

INTEGRATED POWER SYSTEM ANALYSIS SOFTWARE

DIGSILENT

PowerFactory 15



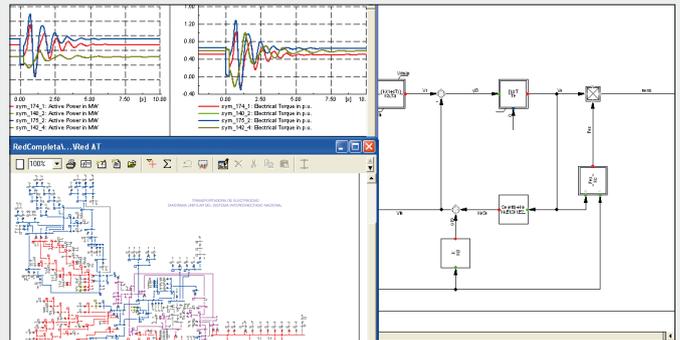
DIgSILENT Power System Analysis Software

DIgSILENT has set standards and trends in power system modelling, analysis and simulation for more than 25 years. The proven advantages of the PowerFactory software are its overall functional integration, its applicability to the

PowerFactory Applications

POWER TRANSMISSION

PowerFactory offers a complete suite of functions for studying large interconnected power systems integrating new technologies for power generation and transmission such as wind generation, virtual power plants, HVDC-VSC or FACTS. The fast and robust load flow algorithm can be applied to any AC or DC network topology. It uses highly accurate models including various types of MW and Mvar-controllers. **PowerFactory's** functions can be applied to improve the security, stability and economics of complex power transmission systems.



POWER DISTRIBUTION

Different phasing technologies, such as single-wire earth return, two-phase, bi-phase or classical three-phase systems, have created a need for multi-phase distribution system modelling. **PowerFactory** provides the most comprehensive modelling features for studying all kinds of phasing technologies, meshed or radial topologies and railway supply systems connected to public distribution systems. In order to reduce network unbalance, improve quality of supply and optimize distribution networks, **PowerFactory** offers a large variety of functions, such as multi-phase load flow analysis, short-circuit analysis (IEC 60909, ANSI C37 and multiple fault analysis), harmonic analysis, time-domain simulation and reliability assessment. Other standard features include the modelling of distributed generation and virtual power plants, voltage drop analysis, branch loading calculation, daily load curves and the consideration of LV load diversity. This is complemented by an easy-to-use protection coordination functionality.



OTHER IMPORTANT ASPECTS ARE:

- Tie open point optimization
- Optimal capacitor placement
- Voltage profile optimization for bi-directional power flows
- Geographic diagrams (GPS based) with background maps
- GIS and SCADA integration

INDUSTRIAL SYSTEMS

Industrial power systems supplying refineries, paper-mills, car factories or other plants with high power quality requirements benefit from high precision **PowerFactory** load flow algorithms, short-circuit calculation features, 4-wire modelling, harmonic analysis and filter design options.

OTHER RELEVANT FUNCTIONS INCLUDE:

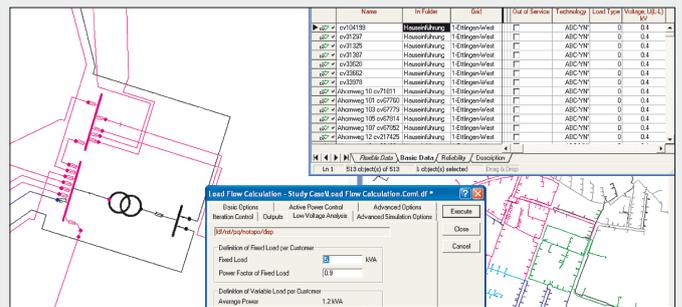
- Steady-state/transient motor starting and plant re-acceleration
- Protection coordination and settings verification
- Stability analysis and electromagnetic transients

modelling of generation-, transmission-, distribution- and industrial grids and the analysis of the interactions of these grids. **PowerFactory** is the ideal tool for studying the grid integration of renewable energies.

DISTRIBUTED GENERATION

Generation at distribution levels defines entirely new challenges for distribution planning engineers due to reverse power flows, voltage drops and extreme variations in equipment loading. Various generation technologies are possible, such as synchronous and asynchronous cogeneration units, PV-cells, wind turbines, fuel cells and micro-turbines. Typical studies include steady-state and dynamic analyses, taking into consideration time-varying correlated or un-correlated energy sources.

