



Piping Design & Analysis Influence on Pipe Support Selection & Design



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Introduction:

This oil and gas piping design, analysis, and support selection course covers important subjects, including piping design, the impact of the overall configuration on preliminary piping design, the initial layout of the system, an introduction to pipe stress analysis, detailed piping design, and how this knowledge is applied in the design of pipe supports and pipe hangers.

This oil and gas piping design, analysis, and support selection course encompasses a wide range of topics essential for individuals involved in the piping design and analysis sector, particularly focusing on the oil and gas industry. Its curriculum includes an introduction to piping design fundamentals and the nuanced details of pipe support design.

It aims to equip participants with the core skills and knowledge required in the field. Key areas of focus include the intricacies of the piping design process, the use of piping design software, comprehensive piping analysis, and the various challenges specific to oil and gas piping design.

Target Audience:

- Process, Mechanical, and Chemical Engineers.
- Operation and Maintenance Engineers.
- Project Engineers.
- Supervisors and Managers.
- Technical Personnel involved in inspections.

Course Objectives:

At the end of this oil and gas piping design, analysis, and support selection course, the participants will:

- Increase their awareness of the mechanical integrity of process equipment and piping systems, emphasizing their crucial roles in managing change.
- Follow industry codes, standards, and best practices, and acquire practical methods and tools for basic design calculations.
- Understand degradation mechanisms affecting equipment over operating life and how to prevent and control resultant damage.
- Enhance their failure analysis and problem-solving skills.
- Improve their abilities in hazard identification, risk assessment, and management.

Targeted Competencies:

By the end of this oil and gas piping design, analysis, and support selection training, the participant's competencies will:

- Overview of Piping.
- Predesign of Piping Systems, including system components and their impact on the system.
- Intro to the basics of stress analysis, flexibility analysis, and design bases.
- Understand the role of pipe supports in system design, such as rigid and spring supports and restraints.

Course Content:

Unit 1: Introduction - Overview of Piping:

- Overview of piping system design.
- Effects of operating conditions on piping design, including flow rate, design pressure, and temperature.
- Impact of internal and external forces on the design.
- The different modes of failure and the applicable codes affect the entire system.
- Piping layout, an overview of the general support classifications.

Unit 2: Preliminary Piping Design - Piping System Components:

- Concepts used in developing an initial piping layout.
- Design principles, including fluid properties, flow rate, and physical laws influence the complete piping system layout.
- Understand the effect of different piping system components, such as tanks, vessels, valves, and pumps, on the overall configuration.

Unit 3: Preliminary Piping Design - The Total System:

- The total piping system.
- The different types of equipment and components define various piping systems.
- Differences between series piping, parallel piping, and branch piping, as well as their specialized applications.
- The piping system conditions such as static and dynamic head loss.
- Influences on the selection and distribution of piping components throughout the entire system.

Unit 4: Basic Concepts of Stress Analysis - Flexibility Analysis:

- Historical perspective of how earlier analysis techniques were developed without today's computer technology.
- Review how earlier techniques evolved, leading to today's finite element practices.
- The basic concepts of stress analysis will be covered, including failure theories, stress intensification factors, and the overall purpose of stress analysis.

Unit 5: Basic Concepts of Stress Analysis - Design Bases:

- A review of the different phases of project evolution.
- The design bases form the foundation of all our analyses, including physical attributes, loading conditions, and joint design.
- Development of a Stress Model.
- Rudimentary stress analysis assembly procedure.
- How vibration affects the piping system.

Unit 6: Influences on Pipe Support Design - Rigid Supports:

- Rigid Pipe Supports.
- Support elements ranging from stock catalog items to completely customized parts.
- Factors of the piping stress analysis that have an impact on the overall support design and feasibility.
- How can adjustability be incorporated into the design to accommodate on-site discrepancies?

Unit 7: Influences on Pipe Support Design - Spring Supports:

- Resilient support elements include variable, constant, and big-ton springs.
- The operating conditions that define the ideal pipe support per application.
- Uses standard pipe support hardware with stock spring components to design entire pipe support assemblies.
- Modification of standard spring elements to fit unusual configurations in a piping system.

Unit 8: Influences on Pipe Support Design - Restraints:

- Restraint devices are used for transient loading conditions.
- Types of components and their particular functions, including hydraulic snubbers, mechanical snubbers, and sway struts.
- Design parameters to consider when selecting the most appropriate restraint device.
- General guidelines focused on standardization and versatility of pipe supports throughout the piping system.

Conclusion:

The oil and gas piping design, analysis, and support selection course integrates core principles with in-depth technical knowledge, providing comprehensive piping design training tailored to the industry's demands.