

PIPE STRESS ANALYSIS

MCE071

COURSE DESCRIPTION

This course offers a comprehensive exploration of fundamental principles and contemporary practices essential for designing, analyzing, constructing, and managing the integrity of piping systems and pipelines across various industries. Participants will delve into the intricacies of pipe stress analysis, learning to identify stress sources, calculate stresses, assess loads, and mitigate potential risks. Through a combination of theoretical discussions, practical demonstrations, and hands-on exercises, attendees will gain proficiency in utilizing industry-standard codes, software tools, and methodologies to ensure the structural integrity and operational efficiency of piping networks.

COURSE OBJECTIVES

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

- Gain in-depth knowledge of the ASME codes, API standards, and other regulatory requirements pertinent to pipe stress analysis in industrial settings.
- Acquire practical skills in conducting pipe stress analysis, including stress calculations, load assessments, and critical line identification.
- Learn effective strategies for mitigating piping stresses, addressing potential failures, and enhancing the reliability and safety of piping systems.
- Develop proficiency in utilizing stress analysis software and tools for modeling, simulating, analyzing, and optimizing piping configurations.
- Explore best practices in pipeline integrity management, including corrosion assessment, material testing, inspection protocols, and risk assessment methodologies.
- Enhance critical thinking abilities and problem-solving skills essential for identifying, analyzing, and resolving complex issues related to pipe stress analysis and integrity management.
- Learn how to effectively document stress analysis procedures, interpret analysis results, and generate comprehensive reports for stakeholders and regulatory compliance.

WHO SHOULD ATTEND

This course is suitable for professionals and practitioners involved in the design, engineering, construction, maintenance, inspection, and management of piping systems and pipelines.

Targeted attendees include:

- Mechanical Engineers
- Piping Designers
- Structural Engineers

- Pipeline Engineers
- Project Managers
- Maintenance Engineers
- Inspection Engineers
- Plant Operators
- Quality Assurance/Quality Control Personnel
- Regulatory Compliance Officers

COURSE DURATION

5 Working Days

COURSE OUTLINES

1. ASME Code Requirements for Pipe Stress Analysis

- Differentiation between Pipe, Tube, Line Pipe, Piping, and Pipeline
- Understanding Piping Systems
- Overview of ASME B31 Code for Pressure Piping
- Overview of API 570 Pipe Inspection Code

2. Basics of Pipe Stress Analysis

- Sources of Stress in Piping Systems
- Sustained Stresses
- Pipe Thickness Calculations
- Expansion Stresses
- Stress Intensification Factor
- Occasional Piping Stresses
- Techniques for Reducing Piping Stresses

3. Loads on a Piping System

- Static Loads
- Dynamic Loads
- Load Combinations & Code Compliance
- Basic Allowable Stress and Pipe Material Stress

4. Workflow Diagram for Pipe Stress Analysis

- Input Requirements
- Output Analysis

- Types of Piping Supports and Selection
- Expansion Loops Stress Criticality and Analysis Methods
- Stress Critical Line List

5. Piping Integrity Management

- Corrosion Allowance and Remaining Service Life
- Pipe Material Requirement, Examination, Testing, and Inspection
- Pipeline Integrity Systems and Risk Assessment

6. Stress Analysis of Underground Pipelines

- Factors affecting Underground Pipelines
- Internal Pressure
- Soil Loads
- Surface Loads
- Thermal Expansion and Contraction
- Ground Conditions

7. Pipeline Integrity Management Practices

- Threats to Pipeline Integrity
- Pipeline Integrity Design
- Pipeline Inspection Management
- Pipeline Assessment Methods
- Pipeline Integrity Monitoring and Maintenance
- Designing Pipeline Integrity Management Systems

8. Stress Analysis Software and Tools

- Introduction to Stress Analysis Software and Tools
- Modeling Piping Systems
- Performing Stress Analysis
- Evaluating Stress Analysis Results
- Optimization and Design Improvements
- Reporting and Documentation

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