PowerFactory is the ideal tool for analyzing the impact of distributed generation on the network. It combines classical distribution system analysis functions such as voltage drop calculation, unbalanced network, load and generation modelling, selectivity analysis, etc. with the power of a highly modern analysis tool featuring dynamic simulation functions and reliability analysis. Full support is available for developing and analysing the impact of virtual power plants and new control techniques on distribution networks.



WIND GENERATION

Complex studies for the integration of wind generation into distribution and transmission networks are becoming increasingly important. **PowerFactory**, the de-facto standard in wind generation modelling, combines extensive modelling capabilities with advanced solution algorithms, providing the analyst with tools to undertake the full range of studies required for grid connection and grid impact analysis. The modelling capabilities of **PowerFactory** allow the inclusion of complex control dynamics, new generator technologies, blade control and wind turbulence.



Detailed wind turbine models

- Doubly-fed induction generator models (DFIG)
- Converter driven synchronous machine models (CDSG)
- Squirrel-cage induction generator models
- Manufacturer-specific high precision model with built-in control code

Power electronic devices and grid harmonic analysis

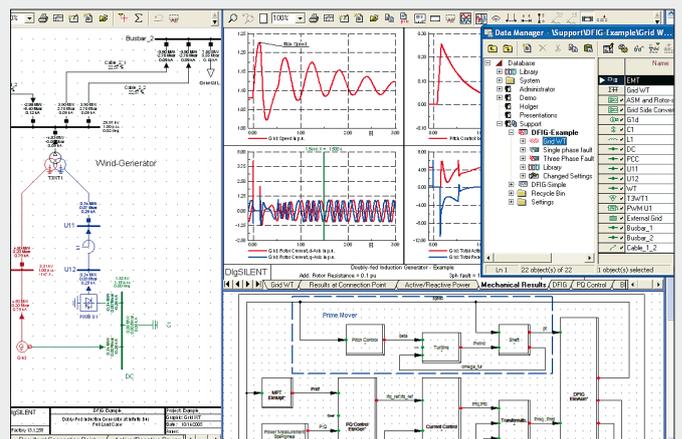
Generator protection and Crow Bar modelling

Blade control

Wind turbulence and gust models

Stability and EMT analysis

Integrated modelling of large wind parks

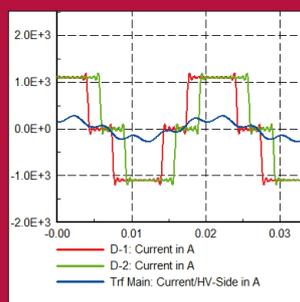
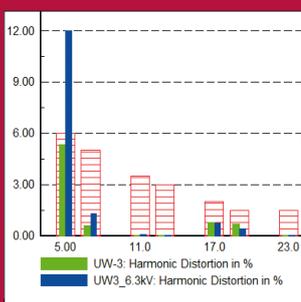
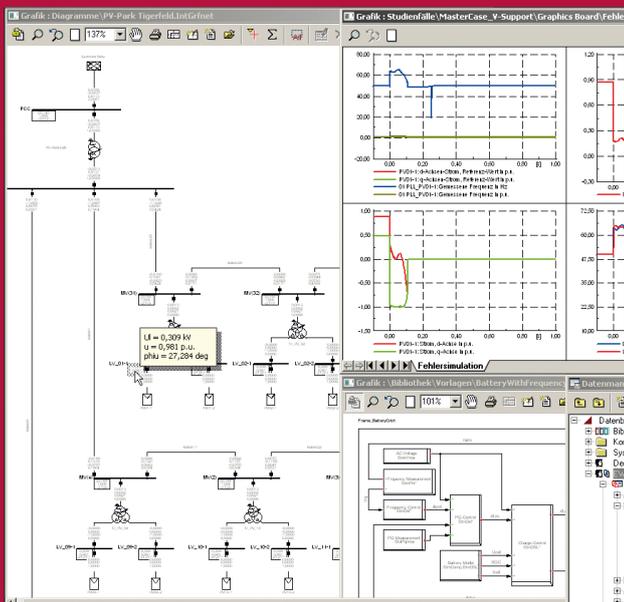
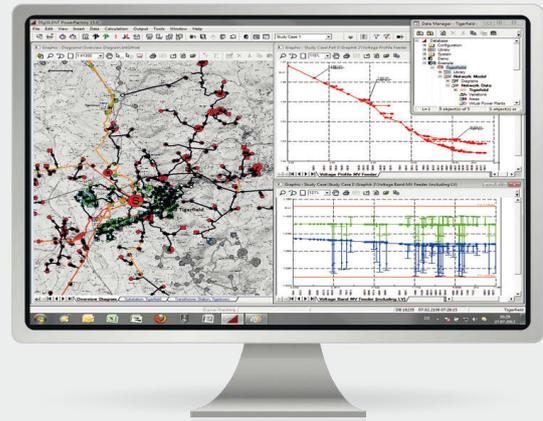


