

**etap**<sup>®</sup>



# Products & Solutions

Comprehensive, Integrated Suite of Power System  
Software Modules from Design to Operation

*Trusted Solution   Established Quality   Verified & Validated Software*



# From Model-Driven Design . . .

## Modeling & Visualization

### Core Module - 64 Bit

- Integrated 1Φ, 2Φ, 3Φ, & DC Systems
- One-Line Graphical View - OLV
  - Intelligent Electrical Diagram
  - Auto-Build - Faster Layout & Design
  - Templates - One-Click Modeling
  - Datablocks - Info & Study Results
  - Voltage Propagation & Error Checking
  - Unlimited Nested Networks
  - Solve Unlimited Elements & Devices
  - Protective Device & Panel Systems
  - Theme, Data, Configuration Managers
- 3-Dimensional Orthogonal Database
  - Base & Revision Data
  - Switching Configurations
  - Graphical Views
- User-Access Control & Security
- Switching Device Interlock Enforcer
- Rule Books - Design Standards
- Libraries - 25+ Equipment Types
- Warehouse - Project Specific Library
- Study Scenario Wizards
- Power & Per Unit Calculators
- Cable Ampacity & Sizing Modules
- Cable & Line Impedance Calculation
- Schedule Reports - Cables, Transformers, Motor Datasheets, Bus & Load Tabulation
- Multi-Language Ed. - 8+ Localized Versions

### Geospatial Diagram

- Intelligent Electrical GIS View
- Incremental Import
- Data Quality & Error Checking
- Intelligent Circuit Tracing & Loop Detection

### NetPM™

- Network Modeling & Project Management

### etapAPP™

- Data Collection & Synchronization

### DataX™ - Data Exchange Interfaces

- Microsoft® Excel
- Universal Mapping
- ESRI®, Smallworld™ GIS
- KML, OSM, CIM, MultiSpeak®
- Autodesk Revit®
- SmartPlant® Electrical
- AVEVA Electrical™ / Engineering
- OPAL-RT ePhasorSim
- Conversion from Legacy Software

## Analysis & Optimization

### Network Analysis

- Load Flow & Voltage Drop
- Unbalanced Load Flow
- Unified Load Flow - AC, DC, Unbalanced
- Time Domain Load Flow
- Short Circuit
  - ANSI / IEEE C37 & UL 489
  - IEC 60909
  - IEC 60363
  - GOST R-52735
- Motor Acceleration - Static, Dynamic
- Harmonics & Filter Sizing
- Voltage Stability
- Contingency Analysis
- Reliability Assessment
- Load Allocation
- Transformer Sizing - ANSI, IEC

### Network Optimization

- Optimal Power Flow
- Optimal Capacitor Placement
- Unit Transformer Tap Optimization
- Switching Optimization

### DC Modeling & Analysis

- Battery Sizing
- Battery Discharge
- DC Load Flow
- DC Short Circuit

## Safety & Protection

### Protective Device Analysis

- **Star™** - Protection & Selectivity
  - Auto Evaluation - Rule-Based
  - Selectivity Zone & Path Detection
  - Zone Selective Interlock - ZSI
- **StarZ™** - T&D Protection & Selectivity
  - Distance Relay - Model Specific
  - R-X Characteristics Plots
  - Sliding Fault & Line Loadability
  - User-Editable Scheme Logic
- Device Sequence-of-Operation
- Device Library - 5,000+

### Arc Flash Analysis

- AC Arc Flash
  - IEEE 1584-2018
  - NFPA 70E
  - BGI/GUV 5188E D.8.12
- ArcFault™ - High Voltage Arc Flash OSHA
- Arc-in-a-Box - 15 to 36 kV, IEEE 1584
- DC Arc Flash - NFPA 70E 2018 D.5.1 - 5.3
- Arc Flash Calculators
- Graphical Sequence-of-Operation
- Result Analyzer & Worst-Case Evaluation
- PPE Requirements Approval
- Customizable Work Permits & Labels

