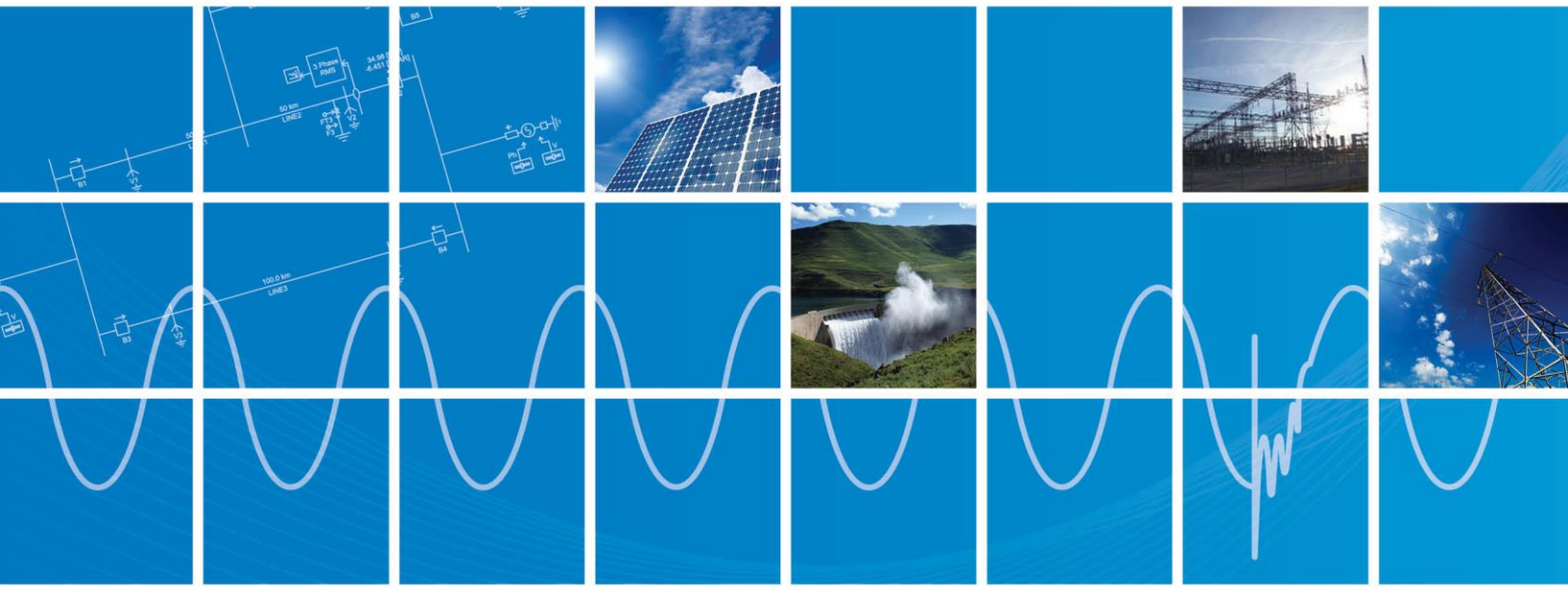
What's New in PSCAD v4.4.0

(as of May 27, 2011)

Written for PSCAD™ X4 version 4.4.0



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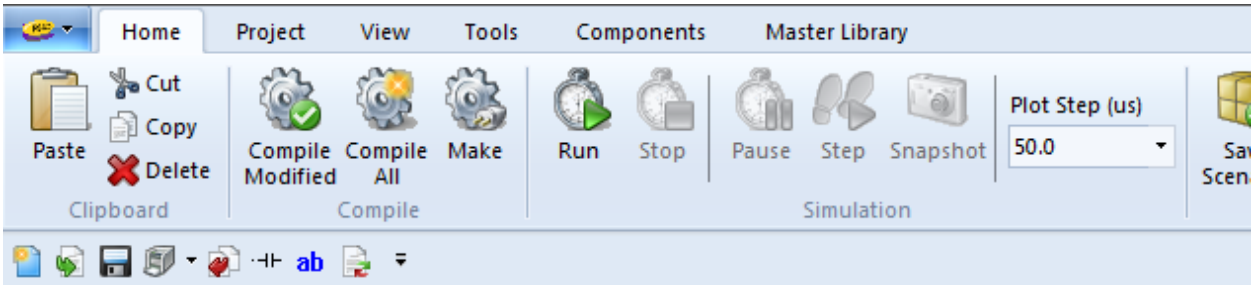
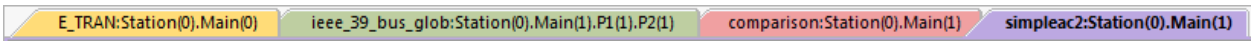
PSCAD