DIGSILENT PowerFactory 15 Highlights

PowerFactory Version 15 continues with the successful concepts of the PowerFactory software while adding powerful new features improving the business processes of network planners, network operators, consultants and researchers.

PowerFactory 15

PowerFactory Version 15 offers major features in calculation functionality, extensions to the data model and data management system. It comes with improved visualisation features, new models and solving algorithms. The newly enhanced power distribution analysis tools integrate advanced network analysis and optimization techniques with economic evaluations. With its rich modelling capabilities for variable loads and distributed generation such as PV, fuel cells, wind generation and battery storage, **PowerFactory** is perfectly suited for network planning and operation studies of increasingly smart grids.



SOME OF THE HIGHLIGHTS ARE:

Geographic diagrams and enhanced tools for visualizing topological network structures

Optimal power restoration and enhanced reliability assessment for balanced and unbalanced networks

Voltage profile optimization for bi-directional power flows

Arc-Flash analysis (IEEE1584, NFPA 70E) incl. label printing

Automatic cable sizing (IEC 60364-5-52, NF C15-100, NF C13-200, BS 7671, etc.)

New and improved electrical models (MV load, secondary substation, single-phase static generator, PLL model, CVT, etc.)

Database offline mode with local caching and re-synchronisation, automatic rule-based database housekeeping

Techno-economic analysis of grid expansion strategies

New comprehensive real-world application examples with video presentations

PowerFactory 15 Base Package

LOAD FLOW ANALYSIS

- Balanced and unbalanced load flow for coupled AC and DC grids
- Meshed DC Super-Grid load flow analysis
- SVC, shunt and tap controllers
- Station- and network control features, incl. Q(U)-/cosphi(P), and droop characteristics
- Local- and remote control options
- Consideration of generator capability curves
- Secondary and primary control, inertial response
- Distributed slack by load and generation, including grid interchange schedules
- Accurate modelling of induction machines
- Voltage dependent load models
- Simple load/generation scaling, as well as automated feeder load scaling
- Determination of "Power at Risk"
- Consideration of temperature dependency
- DPL scripts for Time Sweeps, ATC, penalty factor calculation, etc.

SHORT-CIRCUIT ANALYSIS

- Support of IEC 60909, IEEE 141/ANSI C37, VDE 0102/0103, G74 and IEC 61363 norms and methods
- Complete superposition method, including dynamic voltage support of generators connected via power electronics
- Multiple fault analysis of any kind incl. single-phase interruption, inter-circuit faults, etc.

CONTINGENCY ANALYSIS

- AC or DC and combined AC/DC load flow analysis
- Fast contingency screening
- Single and multiple time phase consideration
- Event-based post-fault actions
- Substation Automation via Switching Schemes
- Automatic time sweep contingency analysis of 24 hours time span incl. parallelization
- Generator effectiveness and Quad Booster effectiveness
- Enhanced fault case management
- Comprehensive spreadsheet reporting features incl. graphical visualization of critical cases
- Tracing of individual contingency cases
- Contingency comparison mode
- Grid/multiple-CPU computing support

NETWORK REDUCTION

- Flexible definition of Boundaries
- Calculation of load flow and short-circuit equivalent
- Support of Load, Ward and Extended Ward Equivalents
- Capturing of reduction via variation for convenient toggling between original and equivalent grid

