



Piping Design & Analysis Influence on Pipe Support Selection & Design

This class covers the following topics: piping design, the effects on overall configuration on preliminary piping design, initial layout, the total system, introduction to pipe stress analysis, detailed piping design, and how all of this influences pipe support and pipe hanger design.

Syllabus

Part 1: Introduction - Overview of Piping

1. This section serves as an introductory overview of piping system design.
 - a. Effects of operating conditions, including flow rate, design pressure and temperature on piping design
 - b. Impact of internal and external forces on the design.
 - c. Influences that the different modes of failure and the applicable codes have on the entire system.
 - d. Piping layout, an overview of the general support classifications.

Part 2: Preliminary Piping Design - Piping System Components

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

Part 3: Preliminary Piping Design - The Total System

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

Part 4: Basic Concepts of Stress Analysis - Flexibility Analysis

1. Historical perspective of how earlier analysis techniques were developed in the absence of today's computer technology.
2. Review how earlier techniques have evolved ultimately leading to today's finite element practices.
3. The basic concepts of stress analysis will be covered, including failure theories, stress intensification factors and the overall purpose of stress analysis.

Part 5: Basic Concepts of Stress Analysis - Design Bases

1. A review of the different phases of project evolution.
2. The design bases which form the foundation of all our analyses, including physical attributes,

loading conditions and joint design.

3. Development of a Stress Model
4. Rudimentary stress analysis assembly procedure.
5. How vibration affects the piping system.

Part 6: Influences on Pipe Support Design - Rigid Supports

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

Part 7: Influences on Pipe Support Design - Spring Supports

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

Part 8: Influences on Pipe Support Design - Restraints

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