New Features:

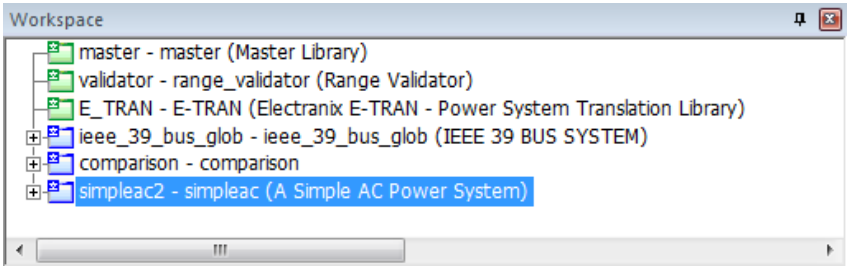
1. **Ribbon Control Bar:** As part of an application framework upgrade from MFC 6 (c. 1998) to the latest version MFC 10, a modern ribbon control bar has been added that provides easier accessibility to most features and components. Included with the ribbon is an inherent quick access bar, which is fully customizable by the user for placement of favoured and well used button actions. The ribbon control bar is featured prominently across the top of the application environment.



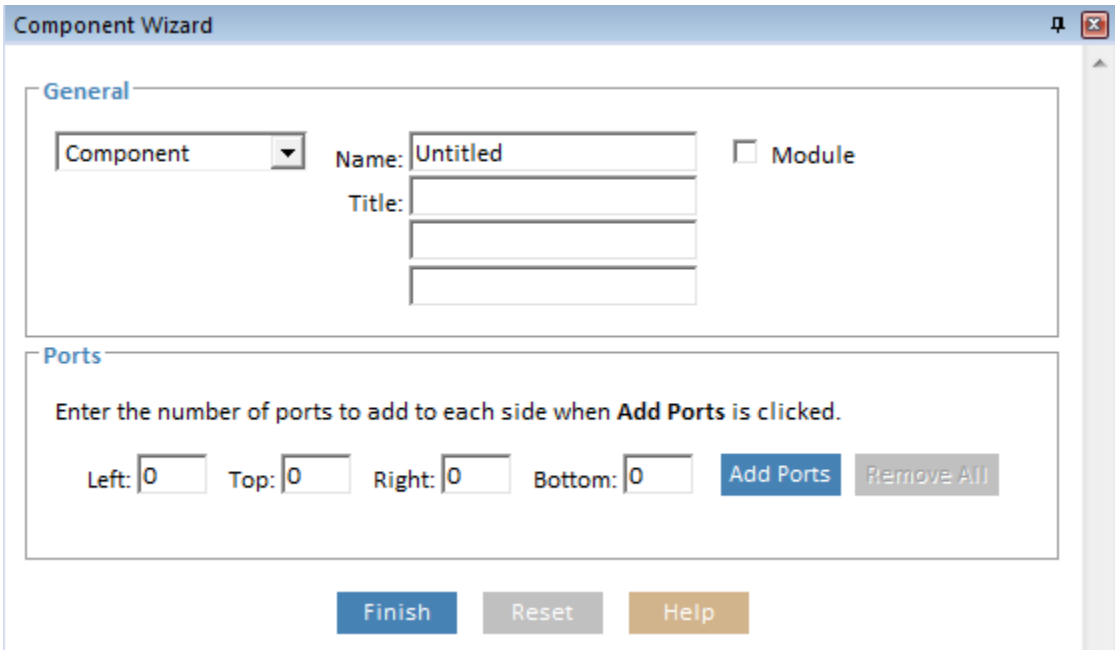
2. **Tabbed Document Interface (TDI):** As part of an application framework upgrade from MFC 6 (c. 1998) to the latest version MFC 10, a modern working environment including customizable docked windows and window pinning and hiding has been added. The new MFC framework also incorporates a new tabbed document interface, which enhances convenience in inter-project navigation.



