

# GAS TURBINE AND COMPRESSOR OPERATION, MAINTENANCE AND TROUBLESHOOTING

# **COURSE OUTLINE 2020**

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# TRAINING TITLE

GAS TURBINE AND COMPRESSOR OPERATION, MAINTENANCE AND TROUBLESHOOTING

### <u>VENUE</u>

Dubai, UAE

### DURATION

5 Days

# DATES

15 - 19 March 2020

#### PRICE

US\$4,000 per attendee including training material/handouts, morning/afternoon coffee breaks and Lunch buffet daily.

# TRAINING INTRODUCTION

Gas Turbine Training classes provide technical information for those people who maintain the gas turbine engines. The goal of each training program is to build confidence based on knowledge and understanding. Engine System Familiarization and Maintenance Procedures are key focal points of each program. This training is built on a foundation that will enable the student to understand:

- Engine Nomenclature & Functions
- Engine Systems Operation
- Gas Turbine Principles and Theory
- Troubleshooting Techniques Through Class Discussions
- Maintenance and Preventative Maintenance
- Inspection technique

# TRAINING OBJECTIVES

The objective of this course is to give participants an understanding of basic gas turbine operations and construction as well as a fundamental knowledge of proper operation, control and protection of the turbine and its accessory systems.

Emphasis is placed on the following areas:

• Basic gas turbine operating cycle

- Overview of gas turbine major components and equipment arrangements and how these relate to overall operation and performance
- Fundamentals of gas turbine control and protection: start-up, speed, load, shutdown and temperature
- Operating parameters and control / protection features of the various turbine support systems such as the lubricating oil, hydraulic, variable inlet guide vanes, starting means and fuels
- Operating factors and considerations that affect maintenance intervals

#### TRAINING AUDIENCE

Operators, engineers, technicians, and administrative personnel of operating facilities as well those who may work in affiliated industries, who wish to gain an understanding of the day-to-day operation of heavy duty gas turbines.

#### COURSE OUTLINE

• An overview of gas turbine Gas turbine cycle

Performance

Design consideration

Major components

Environmental effect

Theoretical and actual cycle analysis

Brayton cycle

Combined cycle

• Compressor and turbine performance characteristics Performance characteristic

#### Aerothermal equations

- Performance and mechanical standards Major variables for gas turbine application
- Rotor dynamics

- Major Components

• Centrifugal compressors Components

Performance

Surge

Process

• Axial flow compressors Blade and cascade

Airfoil theory

Compressor stall

Performance characteristics

• Radial- inflow turbines Description theory

Performance of a radial –inflow turbine

• Axial- flow turbines Turbine geometry

Impulse turbine

**Reaction turbine** 

Turbine blade cooling

Cooled turbine Aerodynamic

Turbine looses

Combustors

Combustion terms

Combustion chamber design

Fuel atomization and ignition

Typical combustor arrangement

Air pollution problems

- Materials, fuel technology and fuel systems
- Materials

General metallurgical behaviours in gas turbine

Gas turbine material

Compressor blades

Forging and non-destructive Testing

Coating

Fuels
Fuel specifications
Fuel properties
Fuel treatments
Heavy fuel
Cleaning of turbine components
Fuel economic
Heat tracing of piping system

Storage of liquids

- Auxiliary components and Accessories

Bearings
 Bearing design principles
 Tilting pad journal bearing
 Bearing materials
 Bearing and shaft instabilities
 Thrust bearing
 Thrust bearing power loss

Seals
 Noncontact seals

Mechanical face seals

Mechanical seal selection and application

Seal systems

Associated oil system

Dry gas seals

• Gears

Gear types

Factors affecting gear design

Installation and initial operation

- Installation, operation and maintenance

• Lubrication

Basic oil system

Lubrication selection

Oil sampling and testing

Contamination and filter selection

Cleaning and flushing

Lubrication management

• Spectrum analysis Vibration sensors

Vibration measurements

Vibration analysis

• Balancing Rotor imbalance

**Balancing procedures** 

Application of balancing techniques

**Balancing machine** 

Coupling and alignment
 Gear coupling

Metal diaphragm coupling

Metal disc coupling

Shaft misalignment and correction

• Control system and instrumentation Control system

Condition monitoring system

Implementation of condition monitoring

Life cycle cost

Temperature measurements

Pressure measurements

Vibration measurements

Failure diagnostics

Mechanical [problem diagnostics

• Maintenance techniques Philosophy of maintenance

Training of personnel

Tools and shop equipments

Machine cleaning

Hot section maintenance

Compressor maintenance

Bearing maintenance

Coupling maintenance

Repair and rehabilitation of turbomachinery

Foundation

Typical problem encountered in gas turbine

#### TRAINING CERTIFICATE

**MAESTRO CONSULTANTS** Certificate of Completion for delegates who attend and complete the training course

#### **METHODOLOGY**

Our courses are highly interactive, typically taking a case study approach that we have found to be an effective method of fostering discussions and transferring knowledge. Participants will learn by active participation during the program through the use of individual exercises, questionnaires, team exercises, training videos and discussions of "real life" issues in their organizations. The material has been designed to enable delegates to apply all of the material with immediate effect back in the workplace.