

The Future of Power System Engineering & Operation – Today



Innovation Automation Collaboration

The ETAP 11 release represents our continued commitment shared with clients and business partners to provide the most comprehensive analytical solutions for the design and operation of power systems now, and the energy technologies for tomorrow.

This automated design and analysis software enables engineers and managers to significantly increase their productivity by reducing the amount of design and review man-hours.

As the industry's market leader, ETAP delivers the future of power systems engineering and operation - today.

New Features & Capabilities

Elements & Database

Multi-Dimension Database

- Lock & unlock element properties
- 10 States to track equipment conditions
- Local SQL server connectivity

Data Manager

- View / edit Base & Revision Data differences
- View equipment property differences
- Display & filter study data
- Graphical management of data

Data Exchange - DataX

- Bi-directional Excel data exchange
- Load Ticket for induction machines
- GIS handling of 1-phase systems
- PSS/E Raw data import
- ETAP-SPEL interface

Project Merge

- Multi-user management of project merge
- Parallel ETAP project development
- Self contained snapshots of the parent & branch projects
- Merge Base & Revision Data

Theme Manager

- Display color coding based on:
 - Standard
 - Voltage level
 - Area
 - Grounding (Solid, Low-Z, High-Z, Ungrounded)
 - Earthing (TT, TN, IT, NEC)
 - Grounding by ground switch
- Display faulted buses by symbol or color

Multiple Language Support

- Interface & Help File in four languages
- Localized output reports:
 - English, Spanish, Chinese, Japanese, Russian, Portuguese, & German

Induction Machine

- PF & EFF at no-load & over-load conditions
- Locked-Rotor current based on NEMA MG1 Code Letter
- Option to calculate X_d'' & X_d' based on machine time constant

Libraries

- Photovoltaic panel library
- Wind turbine generator library
- GFI / RCD library
- Cable library with neutral, grounding / protective (PE) conductors
- New Verified & Validated library data

Transformer

- Open-Delta transformer
- Three 1-phase transformer
- MVA rating based on first & second stage cooling
- Option to display Vector Groups

Uninterruptable Power Supply - UPS

- Parallel UPS connection modeling
- Option to control input PF
- Bypass switch modeling

Bus Duct

- Graphical representation on the One-Line Diagram
- Bus duct length, construction type, & material

Single Phase Source

- 1-phase power grid modeling
- 1-phase inverter modeling

Photovoltaic Array

- Performance adjustment coefficients
- Solar farm modeling
- Solar irradiance based on location & time
- AC & DC system analysis
- Inverter dynamic modeling & operation modes
- Maximum Peak Power Tracking (MPPT)
- Extensive Manufacturer/Model library
- P-V & I-V curves

Wind Turbine Generator - WTG

- WTG Manufacturer / Model library
- New WTG & control models for WECC type 1, 2, 3, & 4

Variable Frequency Drive - VFD

- Multi-input connection for 6-24 pulse
- Sub-system modeling between VFD & motor
- Rectifier & inverter control models
- Output voltage & frequency control
- Frequency dependent modeling of sub-system
- Adjustable speed drive operation
- Motor acceleration control schemes
- Bypass switch for soft starter operation
- Input PF control

Switching Devices

- Safety ground switch
- Integrated operation with Switching Management System
- Supervisory control for real-time switching operation

Real-Time

Power System Monitoring & Simulation

- Generation reserve monitoring
- Multi-state breaker monitoring & control
- Large system handling optimization
- EPICS interface

Event Playback

- Playback of event views
- Historical alarm database

Intelligent Fast Load Shedding

- System islanding generator logic
- VFD load reduction control
- Automatic generation of transient study cases

Interchange Transaction Scheduling

- Transaction reports
- Fuel cost schedule reports

OPC Unified Architecture - UA Server

- Console communication via WAN
- Thin client application
- Secured access control
- Interface to OPC UA & DA clients

Monitoring & Control Templates

- Thin client application for monitoring & control
- Customizable Web-based interfaces & technology
- Human Machine Interface (HMI) template library
- Web-based customizable HMI:
 - SCADA views
 - WPF dashboards
 - Trending & forecasting
 - Alarms & warnings
 - Control & supervision
 - Energy consumption monitoring
 - Reporting & logging
 - Geographical monitoring view

Command & Control

- Remote control - enable & disable commands
- Control inhibition based on system operational constraints
- Control inhibition based on switching operations