### System Grounding & Earthing

- Ground Grid Systems
  - IEEE 80 Method
  - Finite Element Method
- Protective Earthing Conductor Sizing
- Electric Shock Protection

## Dynamics & Transients

### Dynamic Modeling

- User-Defined Dynamic Model - UDM
- Frequency Dependent
- Generator, WTG, Motor, Load
- Governor, Exciter, PSS
- HVDC, SVC, FACTS
- Converters, Energy Storage
- Automatic Relay & Switching Actions
- Microgrid Controller

### Dynamic Simulation

- Transient Stability
- Transformer Inrush
- Generator Start-Up
- Dynamic Parameter Estimation & Tuning - DPET
- Motor Parameter Estimation
- Electromagnetic Transients - EMTP

## Cable Systems

### Ampacity & Sizing

- IEEE 399
- NFPA 70 - NEC
- ICEA P-54-440
- IEC 60364
- IEC 60092
- IEC 60502
- BS 7671
- NF C 15-100

### Underground Cable Thermal Analysis

- Neher-McGrath
- IEC 60287
- Transient Temperature Calculation

### Cable Pulling

- Sidewall Pressure & Tension Evaluation
- 3-Dimensional Conduit Layout & Views

# ... to Real-Time Operation

## Power Management

### Model-Driven PMS

- Intelligent Monitoring
- Predictive Simulation
- Situational Awareness
- Event Playback
- Load Forecasting
- Energy Accounting
- State Estimation
- Alarm Management

## Automation & Control

### iSub™ - Intelligent Substation

- Substation Automation
- Switching Order Management - SOM
- Switching Sequence Validation
- Load Management
- Demand Side Management

### ILS™ - Intelligent Load Shedding

- Instantaneous Load Shedding
- Optimal Load Preservation
- Automated System Restoration
- Integrated Validation via Transient Stability
- Intelligent Automatic Subsystem Islanding
- Time-Based Load Priority Schedules

### Distribution Load Shedding

- Load Curtailment Management
- Automatic & Manual Planned Outages
- Optimized Rolling Outages
- Priority-Based Customer Restoration
- Interruption Minimization per Customer per Time Periods
- Under-Frequency & Overload Shedding

### iCE™ - Intelligent Control Enterprise

- Programmable Controller
- Remote Terminal Unit - RTU
- Data Acquisition & Control
- Secure Controller
- Integrated Fault Detector
- Fault Tolerant Hardware
- Built-in Redundancy
- Wireless Communications

## Energy Management

### Model-Driven EMS

- Network Security Analysis
- Equipment Maintenance Scheduling
- Automatic Generation Control
- Economic Dispatch
- Unit Commitment
- Interchange Scheduling
- Reserve Management

## eSCADA™

### Model-Driven Electrical SCADA

- Data Acquisition
- Human Machine Interface
- Web-Based Dashboard
- Supervisory Control
- Geographical Monitoring
- Historian - Information Storage & Retrieval
- Simplified Template-Driven Integrator
- Alarm Management
- Sequence-of-Event Management
- Graphical & Tabular Reporting
- Operator & Management Notifier
- Waveform Capture Dashboards
- Synchrophasor Measurements Views
- Redundant Architecture
- Control Inhibition
- Dynamic Network Coloring
- Analytical Alarming

### Native Communication Protocols

- IEC 61850 - GOOSE / MMS
- IEC 60870-5 - 101 / 104
- ICCP
- Modbus
- DNP 3
- OPC UA - Server / Client

## Training Simulator

### eOTS™ - Operator Training Simulator

- SCADA, PMS, EMS, ADMS
- Instructor & Trainee Environment
- Multiple Trainees with Individual Actions
- ETAP-in-the-Loop w/ Dynamic Feedback
- Ad Hoc & Pre-Defined Scenarios
- Evaluation of Trainee Performance

## Microgrid Management

### Microgrid Management System

- Generation Optimization
- Energy Storage Management
- Generation & Load Forecasting
- Demand Side Management
- Economic Dispatch
- Supervisory Control
- Unit Commitment
- Volt/VAR Optimization - VVO

