

Steam Turbines and Centrifugal Compressors: Operations, Maintenance and Troubleshooting

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Steam Turbines and Centrifugal Compressors: Operations, Maintenance and Troubleshooting

Overview

The course is devoted to design features, efficiencies, operating characteristics, reliability and maintenance implications of centrifugal compressors and steam turbine drivers. This training course is intended to familiarise engineers, technicians and operators with the guidelines and best practices employed in utilising this equipment, including design, operation, maintenance, and repair. The emphasis in the training course will be on the physical understanding of the problems in operation and the best way of troubleshooting them.

Course Objectives

- Understand the technical features of centrifugal compressors and steam turbines.
- Select the optimal type and size of equipment for a given industrial application.
- Utilise methods to estimate the degree of deterioration and inefficiency of equipment.
- Apply best practices and techniques to pinpoint the root cause of problems.
- Choose the most efficient remedies and troubleshooting techniques in operation.

Course Content

1. Gas Thermodynamics

- Gas Properties and Laws
- Centrifugal Compressor Aerodynamics - Thermodynamics
- Changes in Gas Velocity and Pressure in a Centrifugal Compressor
- Mass and Volume Flow Rate as a Function of Pressure, Temperature and Gas Composition
- Molecular Weight of Gas and Its Effect on Performance
- Discharge Temperature, Power Absorbed as a Function of the Gas Composition and the Operating Conditions
- Investigating and Controlling Surge and Choke



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Course Content

2. Centrifugal Compressors – Design – Operation

- Overview of the Main Features of Various Types of Compressors
- Classification of Compressors based on Design and Application
- World Standards and Codes related to Compressor Design
- Main Elements of Centrifugal Compressor Construction
- Analysis of Centrifugal Compressor Efficiency
- Guidelines for Trouble-free Centrifugal Compressor Operation

3. Steam Thermodynamics

- Steam Properties and the Mollier Charts
- The Rankine Cycle
- Steam Requirement per KWH Production
- Ultra-supercritical Conditions

4. Steam Turbines – Design -Operation

- Actuation Systems and Forces
- Main Elements and Technical Characteristics of Steam Turbine Design
- The Rotating and Stationary Blades
- The Internal and External Seals
- Radial and Thrust Journal Bearings
- Stop – Control – Non-Return Turbine Valves
- Turbine Controls and Interlocks

5. Maintenance of Rotating Machines

- Machines, Pipin,g and Ground Regulations
- Alignment of Thermal Machines
- Balancing of Rotating Machines
- Surface Treatments of Sealing Interfaces
- Online Washing
- Troubleshooting through Vibration Analysis, Oil Analysis and Thermography



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Targeted Audience

- **Process and Mechanical Engineers**
- **Product Engineers and Technologists**
- **The operation, Technical Service and Maintenance Professionals**
- **Engineers and Consultants**

Course Methodology

Facilitated by an experienced professional trainer, this training course will be conducted as a highly interactive workshop session. A variety of training methodologies and facilitation techniques will be employed before and during the course, as applicable. These methods are aimed at enhancing individual and group interaction while maximising learning. Some of these methods are:

- **Online Pre-post Test**
- **Colourful Visual Aids**
- **Gamification**
- **Self-Assessment Instruments**
- **Simulations**
- **Case Studies**
- **Videos**
- **Group Exercises & Discussions**
- **Role-plays**
- **Indoor & Outdoor games**

