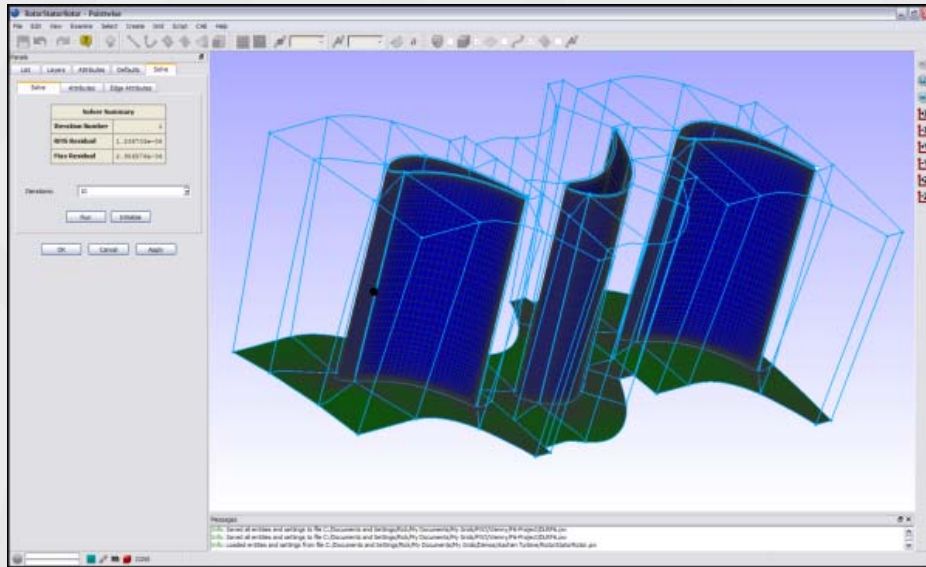


Pointwise: The Next Generation of Reliable CFD Meshing

上海飞熠软件技术有限公司
www.shanghaifeiyi.cn

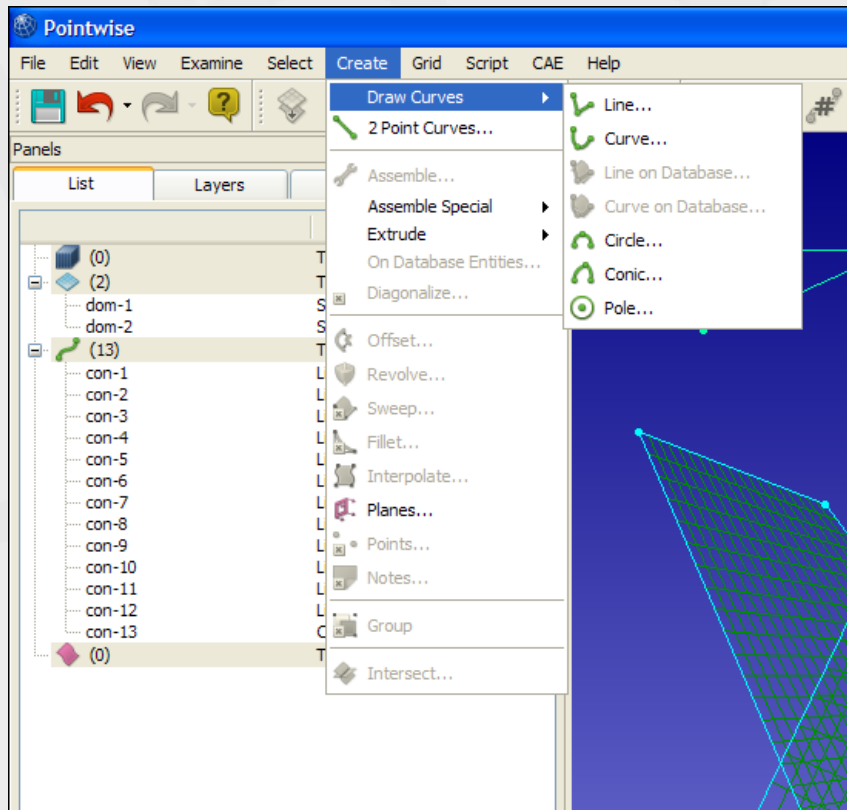
Pointwise is...



- The name of our next-generation meshing software.
- The results of over 20,000 hours of work.
- A modern software architecture
 - C++ core
 - Qt GUI
 - Tcl scripting
- The future of of our meshing software products.

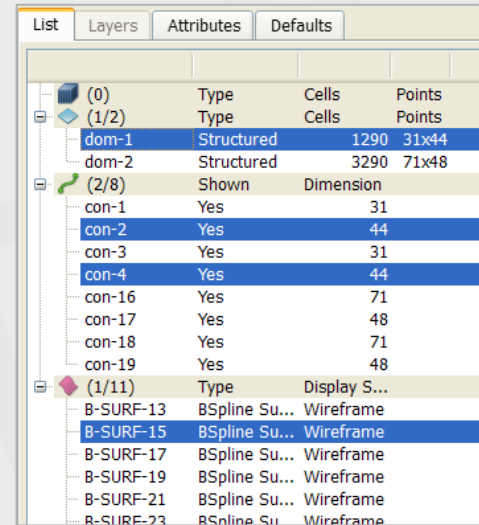
Pointwise Benefits

- Easier to use
 - Standard graphical interface
 - Flat menu structure/toolbars
 - Standard keyboard accelerators
 - User customizable
- New ease of use capabilities
 - Full undo and redo
 - Magic domain and block assembly
 - Progress bars/command interrupt
 - Combined grid/database file
 - Full journaling
- Same high quality grids
 - Port of Gridgen's proven methods
- Plus 64-bit support

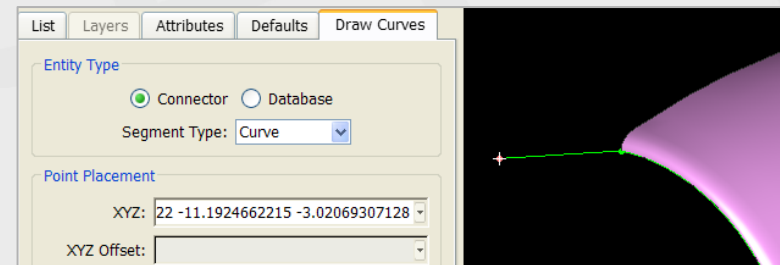


Pointwise Ease of Use

- Standard GUI
 - Entity List
 - Selection
 - Data table
- Unified Curve Drawing
 - Connectors & Database
 - Simply point and click
 - Easy coordinate editing
- Keyboard Accelerators
 - Ctrl+C = copy
 - Ctrl+V = paste
- User Customization
 - Place buttons on toolbars
 - Resize/relocate components

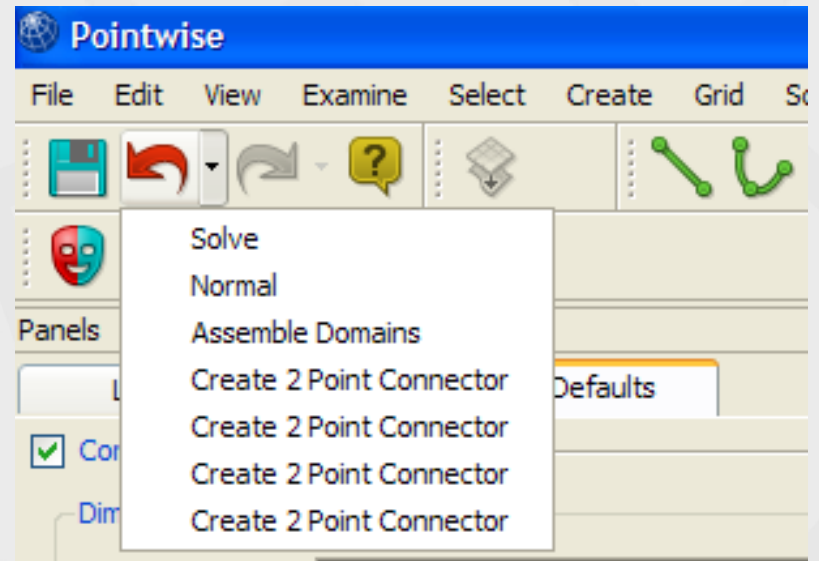


List				
Layers				
Attributes				
Defaults				
(0)	Type	Cells	Points	
(1/2)	Type	Cells	Points	
dom-1	Structured	1290	31x44	
dom-2	Structured	3290	71x48	
(2/8)	Shown	Dimension		
con-1	Yes	31		
con-2	Yes	44		
con-3	Yes	31		
con-4	Yes	44		
con-16	Yes	71		
con-17	Yes	48		
con-18	Yes	71		
con-19	Yes	48		
(1/11)	Type	Display S...		
B-SURF-13	BSpline Su...	Wireframe		
B-SURF-15	BSpline Su...	Wireframe		
B-SURF-17	BSpline Su...	Wireframe		
B-SURF-19	BSpline Su...	Wireframe		
B-SURF-21	BSpline Su...	Wireframe		
B-SURF-23	BSpline Su...	Wireframe		

