

2013 PLS-CADD Advanced Training and User Group Meeting

What's New in TOWER™

Summary of changes since July 2011 User Group, covers versions 11.18-12.50

Engineering

- 1) The automated design and checking of redundant members was described at the 2011 ATUG. That remains one of the most significant changes to TOWER in recent times and could only be eclipsed by something like Body and Leg Extensions.
- 2) Increased the maximum number of load cases to 1000 and incremented the LCA and LIC file versions as a result.
- 3) Added "Tension only member maximum compression load as a percent of compression capacity" to the General Data dialog. This can be used to solve three problems with tension-only members:
 - 3.1) Tension-only member compression usage may control the usage of a structure (which is essentially irrelevant) masking useful information.
 - 3.2) Usage of tension-only members in compression can exceed 100% when have a steel strength factor less than one.
 - 3.3) Some clients require that tension-only members take no compression load. They currently use *Geometry/Member/Capacities and Overrides* to do this, but need to remember to input an override every time a t-only member is added.

Inputting a value less than 100% will resolve all three of these problems by reducing the amount of compression load a tension-only member will take during the analysis.
- 4) Interactive Member Sizing and Auto-Fix Angles have a new setting in *General/Optimization Options* to calculate the number of bolts needed for the actual force (what TOWER did previously) or compression capacity, tension capacity or overall capacity.
- 5) Added "Symmetrical hole distribution about member longitudinal axis when both legs connected" setting to *General/General Data* which uses less conservative calculation of net section area when $nh=0$ and $cl=both$ for all codes except IS802 and PN90.
- 6) Added optional calculation of RBSH using Shear and Tension path lengths concept (ASCE-10 eqn 3.10-1) which when input in *Geometry/Members/Table Edit* overrides calculation based on end/edge distances. This is applicable when $g > 0$ (have two or more rows of bolts) for ASCE10, IS802, 222-G and CSA S37-01.
- 7) Added another solution strategy to the nonlinear finite element engine which is automatically used when have particularly sensitive models.
- 8) Increased the maximum number of load cases to 1000 and incremented the LCA and LIC file versions as a result.

Standards and Codes

- 1) Added NESC 2012 and IS802:1995 options to the Wind/Ice Model column in *Loads/Vector Loads* and *Loads/Wire Loads*. See http://www.powline.com/products/version7_loads.pdf for details
- 2) Improved IS 802 implementation with:
 - 2.1) Addition of IS802 (Part 1/Sec 1) 12.2.3: Climbing Load Check of 1.5kN for members within 15deg of horizontal option in *General/General Data*.
 - 2.2) Addition of IS802 (Part 1/Sec 2) 5.3: Redundant Member Check option in *General/General Data*.
 - 2.3) Addition of IS802 (Part 1/Sec 2) 6.4: Special case slenderness limit of 400 for tension only members
- 3) Added "Apply wind on structure ice area" IEC option to the Loading Method Parameters dialog reached from Vector and Wire Loads tables. This option also invokes a slightly more conservative calculation of ice perimeter area on angle members.
- 4) Added "Lattice tower load distribution in sections 'Evenly' and 'Top and Bottom only' options" to the Loading Method Parameters dialog reached from Vector and Wire Loads tables. Prior to this version the program has always used 'Evenly'.
- 5) The "UK NNA" loading method now has an option in the "Loading Method Parameters" dialog to use the corrigenda wind height adjust equation instead of the one published in 2001.
- 6) Added EN50341-1:2012 loading methods (both face and member based) and renamed old CENELEC method to "EN50341-1:2001". See http://www.powline.com/products/version7_loads.pdf for details

Interface

- 1) Added a "read-only" check box to the *File/Open* dialog so that a file may be open for review without locking it.
- 2) *General/Attachments/Attachment Manager* now works with images in JPEG and TIFF formats.
- 3) *Geometry/Joints and Geometry/Secondary Joints* now live update geometry views as joints are edited and color codes fixed joints.
- 4) Made color coding in *Geometry/Members/Table Edit* more consistent by coloring unused RL* columns and used Eccentricity/Restraint column.
- 5) The Groups Table now color codes the row background in light blue for groups that do not have any members.
- 6) *Geometry/Groups/Table Edit* now hilites the current group in the inset graphics. Element and group type columns are now color coded using the same color scheme as the view color by "type" and "group" options (i.e. legs and beams are green, other and truss members blue, etc.).
- 7) Interactive Member Sizing now color codes any member that matches the current size in green.
- 8) Added member weight to the Connection Inspector and *Geometry/Members/Table Edit* details listing.
- 9) The Connection Inspector now has an "Edit Group" button that edits the current group.
- 10) The new "Orientation View" joins the Connection and Compression Views available in the angle members edit table and the Connection Inspector. It illustrates the coordinate system reference TOWER uses for angles.
- 11) Right click results explorer menu in Deformed Geometry views now supports 1000 load cases.
- 12) Added the Quick Search Toolbar which can be used to search the menus, help, technical notes and videos. Also acts as a calculator (try typing " $=10*\sin(45)$ "). Please refer to video "Introduction to the QuickSearch

Toolbar" (<http://youtu.be/DwYgf5e9IOk>).

