

€ TRAINING

Pressure Vessel Design Awareness and
ASME PCC2 Repair





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Introduction:

Pressure vessels are the backbone of countless industries, safely containing fluids and gases under pressure. Understanding their design principles and how to effectively repair them is critical for ensuring safety and operational efficiency. This training program will equip you with the essential knowledge of pressure vessel design and guide you through the intricacies of ASME PCC-2 repair procedures.

Program Objectives:

At the end of this program, participants will be able to:

- Acquire a fundamental understanding of pressure vessel design principles and components.
- Grasp the theoretical frameworks governing pressure vessel analysis and stress calculations.
- Decipher ASME Boiler and Pressure Vessel Code BPVC requirements for design and construction.
- Explore various pressure vessel fabrication and material selection considerations.
- Master the principles and methodology of ASME PCC-2 repair standards for pressure vessels.
- Apply repair techniques using welding, bolting, composite, and other methods.
- Develop comprehensive skills for repair planning, documentation, and inspection.

Targeted Audience:

- Engineers involved in pressure vessel design, modification, and repair.
- Plant operators and maintenance personnel responsible for pressure vessel integrity.
- Inspectors and surveyors verifying pressure vessel compliance with standards.
- Quality assurance and quality control professionals overseeing pressure vessel projects.
- Employees seeking comprehensive knowledge of pressure vessel design and repair.

Program Outline:

Day 1:

Pressure Vessel Design Fundamentals:

- Basic Pressure Vessel Components and Terminology: Shell, heads, nozzles, closures, supports.
- Design Loads and Stresses: Internal pressure, dead weight, wind, earthquake, thermal expansion.
- Pressure Vessel Materials and Selection: Steel, alloys, polymers, composites, corrosion considerations.
- Code Requirements and Standards: ASME BPVC sections, design formulas, material specifications.
- Pressure Vessel Fabrication Processes: Forming, welding, machining, heat treatment, testing.

Day 2:

Pressure Vessel Analysis and Design Calculations:

- Theoretical Basis of Pressure Vessel Design: Thin-walled cylinder theory, stress-strain relationships.
- Design Calculations for Cylindrical Shells and Heads: Hoop stress, membrane stress, bending stress.
- Discontinuity Stress Analysis: Nozzle attachments, openings, supports, fatigue considerations.
- Finite Element Analysis FEA Introduction: Basic principles and applications in pressure vessel design.
- Pressure Relief Devices and Safety Systems: Safety valves, rupture discs, overpressure protection.

Day 3:

ASME PCC-2 Repair Principles and Requirements:

- Introduction to ASME PCC-2 Standard: Scope, limitations, benefits, and applications.
- Repair Planning and Procedures: Damage assessment, material selection, weld qualification, testing.
- Types of Pressure Vessel Repairs: Welding repairs, mechanical repairs, composite repairs, bolted connections.
- Welding Repair Techniques: Procedures, filler metals, preheating, post-weld heat treatment.
- Non-Welding Repair Techniques: Mechanical clamps, adhesives, composites, bolted sleeves.

Day 4:

Case Studies and Hands-on Activities:

- Real-world examples of pressure vessel failures and successful repairs using ASME PCC-2.
- Interactive sessions for applying repair principles to specific scenarios and case studies.
- Hands-on demonstrations of welding and non-welding repair techniques for various materials.

- Group discussions and Q&A sessions to solidify understanding and address practical challenges.

Day 5:

Pressure Vessel Inspection and Documentation:

- Pre- and Post-Repair Inspection Procedures: Visual inspection, non-destructive testing methods.
- Repair Documentation and Quality Assurance: Reporting forms, procedures, certifications.
- Maintaining Pressure Vessel Integrity: Long-term inspection and maintenance plan development.
- Future Trends and Advancements in Pressure Vessel Design and Repair.
- Course wrap-up, final assessments, and certificate of completion.