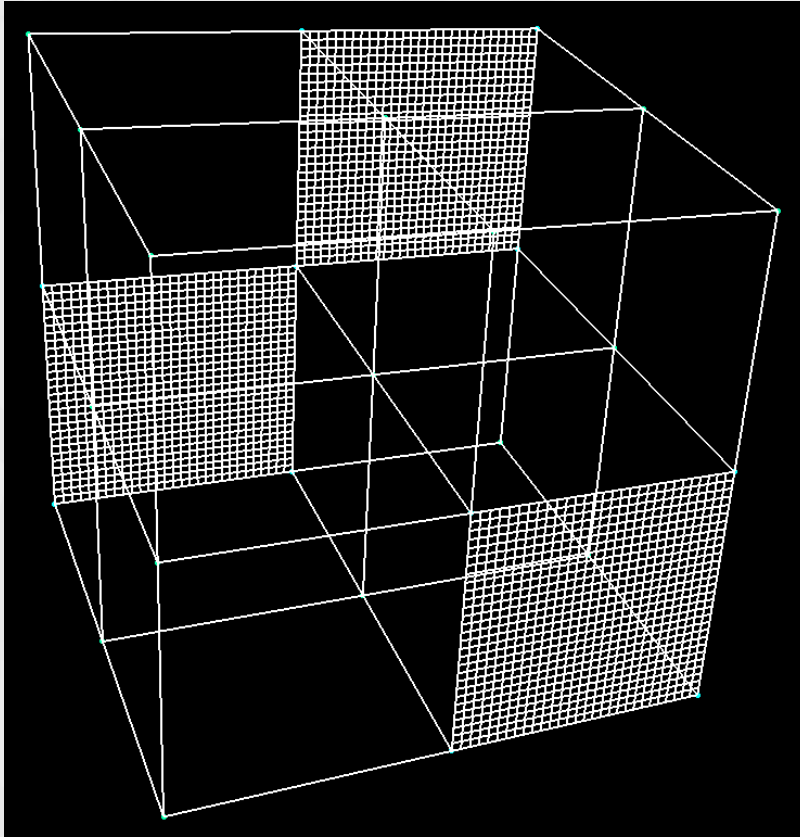


New Ease of Use Features

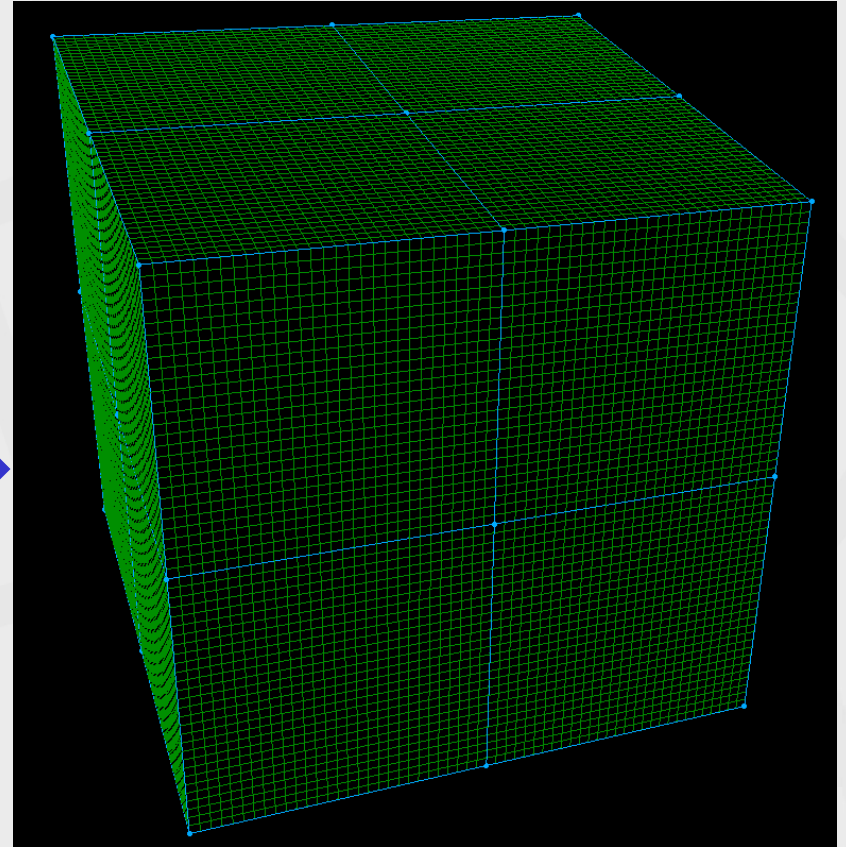
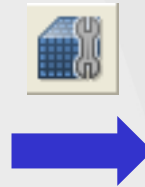
- Multiple-level undo and redo
 - User configurable up to 20 levels
 - Menu select any level
 - Keyboard accelerator available
 - Levels adapt to memory usage
- Progress bars
 - Show time remaining in operation
 - User interrupt at any time



Magic Domain/Block Assembly



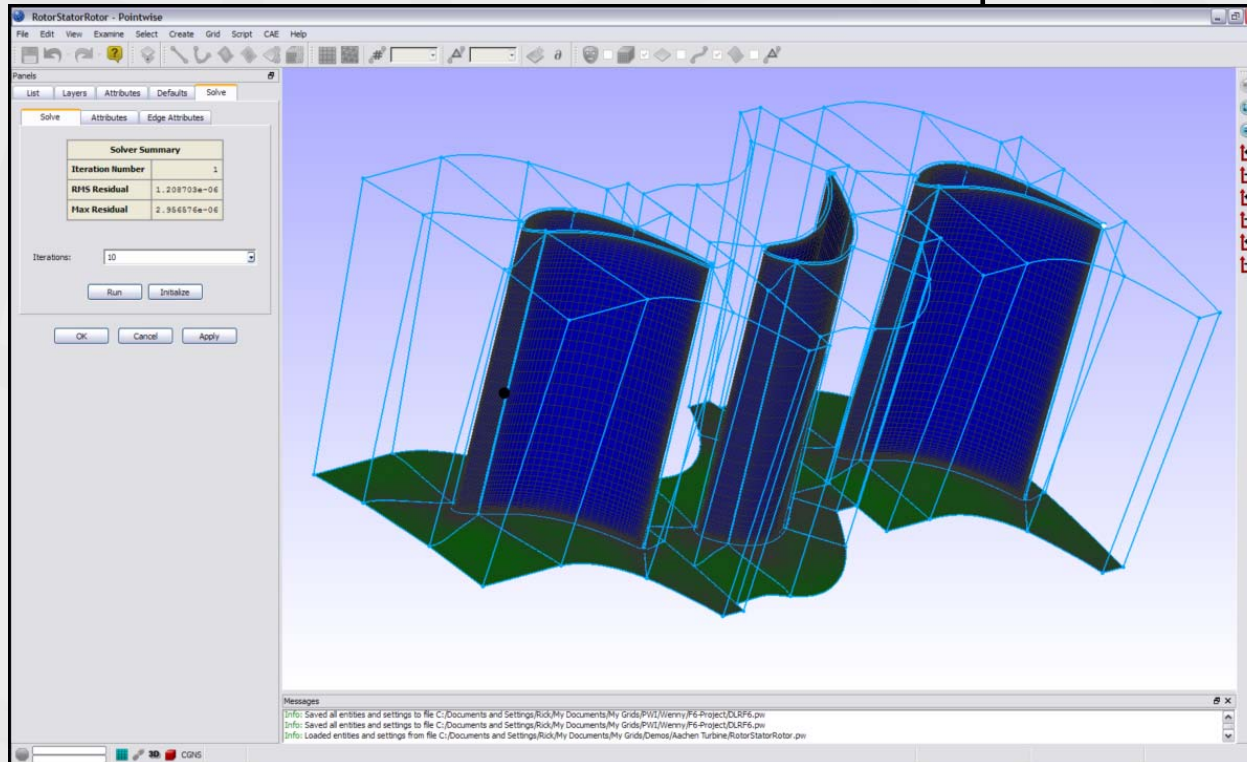
Selected connectors and domains







Assembled block or blocks

Pointwise 64-bit Support

- Remove 2 GB memory limit
- Generate larger grids
- Initial platforms
 - Linux and sgi
- Additional platforms in work





Pointwise Terminology

-  • Connector – 1D Grid element. Foundation for all other grid hierarchy.
-  • Domain – 2D Grid element. Can be structured or unstructured.
-  • Block – 3D Grid element. Can be structured, unstructured or hybrid.
-  • Database – CAD geometry. Can be imported or created directly.
- Entity – An individual grid or database element.

Hint: Same terminology as Gridgen!

More Pointwise Terminology

- Control Point – User defined points specifying the shape of curve entities.
- Node – First and last control point defining a connector. Must match within Node Tolerance to form a domain.
-  Spacing Constraint – User defined grid point spacing adjacent to connector nodes.
-  Dimension – Number of grid points assigned to a connector.
- Edge – Boundary of a domain. Exactly four for structured. One or more for unstructured.
- Face – Boundary of a block. Exactly six for structured. One or more for unstructured.

Graphical Interface Components

Menus

Undo Button!