## Power Plant Control

### Model-Driven Power Plant Controller

- Centralized Renewable Farm Control
- Active Power & Reactive Management
- Energy Storage Management
- Grid Code Compliance
- Renewable Energy SCADA & Dashboards

## ADMS

### Distribution Management - DMS

- Network Connectivity Analysis
- Distribution State Estimation
- Load Forecasting - Short & Long-Term
- Asset Operation Monitoring
- Predictive Simulation
- Fault Detection & Identification
- Fault Location, Isolation & Service Restoration - FLISR
- Switching Order Management - SOM
- Volt/VAR Optimization - VVO
- Feeder Balancing & Loss Minimization
- Technical & Non-Technical Energy Losses Report

### Outage Management - OMS

- Crew Dispatch & Work Management
- Planned Outage Management
- Trouble Call Management
- Outage Analytics & Reporting
- Storm Assessment

The logo for etap, featuring the word "etap" in a bold, lowercase, red sans-serif font.

Convergence of Power & Intelligence

# Solutions



## Generation

From renewable to nuclear, majority of power generation plants rely on ETAP

- Grid Interconnection Studies
- Renewable Penetration Studies
- Design & Analyze Solar & Wind Farms
- Model Validation & Compliance Reports
- Dynamic Parameter Tuning
- Generation Protection
- Power Train, Auxiliary & Safety Systems
- Unit Commitment & Dispatch
- Microgrid Modeling, Design & Control
- Generation Management System



## Industrial

Intelligently model, design, and operate oil & gas, mining & metals, manufacturing plants

- 'What If' Studies w/ Multiple Results of Load Flow, Faults & Arc Flash Studies
- System Loss Reduction & Reactive Compensation Studies
- Equipment Capacity Sizing
- Acceleration Studies w/ Adjustable Drives
- Protective Device Auto-Evaluation
- Harmonic Evaluation & Limit Compliance
- Fast Load Shedding & Bus Transfer
- Predictive Analysis, Control & Automation
- Power Management System



## Distribution

Modeling, planning and operations of state and city-wide power distribution networks

- Planning & Optimization Studies
- Intelligent GIS & Logical Diagrams
- Substation & Feeder Diagrams
- Equipment Warehouse & Sizing
- Reliability Assessment & Indices
- Substation & Feeder Automation
- Smart Grid Management & Optimization
- Advanced Fault Detection & Location
- Automated Outage Restoration
- Demand Response & Load Shedding
- Integrated DMS & OMS Solution



## Transmission

Integrated grid modeling, planning, protection and energy management solution

- Multi-Area System Planning
- Grid Code Compliance & Evaluation
- Grid Interconnection Studies including Offshore Wind Parks
- HVDC Link & FACTS Models
- Overhead Line Distance Protection
- Line Constants & Coupling
- Outage Assessment & Sensitivity Analysis
- Electromagnetic Transients
- Substation Automation
- Substation Grounding Design & Analysis
- Security Constrained Optimization
- Energy Management System



## Data Center Commercial

Design, analysis, and protection of low voltage installations and mission critical facilities

- Dedicated Data Center Dashboards
- Electrical Safety System Monitoring & Evaluation Redundancy Adequacy Assessment
- UPS Design, Monitoring & Control
- Critical Infrastructure Failure Mode & Effects Analysis
- Rule-Based Design per Industry Guidelines
- Panel Board Schedules
- Cable Sizing & Thermal Analysis
- System / Zone Protection & Selectivity
- Power Quality Analysis & Mitigation
- Interface w/ Revit & BIM Software



## Transportation

AC & DC electrical system analysis for railways, marine and aerospace

- **eTraX™** - Rail Traction System Solution for analysis and operation of HV & LV railway power and signaling systems
- **Marine, Offshore & Shipbuilding** Design, operate and maintain ship, platform, and port power systems safely, while improving critical uptime
- **Airports & Aerospace** Design, simulate, analyze and operate airport & aerospace unified AC & DC power systems

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