



**Chemical, Mechanical Engineering**



**SCANDINAVIAN ACADEMY**  
Training and Development

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# Course: Process Equipment & Piping Systems

Code	City	hotel	Start	End	price	Hours
641	Munich (Germany)	Hotel Meeting Room	2024-07-01	2024-07-05	5450 €	25

## Why Choose this Course?

This course is designed to provide practical aspects of the mechanical design of pressure vessels, storage tanks, thermal equipment, piping systems and fluid transport machinery. The course will discuss the performance of these components under various operating conditions including in-depth explanation on the process of material degradation such as corrosion, erosion, fatigue and others that may lead to component failure.

Several examples and case studies included in the workshops and will demonstrate the application of Fitness for Service (FFS) assessment method that enables quantitative evaluation of the remaining life in service of any component of equipment. Failure prevention methods will also be discussed and explained.

### The course will feature:

- Explanation of mechanical design of pressurized equipment according to ASME Code
- Consideration of best operating conditions: Integrity Operating Window and MOC
- Analysis of damage and degradation mechanisms that affect process equipment and piping
- Guidance for selecting the most appropriate inspection method based on API code guidelines
- Procedure for assessing the existing flaws and defects in the given component

## What are the Goals?

### By the end of this course, participants will be able to:

- Understand the safe design and operation of pressurized process equipment
- Follow the procedure for inspection and testing of process equipment
- Apply the fundamental concepts and strategies to prevent failures
- Use the best practices of FFS to estimate the remaining life of operating equipment
- Select the methods of repair and alteration of pressurized process equipment

## Who is this Course for?

This course is designed to benefit all levels of Technical Personnel in the oil and gas industry as well as in chemical and process industries but will greatly benefit:

- Process, Mechanical and Chemical Engineers



- Operation and Maintenance Engineers
- Project Engineers
- Supervisors and Managers
- Technical Personnel involved in inspection

## **How will this be Presented?**

This course will utilise a variety of proven adult learning techniques to ensure maximum understanding, comprehension and retention of the information presented. This includes formal lectures and interactive worked examples with active contribution of all delegates during discussions and team work. Real life examples (i.e. case studies) will be selected to illustrate the procedure for carrying out typical equipment failure analysis.

The emphasis in the entire course will be on the explanation of equipment failure causes and safety operation system as well as providing answers to problems that is encountered in everyday practice. There will be ample opportunities for open discussion and sharing professional experiences on existing and new technologies.

## **The Course Content**

### **Day One**

#### **Overview of Design Features of Process Equipment and Piping System**

- General Concept of Safety in Design: Codes and Standards
- Design Features of Pressure Vessels and Storage Tanks
- Design Features of Piping Systems
- Design Characteristics of Fluid Handling Equipment
- Design Characteristics of Thermal Equipment
- Overpressure Protection of Equipment

### **Day Two**

#### **Overview of Operation Issues of Components of Process Equipment**

- Safe Operation of Process Equipment: Integrity Operating Window
- Over-pressuring of Process Equipment
- Uncontrolled Runaway Chemical Reaction
- Overheating of Boiler Tubes
- Abnormal Operation of Fluid Handling Equipment
- Vibration of Piping Systems



### **Day Three**

#### **Failure Modes and Fracture Mechanisms**

- Characteristics of Material Used for Construction of Process Equipment
- Material Degradation Processes
- Causes of Failures of Process Equipment and Piping Systems
- Failure Modes
- Fracture Mechanisms
- Lessons Learnt from Major World Equipment Failures

### **Day Four**

#### **Design and Operation of Fluid Handling Equipment**

- Condition Monitoring
- Inspection and Testing Techniques: API 572, API 510, API 570
- Risk Based Inspection (RBI): API 580
- Fitness for Service Assessment: API 579/ASME FS1
- Failure Evaluation and Calculation of Component Remaining Life
- Failure Prevention Methods

### **Day Five**

#### **Repairs, Alterations and Rerating of Process Equipment**

- Classification of Repairs
- Repair Best Practices for Pressure Vessels and Other Equipment
- Rerating of Pressure Vessels
- Hot Taping and Line Stopping

#### **Positive Material Identification (PMI)**



**The Scandinavian Academy employs modern methods in training and skills development, enhancing the efficiency of human resource development. We follow these practices:**

- **Theoretical Lectures:**
  - We deliver knowledge through advanced presentations such as PowerPoint and visual materials, including videos and short films.
- **Scientific Assessment:**
  - We evaluate trainees skills before and after the course to ensure their progress.
- **Brainstorming and Interaction:**
  - We encourage active participation through brainstorming sessions and applying concepts through role play.
- **Practical Cases:**
  - We provide practical cases that align with the scientific content and the participants specific needs.
- **Examinations:**
  - Tests are conducted at the end of the program to assess knowledge retention.
- **Educational Materials:**
  - We provide both printed and digital scientific and practical materials to participants.
- **Attendance and Final Result Reports:**
  - We prepare detailed attendance reports for participants and offer a comprehensive program evaluation.
- **Professionals and Experts:**
  - The programs scientific content is prepared by the best professors and trainers in various fields.
- **Professional Completion Certificate:**
  - Participants receive a professional completion certificate issued by the Scandinavian Academy for Training and Development in the Kingdom of Sweden, with the option for international authentication.
- **Program Timings:**
  - Training programs are held from 10:00 AM to 2:00 PM and include buffet sessions for light meals during lectures.