONS

[M1] [M2] [M3]

[M1] *Double click* - Quick-Pick to select a surface/rake in graphics window

[S P A C E B A R] - Toggle mouse controls when cursor is in graphics window

[M1], then [SHFT][M1] - Select a range of boundary types or grids in a long list

[CTRL][M1] ([Command][M1] for macOS) - Select *add'l* boundary types or grids in a long list

[CTRL][M1] ([Command][M1] for macOS) - All picking operations, set center of view/rotation

[ALT][M1] ([Option][M1] for macOS) - Emulate M2 for transforms in graphics window

[SHIFT][ALT][M1] ([Control][M1] for macOS) - Emulate M3 for transforms in graphics window

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