Data Center Power Management

- Power panel monitoring
- Parallel UPS operation
- CO₂ & energy management system
- PDU monitoring & control templates

Analysis Modules

Protective Device Coordination - Star

- Automatic detection of protection zones
- Automatic selection of coordination paths
- Protection & coordination zone viewer
- Combine / Integrate multiple device curves
- Ground & Neutral conductors damage curves
- Cumulative Transformer Inrush current
- Enhanced Plot Options

AC Arc Flash Analysis

- Primary protective device identified
- Current Limiting Fuse (CLF) modeling based on:
 - IEEE 1584 equations (Class L & RK1)
 - Peak let-through curves
 - TCC Curve method
- LV transformer arc flash limit based on impedance, voltage & current
- Incident Energy plots for Ia & Ibf
- Enhanced display of results on the one-line diagram

DC Arc Flash Analysis

- Maximum power method
- Stokes & Oppenlander method
- Paukert method
- Determine incident energy
- Assess arc flash protection boundary
- Customize arc flash labels
- DC arc flash Result Analyzer

User-Defined Dynamic Model - UDM

- Graphical model builder
- Library of pre-defined UDM models to create more complex models
- Compile & test directly from the UDM builder
- Control element toolbars including transfer blocks, input ports, output ports, etc.
- Automatic UDM links to components
- Import & Export to Simulink® models
- Create & edit models for Exciter, Governor, Power System Stabilizer, & Lumped Load

Underground Raceway System

- Intelligent rule-based alignment & spacing tools
- Automatic conduit distribution & spacing
- Uniform & non-uniform conduit arrangements
- Utilize custom, NEC, or standard IEEE rule-based spacing
- Wizard for creating raceways

Cable System

- Cable Library with neutral, grounding / protective conductor (PE)
- Add auxiliary neutral & PE conductors to cables
- Damage curve for neutral & PE conductors

Cable Ampacity & Sizing - IEEE/NEC

- IEEE 399, NFPA 70 (NEC), ICEA P54
- Cable sizing based on maximum or average phase operating current
- Reports in Crystal Reports & Excel
- Grounding conductor selection
- Cable ampacity & sizing for U/G

Cable Ampacity & Sizing - IEC/BS

- BS 7671, IEC 60364-5-52, IEC 60364-4-43
- Model Forms: BS & user-definable
- Cable sizing based on harmonic effect
- Typical overcurrent device curves
- Cable sizing based on maximum or average operating current
- Reports in Crystal Reports & Excel

Protective Conductor Sizing - IEC/BS

- BS 7671, IEC 60364-5-54
- PE thermal requirements & sizing
- Calculated or user-defined fault current & fault clearing time
- Reports in Crystal Reports & Excel
- Consider leakage current

Electric Shock Calculation - IEC/BS

- BS 7671, IEC 60364-4-41, EN 50122
- TN-C, TN-S, TN-C-S, TT, & IT Earthing Types
- Electric shock requirements
- Loop impedance & current calculation
- Touch voltage calculation & evaluation
- Consider resistance to Ground / Earth
- GFCI / RCCB protection
- Reports in Crystal Reports & Excel

Load Flow

- Auto-Run load flow based on system changes
- New toolbar to change & display result units
- Report voltage in %, kV, V
- Report Power in MVA, kVA
- Isolated 1-phase source modeling

Unbalanced Load Flow

- Report voltage & power in multi-units
- Open-Delta transformer modeling
- Center-Tap transformer modeling
- Three 1-phase transformer modeling
- Isolated sub-systems with Voltage-Control source modeling
- Isolated 1-phase source & system modeling

Motor Acceleration

- VFD frequency control motor starting
- User-defined frequency and Volt/Hz as functions of time
- Simulate voltage-boost effect at low frequency during starting
- Motor acceleration with VFD & soft starter

Harmonics

- VFD harmonic modeling
- Calculate & report I*TB (Balanced) & I*TR (Residual)
- UPS AC input & output modeling for harmonic orders
- PV Array modeling for harmonic orders

Transient Stability

- Lumped Load UDM
- New built-in IEEE standard exciters:
 - AC2A, AC7B, DC4B, ST1A, ST2A
- VFD dynamic modeling:
 - Rectifier, DC link, & inverter models
 - Voltage & frequency control models
 - Frequency control acceleration & operation
- UPS parallel operation modeling
- PV Array source modeling
- Inverter source modeling



New Features & Capabilities



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