



*Training Course:
Advanced Failure Analysis and Repairs of Piping
and Vessels*

*20 - 24 April 2025
Alexandria (Egypt)*

Training Course: Advanced Failure Analysis and Repairs of Piping and Vessels

Training Course code: EN2005 From: 20 - 24 April 2025 Venue: Alexandria (Egypt) - Training Course Fees: 4750 € Euro

Introduction

The Failure Analysis and Repairs of Piping and Vessels Training Program is designed to provide participants with advanced knowledge and practical skills in identifying, analyzing, and repairing failures in piping and vessels. The program aims to enhance participants' understanding of failure analysis methodologies, advanced inspection techniques, repair strategies, and preventive maintenance practices. Through a combination of theoretical sessions, case studies, and interactive discussions, participants will gain the expertise needed to effectively analyze failures and implement appropriate repair and maintenance solutions in their respective industries.

Target Audience

The training program is suitable for professionals involved in the design, operation, maintenance, inspection, and repair of piping and vessels. This includes but is not limited to:

- Engineers and technicians working in the oil and gas industry.
- Plant managers and supervisors
- Maintenance and reliability professionals
- Inspectors and integrity engineers
- Quality assurance/control personnel
- Project managers and consultants
- Regulatory compliance officers

Objectives

By the end of the training program, participants will be able to:

1. Understand the importance of failure analysis in piping and vessels and its impact on safety, reliability, and productivity.
2. Apply advanced inspection techniques to identify and characterize failures in piping and vessels.
3. Conduct comprehensive failure analysis investigations using appropriate methodologies and tools.
4. Develop effective repair and remediation strategies based on failure analysis findings.
5. Implement preventive maintenance programs and risk-based inspection practices.
6. Interpret and evaluate results from non-destructive testing NDT techniques for failure analysis.
7. Assess the fitness-for-service FFS of damaged piping and vessels using industry standards.
8. Analyze materials and metallurgical properties to determine failure causes.
9. Apply advanced stress analysis and vibration assessment techniques.
10. Understand and comply with relevant codes, standards, and regulations in failure analysis and repairs.

Methodologies

The training program will employ a variety of methodologies to ensure a comprehensive and engaging learning experience:

1. Interactive lectures: In-depth presentations by subject matter experts to cover theoretical concepts and best practices.
2. Case studies: Real-world failure cases will be analyzed to provide practical insights into failure analysis and repair strategies.
3. Group discussions: Collaborative discussions and workshops will encourage knowledge sharing, problem-solving, and exchange of experiences among participants.
4. Q&A sessions: Dedicated time for participants to ask questions, seek clarifications, and engage in open discussions.
5. Assessments: Regular assessments and a final evaluation will be conducted to gauge participants' understanding and progress throughout the training program.
6. Resource materials: Participants will receive comprehensive training materials to support their learning and serve as a future reference.

Training program outline

Day 1

Module 1: Introduction to Failure Analysis

- Importance of failure analysis in piping and vessels
- Failure analysis process and methodologies
- Failure modes and their causes
- Failure analysis documentation and reporting

Module 2: Piping Failure Analysis

- Types of piping failures and their characteristics
- Advanced inspection techniques for identifying piping failures.
- Failure analysis of high-pressure and high-temperature piping
- Case studies on piping failure analysis

Module 3: Vessel Failure Analysis

- Types of vessel failures and their root causes
- Advanced inspection methods for vessel failure analysis
- Failure analysis of pressure vessels and storage tanks

Day 2

Module 4: Advanced Non-Destructive Testing NDT Techniques

- Advanced NDT methods for piping and vessels e.g., ultrasonic testing, magnetic particle testing,

- radiographic testing
- Interpretation and analysis of NDT results
- Advanced NDT equipment and technologies

Module 5: Fitness-for-Service FFS Assessment

- Introduction to FFS assessment for evaluating damaged piping and vessels.
- API 579-1/ASME FFS-1 standard overview
- Level 1, Level 2, and Level 3 assessments
- Case studies on FFS assessment

Module 6: Materials and Metallurgical Analysis

- Understanding materials used in piping and vessels.
- Metallurgical analysis techniques for failure investigation
- Microstructural analysis and interpretation

Day 3

Module 7: Repairs and Remediation Techniques

- Advanced repair methods for piping and vessels
- Welding procedures and techniques for repairs
- Composite repair systems for piping
- Rehabilitation and strengthening techniques.

Module 8: Risk-Based Inspection RBI and Integrity Management

- Introduction to RBI and integrity management concepts
- Risk assessment methodologies for piping and vessels
- Implementation of RBI programs
- Interactive exercises and case studies on RBI and integrity management

Module 9: Corrosion Analysis and Mitigation

- Advanced corrosion mechanisms and their effects on piping and vessels
- Corrosion monitoring and assessment techniques
- Corrosion mitigation strategies and materials selection

Day 4

Module 10: Advanced Stress Analysis

- Principles of stress analysis in piping and vessels
- Finite element analysis FEA techniques
- Dynamic analysis and vibration assessment
- Case studies on advanced stress analysis

Module 11: Failure Prevention and Reliability Engineering

- Proactive approaches to failure prevention
- Reliability engineering principles and techniques
- Root cause analysis RCA methodologies
- Failure mode and effects analysis FMEA
- Group discussions on failure prevention strategies

Day 5

Module 12: Case Studies and Best Practices

- In-depth analysis of real-world failure cases in piping and vessels
- Discussion on best practices and lessons learned.
- Application of learned concepts to case studies.
- Group presentations and interactive sessions

Module 13: Regulatory Compliance and Standards

- Overview of relevant codes, standards, and regulations e.g., ASME, API, OSHA
- Compliance requirements for piping and vessels
- Role of inspections and audits in regulatory compliance
- Open forum for discussion and clarification

Module 14: Emerging Technologies and Future Trends

- Introduction to emerging technologies in failure analysis and repairs
- Impact of digitalization and automation
- Predictive maintenance and condition monitoring
- Exploration of future trends in the industry

Registration form on the Training Course: Advanced Failure Analysis and Repairs of Piping and Vessels

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