Power System Modelling Using DIgSILENT PowerFactory

Venue Information

Venue: London UK

Place: London UK

Start Date: 2027-01-12

End Date: 2027-01-23

Course Details

Net Fee: £2000.00

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, DIgSILENT 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 DIgSILENT power system analysis and simulation software.

- Develop participants' proficiency in using DIgSILENT PowerFactory to perform load flow analysis for evaluating system performance under various operating conditions.
- Enable participants to apply DIgSILENT PowerFactory for conducting fault and contingency analyses to assess system reliability, security, resilience and stability.
- Develop and define various operational states for assets to clearly represent their current performance and availability.
- Perform probabilistic analyses of the power system to assess its reliability, resiliency, and security using methods such as Monte Carlo simulations.
- DIgSILENT scripting (DSL, Python, MATLAB interface) basics.
- Provide hands-on experience in modelling and analysing protection systems within DIgSILENT PowerFactory, with a focus on understanding key protection components and principles.
- Train participants to perform relay coordination and protection studies using DIgSILENT PowerFactory, ensuring optimal operation of diverse protection schemes.

Course Outline

- Reliability, Security and Resilience Analysis
- Contingency Analysis
- Overcurrent Protection
- Grid Connection of Renewable Generation
- Transmission Network Tools
- 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.

Busbar, transformer, and load modelling and static and dynamic thermal modelling for line,
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:
Symmetrical and asymmetrical fault types
IEC and ANSI short-circuit calculation methods
Fault current paths and breaker rating validation
Hands-on: Fault simulations and results reporting

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

Control system modelling and tuning

Case study: Enhancing system stability using FACTS

Summary:

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

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:

DIgSILENT 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

£2,000 per participant