Toolbars

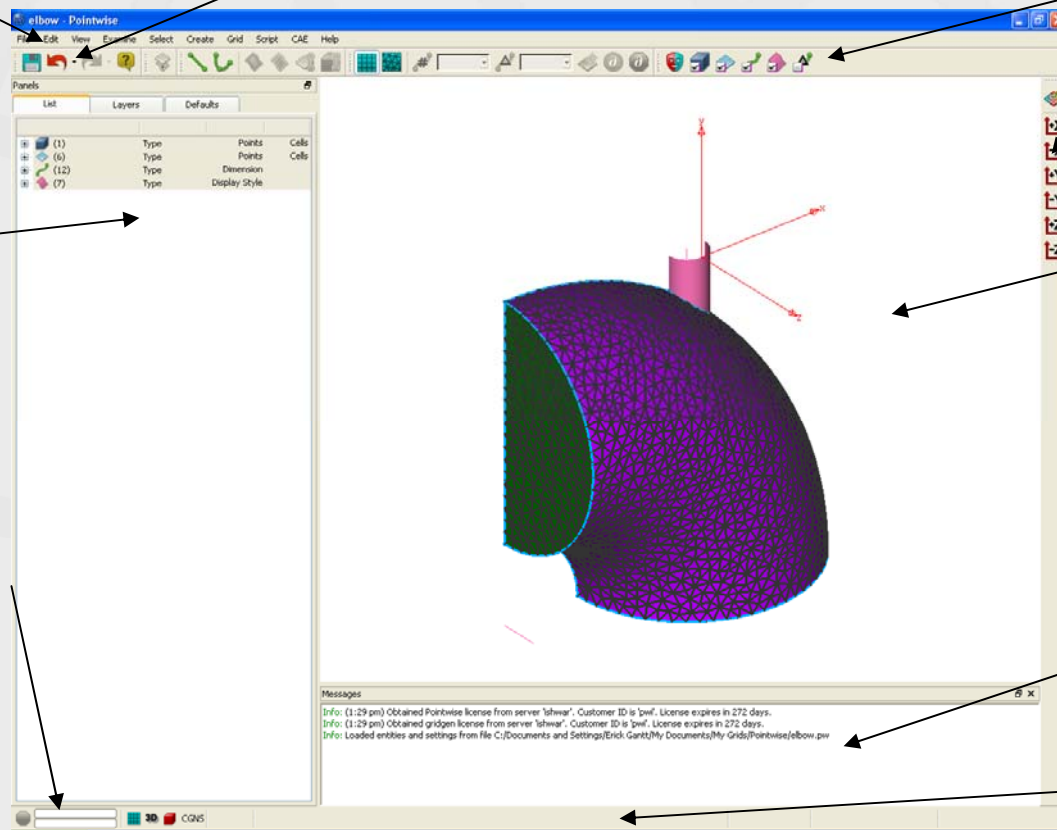
Panels

Display Window

Two Level Progress Bar

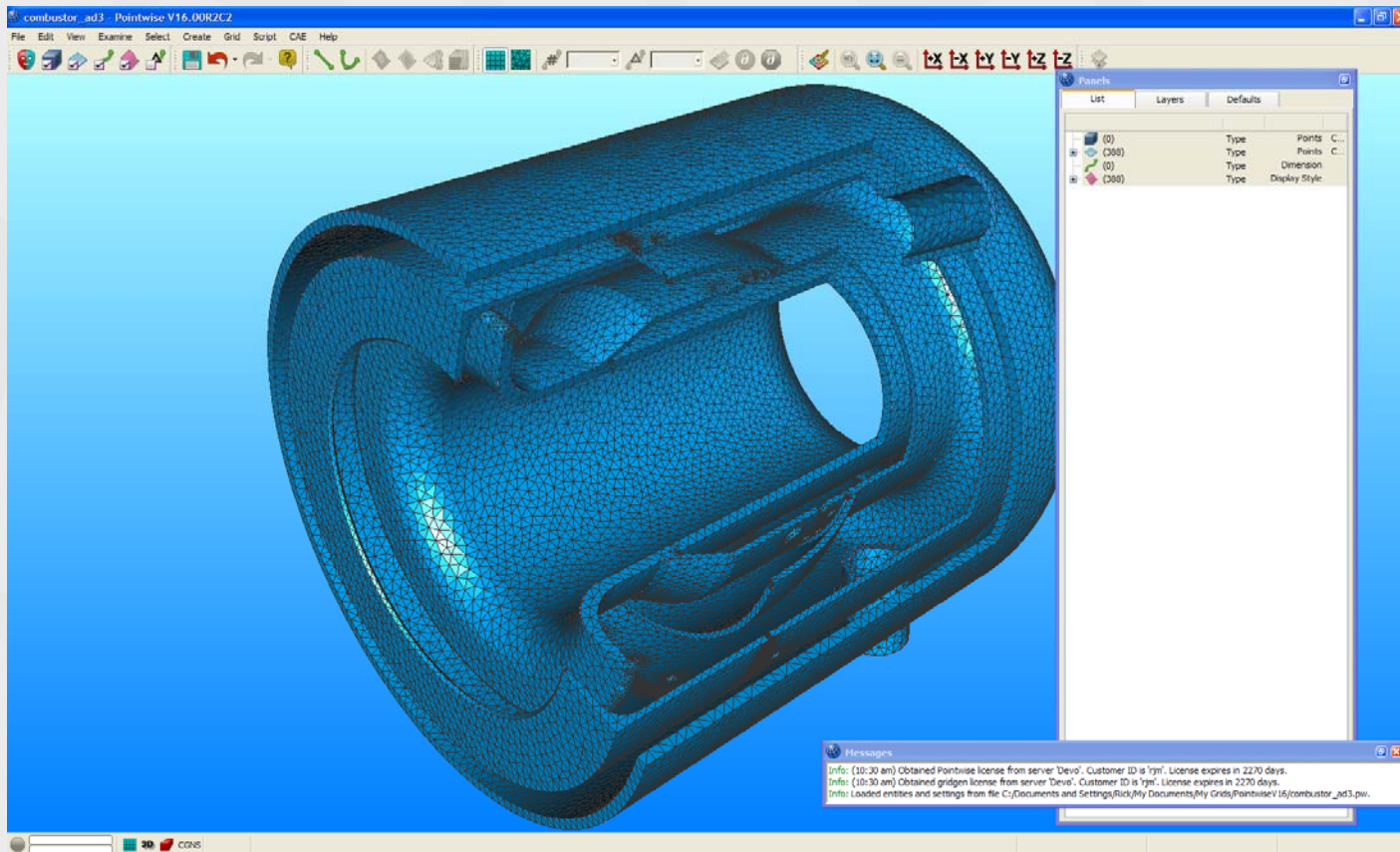
Messages Window

Status Bar



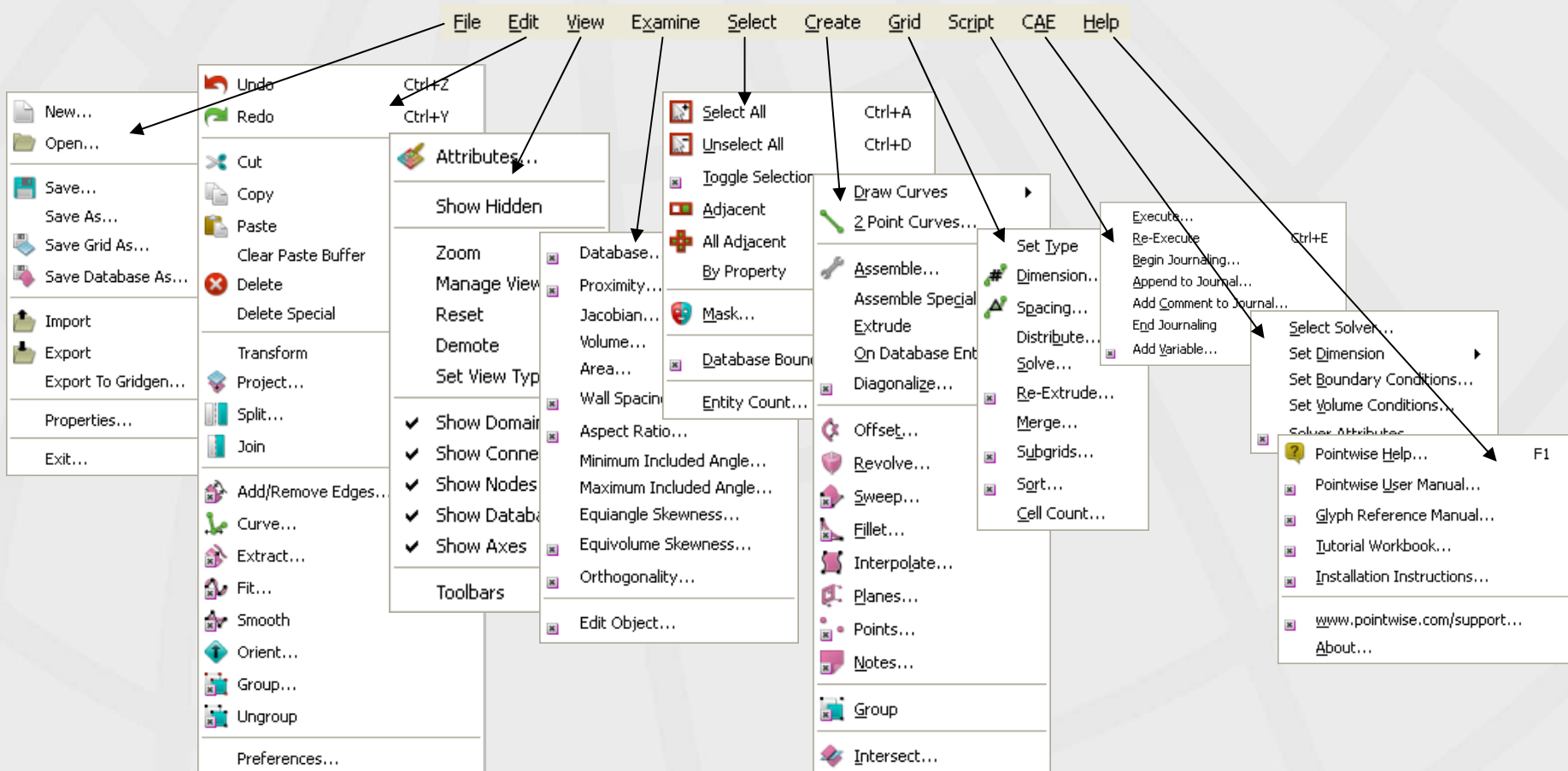
GUI Customization

- Reposition Toolbars, Panels or Messages window
- Change Display window colors and default selection box behavior



Pulldown Menus

- All commands can be accessed from the pulldown menus with keyboard mnemonics

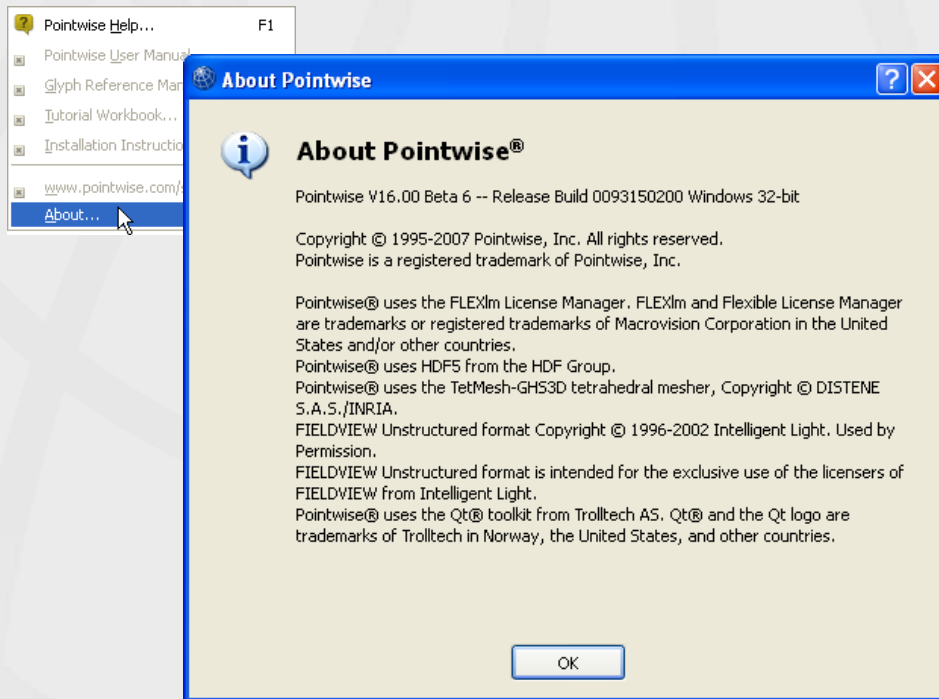


Online Help



- Access via the F1 hot key for context sensitive information.
- Access via the Help menu.
- Browser style Back and Forward buttons.
- Embedded links for quick navigation to related topics or more detailed information.
- Future enhancements planned to include search and index features.

