

COMBINED CYCLE GAS TURBINE PERFORMANCE

Course Objectives

To obtain an understanding of the performance of a Combined Cycle Gas Turbine. This will include sections on the different types of Combined Cycle Gas Turbine, Gas Turbine Performance and Power Plant Operations.

Course Description

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

This course would benefit Engineers and Supervisors.

Pre-Requisites

All Attendees should have a sound power generation background.

Course Outcome

At the end of this course you will be able to understand:

Combined Cycle Gas Turbine
Gas Turbine Performance and Power Plant Operations.

Combined Cycle Power Plant Course Outline

Day 1 – Course Introduction

Introduction

Combined Cycle GT Plant Overview

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

Performance Theory

Brayton Cycle
Rankine Cycle
Combined Cycle

Day 2 – Performance Terms and Definitions

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

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Day 3 – Gas Turbine Performance

Gas Turbine Performance

- Test Procedure
- Instrumentation Required
- Performance Data Collection
- Performance Calculations
- Practical Examples of Performance Calculations
- Using Correction Factors

Steam Turbine & Boiler Performance

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

Day 4 – CCGT Plant Performance

CCGT Plant Performance

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

Day 5- Power Plant Operations

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

Course Assessment and Evaluation