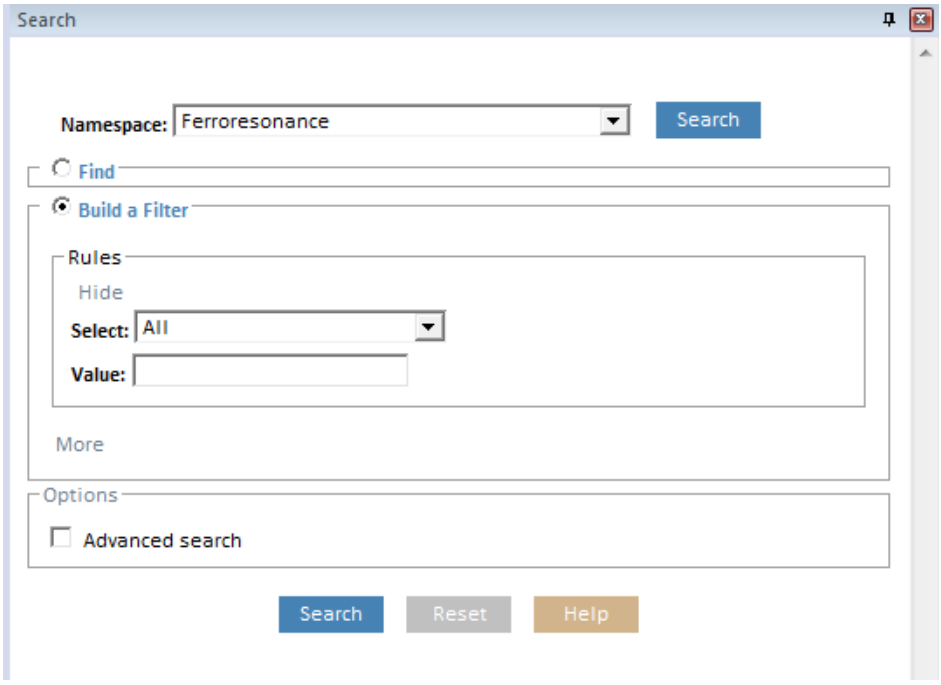
3. **Active Project Concept is Obsolete**: In previous versions of the software it was necessary to set an 'active' project for compiling and running the simulations. Due to recent changes in the way the software navigates and displays status information, the concept of an 'active' project is no longer necessary. It is now possible to run multiple cases in the environment simultaneously. All ribbon control buttons and status bar messages are based on the project currently in focus.



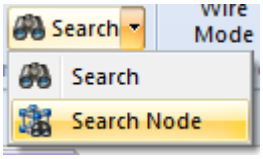
4. **New Component Wizard:** A revamped component wizard has been included in this release. Functioning internally in a similar manner to the older version, the new wizard possesses a much different interface on the surface. New components (both native and module), transmission lines and cables may be created from this utility.

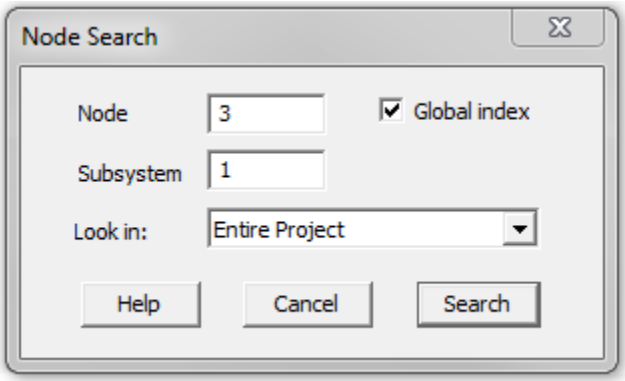


5. **New Search (Query) Utility:** A revamped search utility has been included in this release. Functioning internally in a similar manner to the older version, the new utility possesses a different interface on the surface.

