

Course No. 1147

High Voltage Engineering Training Course

ELECTRICAL ENGINEERING
INDUSTRIAL ENGINEERING, MAINTENANCE & OPERATIONS

DURATION

5 Days

DELIVERY

Classroom



Course Overview

The High Voltage Engineering Training Course is a comprehensive professional development program designed to equip electrical engineers, maintenance professionals, operations personnel, technical specialists, and engineering managers with the knowledge and practical skills required to design, operate, maintain, test, troubleshoot, and optimize high voltage electrical systems. High voltage engineering is fundamental to modern power generation, transmission, and distribution networks, ensuring the safe, reliable, and efficient delivery of electrical power across industrial facilities, utility infrastructures, oil and gas operations, power plants, manufacturing industries, and critical public infrastructure.

High voltage systems operate under demanding electrical and environmental conditions, requiring specialized engineering expertise in insulation systems, electrical protection, switchgear, transformers, substations, transmission lines, power cables, grounding systems, and testing methodologies. Proper engineering design, preventive maintenance, systematic testing, and effective fault diagnosis are essential to maintaining system reliability, preventing equipment failures, minimizing power interruptions, ensuring personnel safety, and complying with international engineering standards. This course provides participants with practical engineering knowledge based on globally recognized best practices for managing high voltage assets throughout their operational lifecycle.

Throughout the program, participants will develop a comprehensive understanding of high voltage engineering principles, electrical insulation, dielectric behavior, power system design, substations, transformers, switchgear, circuit breakers, power cables, surge protection, grounding systems, relay protection, high voltage testing, condition monitoring, fault analysis, predictive maintenance, asset integrity management, and power quality optimization. Practical engineering exercises and real industrial case studies enable participants to apply theoretical concepts to real operational environments while strengthening engineering decision-making and problem-solving capabilities.

The High Voltage Engineering Training Course also demonstrates how high voltage engineering integrates with maintenance management, reliability engineering, asset management, operational excellence, energy efficiency, engineering safety, regulatory compliance, and digital transformation initiatives. By completing this course, participants will be prepared to improve electrical system reliability, reduce maintenance costs, strengthen engineering decision-making, optimize power system performance, enhance electrical safety, and support sustainable engineering operations across government entities, ministries, public sector organizations, financial institutions managing

engineering infrastructure, oil and gas companies, power generation facilities, utility providers, manufacturing organizations, mining companies, transportation infrastructure, and multinational corporations.

Objectives

- Analyze the engineering principles governing high voltage systems and electrical power networks.
- Develop practical knowledge for operating, maintaining, and managing high voltage equipment and substations.
- Evaluate high voltage system performance using engineering calculations, testing procedures, and operational performance indicators.
- Apply insulation engineering and electrical protection principles to improve system reliability and operational safety.
- Design operational improvement strategies that optimize high voltage network performance and equipment reliability.
- Improve high voltage system operation through effective inspection, testing, monitoring, and maintenance practices.
- Strengthen troubleshooting capabilities by identifying electrical faults and conducting systematic root cause analysis.
- Implement preventive, predictive, and reliability-centered maintenance strategies for high voltage equipment.
- Assess power quality, equipment condition, and opportunities for electrical system optimization.
- Align high voltage engineering practices with organizational objectives for safety, reliability, asset management, regulatory compliance, and operational excellence.

Who Should Attend

This course is designed for electrical engineers, power systems engineers, transmission and distribution engineers, substation engineers, maintenance engineers, operations engineers, protection engineers, reliability engineers, utility engineers, project engineers, commissioning engineers, electrical technicians, maintenance supervisors, operations supervisors, engineering technicians, maintenance planners, equipment inspectors, engineering consultants, and technical professionals responsible for high voltage electrical systems.

The program is equally valuable for engineering managers, maintenance managers, operations managers, plant managers, facility managers, project managers, asset management professionals, procurement engineers, HSE specialists, quality professionals, executive managers, technical advisors, and decision makers responsible for electrical infrastructure, industrial maintenance, operational reliability, engineering asset management, and energy efficiency.

Professionals working within government entities, ministries, public sector organizations, financial institutions managing engineering infrastructure, oil and gas companies, electric utility providers, transmission and distribution companies, power generation facilities, manufacturing plants, mining operations, transportation authorities, airports, marine industries, infrastructure developers, and multinational engineering organizations will benefit significantly from the practical engineering methodologies and internationally recognized high voltage engineering practices covered throughout the course.

Learning Outcomes

- By the end of this course, participants will be able to:
- Explain the principles, architecture, and industrial applications of high voltage electrical systems.
- Analyze high voltage transmission and distribution networks to evaluate system performance and reliability.
- Apply insulation coordination, grounding, and electrical protection principles to improve system safety.
- Interpret electrical drawings, single-line diagrams, protection schemes, and technical specifications.
- Diagnose electrical faults and perform systematic troubleshooting and root cause analysis for high voltage equipment.
- Develop preventive and predictive maintenance programs for transformers, switchgear, substations, and associated equipment.
- Perform high voltage testing, insulation assessment, and condition monitoring to evaluate equipment integrity.
- Assess the performance of transformers, circuit breakers, protection relays, power cables, surge arresters, and grounding systems.
- Apply engineering safety procedures during high voltage operation, testing, maintenance, switching, and commissioning activities.

- Support operational excellence through effective high voltage asset management, reliability improvement, and continuous performance optimization.

Course Outline

DAY 01

Fundamentals of High Voltage Engineering

- Principles of high voltage engineering and electrical power systems
- Electrical insulation and dielectric behavior
- High voltage transmission and distribution systems
- Electrical drawings, single-line diagrams, and technical documentation

PRACTICAL

Practical workshop on interpreting high voltage engineering drawings and equipment specifications

DAY 02

High Voltage Equipment and Protection Systems

- Power transformers and substation equipment
- Switchgear, circuit breakers, disconnectors, and isolators
- Protection relays, surge protection, and insulation coordination
- Grounding systems and lightning protection

PRACTICAL EXERCISE

Practical exercise on evaluating high voltage equipment performance and protection schemes

DAY 03

Operation, Maintenance, and High Voltage Testing

- Safe operation of high voltage systems
- Preventive, predictive, and reliability-centered maintenance strategies

DAY 03 — CONTINUED

- High voltage testing, insulation resistance testing, and condition assessment
- Condition monitoring and equipment integrity management

PRACTICAL

Practical workshop on maintenance planning and high voltage testing procedures

DAY 04

Fault Analysis, Safety, and Reliability Improvement

- High voltage fault diagnosis and root cause analysis
- Power quality assessment and electrical system reliability
- Electrical safety requirements, switching procedures, and Lockout/Tagout (LOTO)
- Risk assessment and operational safety management

PRACTICAL APPLICATION

Practical application involving fault investigation and reliability improvement planning

DAY 05

Advanced High Voltage Asset Management and Operational Excellence

- High voltage asset lifecycle management
- Regulatory compliance and engineering best practices
- Performance measurement and reliability key performance indicators
- Continuous improvement strategies for high voltage systems

FINAL WORKSHOP

Final workshop involving the development of a comprehensive High Voltage Engineering management plan integrating equipment testing, maintenance planning, fault analysis, condition monitoring, protection coordination, electrical safety, asset management, energy optimization, and continuous improvement to maximize system reliability, operational efficiency, and engineering excellence.



Register or Request More Information

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