MERCURY

Piping Layout and Pipe Support Engineering

24 May – 4 June 2027
Barcelona (Spain)

Dubai - UAE: +971 4 450 5697
Istanbul - Türkiye: +90 539 599 1206
Amman - Jordan: +962 79 712 3347

Piping Layout and Pipe Support Engineering

Ref: 15160_272487 **Date:** 24 May – 4 June 2027 **Location:** Barcelona (Spain) **Fees:** 11100 Euro

Piping Layout and Pipe Support Engineering: Two-Week Course is a 2-week course for engineers and designers who route process lines and then have to hold them up, guide them and protect connected equipment. You move from layout and flexibility basics to rigid supports, spring hangers, snubbers and load cases, and leave with a Line Support Specification Package. Mercury Training Center delivers this piping layout and pipe support engineering course.

About This Course

Lines that look tidy on a model often overload pump nozzles, lift off their shoes or need field rework because hangers were chosen late. You should already read isometrics and P&IDs and take part in plant projects or upkeep. You practice on routing studies, load summaries, hanger tables and restraint details from hydrocarbon, power and chemical plants.

Who It Is For

- Routing process lines around vessels, pumps and pipe racks during project engineering.
- Selecting and specifying hangers, guides, anchors and snubbers for new or modified lines.
- Checking flexibility and nozzle loads before equipment is ordered or modified.
- Approving plant changes that move, add or reroute lines during operation.
- Inspecting hangers and restraints in service and deciding repair or adjustment.

This course is not for readers new to plant drawings, who are better served by an introductory course on reading process drawings, or for specialists who already run detailed flexibility models daily, who need an advanced software-focused course.

Competencies You Will Build

- Layout Planning: routing lines for access, drainage and thermal growth around equipment and racks.
- Flexibility Judgment: spotting stiff lines and adding loops or offsets before modeling.
- Load Case Setup: defining sustained, thermal, occasional and test cases for a line.
- Rigid Restraint Selection: choosing shoes, guides, line stops and anchors that suit the movement.
- Spring Hanger Sizing: selecting variable or constant springs from load and travel.
- Dynamic Restraint Choice: specifying snubbers and sway struts for transient events.

What You Will Be Able to Do

By the end of the course you will be able to:

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- Given a plot plan and equipment list, sketch a routing that meets access and flexibility needs.
- From line conditions and a material spec, calculate wall thickness and set the critical line list.
- Using a load summary, compare nozzle loads with equipment allowables and propose layout changes.
- From hot and cold movements, select spring hangers and write their setting values.
- Given a surge or relief event, place and size snubbers or sway struts.
- Using the hanger tables, issue a support specification that a fabricator can build from.

Course Content

Day 1: Process Line Fundamentals

- Flow Rate, Design Pressure and Temperature as Inputs to Line Sizing
- Internal Pressure and External Loads on Process Lines
- Failure Modes and the Role of ASME B31.3 in Process Plants
- Wall Thickness Calculation and Corrosion Allowance
- General Classification of Hangers, Guides and Restraints

Day 2: Preliminary Layout and Components

- Initial Routing Concepts Around Tanks, Vessels, Valves and Pumps
- Fluid Properties and Head Loss Effects on Line Configuration
- Series, Parallel and Branch Arrangements and Where Each Fits
- Static and Dynamic Head Checks on Pump Suction and Discharge
- Pipe Rack Planning, Spacing and Access for Upkeep

Day 3: Layout of the Whole Plant Area

- Equipment Groupings That Define Line Classes and Routes
- Isometric Drawing Reading and Line List Preparation
- Critical Line List Selection by Temperature, Size and Equipment Type
- Relief Valve Discharge and Flare Header Routing
- Storage Tank and Buried Line Settlement Considerations

Day 4: Flexibility Basics

- Historical Hand Methods and the Move to Finite Element Practice
- Failure Theories and Stress Intensification Factors
- Expansion Loops, Offsets and Cold Spring for Thermal Growth
- Sustained, Thermal and Occasional Load Categories Under ASME B31.3
- Purpose of Flexibility Checks at Each Project Phase

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Day 5: Design Bases and Software Models

