



## Power System Design, Analysis and Review

**Duration:** 5 Days

**Language:** en

**Course Code:** IND04-105

### Objective

Upon completion of this course, participants will be able to:

- Understand FACTS devices and their uses.
- Develop power flow charts for large and small systems and acknowledge their individual uses and differences.
- Create programs using CT and VT optical transducers as protection relaying systems.
- Configure delays and protection devices based on thermal monitoring and cabling networks.
- Determine the best ways to move forward with system configuration.
- Understand safety mechanisms and contingency plans.
- Discover how HDVC links can make advances in power technology.
- Research high-speed fault limiters and the best demand-side management platforms.

### Audience

This course is designed for anyone in the utility or power plant sector responsible for operational development, fault management, or advancement of power systems. It would be especially beneficial for:

- Engineers
- Technicians
- Planning Professionals
- Renewable Energy Practitioners
- Plant Operational Managers
- Project and Contingency Managers
- Health and Safety Professionals

## Training Methodology

This course contains a variety of adult learning methods and techniques to maximise understanding. Participants will participate in workshops to understand calculations and review concepts compared to real-world situations. They will view simulations of best practices and risk elements to discuss the next steps and amendments required in their own power system.

## Summary

In the modern era, having a functioning, well-designed and sophisticated power system is essential. Power is now used more frequently than ever for homes and businesses, and the automation of services and power outages or problems now cause much larger issues than ever before. For this reason, it's essential to understand the inner workings of a power system, develop fool-proof designs which are fit for purpose, and conduct constant analysis to aid continuous improvement.

A power system must be tested using the most up-to-date technology, and regular reporting and analysis must be undertaken to highlight risk areas. It's important that everyone working in the energy field understands the requirement for an advanced contingency plan to prevent power outages and safety issues.

To ensure all employees involved develop an in-depth knowledge of issues that can arise and how to deal with them in the most effective and efficient ways, they must be able to identify the key components, conduct a full circuit and power surge analysis and fully understand the various power flow models to make amendments and developments where needed to ensure the power system is adequately maintained.

## Course Content & Outline

### Section 1: System Auditing & Planning

- Why system planning is important.
- The basics of industrial plant design.
- Voltage and safety considerations.
- The three-phase system to review current efficiency.

- Per-unit calculations and phasor domains.

## **Section 2: Analysing a Power System**

- Understanding the power unit system.
- Transformers and the best transformer models.
- Load models.
- Transmission lines and cabling.
- Transmission parameters.
- AC power and Ybus and Zbus matrices.

## **Section 3: Monitoring Short Circuits**

- The importance of studying short circuits.
- Short circuit currents.
- Short circuit calculations and getting the most out of your data.
- Basic circuiting concepts.
- Sequencing and symmetrical networks.
- Faults, risks, and resolutions.
- ANSI/IEC calculation methods.
- Circuit breakers and monitoring.
- Interpreting monitoring results.
- Software shortcuts and simulations.

## **Section 4: Looking at Power Flow**

- What is a power flow study?
- Why are power flow studies essential?
- Formulating a power flow evaluation.
- Problem-solving with power flow.
- DC and AC solutions.
- Being reactive with voltage control.
- Motor studies and their uses.
- Synchronous motors and their introduction into power systems.
- Load generation errors and area control errors (ACE).

## **Section 5: Power Considerations & Risk Factors**

- Starting a motor and studying performance.
- Voltage problem diagnosis.
- Problems starting a motor and their resolutions.
- Different types of starting devices.
- Frequency bias and economic dispatch.
- Network behaviours.
- Power system fundamentals and reactivity.

## **Section 6: Power Capacity Units**

- Capacitor units and bank ratings.
- Protection and usage of capacitor and bank units.

- Motor terminal changes.
- Capacitor switching and application.
- Circuit harmony and smooth amendments.
- Delta-wye transformer analysis.
- Flash hazards.

## Section 7: System Grounding

- Grounding your equipment.
- Solidity grounding and system grounding.
- Ungrounded equipment and the risks.
- High and low resistance.
- System grounding types and changes.

## Section 8: Harmonic Analysis

- Harmonic analysis - an overview.
- What are harmonics, and why are they necessary?
- How to generate harmonics.
- Harmonic amplification.
- Harmonics and your equipment.
- Filtering and stability studies.
- Reliability and review.
- Implementing modifications.

## Certificate Description

Upon successful completion of this training course, delegates will be awarded a Holistique Training Certificate of Completion. For those who attend and complete the online training course, a Holistique Training e-Certificate will be provided.

Holistique Training Certificates are accredited by the British Assessment Council (BAC) and The CPD Certification Service (CPD), and are certified under ISO 9001, ISO 21001, and ISO 29993 standards.

CPD credits for this course are granted by our Certificates and will be reflected on the Holistique Training Certificate of Completion. In accordance with the standards of The CPD Certification Service, one CPD credit is awarded per hour of course attendance. A maximum of 50 CPD credits can be claimed for any single course we currently offer.

## Categories

Engineering, Technology

## Tags

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