

# € TRAINING

Power Plant Operations and Maintenance





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## Introduction:

This training program provides comprehensive instruction on the principles, components, and operation of steam turbines, gas turbines, and combined cycle power plants. Through theoretical knowledge this program equips individuals with the skills needed to effectively operate and maintain steam and gas turbine power plants, as well as combined cycle systems.

## Program Objectives:

At the end of this program, participants will be able to:

- Learn about components and subsystems of various types of gas turbines, steam power plants, and combined cycle plants.
- Examine the advantages, applications, performance, and economics of combined cycle plants.
- Study various equipment including compressors, turbines, governing systems, combustors, deaerators, feedwater heaters, transformers, generators, and auxiliaries.
- Discover maintenance practices to minimize operating costs and maximize efficiency, reliability, and longevity of gas turbines, steam power plants, combined cycles, and generators.
- Explore monitoring and control of environmental emissions, instrumentation, and control systems of gas turbines and combined cycles.
- Increase knowledge of predictive and preventive maintenance, reliability, and testing, and gain a thorough understanding of selection considerations and applications of steam power plants and combined-cycle plants.

## Targeted Audience:

- Chemical, Process and Mechanical Engineers.
- Product Engineers and Technologists.
- The operation, Technical Service and Maintenance Professionals.
- Engineers, Consultants, and Sales Professionals.
- Technical Professionals responsible for interdisciplinary energy projects.

## Program Outlines:

### Unit 1:

#### Steam Power Plants:

- Review of Thermodynamics Principles.
- Overview of Steam Power Plants, including Fire-Tube and Water-Tube Boilers.
- Understanding the Steam Drum, Superheaters, and Reheaters.
- Exploring Condensers and Feedwater Heaters.
- Analyzing Efficiency, Heat Rate, and Supercritical Plants.
- Evaluating the Economics of Steam Power Plants.

### Unit 2:

#### Steam Turbines and Auxiliaries:

- Differentiating Turbine Types and Compound Turbines.
- Examining Turbine Control Systems and Governing Systems.
- Maintaining Steam Turbines and Monitoring Power Station Performance.
- Understanding Steam Generators, Heat Exchangers, and Condensers.
- Exploring Turbine Protective Devices, Instrumentation, and Lubrication Systems.
- Addressing FAQs on Turbine-Generator Balancing, Vibration, Analysis, and Maintenance.

### Unit 3:

#### Gas Turbines & Compressors:

- Gas Turbine Fundamentals and Design.
- Overview of Gas Turbines and Calculations.
- Gas Turbine Compressors, Auxiliaries, and Performance.
- Centrifugal Compressors: Components, Balancing, and Surge Prevention Systems.
- Understanding Dynamic Compressors Performance and Seal Systems.
- Exploring Advanced Sealing Mechanisms and Magnetic Bearings.

## Unit 4:

### Combined Cycle Power Plants:

- Comparing Combined Cycle vs Simple Cycle Power Plants.
- Technology Overview and Economic Considerations for Combined Cycle Performance.
- Operation, Maintenance, and Technical Enhancements of Combined Cycle Plants.
- Latest Improvements in Combined Cycle Technology.

## Unit 5:

### Transformers & Generators:

- Fundamentals of Electric Systems and Machinery Principles.
- Transformers: Components, Maintenance, and Operation.
- Understanding Synchronous Generators and Excitation Systems.
- Exploring Generator Testing, Inspection, and Maintenance.