VOLTAGE STABILITY ANALYSIS

- PV curves and QV analysis

LOAD FLOW SENSITIVITIES

- Voltage Sensitivities and Branch Flow Sensitivities
- Transformer and booster Sensitivities
- Modal analysis for identifying "strong" and "weak" parts of the network

ASYNCHRONOUS MACHINE PARAMETER IDENTIFICATION

OVERHEAD LINE & CABLE PARAMETER CALCULATION

BASIC MV/LV NETWORK ANALYSIS

- Feeder Analysis Tools incl. voltage profile plots and feeder load scaling for simple and meshed feeders
- Automated schematic visualization of feeder topology

- Radial Feeder Tools incl. Voltage and Phase Technology Change Tools and Auto-Balancing Tool
- Backbone Calculation determining the main connections between meshed feeders
- LV Network Analysis Functions
- Stochastic Load Modelling

TECHNO-ECONOMICAL ANALYSIS

- Economic assessment of network expansion strategies
- Net Present Value method considering costs of losses, investment costs, economic impact of failure rates (only with Reliability Analysis Functions), and project schedules
- Efficiency Ratio Evaluation to determine optimal year of investment

RESULTS AND REPORTING

- Extremely rich set of calculation quantities
- Text and interactive spreadsheet reports
- Configurable Flexible Data Pages
- Most comprehensive reporting in network diagrams
- Numerous interactive plots for result visualisation (protection, harmonics, stability and transients, eigenvalue analysis, etc.)
- Powerful result comparison mode

NETWORK DIAGRAMS AND GRAPHIC FEATURES

- Simplified Single Line Diagrams for schematic and design views
- Detailed Single Line Diagrams showing full switch & component model
- Intelligent Overview Diagrams supporting node & branch views
- Geographic Diagrams (GPS based) with background maps
- Single Line Diagram handling across Variations and Expansion Stages
- Automated drawing of Substation Diagrams
- Auto-assistant for diagram drawing based on grid data
- User-definable Symbols and Composite Graphics
- Global template libraries (e.g. for substation configurations, WTG, PV-systems)
- Numerous diagram colouring and result visualization modes

NETWORK REPRESENTATION

- Support of any kind of meshed/radial 1-, 2-, 3- and 4 wire AC and DC networks with combined AC and DC modelling for all available analysis functions
- Single-phase, two-phase, bi-phase and three-phase technology with/without neutral
- Detailed primary and secondary substation models (single/double busbars w/o tie breaker, 1-1/2 busbar, bypass busbar), extendable for user-specific busbar configurations incl. Protection schemes
- Switches and substation equipment such as CB, fuse, disconnecter, load break switch, grounding switch, NEC/NER, surge arrester, CT, VT, CVT, etc.
- Running arrangements and switching rules for substation automation

POWER EQUIPMENT MODELS

- Large and comprehensive Equipment Type Library
- Synchronous and asynchronous motor/generator
- Doubly-fed induction machines
- Static generator for modelling wind- and PV- generators, fuel cells, micro-turbines, etc.
- External grids, AC and DC voltage and current sources
- Simple and complex load model, special MV and LV load models
- Static var compensation (SVC) and shunt/filter models
- Network branches (OHL, cable, branches, line couplings, tower geometries, cable systems, 2-/2-N-winding transformer and auto transformer, 3-winding transformer, booster transformer, reactor, series capacitor, common impedance, etc.)

- DC/DC converter, inductive DC-coupling
- Power electronic devices (thyristor/diode, VSC, DC valve, soft starter, etc.)
- FACTS and HVDC systems
- Controller objects such as station & secondary controller, transformer tap controller, virtual power plants, capability curves
- Protection devices with over 30 basic function blocks
- Protection device library (static/dynamic functions)
- Fourier source, harmonic source, FFT, clock, S&H, etc.
- Composite models for branch and node models, incl. template library for handling composite models
- Parameter characteristics (scalar, vector, matrix, files) for modelling of load profiles, wind-/PV in-feed, temperature dependencies, etc.
- Grid organisation and element grouping (zones, areas, boundaries, circuits, routes, feeders, operators, owners, etc.)