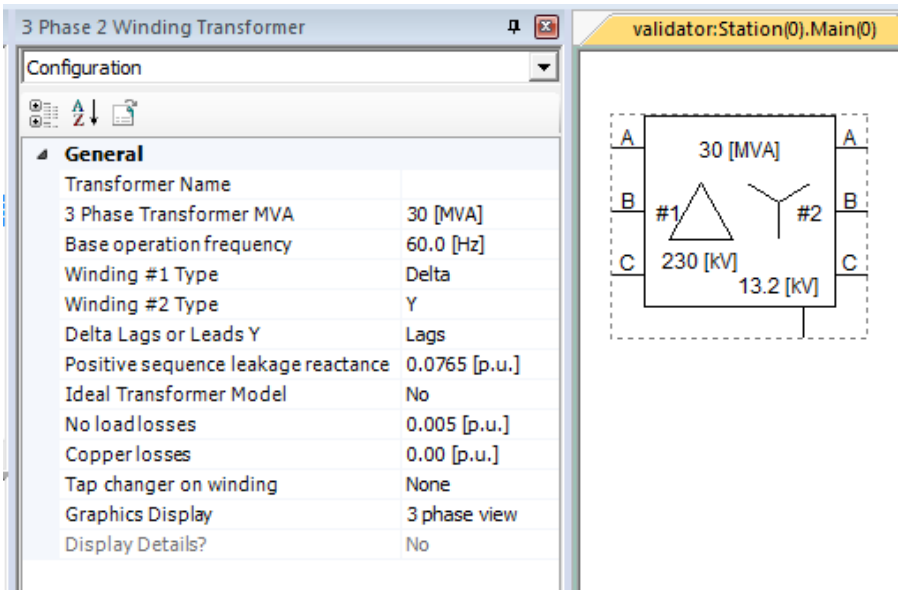


The ability to search nodes has temporarily been removed from this interface, but node searching can still be accessed by using a separate *Search Node* dialog.



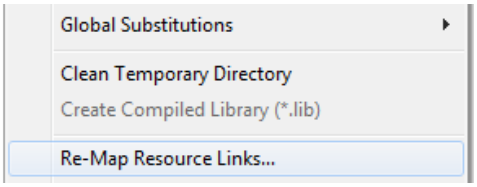


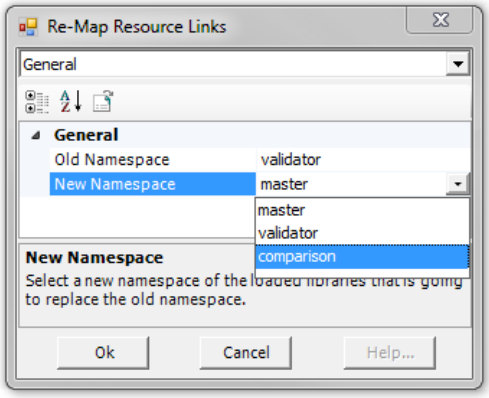
6. **Docked Parameters Window**: Users may now utilize a dock-able window for viewing component parameters. Once enabled (click the *Parameters* check box in the *View* ribbon tab), the docked window will reflect the parameter dialog of whatever component happens to be selected. This avoids the need to double-click the component to open a separate parameters dialog.



