

PowerWorld Client Conference



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What's New in Simulator Version 12.0



- Power Flow Solution
- Display Auxiliary Files (*.AXD)
 - Editing of Onelines from Information Displays
- New Pie Chart and Gauge Objects for all data objects
- Many oneline improvements
- More GIS Support
- Multi-Section Line Display Object support
- Dialog Changes
- Data Object Improvements
- Case Information Display Improvements
- Line Loading Replicator
- Line Impedance Calculator
- PVQV, ATC, and Contingency Analysis Improvements
- File Format Support

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Power Flow Solution



- Spent many months speeding up solution
 - 5-10 percent speed up due to Jacobian storage change
 - Doubled speed of coordinated transformer tap switching algorithm
 - General code optimization throughout to speedup the solution
 - New memory manager which results in 5-10 percent speed-up
- New global solution options
 - Transformer Stepping Methodology
 - Coordinated Sensitivities (previously this was only option)
 - Self-Sensitivity Only
 - Three methods for sharing generator vars during remote regulation
 - Allocate using Remote Reg % (previously only option) [PTI does]
 - Allocate so all generators are at the same [min..max] range [Areva EMS]
 - Allocate using SUM of Remote Reg % [GE does]
 - Minimum Per Unit Voltage for Constant Current Loads now
 - Remote Regulation can now be a mixture of local and remote generators.

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Power Flow Solution: Object-Specific Features



- Area Interchange control by user-specified Injection Group
- Added option with a Switched Shunt to allow it to switch during the inner power flow loop.
 - This allows discrete switched shunts to be treated as PV buses initially and then revert back to discrete shunts after the initial solution
- With each transformer, a new field called “Regulation Range Target Type” has been added with following options:
 - *Middle of Reg Range* or *Max/Min of Reg Range*
- Generally more error checking
 - Parallel transformer regulation ranges that don’t overlap
 - Values of Line Drop Impedance that are too large
 - Notification of transformers that are turned off control due to large regulation range
- Islanding:
 - Ensure that a new slack bus is chosen if the generation at the slack is taken out of service.
 - Treat an island as “dead” if there are no in-service loads in the island.

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Power Flow Solution: Solution Diagnosis Aids



- Improved display for showing which devices remotely regulate a particular bus (shows generators, LTCs, and shunts now)
 - Appears on Run Mode Bus dialog
 - New Case Information, Other, Remotely Regulated Buses display
- Bus field “Type” has been improved to show 6 new descriptive strings to better help you understand the case
 - Type column is shown by default on Mismatches display now
 - Slack, PQ, and PV, slack still exist
 - PV (Remote Reg Master)
 - PQ (Remote Reg Slave)
 - PQ (Continuous Shunts at Var Limit)
 - PQ (Gens at Var Limit)
 - PQ (Remotely Regulated at Var Limit)
 - PQ (Remotely Regulated)
- Bus Zero Impedance branch groupings Display
- Case Information Islands has been improved to list the buses, generators, loads, and switched shunts that are part of an island

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Display Auxiliary Files (*.AXD) and Case Info Editing of Onelines



- New *.AXD Format (DISPLAY Auxiliary Format)
 - You can save and create onelines using a purely text format
 - Allows user to programmatically create and edit oneline diagrams
- Display objects case information improved
 - Allows editing of oneline via a Oneline Information Display
 - Supports cut/paste of from Excel of oneline information

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New Pie Chart and Gauge Objects



- Pie Charts and Gauges for
 - Areas
 - Bus
 - Generator
 - Injection Group
 - Owner
 - Substation
 - Super Area
 - Switched Shunt
 - Transformer
 - Zones

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Online Enhancements: Miscellaneous



- Online links can now open an AUX file directly
- URL links can now run windows batch commands
- Custom Colors are now properly managed across Simulator
- Added ability to specify with a layer whether objects are selectable in Edit Mode (great for use with borders)
- The hints that appear when hovering the mouse over an object may now be customized by the user
- Dynamic Formatting now includes “lookup tables” to make them more versatile
- Alignment Toolbar for aligning selected groups of objects

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More GIS Support



- More support for reading and writing GIS Shapefile information
 - Ability to bring up Shapefile data DBF data from within Simulator
- Added ability to draw a “Measure Line” which calculates the approximate distance
- Auto insert buses and substations using Lat/Longs stored with the bus or substation data object

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Online Enhancements: Multi-Section Lines



- New multi-section line fields are available
- New multi-section line pie charts are available
- Auto-insert transmission lines support
- Bus Palette support
- Bus View and Sub View support
- Power Flow List and Quick Power Flow List
- Ability to open a single-section of a multi-section line (done by allowing “mixed statuses”)

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Dialog Changes



- For dialogs with a large number of tabs, a new layout is used that is easier to navigate (Simulator Options is an example of this)
- Dialog Cleanup
 - More clearly show which fields may be edited (fields that may be edited are shown with a white background, others are gray)
 - Consistent display of label, area, zone, owner, substation information

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General User Interface Changes



- Tried to clean up error messages to make more readable and reduced unnecessary messaging
- Added ability to timestamp all messages in message dialog
- Added windows registry option to prevent user modification of the toolbars and menus
- Case Summary enhanced (parses number of elements of all types)
- Complete overhaul of transformer impedance corrections table to make more useable
- Clean-up of Menus – Added **Onelines** Menu

