

Power System Modelling Using DlgSILENT PowerFactory

Venue Information

Venue: London UK

Place: London UK

Start Date: 2025-12-01

End Date: 2025-12-12

Course Details

Net Fee: £3000.00

Duration: 2 Weeks

Category ID: EAPET

Course Code: EAPET-72

Syllabus

Course Description

PowerFactory is a leading power system analysis software application for use in analysing generation, transmission, distribution, and industrial systems. Since its start, PowerFactory software has expanded to provide a wide range of analysis features necessary for the planning, operation, and maintenance of any power system component.

The majority of power system analysis issues can be resolved by a variety of commercial products. However, there are significant differences between these packages in terms of computing efficiency, result validity, and integration. In terms of combined modeling capabilities and solution methods, DlgSILENT PowerFactory is the industry leader. It offers all the necessary models and methods for contemporary power systems. It 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. This course's primary goal is to familiarize participants with the many capabilities of the DlgSILENT power system analysis and simulation software.

- Equip participants with the essential tools and technical expertise to effectively operate the DlgSILENT PowerFactory power system analysis software.
- Develop participants' proficiency in using DlgSILENT PowerFactory to perform load flow analysis for evaluating system performance under various operating conditions.
- Enable participants to apply DlgSILENT PowerFactory for conducting fault and contingency analyses to assess system reliability and stability.
- Provide hands-on experience in modelling and analysing protection systems within DlgSILENT PowerFactory, with a focus on understanding key protection components and principles.
- Train participants to perform relay coordination and protection studies using DlgSILENT PowerFactory, ensuring optimal operation of diverse protection schemes.

Course Outline

- Contingency Analysis
- Overcurrent Protection
- Grid Connection of Renewable Generation
- Transmission Network Tools
- Reliability Analysis
- Optimal Power Flow (OPF)
- Stability Analysis
- Flexible AC Transmission Systems (FACTS)
- Generation Adequacy

Day 1 – Introduction to PowerFactory and Project Setup

Topics:

- PowerFactory environment overview and licensing
- Project creation, data handling, and user interface navigation
- Network element libraries and component definitions
- Basic single-line diagrams and data management
- Hands-on: Creating and saving a basic network model

Summary:

Participants are introduced to PowerFactory's interface and learn how to set up, save, and manage projects, forming the groundwork for all subsequent analyses.

Day 2 – Power System Modelling Techniques

- Load and generation profiles, static vs. dynamic models
- Hands-on: Developing and validating a complete test system

Summary:

Day 2 focuses on creating detailed, realistic network models, including data input consistency and validation of model integrity.

Day 3 – Load Flow and Contingency Analysis

Topics:

- Load flow principles and algorithms in PowerFactory
- Performing and interpreting load flow results
- Contingency analysis: N-1 and N-k scenarios
- Reliability of network configurations and sensitivity analysis
- Hands-on: Scenario simulation and results visualization

Summary:

Participants will gain hands-on experience running load flow and contingency studies to evaluate system reliability under different conditions.

Day 4 – Protection Systems and Overcurrent Coordination

Topics:

- Fundamentals of protection systems
- Modelling protection devices: relays, fuses, and circuit breakers
- Time-current characteristics and selectivity principles
- Hands-on: Performing relay coordination studies

Summary:

Day 4 equips participants with practical knowledge of modelling and testing protection systems within PowerFactory for reliable fault isolation.

Day 5 – Short-Circuit and Fault Analysis

Topics:

- Hands-on: Fault simulations and results reporting

Summary:

Day 5 expands the protection study into short-circuit analysis, enabling participants to evaluate system fault levels and breaker duties.

Day 6 – Renewable Energy Integration and Grid Connection

Topics:

- Grid connection studies for renewable generation
- Modelling wind, solar, and distributed energy systems
- Grid code compliance and power quality analysis
- Hands-on: Renewable penetration and grid compliance studies

Summary:

Participants will explore modelling of renewable generation sources and evaluate their technical impacts on grid stability and performance.

Day 7 – Transmission Network Tools and Dynamic Stability

Topics:

- Transmission network analysis and power transfer capability
- Small-signal and large-disturbance stability analysis
- Frequency stability and rotor angle monitoring
- Hands-on: Transient stability case studies

Summary:

Day 7 covers advanced transmission network and stability studies to evaluate system dynamic response and oscillatory behaviour.

Day 8 – FACTS Devices and Advanced Control

Topics:

- Modelling FACTS devices: SVC, STATCOM, TCSC, UPFC
- Impact on voltage control, damping, and power transfer

This day focuses on advanced system control using FACTS devices, providing participants with methods to improve stability and reliability.

Day 9 – Optimal Power Flow, Reliability, and Generation Adequacy

Topics:

- Optimal Power Flow (OPF) formulation and constraints
- Economic dispatch and loss minimization
- Reliability indices and generation adequacy assessments
- Hands-on: Multi-objective optimization and probabilistic reliability

Summary:

Participants learn how to perform and interpret OPF studies while ensuring reliability and adequacy across operational conditions.

Day 10 – Automation, Reporting, and Capstone Simulation

Topics:

- DlgSILENT scripting (DSL, Python interface) basics
- Automating repetitive simulations
- Custom reports and data export
- Capstone project: Integrated simulation covering load flow, faults, protection, stability, and optimization

Summary:

The final day integrates all topics into a comprehensive system case study, reinforcing software proficiency. Participants will also learn how to automate analyses and generate professional reports for engineering documentation.

Training Duration

2 weeks

Fee

£3,000 per participant