- Project Evolution Phases and When Line Checks Are Run
- Design Basis Inputs: Physical Attributes, Loading Conditions and Joint Details
- Building a Line Model and Defining Load Cases in Analysis Software
- Pump, Vessel and Exchanger Nozzle Load Checks Against API 610 Allowables
- Flange Leakage Checks with the Pressure Equivalent Method

Day 6: Vibration and Transient Loads

- Flow-Induced and Mechanical Vibration on Small-Bore Connections
- Water Hammer and Slug Flow Loads on Long Runs
- Relief Valve Reaction Forces and Their Restraint
- Wind and Seismic Occasional Loads on Rack Lines
- Field Vibration Survey Findings and Retrofit Bracing

Day 7: Rigid Supports

- Shoes, Guides, Line Stops and Anchors Selected by Movement
- Catalog Items Versus Custom Fabricated Assemblies to MSS SP-58
- Span Tables and Spacing for Weight and Deflection
- Adjustable Details That Absorb On-Site Discrepancies
- Friction, Lift-Off and Load Transfer to Steel Structures

Day 8: Spring Hangers

- Variable, Constant and Big-Ton Spring Selection by Load and Travel
- Load Variation Limits and Hot and Cold Setting Values
- Assembling Standard Hardware with Stock Spring Components
- Modifying Spring Elements for Unusual Configurations
- Spring Hanger Inspection, Travel Stops and Field Adjustment

Day 9: Restraints for Transient Events

- Hydraulic and Mechanical Snubber Selection and Sizing
- Sway Struts and Sway Braces for Dynamic Loads
- Selection Criteria for Choosing the Right Restraint Device
- Standardization of Hanger Types Across a Plant
- Mechanical Integrity, Degradation and Management of Change for Modified Lines

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Day 10: Practice on a Plant Line Package

- Pump Suction and Discharge Routing Exercise
- Spring Hanger Selection Exercise on a Hot Steam Line
- Snubber Placement Exercise for a Relief Event
- Results Review and Client Report Exercise
- Completing Your Line Support Specification Package

Case Studies and Exercises

The items below are suggested activities.

- Case study: a refinery pump trips on high vibration after a line change; you trace the nozzle overload and propose a revised routing and restraint.
- Case study: a power station steam line has bottomed-out springs; you decide new hanger sizes and settings.
- Exercise: a chemical plant relief header needs restraint for valve reaction forces; you place and size snubbers and guides.
- Exercise: a gas processing rack extension; you set span spacing and anchor points for thermal growth.

What You Take Back

The Line Support Specification Package records how one critical line is routed, loaded and held. In your first month back you use it to review a live line on your project or plant, agree hanger settings with the fabricator and check nozzle loads with the equipment team.

- A critical line list and load case table.
- A routing sketch with expansion allowances.
- A hanger and restraint schedule with spring settings.
- A nozzle load check summary.

Quick Answers FAQ

What should I know before a piping layout and pipe support engineering course?

You should read isometrics and P&IDs, know basic mechanics and units of force and pressure, and have worked on plant projects or maintenance. Software experience helps but is not required, since models are built step by step.

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How does pipe support engineering training differ from a shorter piping stress course?

It runs two weeks and spends half its time on hangers and restraints: spans, rigid supports, spring sizing, snubbers and specifications. A shorter course covers layout and flexibility principles and introduces supports without sizing them in detail.

When should a pipe support be a spring hanger instead of a rigid support?

A spring hanger is used where the line moves vertically under heat and a rigid support would lift off or overload connected equipment. Variable springs suit small travel; constant springs suit large travel or tight load limits.

What do I take back from piping layout and pipe support engineering training?

You take back a Line Support Specification Package for a critical line: line list and load cases, routing sketch, hanger and restraint schedule with spring settings, and a nozzle load summary ready to use on your next project.

For Your Manager

After the course, the team member will be able to route lines for flexibility, set load cases, select rigid supports, springs and snubbers and check equipment nozzle loads. They return with a Line Support Specification Package, first used to review a critical line on the current project and to agree hanger details with the fabricator.

training@mercury-training.com
www.mercury-training.com