- 13) Edit controls now support "=help" expression to display list of available arithmetic operations and functions.
- 14) Most input control value out of range errors now displayed as message balloons rather than message boxes that must be OK'd.
- 15) Pressing the shift key and right clicking on a menu item now copies it to the clipboard.
- 16) You may now right click on any inset view (structure picture, connection inspector, etc.) to copy it to the Windows clipboard.
- 17) New *Geometry/Members/Delete* can be used to graphically select and delete any member or insulator in the model.
- 18) The Custom Toolbar has been improved to allow up to 4 Custom Toolbars to be used simultaneously and to display icons instead of text for many of the commands.
- 19) *View/Edit Customizations/Tables* "Report Format" buttons that used to require user to enter C language format strings (%8.1lf, %6s...) now display a dialog box with simple English language controls for modifying column widths, alignment and digits after the decimal.
- 20) Graph views (nonlinear convergence, post interaction capacity, interaction diagrams, etc.) now print the label of the curve under the mouse in the status bar.
- 21) Converted Auto Arrange Toolbars from a command to a mode. When checked it will auto arrange whenever the program window size changes.
- 22) Sped up calculation of loads for very large models that use a solidity ratio based Wind/Ice loading method.
- 23) *Geometry/Members/Fence Remove Symmetry* enhanced to allow removing symmetry from Members and/or from Joints. Use 'M' and 'J' keys to toggle between the modes.
- 24) The Member capacities report shown in the Connection Inspector and Angle Members table now indicates when a capacity has been overridden.
- 25) *View/Edit Customizations/Tables* "Report Format" buttons that used to require user to enter C language format strings (%8.1lf, %6s...) now display a dialog box with simple English language controls for modifying column widths, alignment and digits after the decimal.

Tables

- 1) Pressing Control-apostrophe (Ctrl-') in tables will copy into the current cell the contents of the cell above it. This is similar to the Excel keyboard shortcut.
- 2) Can now press F2 in tables to switch between move and edit mode for columns with text edit and combobox controls.
- 3) Output tables may now be filtered by any column, not just numeric columns.
- 4) Table controls evaluation of expressions now detect invalid expressions with a message balloon and prevent switching to other cells until it is fixed (older versions replaced expression typed in with a 0 w/o any warning).
- 5) Sped up navigation of very large output tables and fixed problem scrolling when have more than 32767 rows of data.

Reporting

- 1) You may now enter a warning message in *General/Output Options* which will be printed in the Model Check, Analysis Results and Summary Results reports (for example, "Preliminary unverified model").
- 2) *General/Output Options* now has a "Print extended diagnostic output" setting. When checked intermediate calculations will be printed for allowable spans/interaction diagrams generation. Other intermediate calculations will be added in future versions.
- 3) Report right click menu now includes menu option to customize the current report schema.
- 4) Sped up creation of very long (20,000+ line) Analysis Results reports by 10-40%.
- 5) The Summary of Maximum Usages by Load Case now includes usages from the climbing load check and the redundant member checks.
- 6) Right click results explorer menu in reports now organizes load cases in blocks of 25 and can now handle up to 3000 results (previously limited to 2000).

View

- 1) Ground is now depicted at foundation joints and guy anchors by green translucent circles.
- 2) Now suppress draw of member and joint labels if they will completely obscure the structure.
- 3) The default mode when opening a model that has members is now Member Info, not Joint Info.
- 4) Group Info and Member Info in deformed geometry views now color code the status bar when an overstressed member is hilited.
- 4) Group Info status bar text now includes the element type and group type for the selected group.
- 5) When in Member Info and select a member that has warnings, the warning will appear in a tooltip if Warnings are enabled in *View/Display Options/Set Rotation, Color and Label Options*. In addition, Climbing Load, Included Angle, Dangerous Moment, Redundant Member Design, ... warnings are all available in the Deformed Geometry view. Members with warnings are graphically denoted with a "?" icon as per the settings in the 3D Controls ("Set") dialog.
- 6) You can now switch from one info mode to another info mode using keyboard shortcuts: (J)oint, (M)ember, (G)roup, (P)roperty info.
- 8) Pressing the 'F' key in view joint info mode in the deformed geometry will now add annotation for all members connected to that joint with their forces in the global coordinate system.
- 9) Pressing the A key in the Connection Inspector mode will now annotate the currently selected member with connection and capacity information.
- 10) The 3D Controls dialog now has an option to draw member labels only for overstressed members.
- 11) The 3D Controls dialog now has an Apply button so changes to the geometry may be made without leaving the dialog.
- 12) The 3D Controls dialog now has an option to "Lock" the displayed Geometry load case to that used for Labels so that the two are always in sync.
- 13) Added *View/Find/Joint* command that hilites a joint and draws concentric circles around it. Pressing F11 will redraw the concentric circles.

