



Training Program:

Combined Cycle Turbine Generator Fundamentals

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Introduction:

Reliability and availability of combined cycle power plants can be a matter of skilled routine operations and maintenance activities. These skilled routine operations and maintenance personnel begin their quest with a thorough understanding of combined cycle fundamentals. Understanding of the interaction of major components is required. Furthermore, understanding the operating needs of the individual components may be crucial to satisfactory operation of the machine.

Topical Outline includes: Thermodynamic principles as they apply to a combined cycle power plant, Descriptions of types of combustion turbines, Application, Major Gas Path Components, Major Auxiliary Systems, Starting Systems, Combustion Turbine Controls Overview, Generator Principles of Operation, Generator Components, HRSG, Steam Turbine Fundamentals, and the Condenser. This course is intended for individuals who are new to combined cycle operation for power generation. It also provides an excellent refresher for persons that have been involved with combined cycle equipment and generators, but have not received any formal training.

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:

- Describe the thermodynamic principles associated with the combustion turbine
- Describe the basic cycles used for different types of combustion engines
- List the major components of any combustion turbine and describe their function.
- Discuss the various ways in which efficiency of a combustion turbine can be changed
- Describe the flow through the combustion turbine including any extraction points
- Identify and state the function of a given CT auxiliary system and describe its operation
- Describe the effects that humidity, ambient temperature, compressor ratio, firing temperature, exhaust temperature, and exhaust pressure have on combustion turbine performance
- Describe the ability to determine combustion turbine output and heat rate
- Describe those thermodynamic principles associated with a combined cycle power plant
- Describe the construction and operation of Steam Turbines
- Describe the construction and operation of Heat Recovery Steam Generators
- Describe the construction and operation of Generators
- Describe the major systems associated with Gas (Combustion) Turbine, Steam Turbines and Generators
- Describe the sequencing that occurs in a normal startup, synchronization and operation

- Describe the different fuel systems and requirements for operation
- Describe the components in the Condensate System

Course Outline

Thermodynamic Principles

- Energy
- Energy Conversion
- Heat Transfer
- Combustion Theory

Combustion Turbine Fundamentals

- Design Considerations
- Classifications of Combustion Turbines
- Characteristics of Combustion Turbines
- Advanced Combustion
- Turbine Designs

Combustion Turbine Components

- Turbine Main Components
- Combustion Section
- Turbine Section
- Exhaust Section

- Gears and Couplings
- Turbine Base and Supports
- Unit Enclosures

Combustion Turbine Support Systems

- Electrical System
- Inlet and Exhaust System
- Starting Systems
- Fuel and Fuel Treatment Systems
- Lubricating Oil Systems
- Cooling
- Water/Air Systems
- Water Wash Systems
- Fire Protection Systems

Turbine Controls Overview & Generator

- Generator Major Components
- AC Power Generation
- Generator Auxiliary
- Systems

Steam Thermodynamic Principles

- Energy

- Laws of Thermodynamics
- Water & Steam
- Heat Transfers

Introduction to Combined Cycle Power Generation

- Combined Cycle Fundamental
- Theory and Operation
- Cycle Parameters and The Impact Upon Performance
- Benefits of Combined Cycle
- Fuels

Heat Recovery Steam Generators

- Overview
- Function
- Principle
- Flow Path
- Major Components

Steam Turbine

- Turbine Principles
- Turbine Components
- Steam Turbine Auxiliary Systems
- Turbine Supervisory Instruments

- Starting and Loading Instructions
- Turbine Controls

Condensate System

- Condensers
- Feedwater Heaters
- Cooling Towers

Accreditation:

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