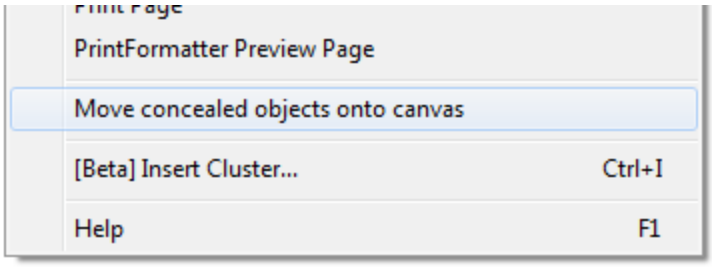
7. **Output Parameters (#3026)**: Signals generated from within a module canvas may now be transferred out of the module component via output parameters (as opposed to only output connection ports).
8. **Windows Regional Settings (#2711)**: A new parameter is provided in the workspace options to set the locale for Windows regional settings. The options are 'current locale' and 'English U.S.'. This alleviates the user from having to alter the regional settings on their machine in order to use the old and new GNU Fortran compilers.

9. **Re-Mapping Resource Links (#3435)**: If a namespace resource is changed, all component instances linked to it become delinked, and In previous versions, the user would need to re-link each instance manually. Users may now re-map multiple component instances to a new namespace simultaneously using a new utility called *Re-Map Resource Links*. It may be accessed via the project pop-up menu.

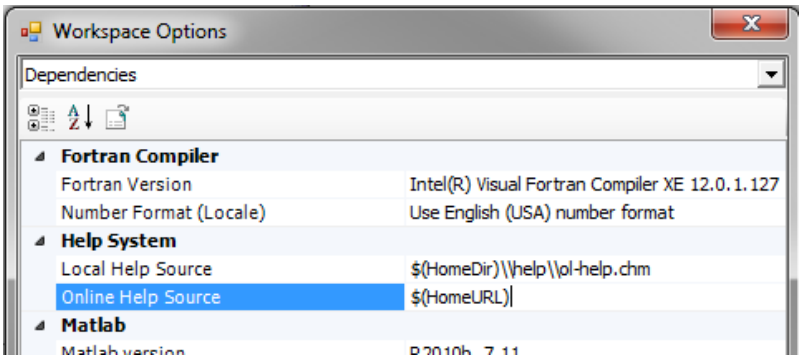




10. **Intel Fortran XE 2011 (v12)**: Support for the latest Intel Fortran compiler has been added. Significant enhancements to EMTDC runtime speed (up to 200%) have been experienced with this compiler. We highly recommend all users upgrade to this version when possible.
11. **MATLAB 2010b SP1 & 2011a**: Support for the latest MATLAB releases has been added.
12. **Namespace Synchronization in Case Projects (#2033)**: With the release of PSCAD X4, a project attribute called the 'namespace' was introduced in order to remove the dependency on project filename when linking component definitions. To make the handling of the namespace concept easier in case projects, the namespace now remains synchronized with the project filename. As such, the namespace may no longer be modified from within case projects. This synchronization effectively removes any namespace/filename maintenance issues in case project management.
13. **Display of Project Name in the Workspace (#2034)**: A new workspace option has been added to control the display of the project filename in the workspace window.
14. **Off-Canvas Components (#3112)**: PSCAD will now allow users to move concealed components back on to the visible part of the schematic canvas. In rare instances, components graphics can end up with a negative x or y-coordinate (i.e. they will not be situated on the visible part of the canvas). If this occurs, right-click on the canvas to invoke the pop-up menu and select 'Move concealed objects onto canvas'. This feature is available in the Transmission Segment Definition Editor.



15. **New Web-Based Help (#1963)**: In addition to the regular compiled online help, we are now providing an un-compiled, HTML-based help website. The current web address is http://nexus.pscad.com/. This help site may be accessed from PSCAD by clicking on 'Web Help' within the Help menu. The URL may be changed from within the Workspace Settings dialog:



Bug Fixes:

1. **Undo/Redo (#3349, 3372)**: A major problem with the undo/redo was identified and resolved. On occasion certain actions were not added to the undo/redo stack. This resulted in a single undo action jumping several modification steps.
    a. Deleted components (from continuously holding down the delete key) will now undo one at a time as expected (#3425).
    b. Undo/redo now works properly on copying/pasting multiple selected components and wires (#3248).
2. **Performance (#3104, 3082)**:
    a. A bug involving the inefficient use of memory was identified and resolved. This problem caused the PSCAD application session to progressively become slower and slower as operations were performed.
    b. Runtime speed has been significantly improved (in some cases faster than v4.2.1).
3. **Control Interfaces**:
    a. The dial position on the dial control interface, modified with a left mouse click, no longer reverts back to its original position when the simulation is run.
    b. Double-clicking on a control interface now longer opens an empty dialog (#3321).
    c. Double-clicking on a meter interface now brings up the proper dialog (#2620).
    d. Dial and slider control position now stick at runtime if clicked. Previously, if either interface was adjusted via a left-mouse click, the position would revert to the previous state when the case was run (#3225).
    e. Multiple instances of control interfaces will now operate in synchronization (#3320).
    f. Inconsistent behaviour no longer occurs when using the push button control interface (#671).
    g. Double-clicking on push button control no longer invokes properties dialog (#208).

4. **Linking External Compiled Files (#2817)**: Pending.

5. **Graph Markers**:
    a. The ability to set the individual X and O marker positions is now working again (#3144).
    b. When markers are enabled and the x-axis is in focus, the hot keys 'X' and 'O' will now immediately snap the markers to the location of the mouse pointer (#3306).
    c. Graph markers may now be set past 1.0 (#3076).
6. **Project Import**:
    a. A normalization function improperly offset the head point of wires in certain instances. This would result in some wires being 'moved' slightly from their original position on import (#3081).
    b. The minimum graph heights now coincide with original height when imported into PSCAD X4 (#3206).
    c. Switch controls now are initialized with the correct state on project import (#3299).
7. **Line Thickness (#3323)**: Setting graphical line thickness according to node type is now working again.
8. **Boolean Parameter (#3256)**: Boolean parameter now labelled as such (was labelled as 'toggle').
9. **Compaq Fortran (#3308)**: Message added to output window indicating that the Compaq Fortran 6 compiler is deprecated.
10. **Subsystem Splitting**:
    a. Bug fixed in subsystem splitting algorithm. Incorrect subsystem mapping occurred when multiple isolated subsystems were present wholly within a single module canvas.
    b. The combine isolated, non-switching networks option now works with all other subsystem splitting options (#3362).
11. **Parameter Check (#3343)**: PSCAD now checks to ensure that parameters have matching import/export tags.
12. **Transmission Segment Editor (#3188)**: Master library tower components may now be pasted directly into the transmission segment editor.
13. **Signal Type Check (#3131, 3183)**: PSCAD will now produce an error message if an electrical branch is connected to an output control signal. This situation was ignored in the past due to a logic loophole.
14. **Global Substitutions (#3261)**: Newly added global substitutions will now work properly without needing to save, unload and reload the case.
15. **Graph Frames:**
    a. Attempting to delete the axis of a graph frame no longer causes PSCAD to crash (#3368).
    b. Added a vertical scroll bar to graph frame to offer a solution that addresses the need to resize the frame when added graph exceeds the frame size (#986).
16. **Adding Multiple Components (#3371)**: When you grab a data label or output channel from the control toolbar and create a few instances (by using Ctrl + left click) on the canvas, the names of all instances may now be modified (before only the first instance could be changed).
17. **Unit Converter (#3288)**: Enabling/disabling the unit converter now forces a project re-compile.
18. **Meters**:
    a. Drag and drop of a curve onto a control panel now creates a meter interface (#3217).

