L&T EduTech
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# Industrial Piping Engineering

## About the Course

Industrial Piping Engineering is a science and a specialized discipline of Mechanical Engineering that is seldom covered in any University curriculum. The science behind piping engineering is extremely important for the reliability of the plant and the safety of the process, personnel, and public. In a typical Chemical or Process Plant, the material cost of piping is around 35% of the initial fixed cost next to the material cost of major equipment (~50%). The field labour cost against the piping goes around 50%. Piping consumes around 50% of engineering man-hours for its design. The importance of piping is far beyond these values. The piping system consists of several piping components. The failure of any one of these components has the potential to shut down the whole plant and, in some cases, it becomes a serious threat to public safety which demands 100% accuracy both in design and erection. With this aim, the course content is meticulously designed to cater to the needs of the Process, Oil & Gas, and Chemical Industries. In a nutshell, the course covers the hydraulics of piping systems subjected to both single and two-phase gas & liquid flows, pipe design, flange types & class, valve types & class, pipe stress analysis, pipe supports, cross-country onshore pipeline construction, and ASME B31.1-Power Piping, ASME B31.3-Process Piping. This course is embedded with working examples of several practical problems coupled with hands-on experience in pipe stress analysis software, and meticulously designed industrial projects for learners' execution.

## Key Topics

Introduction to Flow Regimes | Two-Phase Flow-Homogeneous Model, Separated & Drift Flux Models, | Piping System Components, Pressure Drop in Single phase and Two-phase flows | Pipes, Pipe Fittings & Flanges, Valves | Piping Drawings & Graphics | Flexibility Analysis of Pipes | Supports, Expansion Joints, Jacketing, Vibration, Insulation & Cathodic Protection | Transient Analysis of Pipes | ASME Section B31.1, 31.3, 31.4 | Pipeline Construction

## Course Objectives

Enables learner to:

1. Explain the liquid & gas/vapor two-phase phenomena through a pipeline
2. Predict the pressure drop for both single & two-phase flows through the pipe, pipe fittings, orifice, nozzle, venturi, valves, and pipe networks
3. Distinguish the set forth engineering requirements necessary for the safe design and construction of piping systems covered in ASME B31.1, B31.3, and 31.4 codes
4. Judge the two-phase flow regime and select appropriate friction factor correlations, materials, flange & valve classes, and gasket of a process requirement
5. Design the piping system for the given process requirement, and comply with international codes & standards
6. Perform the flexibility analysis of a given piping system and modify it to ensure safe operation

## Learning Outcomes

Upon successful completion of this course, learners will be able to:

1. Explain the liquid & gas/vapor two-phase phenomena through a pipeline
2. Predict the pressure drop for both single & two-phase flows through the pipe, pipe fittings, orifice, nozzle, venturi, valves, and pipe networks
3. Distinguish the set forth engineering requirements necessary for the safe design and construction of piping systems covered in ASME B31.1, B31.3, and 31.4 codes
4. Judge the two-phase flow regime and select appropriate friction factor correlations, materials, flange & valve classes, and gasket of a process requirement
5. Design the piping system for the given process requirement, and comply with international codes & standards
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