

# COMBINED CYCLE GAS TURBINE PERFORMANCE (REF:OTSCCGT001)

## 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