19. **Example Case Folder (#3178)**: It is now much easier to navigate to the release example case folder via the load menu.
20. **Library Projects (#3387)**: Library project files (*.pslx) are now associated with PSCAD.
21. **Custom Component Help (#3333)**: Linking to help files from custom components is now working again.EMTDC
22. **Snapshots (#3411)**: PSCAD no longer pops up a message dialog when the date/time of the snapshot file is less than that of the project. The message is directed to the output table instead.
23. **Default Units in Parameters (#3400):** New components created using the toolbar now have default units attached to the values (if they exist).
24. **Component Cut Crash (#3401):** Cutting multiple components from the schematic canvas no longer causes crash.
25. **Cross Hair Mode (#3145):** Cross hair mode will no longer be overridden by curve drag/drop when mouse pointer is moved overtop the graph curve legend.
26. **Radio Link Components (#3395):** Radio link transmitters can now be successfully sourced from inside modules. This is accomplished by using the module instance's "Name" parameter. The user must enter a unique name for the module instance hosting the desired radio transmitter. Then the Source Module parameter in the radio receiver must be renamed to include the host module namespace. Note that radio links are not yet multiple-instance module compatible.
27. **Project Navigation:**
    a. Module schematic canvas zoom level is now saved to the project upon navigating away from the canvas. Each canvas zoom level is saved individually, so each module canvas zoom level remains unique (#1433).
    b. Module schematic canvas view position is now saved to the project upon navigating away from the canvas. Each canvas view position is saved individually, so each module canvas view position remains unique (#2002).
28. **Snapping to Grid (#3417)**: Copy/pasted components using ctrl + left click now properly snap to the canvas grid.
29. **File Viewer Tabs (#3419)**: Fixed bug involving inconsistency with file contents. Sometimes a file viewed in tab viewer was not the most up-to-date (due to a failure to remove cached contents). File caching is no longer performed, which forces the file to be re-read each time the tab is accessed.
30. **Shorted Unique Buses (#3218)**: PSCAD now checks for signal/bus name contentions. This effectively will prevent multiple, uniquely named buses from being shorted together.
31. **Message Table (#3202)**: The message table will now limit its size to 1000 messages maximum. The simulation will halt if this message limit is exceeded. This limit is imposed to avoid excessive data transfers, which greatly hinder simulation speed.
32. **New Transmission Lines/Cables (#783)**: When a new transmission line or cable is created, all default components contained within its canvas (i.e. model and ground components) will display their respective parameters and units correctly.
33. **Scientific Notation (#2049)**: Negative numbers in scientific notation are now handled properly.
34. **Frame and Panel Appearance (#3049)**: Graph and control panels will now refresh on canvas to reflect changes made to panel type in workspace options.

35. **Graph Manual Scaling (#3210):** Enabling "Manual Scaling Only" for a graph will no longer allow the y-axis' extents to be reset.
36. **Sequence Numbers (#3041):** Simulation no longer fails when circuit is rotated 180 degrees. This bug was direct cause of failure to update the call stack sequence numbers during the compile process.
37. **Simulation Runtime Speed (#3334)**: Simulation speed no longer severely affected by the existence of a breaker component. A logic bug was causing the animated graphics algorithm to be called every time step.

Master Library

New Models:

1. **Pipe-Type Cable**: A pipe-type (or multi-core) cable component has been added.
2. **1-Phase, L-L Fixed Load**: This is a line-to-line version of the existing Fixed Load component.
3. **Space-Vector Modulation (SVM):** This component generates switching signals to implement space vector modulation, the vector arrangement resets to the Z_0 vector after every sample period.

Bug Fixes:

1. **6-Pulse Bridge**:
    a. An error is no longer produced when you have the component configured to use a firing order of *6 Pulses + 6 Interp.* Times (#3314, 3326).
    b. Now generates the correct results when the alpha order is given in degrees. There was a conversion error from degrees to radians (#3438).
2. **3-Phase Voltage Source Model 1 (#3315)**: When this component was used in R-R//L impedance form, internal quantities are now calculated correctly when specifying terminal conditions.
3. **Current Transformer – JA Model (#3332)**: This component is now behaving properly. There was a problem with the internal variable B, which effected saturation.
4. **Multi-Mass (#3341)**: Resolved an error in the code, which occurred when assigning mutual damping between masses to the self-damping of adjacent masses.
5. **Integrator (#3311)**: Component no longer generates #Nan in Fortran code when reset parameter is disabled.
6. **Optimal Run (#3327)**: Changed the "Select Channel for Basis of Optimal Run" parameter default 1.
7. **Wound Rotor Machine (#3329)**: Component instance parameters in master library synchronized to default values.
8. **Random Number Generator (#3340)**: An option was added to use a known seed or automatically generate a seed based on the time of execution.
9. **Runtime Configurable Passive Branch (#3361)**: Component display now based on configuration selected for the component.

