



Safety In Oil & Gas Process Equipment Design & Operation



Introduction:

In all steps of designing of pressure equipment related to hydrocarbons and chemical processing and applied in Oil & Gas, Chemical and Process industries, the process safety comes on the top of the list of all considerations. The safety remains to be of utmost importance during operation and maintenance and has to be verified with various methodologies.

This course provides an overview of important elements of process safety as they are often encountered in today's industrial practice. The emphasis is on engineering design aspects of Process Safety Management and it will highlight the safeguarding aspects of processing equipment inside the plant. Techniques for analyzing and mitigating process safety hazards applicable to Oil & Gas processing will be reviewed. Integration of the concepts required to achieve an optimum approach to Process Safety Engineering is the main goal of this course. Exercises and useful examples will be utilized throughout the course to emphasize the key learning points.

The course will feature:

- Methods for process hazards analysis: HAZOP, LOPA, FMEA

- Detection and prevention methods for fire and explosion accidents
- Importance of the concept of inherently safer design
- Design principles based on standards for safe operation of process equipment
- Selection and sizing of safety valves and pressure relief systems
- Plant equipment inspection (NDT) and maintenance procedures

Who Should Attend?

Reliability Engineers, Maintenance Managers, Engineers & Planners, Reliability and Maintenance Engineers, Facilities and Utilities Managers, Design Engineers, Top Level Maintenance Technicians, OE Champions, Predictive and Preventive Maintenance, Technicians & Supervisors, Planners, Maintenance Supervisors, Crafts and Tradesmen, Operations Supervisors, Process Engineers, Inspectors and Inspection Supervisors, Equipment Engineers Team Leaders and Professionals in Maintenance, Engineering and Production, Maintenance managers, reliability and maintenance Engineers, Production Managers, Plant Engineers, Design Engineers, Reliability Engineers and Technicians, Operators, Safety Engineers, Risk Engineers, Safety Engineers and anyone who is involved in Reliability Engineering strategies or methodologies to include design engineers for capital projects engineers, Foreman and Technicians, Mechanical, Electrical and Operational Personnel, Personnel designated as Planners, Key leaders from each maintenance craft, Key operations personnel, Technical professionals responsible for maintenance and repair of equipment, Professionals involved in inspection and maintenance and repair, professionals involved in asset & maintenance management auditing, Quality & Compliance Managers, Lead Auditors & Audit Team Members, Process Controllers, Maintenance Supervisors, Maintenance Planners, Predictive Maintenance Technicians & Supervisors, Materials Management Managers and Supervisors, Service Company Representatives, Asset owners & Asset Managers

Course Objectives:

By the end of this course delegates will be able to:

- Identify hazards associated with process fluids regarding impact on material degradation
- Follow code requirements for sizing relief valves to handle relief streams

- Understand different aspects of process design that influence process safety
- Appreciate “inherently safer design” for the entire process plant operation
- Evaluate mechanical integrity of process equipment
- Operate emergency de-pressuring systems (EDP) in case of fire and gas explosions

Course Outline:

Overview of Safety in Process Design

- Definition of Safety in Process Design
- Overview of Historical Incidents and Problem Areas
- Components of Process Safety: People, Plant, Process
- Risk Identification and Safety Analysis
- Process Hazard Analysis: HAZOP, LOPA, FMEA
- Hazards Associated with Specific Plant Systems
- Elimination of Hazards through Process Design
- Prevention of Human Error through Process Control and Monitoring

Inherently Safer Design

- Inherently Safer Design Methodology
- Pre-Design and Design Phases
- Materials of Construction and Optimized Fabrication
- Hazard Associated with Process Fluids and Chemical Reactions
- Corrosion, Erosion and Material Degradation
- Leakage and Loss of Primary Containment
- Dispersion of Hydrocarbon Release
- Flammability of Chemicals

Safety of Process Equipment

- Hazard Associated with Process Equipment

- Safety Considerations in Reactor Design
- Design Procedure for Safety of Pressure Vessels, Storage Tanks, Reactors, Heat Exchangers
- Venting of Tanks and Vessels: Codes, Standards and Best Practices
- Piping System Design and Safety
- Design of Piping System Accessories: Valves, Fittings, Supports
- Assessment of Material Degradation during In-Life Cycle: Fitness for Service
- Monitoring, Testing and Inspection (NDT)

Design of Pressure Relief Systems

- Design of Safety Valves
- Operation of Pressure Relief System
- Calculation and Sizing of Relief Loads of Pressure Relief Systems
- Pressure Relief Valves vs. Rupture Discs
- Codes, Standards and Best Practices
- Specifics of Pressure Relief Systems for Pumps, Compressors, Turbines
- Process Plant Disposal Systems
- Disposal Hazards, Risk Assessment and Environmental Factors

Process Monitoring and Control

- Safety Instrumented Systems
- Process Plant Monitoring and Control System: SCADA
- Emergency De-pressuring Systems (EDP)
- Prevention of Fire and Gas or Dust Explosions
- Safety Consideration in Plant Layout and Equipment Spacing
- Management of Change and Integrity Operation Window
- Plant Equipment Inspection and Maintenance Procedures