DATA MANAGEMENT

- Single-user and multi-user database
- Multi-user operation and team working
- User accounting, data access and function access rights
- User Profiles with customizable toolbars, dialogs and context menus
- Offline Mode via locally cached database and automatic re-synchronization when connected to the networkUser-friendly and powerful Data and Object Manager
- Grid Variations management with time-stamped grid Expansion Stages
- Highly flexible Study Case management with definition of Operation Scenarios
- Flexible Parameter Characteristics
- Master- and Derived Projects with Merge Tools
- Project versioning
- Database undo and rollback function
- Database housekeeping mechanisms

EXTERNAL DATA FORMAT SUPPORT

- Import filters for PSS/E, PSS/U, PSS/Adept, UCTE/ENTSO-E, Neplan, ISU, NETCAL, NEPS, ReticMaster
- Bi-directional, flexible DGS interface (ASCII, XML, CSV, ODBC) supporting GIS and SCADA interfacing
- Optional: PSS/E Export, CIM (ENTSO-E Profile), PRAO

GENERAL SOFTWARE INFORMATION

- Functional integration for all power system applications incl. T&D, industry, renewables, smart grids, etc.
- Various interfaces for communication and data exchange with third-party systems
- MS Windows compatible software supporting 32 Bit and 64 Bit architecture to facilitate very large grids

SCRIPTING AND AUTOMATION

- DPL: Digsilent Programming Language; C-like syntax supporting unlimited access to PowerFactory objects, parameters and their functionality
- Extendable function scope of DPL via C-Interface, thus allowing to access external data and applications
- PowerFactory C++ -API (Application Interface) for full external automation of PowerFactory

GIS AND SCADA INTEGRATION

- Support of various interfacing options incl. bi-directional data exchange with GIS and/or API utilization
- On-line reading of dynamic SCADA data as well as import of static data; engine integration with SCADA systems
- Optional Interfaces: OPC (SCADA Interoperability Standard), A/D Signal Interfacing

⁺ PROTECTION FUNCTIONS

- Comprehensive relay library with relay models suitable for steady-state, RMS and EMT calculations
- Synchronization with StationWare
- Elaborated relay settings spread sheet reports

TIME-OVERCURRENT PROTECTION

- Overcurrent-Time diagram supporting Drag & Drop
- Cable and transformer damage curves
- Motor starting curves
- Automatic display of measured currents
- Steady-state response checks
- Steady-state short-circuit simulation with tracing of individual steps
- Steady-state tripping times for transient or sub-transient current/voltage values
- Transient response checks (Requires Stability Analysis Functions (RMS) or Electromagnetic Transients Functions (EMT))
- Protection Model Features
 - Fuses and low-voltage circuit breakers
 - Positive-, Negative-, Zero-Sequence inverse and definite time characteristics
 - Thermal overload characteristics
 - Directional Elements supporting cross-, self- and memory polarizing, Wattmetric method
 - Differential unit with harmonic blocking for multiple harmonic orders
 - Generic and detailed manufacturer specific Recloser units
 - Signal transmission between relays, inter-tripping, interlocking schemes
 - Detailed CT, VT and CVT models including saturation
 - Over-, Under-voltage inverse and definite time characteristics
 - Programmable logic unit
 - Over-, Under-frequency and df/dt inverse and definite time characteristics (Requires Stability Analysis Functions (RMS))

DISTANCE PROTECTION

- Includes Time-Overcurrent Protection
- R-X diagrams supporting displaying of measured impedance trace
- Time-distance diagrams, with metric or calculated display of zone reach in forward and reverse direction
- Protection Model Features
 - Generic and detailed manufacturer specific Mho, Polygonal distance zones and distance starting units
 - Out of step detection and power swing blocking unit (Requires Stability Analysis Functions (RMS) or Electromagnetic Transients Functions (EMT))

⁺ ARC-FLASH ANALYSIS

- Arc-Flash Calculation in accordance with IEEE-1584 2002 and NFPA 70E-2012
- Incident Energy, Flash-Protection Boundary and PPE Category on the Single-Line Graphic
- Automated preparation of Arc-Flash labels via MS Excel/Word
- Automatic protection-based fault clearing time determination (Requires Protection Functions)

⁺ CABLE SIZING

- Automatic Cable Sizing based on IEC 60364-5-52, NF C15-100, NF C13-200, and BS 7671, etc.
- Cable reinforcement optimization
- Verification of global and/or individual thermal and short circuit constraints