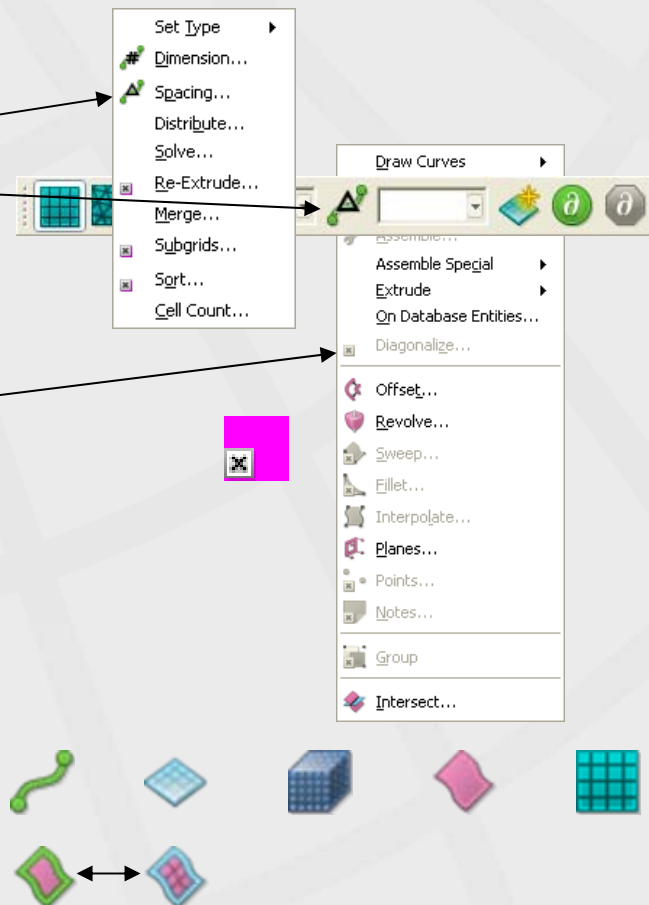
Help - About



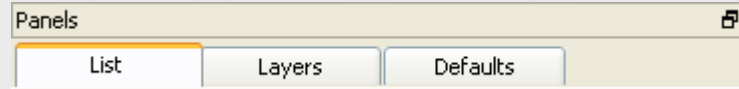
- Provides version, build, platform and bit level information.
- Text can be copied and pasted into email when requesting technical support.
- Access via the Help menu.

GUI Tips

- Frequently used commands have unique icons assigned on menu and toolbar. For instance, the Spacing command:
- Commands not yet implemented have their icons overlaid with an “x” symbol and are grayed out. Those without an icon show only the “x” overlay.
- Color coding is used to indicate entity specific commands.
 - Bright green for connectors.
 - Light blue for domains.
 - Dark blue for blocks.
 - Magenta for database.
 - Teal for non-specific commands.



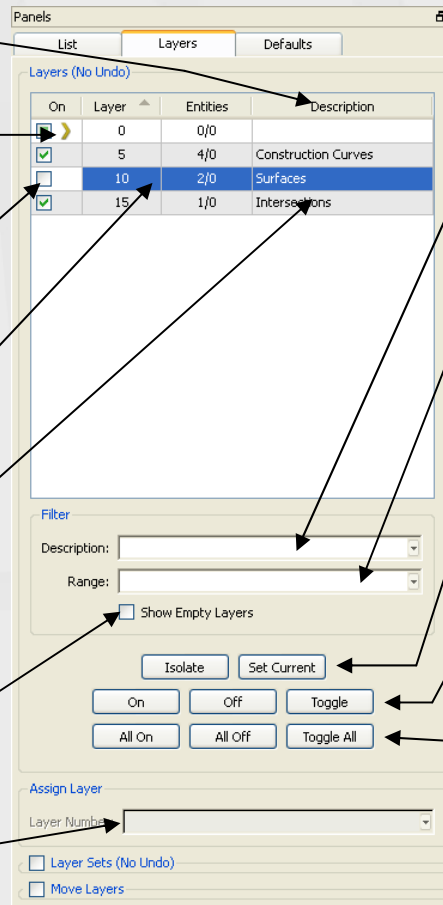
Panels



- Three permanent panels provide continuous access to frequently used functionality: the List, Layers, and Defaults panels.
- Command panels appear as a new tab with the three that are always present.
- Functionality available in a panel is dependent on command panels open or the current entity selection.
- The panels area of the GUI cannot be closed, but can be repositioned to the right side of the GUI or torn off into a floating window.

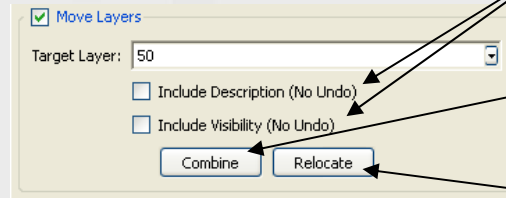
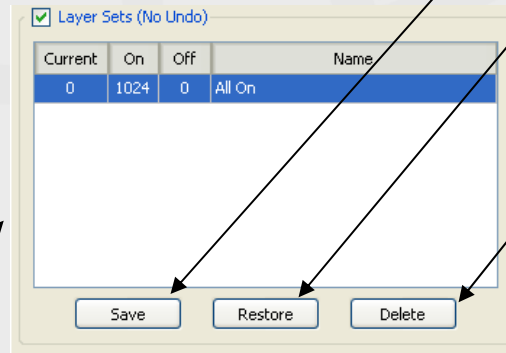
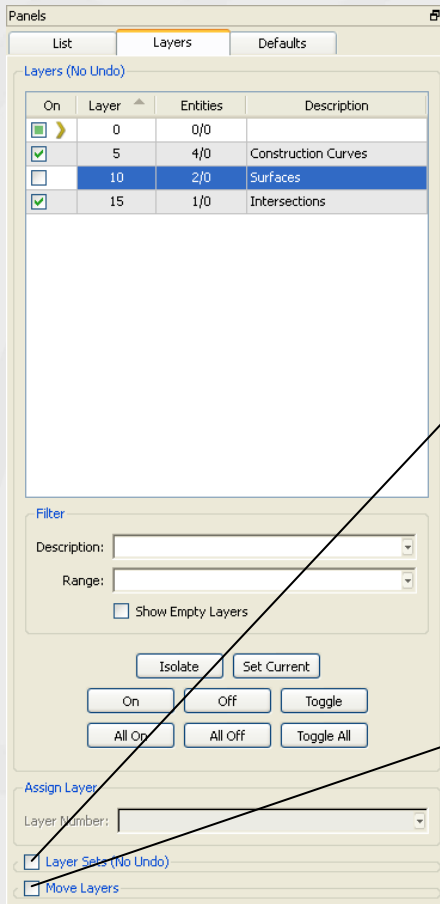
Layers Panel

- Click column header to sort.
- Current layer has filled check box and gold chevron emblem.
- Off layers have clear check boxes.
- Selected layers have royal blue background.
- Double click description field to edit.
- By default empty layers are not shown.
- Select entity or entities to enter a new layer number.



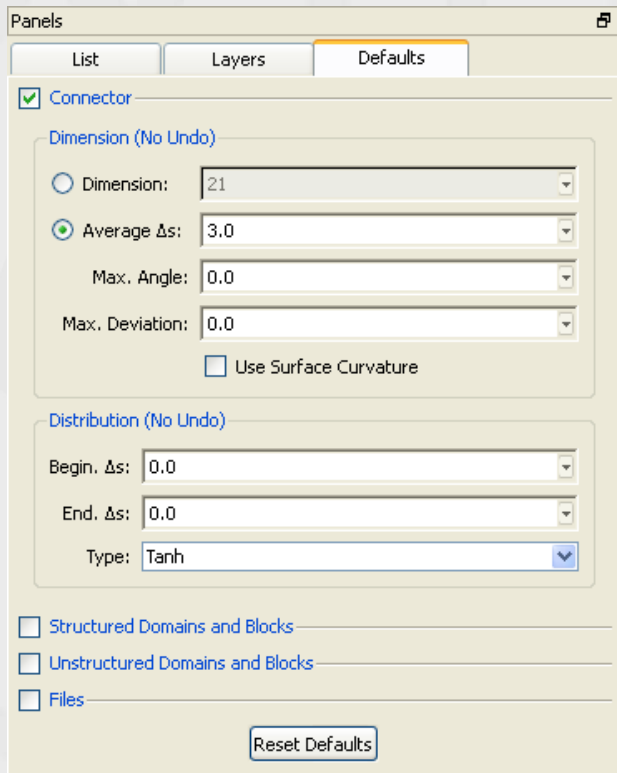
- Entities in off layers not visible/cannot be selected.
- Filter Description field with text string (* wildcard).
- Filter layer list to range or ranges of numbers separated by commas.
- Isolate and Set Current require a single layer to be selected.
- On, Off, and Toggle operate on one or more selected layers.
- All On, All Off, and Toggle All operate regardless of layer selection.