- 14) Moved the *View/[Member|Joint|Property|Group] Info* commands into a *View/Info* submenu and the *View/Find [Member|Group]* commands into a *View/Find* submenu.
- 15) F6 now cycles the load case display through each load case one at a time keeping the display options intact.
- 16) *Edit/Copy* or Ctrl-C in graphics view now asks you if you want to copy current window as a bitmap or current statusbar text to the Windows clipboard or save as a TIFF image.
- 17) Status bar now right justifies text which is too long to fit in it.
- 18) The Dance Structure command now allows you to press "E" to edit the dance amplitude.
- 19) Image attachments may now have an azimuth angle specified. When an azimuth is specified, images will not be drawn if you are looking at them from behind.

File/Preferences

- 1) Settings now colors items with non-default values in black and items with default values in gray to make it obvious which items have been modified.
- 2) Added the following settings:
 - 2.1) "Always keep vector loads (LCA file) saved with model, do not ask to save loads supplied by PLS-CADD." which eliminates a prompt when saving a model that has been edited directly from PLS-CADD.
 - 2.2) "Enable background color coding in tables" to allow disabling background colors for improved contrast.
 - 2.3) "Never suppress draw of view labels" which restores previous behavior where could get a cluttered view when zoomed out with labels displayed.
 - 2.4) "Prompt for permission before saving projects in new versions" setting which if enabled will cause issuance of a warning when you're about to save in a newer version of TOWER than the one that last saved the model.
 - 2.5) "Prefer mm to cm for metric lengths" that substitutes mm where cm would otherwise have been used for both input and output.
 - 2.6) "Connection Inspector is the default mode rather than Member Info" which defaults to off. If on then mouse in undeformed geometry will be in Connection Inspector mode whenever not in another mode.

Batch Modify

- 1) Added commands to:
 - 1.1) "PLS-CADD Insulator Link Supply Set Numbers To Blank Insulators" which will fill in blank rows (for up to 3 phases) in the insulator link table with a user supplied set number
 - 1.2) "Remove .LCA/.LIC/.EIA Loads File References"
 - 1.3) Apply the "User Defined Warning" from "General/Output Options"

Miscellaneous

- 1) Fixed more than 10 crashes reported by clients using the crash reporting service.
- 2) Added *F1/Recover Joint and Member Symmetry* which detects joints/members that were not input with symmetry but that form a symmetrical pattern and converts them into a single joint/member with symmetry.
- 3) *General/Attachments/Extract Joints and Members From DXF* now uses Recover Joint and Member Symmetry to dramatically improve the imported model.
- 4) *Geometry/Guys* now has a "Guy Anchor Type" column which explicitly describes the anchor and adds three methods for specifying an anchor location:

Relative: the anchor is located by adding the X,Y,Z coordinates (in a guy specific local coordinate system) to the position of the Reference anchor.

Slope-Offset: the anchor is located as per "Slope" with the addition of an offset perpendicular to the guy. Any anchors that Reference this guy do not include the offset (makes it easy to model split guys).

LeadL-Offset: the anchor is located as per "LeadLength" with the addition of an offset perpendicular to the guy. Any anchors that Reference this guy do not include the offset (makes it easy to model split guys).

- 5) Guy anchor Z coordinate is now relative to "Z of ground for wind height adjust and PLS-CADD" entered in *General/General Data* rather than zero.
- 6) Added check for invalid bolt spacing, end and edge distances.
- 7) All multi-file operations (*File/Batch Modify*, *File/Analyze Multiple Models*, *Lines/Reports/Structure Usage* from PLS-CADD, etc.) sped up by factor of 25-250% via component file caching.
- 8) Annotation polygons now have a "cloud" setting for making revision clouds.
- 9) Program Generated annotation now has the same graphical editing commands that user input annotation has.
- 10) Line and polygon annotation now allow you to select line type (dot, dash, dash-dot, etc.).
- 11) Many other minor refinements too numerous to list here.

Cool

- 1) Added an unsupported *F1/Debugging Stuff/STL Export* command which produces a STereoLithography ".stl" file that can be used with 3D printers. This is experimental so please relay your experience with it to support@powline.com.