- Verification of user-defined voltage drops per terminal and/or feeders
- Balanced (positive sequence) or unbalanced calculation with support of all phase technologies (1-, 2- and 3 phase systems, w/o neutral conductor)
- System phase technology and cable types consistency checks in the feeder
- Various verification reports and automatic modification of cable types in the existing network via network variations

⁺ POWER QUALITY AND HARMONIC ANALYSIS

HARMONIC LOAD FLOW

- Harmonic voltage and current indices (IEC 61000-3-6, BDEW 2008)
- Balanced (positive sequence) and unbalanced (multiphase) model
- Unbalanced harmonic sources
- Non-characteristic and Inter-harmonics
- Multiple harmonic injections: current and voltage sources, thyristor rectifiers, PWM-converters, SVS, non-linear loads, Norton-Equivalents
- Background distortion Frequency-dependent R and L values
- Various harmonic distortion indices such as THD, HD, TAD, TIFmx, total RMS currents and voltages (definitions acc. to IEEE and DIN/IEC standards)
- Harmonic Distortion Plot with pre-defined distortion limits according to international standards
- Waveform plots

FLICKER ANALYSIS

- Flicker Assessment (IEC 61400-21):
 - Short- and long-term flicker disturbance factors for continuous and switching operations Relative voltage changes
- Flicker Meter (IEC 61000-4-15):
 - EMT or RMS signals
 - Support of multiple file formats as ComTrade, CSV, user-defined, etc.

FREQUENCY SWEEP

- Automatic step size adaption or constant steps
- Balanced (positive sequence) and unbalanced network model
- Self and mutual impedances/admittances (phase and sequence components)
- Frequency-dependent R and L values and line/cable models
- Spectral density of voltage amplitude/ angle

FILTER ANALYSIS

- Various filter models
- Design and layout parameters
- Filter sizing and verification reports
- Ripple control analysis

⁺ DISTRIBUTION NETWORK FUNCTIONS

TIE OPEN POINT OPTIMIZATION

- Optimization of Tie Open Point positions subject to loss minimization and/or improvement of system reliability
- Support of balanced/ unbalanced systems
- Thermal, absolute voltage, and voltage drop/rise constraints
- Enhanced reporting features and graphical visualization

VOLTAGE PROFILE OPTIMIZATION

- Voltage profile optimization for bi-directional power flows in systems with high level of distributed generation
- Determination of optimal distribution transformer tap positions for production and consumption cases
- Combined consideration of MV and LV feeder voltage profiles with enhanced plotting features

OPTIMAL CAPACITOR PLACEMENT

- Determination of optimal locations, types, phase technology and sizes of capacitors
- Economic assessment considering costs for losses against installation costs under predefined voltage constraints
- Support of load variation via characteristics

⁺ RELIABILITY ANALYSIS FUNCTIONS

FAILURE MODELS

- Line, transformer, generator and busbar failures
- n-1, n-2 and common mode failures (n-k)
- Double earth faults
- Independent second failures
- Protection/ circuit breaker failures

OPTIMAL POWER RESTORATION

- Failure effect analysis (FEA)
 - Automatic protection-based fault clearing
 - Intelligent high-end system restoration with potential network reconfiguration and load-shedding
 - Support of thermal, absolute voltage, and voltage drop/rise constraints
 - Sectionalizing (remote controlled switches, shortcircuit indicators, manual restoration)
 - Substation automation with switching rules
- Animated tracing of individual cases
- Detailed reports for restoration action plans

RELIABILITY ASSESSMENT

- Fast state enumeration incl. optimal power restoration techniques for balanced/ unbalanced systems
- Calculation of all common reliability indices (IEEE 1366)
- Components contributions to reliability indices
- Support of load variation, incl. load distribution curves
- Consideration of maintenance schedules
- Support of various tariff and cost models

OPTIMAL REMOTE CONTROL SWITCH (RCS) PLACEMENT

- Determination of optimal number and locations for RCS installation for improvement of system reliability
- Economic assessment against various objective functions

GENERATION ADEQUACY ANALYSIS

- Stochastic assessment of system supply capabilities (Loss of Load Probabilities, Capacity Credit, etc.)
- Consideration of generator outages and maintenance schedules (Monte Carlo), as well as load variation
- Enhanced probabilistic models for wind generation
- Rich suite of reporting and plotting tools

