

# Mechanical Engineering for Rotating Equipment

## INTRODUCTION

- Pumps, compressors, motors, steam, and gas turbines represent major capital investment in any Oil / Gas Production operation. Selection of proper equipment with the application of effective control and condition monitoring methods would reduce their down time thus, save organization huge maintenance and operation costs. Regular monitoring and inspection techniques can help in providing basis for estimating the health of the existing components of the equipment as well as the overall risk assessment.
- The design, working principles, control and proper operation for rotating machinery will be covered in detail during the course. The most up-to-date methods of rotating equipment protection methods will be presented together with maintenance activities, including necessary procedure to prevent from failures. This Mechanical Engineering for Rotating Equipment training course will also cover modern maintenance strategies.
- This training course will include several workshops with real problems from industrial practice which will enable discussions and exchange of experiences.

This training course will feature:

- Types of rotating equipment used for oil and gas industry.
- Motors: design, operation, common failures, and maintenance methods
- Pumps: design, operation, common failures, and maintenance methods
- Compressors: design, operation, common failures, and maintenance methods
- Steam Turbines: design, operation, common failures, and maintenance methods
- Gas Turbines: design, operation, common failures, and maintenance methods
- Rotating equipment energy consumption optimisation methods

## OBJECTIVES

At the end of this course, you will learn to:

- Apply industry inspection standards and best practices at your organization
- Optimize design and operation methods for your rotating equipment
- Apply diagnostics and inspection procedures to the rotating equipment
- Analyze results of condition monitoring and vibration control of rotating equipment
- Plan and manage activities related to maintenance and repair of rotating equipment

## TRAINING METHODOLOGY

- This Mechanical Engineering for Rotating Equipment training course will be conducted along workshop principles with formal lectures and interactive worked examples included in several workshops. Presented also will be several illustrative and instructive videos. The emphasis in this training course will be on the explanation of all technical points and providing answers to problems that are encountered in everyday industrial practice related to operation and maintenance, as well as repair and alterations of rotating equipment.
- Each learning point will be reinforced with practical examples. There will be ample opportunities for active discussion and sharing professional experiences and exchange that will help solidify the gained knowledge. All training course materials will be provided.

## ORGANISATIONAL IMPACT

Proper design and construction of new plant with appropriate specification would result in significant measurable improvements in process plant systems including improved plant integrity, reliability and availability with fewer failures that leading to:

- Better design and operation of plants
- Increased rotating equipment reliability
- Optimized rotating equipment availability
- Improved plant profitability
- Reduce plant maintenance costs

## PERSONAL IMPACT

Delegates will enhance their competencies in the following areas:

- Oil & Gas Process plant design
- Knowledge of rotating equipment design and operation
- Commissioning, inspection & testing
- Knowledge of International Codes for rotating equipment
- Management of reliability as applied to process plant

## WHO SHOULD ATTEND?

This course is suitable to a wide range of professionals but will greatly benefit:

- Operation, technical service and maintenance professionals
- Technical professionals responsible for maintenance and repair of equipment
- Professionals involved in inspection and maintenance and repair
- Technical professionals dealing with risk assessment and integrity analysis
- Technicians dealing with regulating and metering and other measurements

## Course Outline

### Motors: Operation and Technical Characteristics

- Operation Principles of Motors
- Motor Characteristics: Torque Power Curves
- Power Consumption of Motors
- Motors International Standards
- Common Failure Modes

### Pumps: Design, Operation and Monitoring Methods

- Pump Types, Positive Displacement and Dynamic
- Pump curves and Pump Selection
- Pumping system optimisation
- Energy saving opportunities for pumps

### Compressors: Design, Operation and Monitoring Methods

- Types of Compressors
- Compressor Performance Curves
- Surge and Stonewall on Compressors
- Effects of Speed and Gas Composition

### Steam Turbines: Design, Operation and Monitoring Methods

- Fundamentals of Steam
- Design and Operation of Steam Turbines
- Boiler Types and Characteristics
- Performance of Steam Turbines

### Gas Turbines: Design, Operation and Monitoring Methods

- Design and Operation of Gas Turbines
- Gas Turbine Characteristics