Best Technology Soultions **(BTS)**

Training Program

Combined Cycle Gas Turbine Performance

Training program

Introduction:

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.

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.

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

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