+ OPTIMAL POWER FLOW (OPF)

REACTIVE POWER OPTIMIZATION (OPF I)

- Minimization of losses
- Reactive Power Optimization (interior point method)
- Various controls such as:
 - Generator reactive power
 - Transformer and shunt taps
- Flexible constraints such as:
 - Branch flow and voltage limits
 - Generator reactive power limits
 - Reactive power reserve
 - Boundary flows

ECONOMIC DISPATCH (OPF II)

- Various objective functions, e.g.:
 - Minimization of losses
 - Minimization of Costs (Eco Dispatch)
 - Optimization of remedial post fault actions, e.g. booster tap changes (pre- to post fault)
- AC optimization (interior point method)
- DC optimization (linear programming)
- Various controls such as:
 - Generator active and reactive power
 - Transformer, quad booster and shunt taps
- Flexible constraints such as:
 - Branch flow and voltage limits
 - Generator active and reactive power limits
 - Active and reactive power reserve
 - Boundary flows
- Contingency constraints (DC only)

+ STATE ESTIMATION

- P, Q, I and V-measurement models
- Measurement plausibility checks
- Automatic bad data detection/elimination
- Verification of System Observability
- Various options to handle unobservable regions (e.g. pseudo measurements)
- Consideration of load flow constraints

+ STABILITY ANALYSIS FUNCTIONS (RMS)

- Multi-phase AC networks, DC-networks
- Support of balanced and unbalanced grid conditions
- Fast, fixed step-size and adaptive step-size algorithm
- A-stable numerical integration algorithms supporting long-term stability simulations with integration step-sizes ranging from milliseconds to minutes individually selectable for each model
- High precision event and interrupt handling
- Simulation of any kind of fault or event
- Transient Motor Starting (synchr./asynchr. Machines)
- Support of all protection library relays
- Real-Time Simulation Mode
- Simulation Scan Feature, e.g. frequency scan, loss of synchronism scan, voltage/voltage recovery scan, or common variable scan
- Combined RMS and EMT simulation mode (Requires Electromagnetic Transients Functions (EMT))

DIGSILENT SIMULATION LANGUAGE (DSL) FOR DYNAMIC RMS MODELLING

- Graphical editor for drawing any kind of block diagram (AVR, prime mover, relay, etc.)
- Fully flexible signal wiring schemes having access to any grid object and their parameters via definition of frames
- Nesting of frames and model building blocks
- DSL (DIGSILENT Simulation Language) for fully flexible definition of simulation functions via the DSL syntax

- High precision built-in macros & functions
- Automatic initialization of complex, nonlinear models
- Large build-in standard IEEE model library
- Support of MatLab/Simulink interface
- C++ Interfaces for discrete and continuous models
- Optional: OPC interface for real-time applications
- Optional: DSL Crypting Function

+ ELECTROMAGNETIC TRANSIENTS (EMT)

- Integrated simulation of electromagnetic transients in multiphase AC and DC systems
- Fast, fixed step size or adaptive step-size algorithm
- Simulation of FACTS, HVDC interconnections (VSC, thyristor based) and Static Var Systems (SVCs, STATCOMs), etc.
- Power electronic devices (PWMs, rectifiers) and discrete components (diode, thyristors, etc.)
- Constant and frequency-dependent distributed parameter cable/OHL models
 - OHL/Cable constants calculation
 - OHL transpositions
 - Single core and pipe-type cables
 - Cable cross-bonding
 - Semi-conducting layers
- Non-linear elements and saturation characteristics
- Series capacitors incl. spark gap model
- Surge arrester models
- Impulse voltage & current source for lightning surge analysis
- Accurate EMT models of renewable generation (wind/PV, etc.) and storage systems
- Discrete R-L-C elements
- Flexible template definition to create and re-utilize user specific models library
- Insulation coordination analysis including temporary (TOV), switching (SOV) and lightning (LOV) transient over-voltages
- Stochastic switching analysis and point-on-wave (POW) switching
- Fast Fourier Transform (FFT) analysis
- Inrush, Ferro-resonance, SSR and TRV studies
- COMTRADE-file support
- Combined RMS and EMT simulation mode (Requires Stability Analysis Functions (RMS))