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Data object Improvements



- New interface elements
 - Interfaces that include another interface
 - Multi-Section Lines can be added to an interface
- Can now monitor an interface in both directions
- Clone elements from another interface
- New injection group elements
 - Switched Shunts can be added to an injection group
 - Injection group that includes another injection group
- Added memo fields for all objects and displayed on all dialogs
- Added multiple line shunts at each end of a transmission line. Each line shunt can have a status.
- New dialogs showing a list of all the area and zone tie-lines in the case
- Object labels can be used in auxiliary files to define objects
 - for instance you could use `BRANCH label OPEN` in Contingency AUX

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Case Information Displays



- When typing in data you may append the “@” symbol to copy one column to another.
 - For instance, type “@BusPUVolt” into the generator setpoint voltage and it will change the setpoint to the terminal voltage.
- When sending to Excel, a dialog now appears asking to which worksheet to send the data
- Enhanced Interface and Injection Group case information displays to have more flexibility in showing elements
- Creation of injection groups and interfaces via selection of generators, loads, and shunts from a case information display
- Added search ignoring filtering and display/column options
- Removed limitation of 5 conditions for filters or sorting. It is now unlimited. Also modified filter dialogs to make adding/deleting conditions simpler
- Added ability to show hints when hovering the mouse over the case information column headings

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New Tools



- Variety of new sensitivity tools
 - Single meter, multiple transfer
 - Single Transfer, Multiple Meters,
 - Self Sensitivity
 - LODF Matrix
- Line Loading Replicator
 - Specify a buyer and seller injection group
 - Specify a desired flow on a branch or interface
 - This tool tells you how much to transfer to achieve flow
- Line Impedance Calculator
 - Specify physical spacing, conductor type, and distance
 - This tool calculates the per-unit line impedances

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PV and QV Curve Enhancements



- Tracking of limits hit during PV Curve tool trace
- Tracking of dV/dP during PV Curve tool
- New method for ramping reactive power during PV curve trace relative to constant power factor

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Available Transfer Capability Tool



- Added a new option on how the ATC Solution Method "(IL) the Full CTG Solution" is processed called "Force all transfer ramping to occur in pre-contingency states and repeat full CTG Solutions".
 - Prior to this new option, the Full CTG solution would only occur once and extra ramping would occur after that.
- Ability to specify that post-contingency linear calculations not include the effect of phase-shifters.
- Added a script command which would perform the same action as done on the ATC multi-scenario results tab for Write to Excel.
- For multiple ATC scenarios, now have the option of changing line rating A and B.
- Added a better indication of when the "(IL) then full CTG" solution method encounters an unsolvable power flow when ramping out the pre-contingent state

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Optimal Power Flow



- Added new option to optionally
 - Treat Area or Super Area MW constraints as unenforceable even when the ACE is less than the AGC Tolerance
- Added support for handling a group of parallel phase-shifting transformers using a master/slave interaction
 - All are listed as OPF control variables
 - Only the master is included in the optimization.
 - The slaves maintain the same angle as the master at all times.
- Added options to control the detection of Linear Programming Cycling.
- Generally cleaned up situations when an extremely large number of binding constraints are encountered helping Simulator to return better error messages.

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Contingency Analysis



- Dead bus reporting
- dV/dQ change reporting
- Cloning and Merging of a contingencies
- New contingency action for setting the series reactance of a series capacitor
- Added post-contingency voltage limits which are different than normal voltage limits

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File Format Support



- PowerWorld Binary File (PWB)
 - Ability to password protect PWB files
 - Added ability to write out unlinked elements in PWB file after reading them from an AUX file
- PTI RAW File Support
 - When reading RAW files that contain loads assigned to other areas, we now insert transactions to represent these loads.
 - Can create Injection Groups by reading the Participation portion of the *.SUB files

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File Format Support (cont)



- GE EPC File Support
 - Simulator stores all GE EPC data now. User may also edit all EPC data from within Case Information Displays
 - Essentially Simulator has become a complete editor for maintaining GE EPC files
 - Added ability to save and read EPC files “with options”
 - Filter by area / zone / owner filter
 - Added ability to append case using an EPC file
 - For EPC file, now assume all generators with only 2.0 MVar of range are set to AVR = NO
 - Using File, Open, “EPC with Options”, user may specify this value

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Auxiliary File SCRIPT Changes and SimAuto Changes



- New script commands
 - ZeroOutMismatches
 - CalculateVoltSelfSense
 - CalculateVoltToTransferSense
 - SetCurrentDirectory
 - WriteTextToFile
- SimAuto
 - Add procedure
ChangeParametersMultipleElement

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In Progress



- Adding ability to read, write, and edit transient stability dynamic data from GE and PTI dynamics files
 - Initial work is only on file format and interface support
 - Have built a framework for this and have completed the most common models
- Adding ability to specify user-defined generic data objects
 - Background Object can then be linked to these data objects
 - Might represent counties, gas pipelines, etc...
- Developing tool to work with full topology models
 - Real-Time Models for Real-Time Analysis
- Looking into developing new on-line training that will be delivered via the web in 1 hour increments
 - Soliciting feedback on desire and market need for this