



Training Program:

Combined Cycle Gas Turbine's Performance

Introduction:

The addition of gas turbine-based combined cycle power plants to supply new generating capacity continues to play a major role in the power industry. This technology is being adopted by all key players in the power industry because it offers high thermal efficiency, low emissions, low installed cost, flexibility in fuel selection, low operation and maintenance cost, short installation time, and high operating flexibility. A successful approach to providing technical services and engineering support is to address the operational and maintenance aspects involving the integrated functioning of the two thermodynamic cycles in a combined cycle power plant. The staff must understand the interrelationships between the combined cycle plant components and systems to efficiently operate the plant.

The candidates will be able to explain the effect of operating parameters such as firing temperatures, compressor pressure ratios, ambient temperature and pressure conditions, turbine exhaust temperatures and their effect on gas turbine efficiency/power output, and the combined cycle efficiency/power output. This course goes through the overview of a combined cycle gas turbine; this will be followed by the different types of Gas Turbine. This is then expanded on to give a detailed understanding of the performance and management of the operations of a combined cycle gas turbine.

Who Should Attend?

Electrical Engineers, Power Generation Engineers, Power System Protection Engineers, Gas turbine newcomers and more experienced persons who desire an overview of the many available gas turbine technologies, Process Control Engineers & Personnel,

Electrical and Instrumentation Technicians & Design Engineers, Maintenance Technicians & Supervisors, Plant Operators & Technicians, Oil & Gas Industry Personnel

Course Objectives:

By the end of this course delegates will be able to:

- Obtain an understanding of the performance of a Combined Cycle Gas Turbine
- Identify the different types of Combined Cycle Gas Turbine, Gas Turbine Performance and Power Plant Operation

Course Outline

Combined Cycle GT Plant Overview

- Gas Turbine (Frame 9e, 13E2)
- Steam Turbine
- Boiler Components

Performance Theory

- Brayton Cycle
- Rankine Cycle
- Combined Cycle

Performance Terms and Definitions

- Units and Terminology, Conversion factors
- Power Output (Gross and Net)
- Heat Rate (Gross and Net)
- Energy inputs
- Efficiency
- System Losses

Correction Factors

- Test Reference conditions
- Pressure
- Temperature
- Humidity
- Power factor
- Altitude
- Pressure Drops
- Boiler steam flow
- Condenser vacuum
- Frequency

Gas Turbine Performance

- Test Procedure
- Instrumentation Required

- Performance Data Collection
- Performance Calculations
- Using Correction Factors

Steam Turbine & Boiler Performance

- Test Procedure
- Instrumentation Required
- Performance Calculations
- Supplementary Firing Considerations

CCGT Plant Performance

- Test Procedure
- Instrumentation Required
- Performance Data Collection
- Performance Calculations
- Overall Plant Efficiency
- Practical Examples of Performance Calculations

Performance Diagnostics

- Identifying lost performance
- Locating the cause
- Remedial action

Performance Improvement Methods

- Increase Mass Flow (steam, water injection)
- Chillers
- Increase Firing Temperature (Component Upgrade Options)
- Reducing Leakage and Improving Cooling

Accreditation:

BTS attendance certificate will be issued to all attendees completing a minimum of 80% of the total course duration.