Layers Panel (continued)



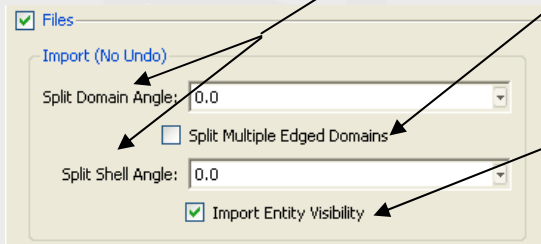
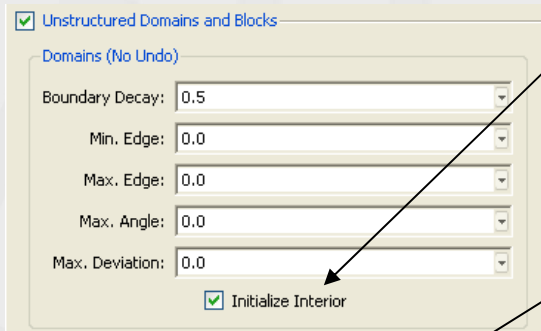
- Save stores the current on layers to new set.
- Double click a set or select use Restore to return to that on/off layer state.
- Delete removes selected layer set.
- Double click Name field to enter a new name.
- Check to also move description and visibility.
- Multiple layers merged using Combine.
- Single layer moved using Relocate.

Defaults Panel



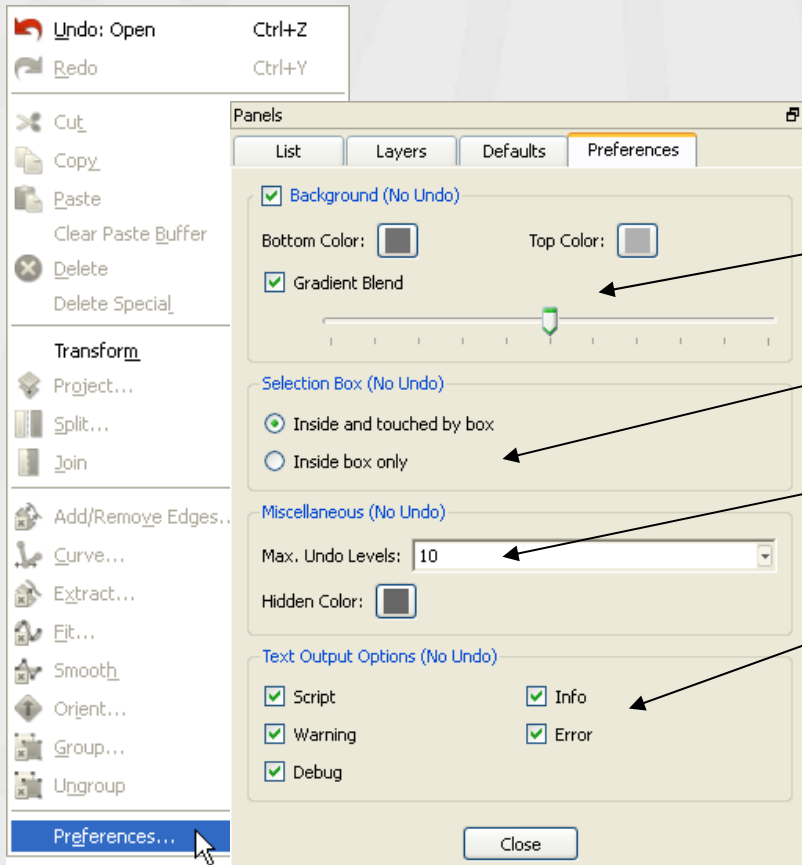
- Defaults panel provides continuous access to default settings.
- Type new value and hit Enter for new default value to take effect.
- Infrequently used features are in closed frames.
- Default values are only applied to entities created **after** default value set. Existing entities are unaffected.

Defaults Panel (continued)



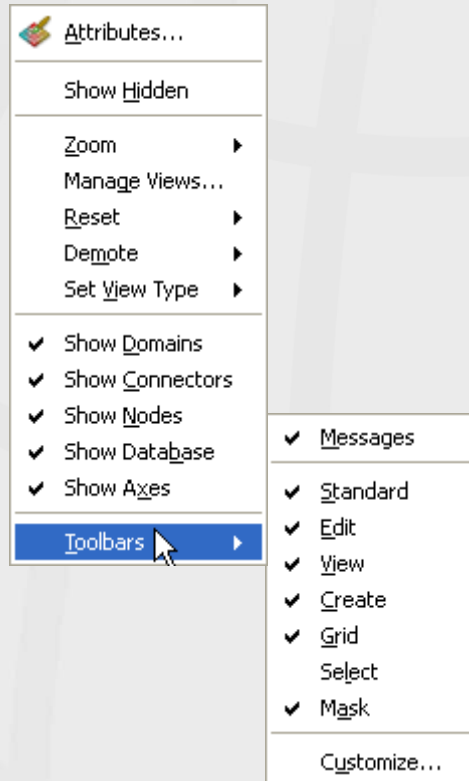
- Uncheck Initialize Interior create new unstructured domains without initializing.
- Files frame includes options for file import:
 - Split Domain Angle and Split Shell Angle split triangular meshes on import
 - Split Multiple Edged Domains automatically splits multiple edged domains during triangular surface import.
 - Import Entity Visibility, on by default , instructs Pointwise to use visibility information from imported CAD file.

Preferences



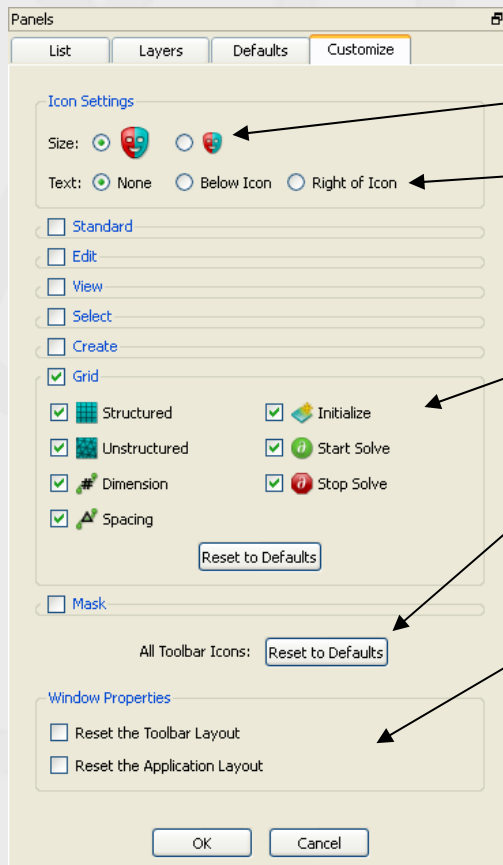
- The Preferences panel controls various GUI options.
- Set bottom and top colors for the Display window
- Switch between “on box” and “in box” style selection box.
- Specify the maximum number of Undo levels.
- Switch on or off the various forms of text output in the Messages window.

Customization



- View, Toolbars controls display of the Messages window and toolbars.
- Can also right-click on Messages window or toolbar.
- View, Toolbars also allows you to toggle which toolbars are displayed.
- Customize... controls toolbar appearance and buttons on each toolbar.

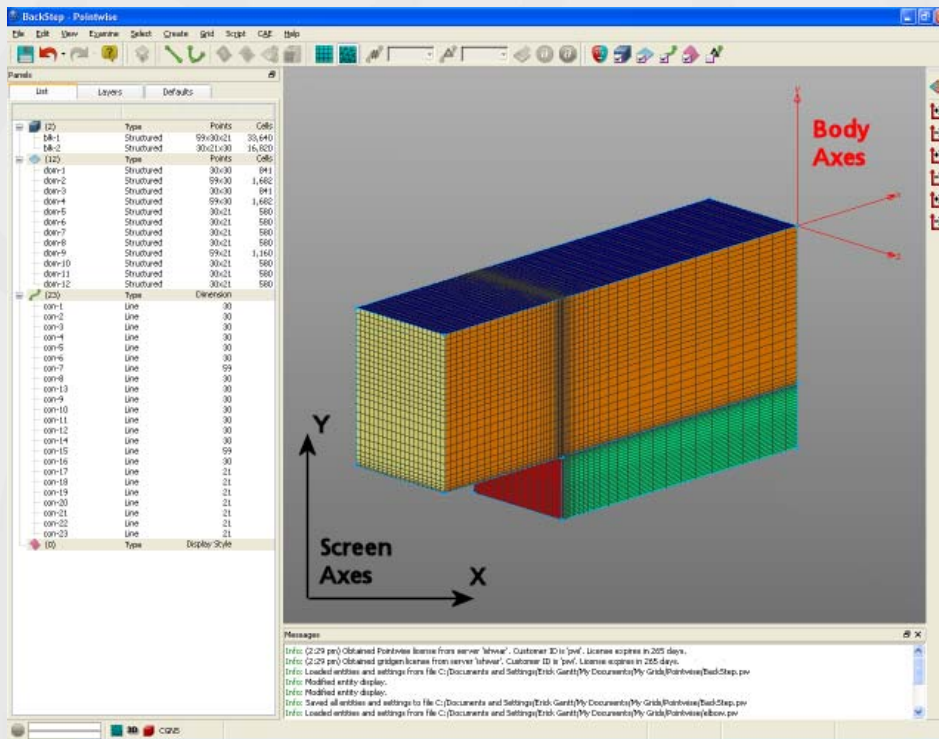
Customization (continued)












- Set toolbar icon size.
- Set whether or where text is displayed with icons.
- Set buttons appearing on each toolbar.
- Reset all toolbars to the default command set.
- Reset toolbar or GUI layout.

Display Orientation

- Two reference axis systems:
 - Body axes associated with geometry and grid.
 - Screen axes aligned with display screen. Z points out of the screen.
 - All model manipulations occur relative to one of these reference axis systems.
- Red axes show center of rotation
Use Ctrl+Shift+right mouse to pick new center of rotation.