10. **Frequency/Incremental Phase/RMS Meter (#3309)**: Component label changed to be more meaningful.
11. **UMEC Transformers (#3432)**: The UMEC transformer components no longer generate a 'suspicious isolated node' warning message.

Line Constants Program (LCP)

New Features:

1. **Pipe Cable Model**: A pipe-type (or multi-core) cable model has been added. This cable may contain up to 8 inner cables and can exist with other coaxial cables in the same right-of-way.
2. **Semi-Conductive Layers**: Users may now include semi-conductive layers in their coaxial cables. There are semi-conductor layers that form a barrier on both the inner and outer surfaces of the insulator separating the core from the sheath.
3. **Stranded Conductor Input Format**: It is now possible to enter conductor information in terms of multiple conducting strands. Additional information needed is the strand radius and total number of outer strands. Stranded conductors effect the series impedance of the line at high frequencies only.
4. **Ideal Cross-Bonding**: The LCP now supports the ideal cross-bonding (transposition) of conductors involved in underground cable systems. This will allow users to quickly represent cross-bonded cable systems, without having to link multiple short cables in series; resulting in decreased electrical nodes as well as enabling a much larger simulation time step.
5. **Buried Bare Conductors**: It is now possible to model bare conductors buried in earth when modeling cable systems. To add a bare conductor, simply add a cable and select the Layer Configuration as C1 (i.e. core without insulator). The presence of the bare conductor will affect the total series impedance Z, but will have no effect on the shunt admittance Y. The bare conductor is removed from the system using Kron reduction, and cannot be connected externally.
6. **New Earth Return Approximation Formula**: The new approximation formula for earth return in cable systems, referred to as *Analytical Approximation (Saad)*, is a more stable alternative to the present formula *Analytical Approximation (Deri-Semlyen/Wedepohl)*. The new approximation formula is for use only in underground cable systems. It works on the assumption that the relative ground permeability is unity (= 1.0). If not, the LCP will force this value to 1.0 if *Analytical Approximation (Saad)* is selected.
7. **Frequency-Dependent Ground Conductivity**: Users may enter frequency-dependent ground conductivity values from measured results.
8. **Executable Built on Intel Fortran XE 2011 (v12)**: The Line Constants Program executable (tline.exe) issued with v4.4 has been built using the Intel Fortran XE 2011. Significant improvements in solve speed (up to 200%) for some cables and transmission lines has been experienced with this new version.

Licensing

New Features:

1. **Lockless Trial Licenses:** Installation and use of a lockless trial license can now be done with just normal user privileges. Power user and Administrator privileges are no longer required. Previously, only users with administrator-level privileges could install or use lockless trial licenses.
2. **Remote License Installation:** Licenses can now be installed by a remotely logged in user. Previously, in order to install SUL or MUL licenses using the License Update tool, the user had to be directly logged into the console of the machine.
3. **License Manager Remote Start:** The License Manager 1.29 can be started by a remotely logged in user. Previously, in order to start the License Manager (1.28 and previous), the user had to be directly logged into the console of the License Manager machine.

Bug Fixes:

1. **SUL Self-Licensing (#3085):** A user with an X4 SUL license and a V4 SUL license can now run PSCAD V4 and PSCAD X4 via self-licensing, as long as PSCAD V4 is launched first. Previously, only one instance of PSCAD could acquire a license via self-licensing.
2. **Localhost/remotehost IP (#3374):** Resolved "Client has localhost and remotehost IPs" issue. Improved logic to ensure that a PSCAD client can get a license from a License Manager running on the same machine as itself.

Installation

New Features:

1. **Elevated Shortcut:** The PSCAD Installer creates an elevated shortcut to PSCAD if on Windows Vista or better. On Windows Vista or better, the PSCAD X4 installer creates an elevated shortcut and a non-elevated shortcut to PSCAD X4.