

# Mechanical Engineering for Static Equipment

## INTRODUCTION

- Pressure vessels, boilers, valves, storage tanks, and piping systems together represent major capital investment in any Oil / Gas Production Plants. Good fabrication of these components, based on rigorous material selection is likely to provide long service life of equipment. Material degradation and aging requires application of adequate diagnostic techniques and continuous monitoring. 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 delegates will be covering design, inspection and testing methods of storage tanks and piping systems according to the relevant API standards in order to perform the fitness for service (FFS) analysis. The most up-to-date methods of equipment protection methodologies will be presented together with maintenance activities, including necessary repairs as prevention of failures. This training course will also cover methodology of the risk assessment and management regarding the overall equipment integrity.
- This Mechanical Engineering for Static Equipment 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:

- Material used for manufacturing of static equipment
- Operation and maintenance of pressure vessels, Tanks, and pipelines
- Design and operation of boilers and Valves
- Heat exchangers: Operation and evaluation methods
- Diagnostics methods including inspection procedures
- Equipment maintenance best practices
- Repair and revitalization technologies

## OBJECTIVES

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

- Follow the requirements of industry inspection standards and practices
- Identify elements of safety of pressure vessels, storage tanks and pipelines
- Apply diagnostics and inspection procedures to pressure equipment
- Analyze results of condition monitoring and corrosion tests of static equipment
- Plan and manage activities related to maintenance and repair

## TRAINING METHODOLOGY

- This Mechanical Engineering for Static 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 static 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 seminar 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:

- Improved plant integrity
- Improved equipment reliability
- Improved equipment availability
- Better safety record
- Improved plant profitability
- Improved plant integration and operation

## PERSONAL IMPACT

- Oil & Gas Process plant design
- Knowledge of static plant construction and design
- Commissioning, inspection & testing
- Knowledge of the requirements and application of relevant sections of the ASME Boiler and Pressure Vessel Code and B31 Piping Codes
- 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

### Materials Engineering for Static Equipment

- Engineering Material Properties and Selection
- Materials Testing and Types of Metals
- Materials Failure Mechanisms
- Mechanical Design, Standards and Codes

### Pressure Vessels, Tanks and Piping Systems

- Pressure Vessels and Steam Boilers
- Above Ground Storage Tanks: Operation & Safety
- Pipelines & Piping Systems: Operation & Safety
- Pressure Relief Valves: Selection & Sizing
- Storage Tanks: External & Internal Maintenance Techniques
- Cathodic Protection of Pipelines and Storage Tanks

### Heat Exchanger: Types and Design Criteria

- Fundamentals and Types of Heat Exchangers
- Tube and Shell Heat Exchanger Design Methods
- Plate Heat Exchangers
- Performance Determination of Heat Exchangers

### Boilers and Valves: Design and Fundamentals of Operation

- Design and Operation of Boilers
- Operation and Control Methods
- Types of Valves
- Inspection Techniques for Boilers and Valves

## Inspection, Monitoring & Maintenance Engineering

- Risk Management & Mitigation Technologies: ALARP Criteria
- Risk Based Inspection (RBI API 580) For Stationary Pressure Equipment (NDT)
- Pipeline Internal and External Corrosion Direct Assessment (ICDA & ECFA) Methods