Pan, Rotate, and Zoom

Ctrl + right mouse	Rotation	
Shift + right mouse	Pan	
middle mouse, scroll wheel	Zoom	
Keypad Num Lock	Body-x Rotation	
Keypad /	Body-y Rotation	
Keypad *	Body-z Rotation	
Keypad 7	Screen-x Rotation	
Keypad 8	Screen-y Rotation	
Keypad 9	Screen-z Rotation	

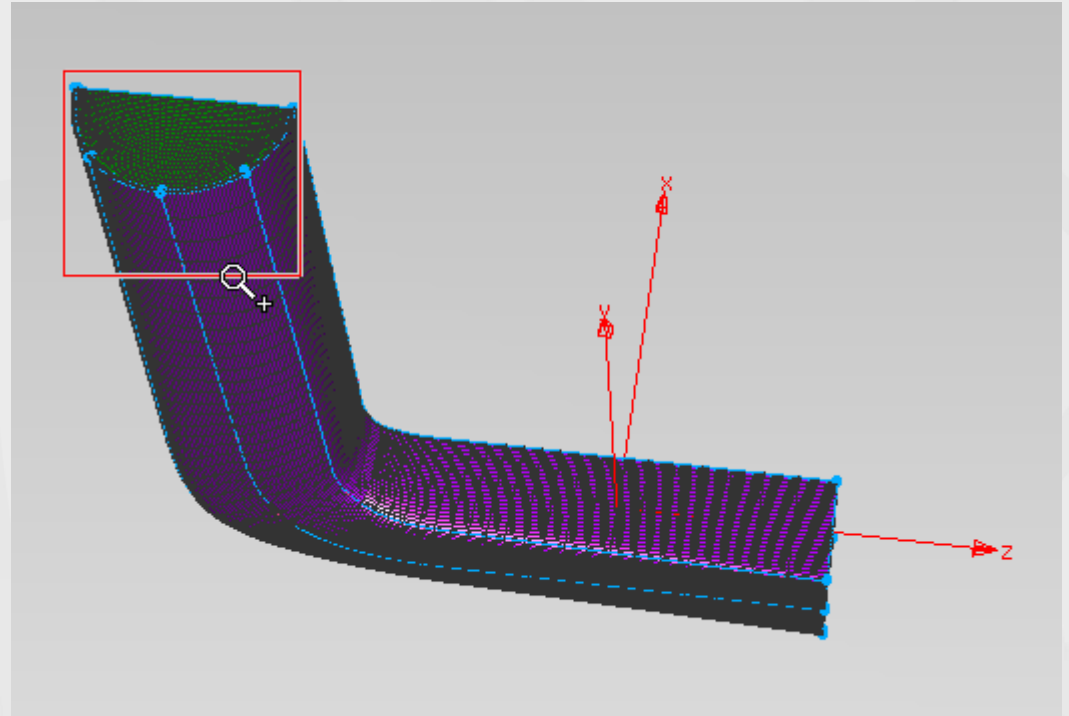
Model Orientation

- Ctrl + Shift + right mouse moves the rotation point to any pickable point or grid intersection.
- Page Down key provides 90 degree keypad rotations.
- Alt key provides single increment keypad rotations.
- Standard orientations via the View, Manage Views menu or toolbar:



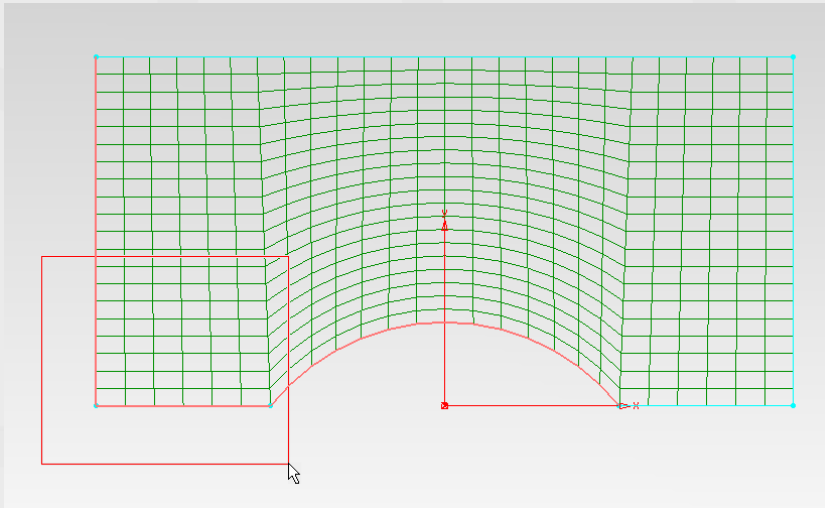
Zoom Box

- Quick zoom into area of the Display using shift+middle mouse.
- First mouse click is center of the zoom box.
- Hold and drag the mouse to size the box.




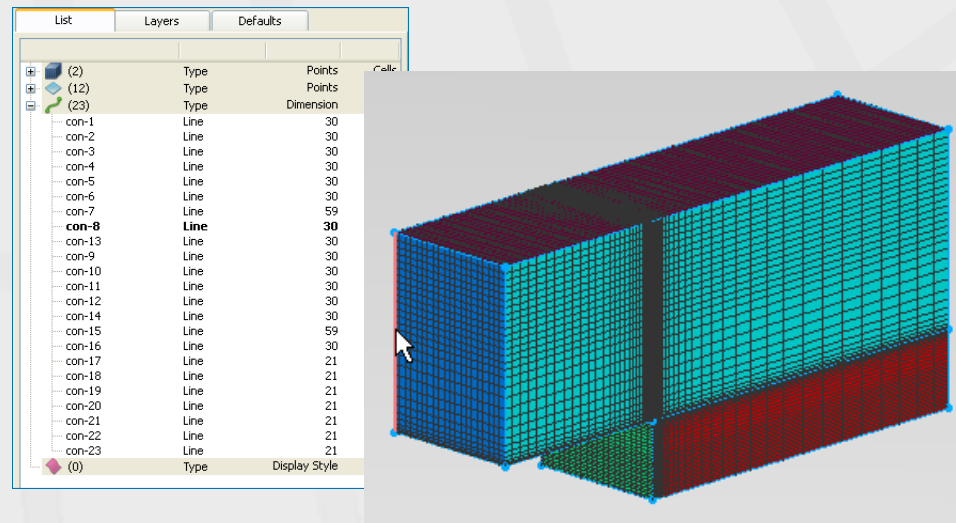
Selection

- Left Click on entity in Display window or List panel to select it.
- Pick Mask, Layers, and Show/Hide control which entities can be picked.
- Pick box (on box style) selection by dragging out a selection box.
- Temporarily change pick box style between on box and in box styles using the Shift key.
 - Pick box style can also be set as a Preference.




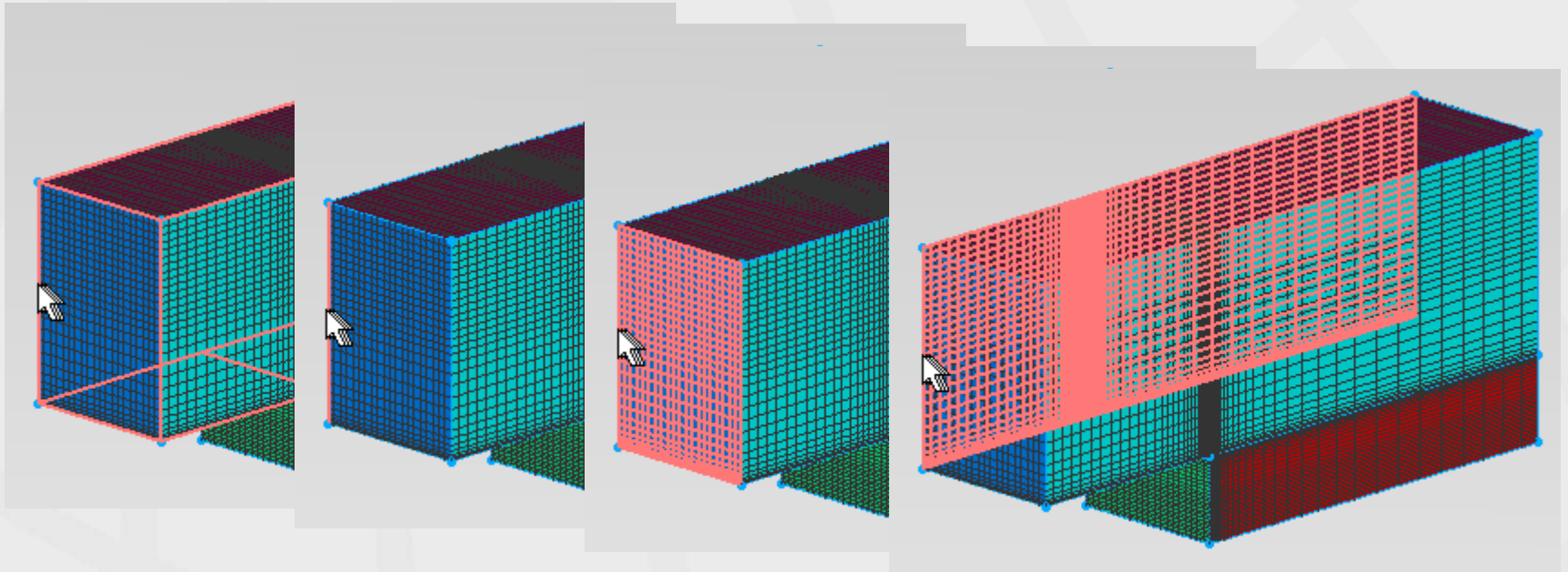
Selection (continued)

- Select entities by placing cursor over entity in the Display window or List panel and clicking the left mouse. Entity highlights in the List and Display window simultaneously.
- Standard pointer cursor () shown when only one selectable object lies below the cursor.



