

Course Name: **Compressors and Turbines**

Code:

DATE:

Course Objective:

This training course will highlight:

- Principles of selection of right pump, compressor, and turbine for the given application
- Practical issues related to trouble-free functioning of pumps, compressors, and turbines
- Explanation of complex flow situations in pumps, compressors, and turbines
- Guidelines for installation, operation, maintenance, and troubleshooting
- Maintenance and repair economic issues: cost and benefit analysis

By the end of this training seminar, participants will be able to:

- Understand technical features of pumps, compressors and turbines
- Select optimal type and size of equipment for a given industrial application
- Use methods of estimating the degree of deterioration and inefficiency of equipment
- Apply best practices and techniques of pinpointing the root cause of problems
- Choose the most efficient remedies and troubleshooting techniques in operation

Who Should attend?

- Chemical, Process and Mechanical Engineers
- Product Engineers and Technologists
- Operation, Technical Service and Maintenance Professionals
- Engineers, Consultants and Sales Professionals
- Technical Professionals responsible for interdisciplinary energy projects

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Course Outline:

DAY 1

Pumps

• Centrifugal Pumps

- - Theory of Operation
 - Types of Pumps Types and Classifications
 - API Standard Pumps Design
 - Selection and Sizing of Centrifugal Pump
 - Main Elements and its functions of Centrifugal Pump
 - Centrifugal Pump Installation Requirements
 - Pump Performance Curve & Head Loss
 - Pump Cavitation, NPSH and Water Hammering
 - Multistage Pumps and Operation Arrangement Requirement
 - Pump Failure Analysis

• Positive Displacement Pumps

- Positive Displacement Pumps PDP: Reciprocating and Rotary
- Reciprocating Pump Components Function
- PDP Pumps Application Requirements
- Rotary Pumps Types and Applications
- Guidelines for Pump Installation and Operation
- Pump Inspection, Control, and Performance Testing
- PDP Troubleshooting

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DAY 2

Centrifugal Compressors

- Gas Laws and Theory of Operation
- Characteristics of Centrifugal and Axial Flow Compressor
- Overview of the Main Features of Various Types of Compressors
- Main Components and its Function
- Analysis and performance characteristics of Centrifugal Compressor Efficiency
- Surging, choking, bleed valves, variable stator vanes, inlet guide vanes
- Troubleshooting and Failure Modes
- Guidelines for Trouble-free Centrifugal Compressor Operation

DAY 3

Positive Displacement Compressors

- Positive Displacement Compressors: Reciprocating and Rotary
- Piston and Diaphragm Compressors
- Rotary compressors, rotary screw compressor, lobe type air compressor, sliding vane compressors, liquid ring compressors
- Essential Criteria for Selecting the Compressor
- Compressor Capacity: Loadings and Speeds
- Compressor Safety Control Noise Control and Protection
- Guidelines for Compressor Installation and Operation
- Compressor inspection, maintenance, control, performance testing, and troubleshooting

DAY 4

Industrial Gas Turbines

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- Gas Turbine Sections and Components
- Types and Classification of Gas Turbines: (Radial and Axial-flow- impulse / reaction)
- Combustor Performance
 - Types of Fuels
 - Combustion
 - Pollution Control
- Gas Turbines: starting system, exhaust system, cooling, and control system
- Condition Monitoring: Mechanical Vibrations - Monitoring, Measurements, Diagnostics, and Analysis
- Turbine Inspection
 - Combustion Inspection
 - Hot Gas Path inspection
 - Borescope Inspections Troubleshooting of Gas Turbines

DAY 5

Rotating Equipment

- **Auxiliary System**
 - Lubrication System
 - Rotating Equipment Bearings
 - Rotating Equipment Different type of Seals
 - Different Design for Cooling System
 - Control and Protection System
 - Hydraulic Balancing Devices, Balancing Drums and Balancing Disks
 - Filtration System
 - Variable Speed Drive
- **Maintenance**
 - Coupling and Alignment

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- Balancing
- Vibration Analysis
- Condition Monitoring

Course Duration: (5) Day

Venue:

Time:

Numbers of hours: Hours

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