# Power System Modelling Using DIgSILENT PowerFactory

## Venue Information

**Venue:** London UK

**Place:** London UK

**Start Date:** 2027-03-09

**End Date:** 2027-03-21

## 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