



MAESTRO
CONSULTANTS

**CENTRIFUGAL
COMPRESSORS
MAINTENANCE
&
FAILURE ANALYSIS**

COURSE OUTLINE 2020

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TRAINING TITLE

CENTRIFUGAL COMPRESSORS MAINTENANCE & FAILURE ANALYSIS

VENUE

Dubai, UAE

DURATION

5 Days

DATES

06 - 10 December 2020

PRICE

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

TRAINING INTRODUCTION

Compressors are common in almost all industrial systems and applications. Compressors represent a significant part of capital and operating costs on most plants.

Gas turbine is a major power source used in the generation of electricity, and the driver of choice for modern aircraft, pumps, compressorsetc. This training course covers main topics of operation and maintenance of gas compressor and turbines and associated support systems. In addition, the course develops a background in gas turbine operation that enables participants to analyze operating problems properly and take the necessary corrective action. The course combines between the basic and practical considerations related to centrifugal compressors. The use of gas turbines in the petrochemical, power generation and offshore industries has increased considerably during the past few years.

The course will cover the design, installation, operation and maintenance of these machines by highlighting characteristics features, efficiencies, reliability and maintenance implications. Upon completion of this course, participants will gain a complete and up-to-date overview of the Gas Turbine technology.

A Vibration- Monitoring system gives warnings when vibration levels reach a preset level, and hence provides a round- the - clock watch on vital machinery. The training course aims to provide a treatment of the detection and diagnosis of faults in rotating equipment using vibration measurement and analysis

TRAINING OBJECTIVES

The course will cover the construction, operation and maintenance of these machines by highlighting characteristics features, efficiencies, reliability and maintenance implications.

Upon completion of this course, participants will gain a complete and up-to-date overview of the centrifugal compressor and Gas Turbine technology and be familiar with all operation and maintenance requirements.

- Learn the principles of the centrifugal compressors and gas turbine.
- Familiarize the participants with various types of centrifugal compressor & gas turbine.
- Understand the operation principles of the centrifugal compressor and gas turbine.
- Learn the maintenance procedure of the centrifugal compressor and gas turbine.
- Discuss the troubleshooting and failure analysis of the centrifugal compressor and gas turbine.

TRAINING AUDIENCE

Turbine & compressor maintenance engineers of relatively short experience and senior technicians of medium experience who have the ability to improve & develop their capabilities. Members of the following departments: Engineering, Planning, Procurement, Operation, Maintenance or Inspection and those who are engaged in or intend to be familiar with compressor systems. Also, senior staff should update and refresh their knowledge by attending this course.

TRAINING OUTLINE

Day 1

Introduction.

What is a compressor?

Compressor terminology

Compressor classification

(Centrifugal – axial – reciprocating –helical- screw, ranges of application)

Compressor finite-life parts (bearings-mechanical seals-couplings.....)

Compressor Drivers

- Overview of maintenance function and objectives.
- Maintenance job standards.
- Maintenance types & strategies.
- Common problems associated in the rotating equipment in general.

PRINCIPLES OF CENTRIFUGAL COMPRESSORS

- Theoretical H-Q curve.
- Theoretical Power-Q curve.
- Performance curves.
- Centrifugal compressor classification
- Basic components and their function
- The effect of outlet blade angle
- Function of the diffuser.

Day 2

CENTRIFUGAL COMPRESSOR OPERATION

- Compressor start-up and shut down.
- Speed limits.
- Required speed calculations
- System Resistance
- Inlet conditions Effects
- Parallel and series operation.

CENTRIFUGAL COMPRESSOR MAINTENANCE

- Maintenance strategies
- Lubrication Systems
- Inlet Filtration
- Sealing Systems
- Shaft Deflection
- Rotor Balancing
- Shaft Alignment

CENTRIFUGAL COMPRESSOR TROUBLESHOOTING AND FAILURE ANALYSIS

- Troubleshooting procedure
- Site inspection
- Monitoring systems
- Surge line and stonewall.
- Anti-surge control system
- Excessive vibration
- Check list of compressor problems

Predictive maintenance program

- a) Building a system
 - a) Equipment data
 - b) Failure data
 - c) Maintenance data
 - d) Data format
- b) Failure and maintenance notations
- c) Failure descriptors
- d) Failure causes
- e) Method of detection
- f) Maintenance activity

Data requirements for various applications

Day 3

OVERVIEW OF GAS TURBINES:

- Industrial heavy duty gas turbines
- gas turbine theory and systems
- Major gas turbines components
- Applications

PRINCIPLES OF GAS TURBINE

- Gas Turbine Components (Compressor-Turbine-Combustor-Ancillary & Auxiliary Systems)

Gas Turbine Components:

- Axial-flow compressor
- Radial-inflow turbines
- Combustors, construction types
- Igniters
- Hot path components

- Firing concept and emission control
- Fuel nozzles
- Air standard cycles and other famous cycles.
- Turbine performance characteristics.
- Main requirements of a gas turbine engine.

GAS TURBINE OPERATIONS

- Pre Start Checks
- Starting Sequence
- Loading/Unloading Operations
- Shutdown Sequence

Day 4

GAS TURBINE CHECKS

- Inlet filter
- Lubricating oil
- Hydraulic and control oil
- Cooling water
- Cooling and sealing air
- Fuel system(s)
- Starting means
- Heating and ventilation
- Fire protection

Materials of Construction:

- General metallurgical behavior
- Gas turbine blade materials
- Turbine wheel alloys
- Corrosion problem

Day 5

Turbine Maintenance.

- GT operating principles, components and characteristics.
- Turbine operating checks & Performance monitoring.
- Shaft, bearings and seals maintenance.
- Blades and nozzles maintenance.

- Shaft sealing system.
- Hydraulic and pneumatic systems maintenance.
- Cooling water system and water injection system maintenance.
- Starting system maintenance.
- Ducting and valves maintenance.
- Turbine troubleshooting, testing and reinstallation.

Vibration analysis

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.