DIGSILENT SIMULATION LANGUAGE (DSL) FOR DYNAMIC EMT MODELLING

- Graphical editor for drawing any kind of block diagram
- Fully flexible definition of simulation functions and signal wiring schemes having access to any grid object and their parameters via definition of frames
- Nesting of frames and model building blocks
- High precision built-in macros & functions
- Automatic initialization of complex, nonlinear models
- Support of MatLab/Simulink interface
- C++ Interfaces for discrete and continuous models
- Optional: OPC interface for real-time applications
- Optional: DSL model crypting feature

+ MOTOR STARTING FUNCTIONS

- Single or multiple Motor Starting
- Transient Motor Starting (synchr./asynchr. Motors), with full support of controller models
- Steady-state Motor Starting
- Various Motor Starting methods (reactor, autotransformer, variable rotor resistance, star delta,...)
- Thermal limit check of cables and transformers
- Automatic starting check function, visualized in Single Line Diagram
- Detailed motor starting report

+ SMALL SIGNAL STABILITY (EIGENVALUE ANALYSIS)

- Full and selective Eigenvalue analysis
- Balanced (positive sequence) and unbalanced (3 phase) network representation incl. non-conventional generation such as wind turbines, PV-systems, HVDC, VSC and other FACTS devices
- Interactive Eigenvalue, Mode Bar and Mode Phasor Plots
- Tabular reports of eigenvalues incl. damped frequencies, damping time constants, etc.
- Detailed reports of oscillatory modes including participation factors of state variables, controllability and observability

+ SYSTEM PARAMETER IDENTIFICATION

- Parameter estimation of non-linear dynamic MIMO-systems fully integrated with DSL-modelling

+ POWERFACTORY INSTALLATION OPTIONS

- License Options:
 - Workstation License (Single-User) via local USB hardlock
 - Network License (Multi-User) via License Server with optional Floating Licenses
- Database Options:
 - Single-User Database
 - Multi-User Database with Microsoft SQL Server and/or ORACLE drivers (Requires Network License)

DIGSILENT Company Profile



DIGSILENT is a consulting and software company providing engineering services in the field of electrical power systems for transmission, distribution, generation and industrial plants.

DIGSILENT was founded in 1985 and is a fully independent, privately owned company located in Gomarigen/Tübingen, Germany. DIGSILENT continued expansion by establishing offices in Australia, South Africa, Italy, Chile, Spain and France, thereby facilitating improved service following the world-wide increase in usage of its software products and services. DIGSILENT has established a strong partner network in many countries such as Mexico, Malaysia, UK, Switzerland, Colombia, Brazil, Peru, China and India. DIGSILENT services and software installations have been conducted in more than 110 countries.

DIGSILENT PowerFactory

DIGSILENT develops the leading integrated power system analysis software PowerFactory, which covers the full range of functionality from standard features to highly sophisticated and advanced applications including wind power, distributed generation, real-time simulation and performance monitoring for system testing and supervision. For wind power applications, PowerFactory has become the power industry's de-facto standard tool, due to PowerFactory models and algorithms providing unrivalled accuracy and performance.

DIGSILENT StationWare is a reliable central protection settings database and management system, based on latest .NET technology. StationWare stores and records all settings in a central database, allows modelling of relevant workflow sequences, provides quick

access to relay manuals, interfaces with manufacturer specific relay settings and integrates with PowerFactory software, allowing for powerful and easy-to-use settings co-ordination studies.

PowerFactory Monitor is a flexible performance recording and monitoring system that copes easily and efficiently with the special requirements for system test implementation, system performance supervision and the determination and supervision of connection characteristics. Numerous Monitoring Systems installed at various grid locations can be integrated to a Wide-Area-Measurement-System (WAMS). PowerFactory Monitor fully integrates with PowerFactory software.

DIGSILENT Consulting

DIGSILENT GmbH is staffed with experts of various disciplines relevant for performing consulting services, research activities, user training, educational programs and software development. Highly specialised expertise is available in many fields of electrical engineering applicable to liberalised power markets and to the latest developments in power generation technologies such as wind power and distributed generation. DIGSILENT has provided expert consulting services to several prominent wind-grid integration studies.



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