Selecting One from Many

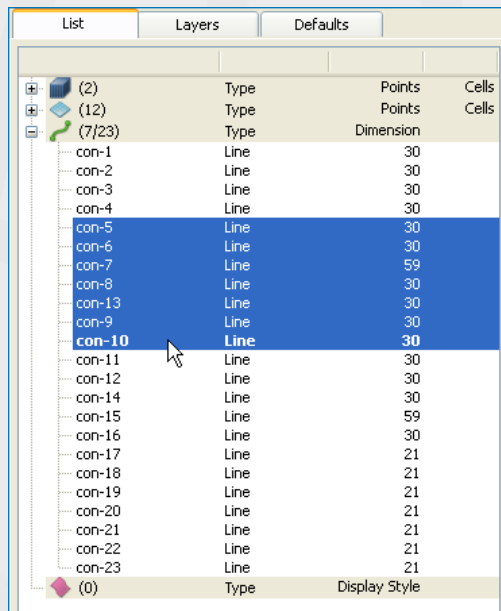
- Multi-pointer cursor ( shown when multiple selectable objects lie below the cursor.
- Use the spacebar to cycle through selectable objects.



Multiple Selection

- Pointwise supports continuous selection of any entities subject to the Pick Mask, Layers, and Show/Hide status.
 - Use the Shift key for contiguous selection in the List panel.
 - Use the Ctrl key for multiple non-contiguous selection in the Display window or List panel.

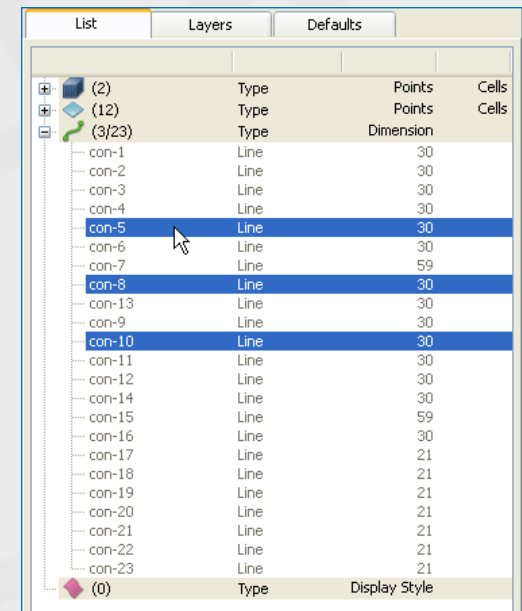
Shift



The screenshot shows the 'List' panel in Pointwise. The table below represents the data shown in the panel. The rows from 'con-5' to 'con-10' are highlighted in blue, indicating they are selected. A mouse cursor is positioned over the 'con-10' row.

	Type	Points	Cells
(2)	Type	Points	Cells
(12)	Type	Points	Cells
(7/23)	Type	Dimension	
con-1	Line	30	
con-2	Line	30	
con-3	Line	30	
con-4	Line	30	
con-5	Line	30	
con-6	Line	30	
con-7	Line	59	
con-8	Line	30	
con-13	Line	30	
con-9	Line	30	
con-10	Line	30	
con-11	Line	30	
con-12	Line	30	
con-14	Line	30	
con-15	Line	59	
con-16	Line	30	
con-17	Line	21	
con-18	Line	21	
con-19	Line	21	
con-20	Line	21	
con-21	Line	21	
con-22	Line	21	
con-23	Line	21	
(0)	Type	Display Style	

Ctrl



The screenshot shows the 'List' panel in Pointwise. The table below represents the data shown in the panel. The rows for 'con-5', 'con-8', and 'con-10' are highlighted in blue, indicating they are selected. A mouse cursor is positioned over the 'con-8' row.

	Type	Points	Cells
(2)	Type	Points	Cells
(12)	Type	Points	Cells
(3/23)	Type	Dimension	
con-1	Line	30	
con-2	Line	30	
con-3	Line	30	
con-4	Line	30	
con-5	Line	30	
con-6	Line	30	
con-7	Line	59	
con-8	Line	30	
con-13	Line	30	
con-9	Line	30	
con-10	Line	30	
con-11	Line	30	
con-12	Line	30	
con-14	Line	30	
con-15	Line	59	
con-16	Line	30	
con-17	Line	21	
con-18	Line	21	
con-19	Line	21	
con-20	Line	21	
con-21	Line	21	
con-22	Line	21	
con-23	Line	21	
(0)	Type	Display Style	

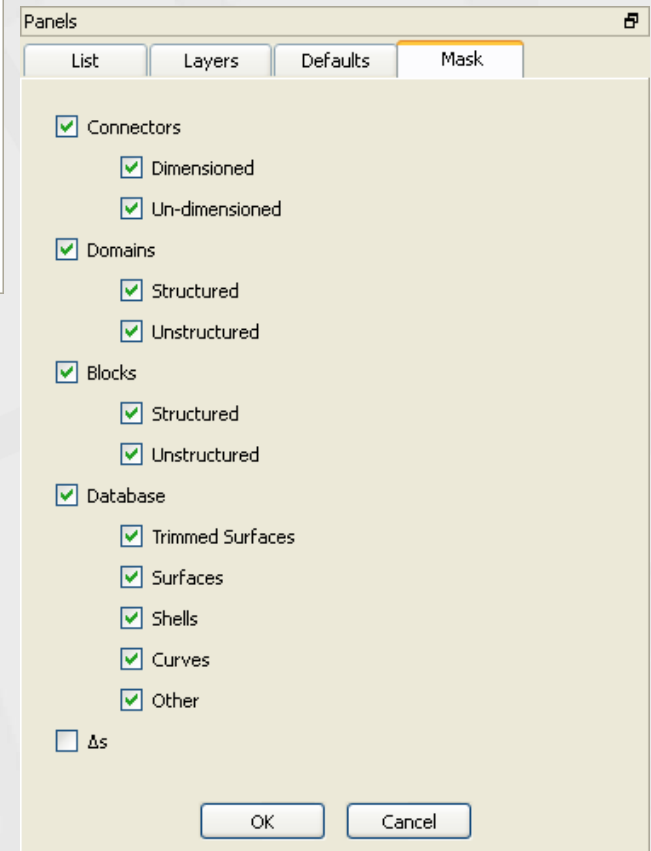
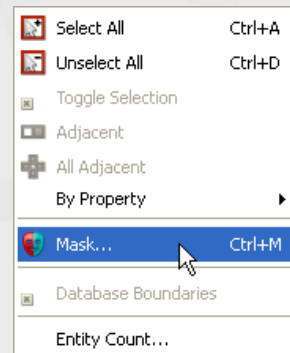
Selection Masks



- Mask toolbar gives quick access to global masking of entity types.
- Clicking Mask icon unchecks all boxes for all types if any currently checked.
 - If all currently unchecked, clicking Mask icon will check all boxes for all types.
- Some commands automatically override mask settings.

Selection Masks (continued)

- More fine-grain masking control is available via the Select, Mask command.
- When a subset of an entity type is masked, a filled checkbox will result in the Mask toolbar.



View Attributes Panel

- Use the Attributes command to change entity specific values
 - Name, Layer, Color, Display Style, etc.

Per Entity – individual entity display.

By Entity Type – use standard entity color scheme.

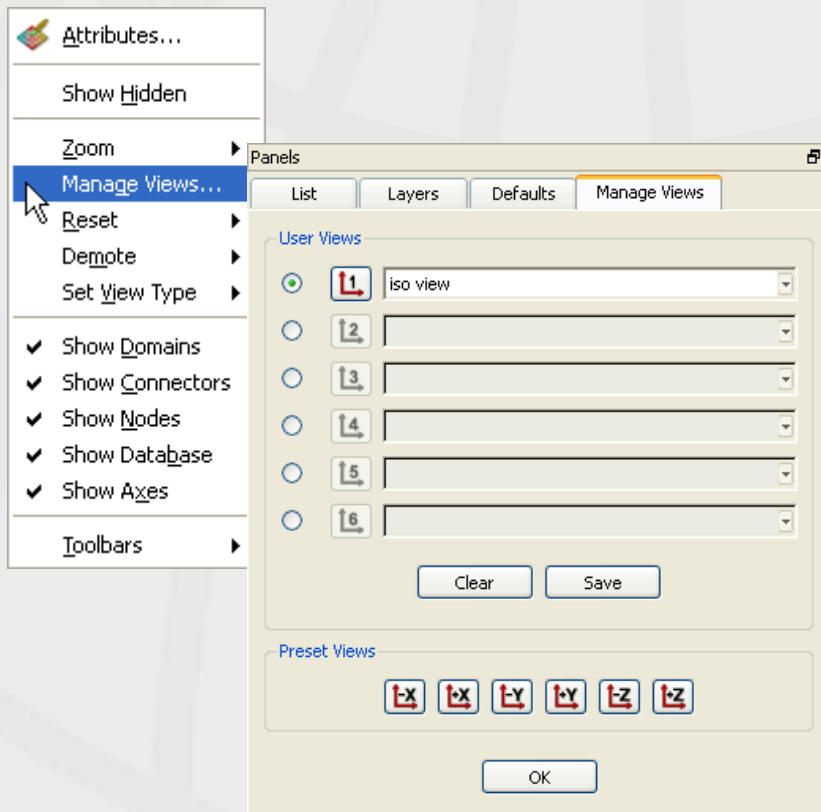
By Topology – use connectivity based colors for connectors.

Rainbow – use a different color per entity selected.

- Set the Show/Hide state here.
- Hidden entities are not visible and can't be selected.

The screenshot displays the 'Attributes...' dialog box in Pointwise. The 'Show/Hide' section contains icons for showing and hiding entities. The 'Display' section includes an 'Update Entity Display' button, a 'Color' dropdown set to 'By Entity Type', a 'Display Style' dropdown set to 'Shaded and Wireframe', a 'Draw Using' dropdown set to 'Triangles', and 'Isolines' set to 2 x 2. A 'Select color' dialog is open in the bottom left, showing a color palette and RGB/HSV sliders. On the right, a list of entity names is shown, with a dropdown menu open over it, listing options like 'By Entity Type', 'Per Entity', 'By Entity Type', 'By Topology', and 'Rainbow'. Arrows point from the text on the right to the corresponding settings in the dialog.

