

# Safety in Process Design

## INTRODUCTION

- This highly interactive training course will help you to learn about the modern approach in process design in oil and gas and Process industries, often called “Inherently Safer Design”. By applying this approach hazards are identified and the risks in operation are reduced through systematic risk assessment.
- This training course will provide important principles of process design in the framework of Process Safety Management. The course will include several workshops with case studies and worked examples that will serve as interactive exchange of ideas and will enhance knowledge and experiences of all participants.

Participants attending this training course will develop the following competencies:

- Design based on standards for safe operation of process equipment
- Selection and sizing of safety valves and pressure relief systems
- Proficiency in process hazards analysis: HAZOP, LOPA, FMEA
- Ability to detect and prevent catastrophic accidents
- Inspection of vital process equipment

## PROGRAMME OBJECTIVES

This training course aims to enable participants to achieve the following objectives:

- Role of Safety in Process Design
- “Inherently safer design” incorporated in Process Design
- Mechanical integrity and fitness for service (FFS) of process equipment
- Risks associated with process fluids and material degradation
- Code requirements for sizing pressure relief valves
- Emergency De-Pressuring Systems (EDP) in case of fire and explosion

## TRAINING METHODOLOGY

- The course will be conducted along workshop principles with formal lectures and interactive examples, which will result in the active participation of all delegates in discussions and teamwork. Real life examples will be selected to illustrate the efficient operation and potential technical failures as well as their root causes. There will be ample opportunities for active, open discussion and sharing professional experiences on various safety issues.

## PROGRAMME SUMMARY

- The course covers essential skills such as hazard identification and risk mitigation that is incorporated in the modern approach in the Safety in Process Design which is developed and accepted as Inherently Safer Design. This will allow you to develop other aspects Safety that are necessary for efficient operation of process equipment in modern industrial organization.

## PROGRAM OUTLINE

### Overview of Safety in Process Design

- Principles of Safety in Process Design: Overview of Incidents
- Components of Process Safety: People, Plant, Process
- Prevention of Human Error through Process Control
- Risk Identification and Safety Analysis
- Process Hazard Analysis: HAZOP, LOPA, FMEA
- Elimination of Hazards through Process Design
- Workshop: Case Studies, Problems and Solutions

### 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
- Leakage and Loss of Primary Containment
- Dispersion of Hydrocarbon Release
- Workshop: Case Studies, Problems and Solutions

### Safety of Process Equipment

- Hazard Associated with Process Equipment
- Design Procedure for Safety of Pressure Vessels, Storage Tanks
- Control of Boilers and Heat exchangers Codes and Best Practices
- Piping System Design and Safety
- Fitness for Service Analysis (FFS-API579)
- Monitoring, Testing and Inspection (NDT)
- Workshop: Case Studies, Problems and Solutions

## Design of Pressure Relief Systems

- Safety Instrumented Systems (SIS)
- Design and Operation of Pressure Relief System
- Codes and Best Practices: Calculation of Relief Loads
- Pressure Relief Systems for Pumps, Compressors, Turbines
- Process Plant Disposal Systems: Hazards, Risk Assessment
- Workshop: Case Studies, Problems and Solutions

## Process Monitoring and Control

- 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
- Summary and Conclusions