Manage Views

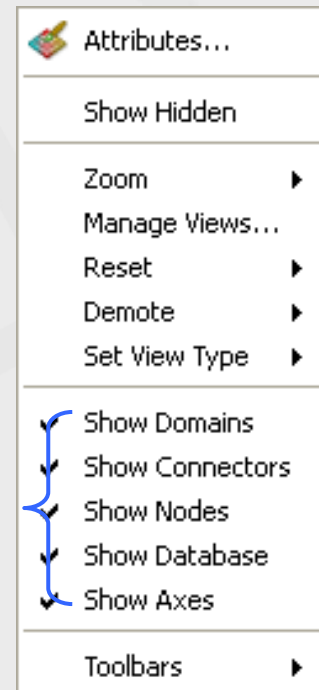


- Manage Views is for saving, naming, and recalling, user preferred model orientations.
- Select radio button for desired view, then click Save. View name can be typed in the adjacent field.
- Views can be saved using the Alt-1 through Alt-6 accelerators and recalled with Ctrl-1 through Ctrl-6.
- User views can also be recalled using the View toolbar:



Show Commands

- Show commands turn off display of various entities and objects:
 - Show Domains – All domains removed from Display and List
 - Show Connectors – All connectors removed from Display and List
 - Show Nodes – Turn off display of connector nodes.
 - Show Database – All database entities removed from Display and List
 - Show Axes – Body coordinates representation at center of rotation.



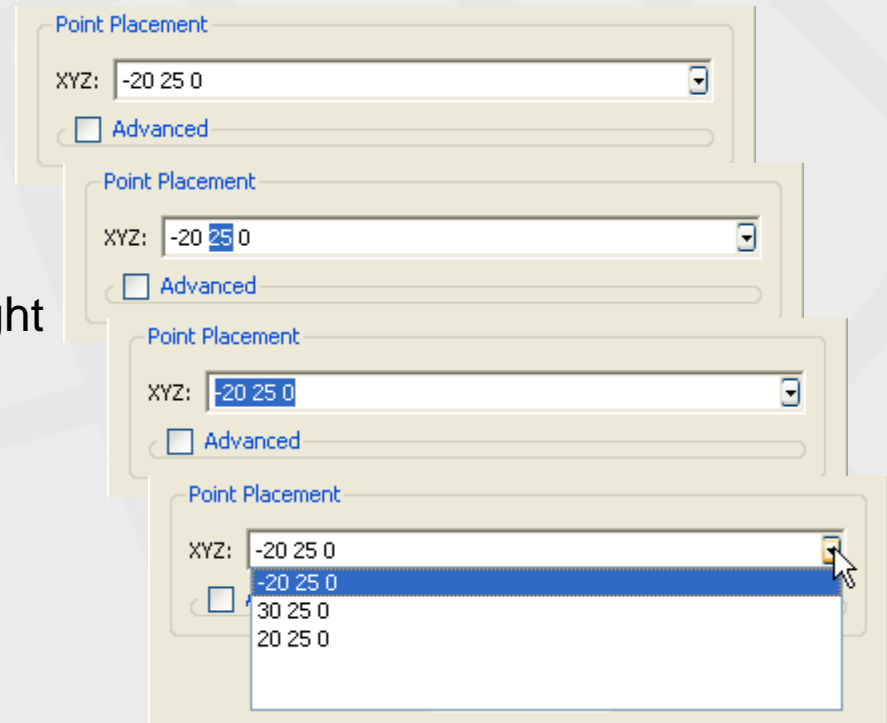
Keyboard Accelerators

- Accelerators are keyboard shortcuts to frequently used commands.
- Globally available throughout the application
- Accelerators are shown right justified in command menus.
- Commonly used accelerators are:

Ctrl-A	Select All	Delete	Delete	Alt-1 (-6)	Save View 1 (-6)
Ctrl-D	Unselect All	Ctrl-Z	Undo	Ctrl-1 (-6)	Recall View 1 (-6)
Ctrl-C	Copy	Ctrl-Y	Redo	Ctrl-R	Reset View
Ctrl-V	Paste	Ctrl-N	File New	Ctrl-Enter	OK
Ctrl-X	Cut	Ctrl-O	File Open	Ctrl-F	“Do It” ( Cmnd

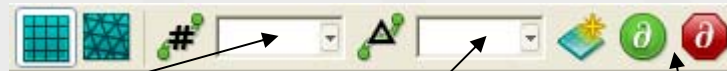
Text Entry

- Hitting the keyboard Enter key after entering text takes action with the value entered. In this example, a new control point is created.
- Text can be edited:
 - Double click a single string to highlight it for replacement.
 - Triple click to highlight the entire field's contents.
- Pull-down at the right end of the field contains a list of all previously entered strings for viewing or selection.



Toolbar Versus Menu

- Toolbar implementations do not always open the command panel for a given command.
- Many are direct shortcuts to most common usage.



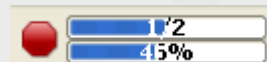
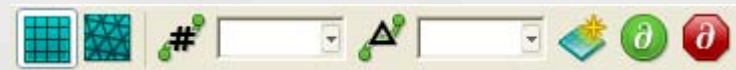
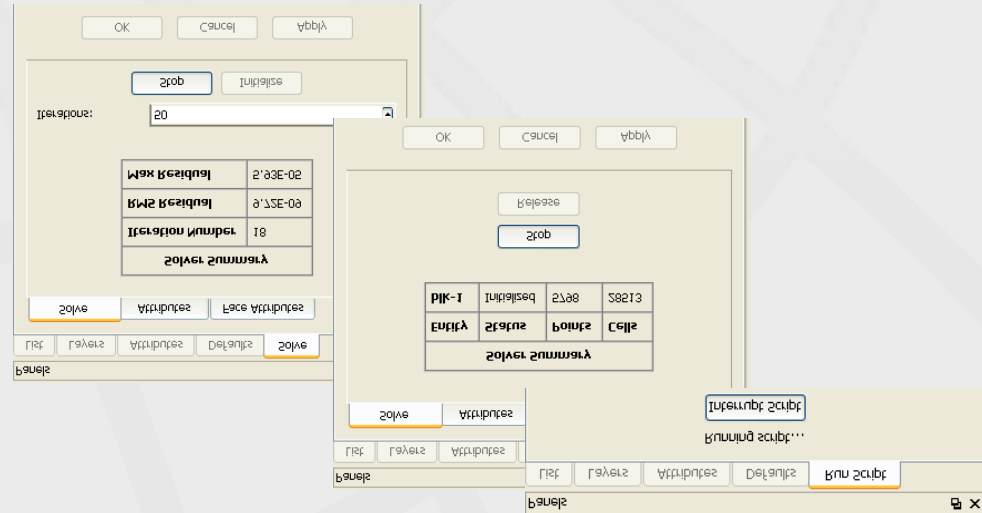
Select one or more connectors and enter their dimension directly into the field on the toolbar.

Spacing constraints.

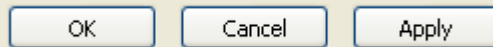
Start and stop elliptic domain and block smoothing.

Process Control

- Lengthy processes have built in interrupt commands such as Stop for the solvers or Interrupt Script for executing a Glyph script.
- The toolbar implementation for Solve provides the Stop sign button.
- Progress bars are active for lengthy processes and clicking on Stop sign can be used to interrupt the process.



Closing Panels

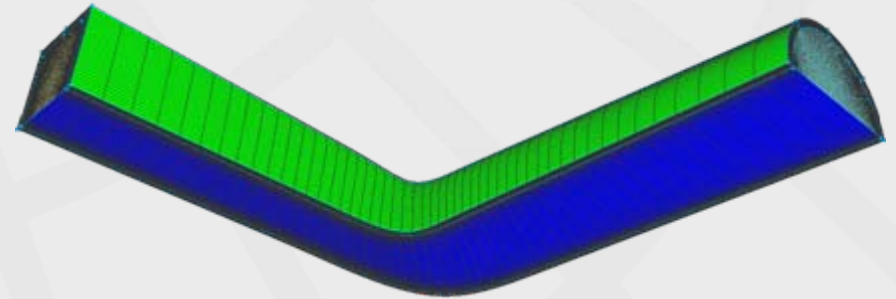


- OK – Save any pending changes and close the panel. This operation creates an Undo level.
- Cancel – Drop any pending changes and close the panel. This operation does not create an Undo level.
- Apply – Save any pending changes and keep the panel open for additional work. This operation creates an Undo level.

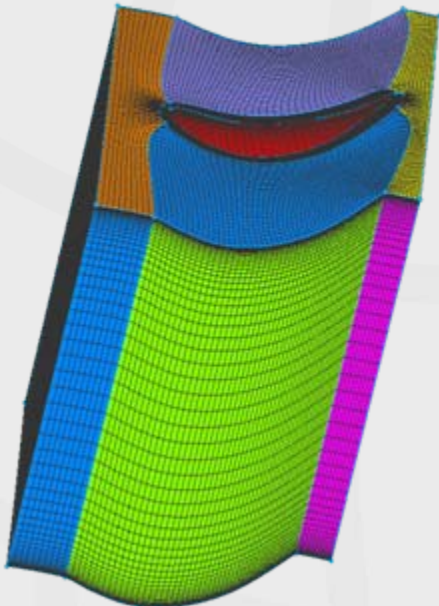
Demonstration Grids



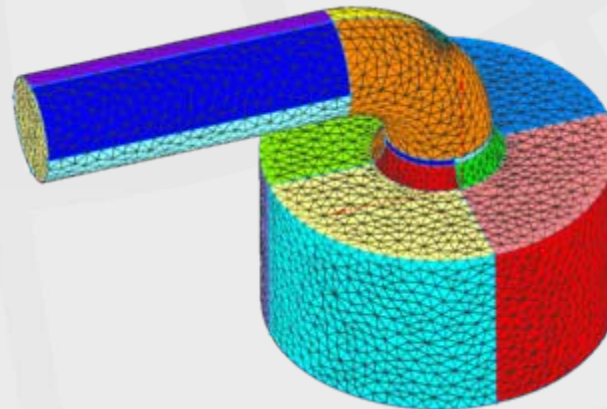
Airfoil



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