



Fluid Flow Control System in the Process Industry

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Rome (Italy)



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Introduction

Modern techniques for fluid flow control in systems encountered within the process and chemical industries are integral for managing operations efficiently. These systems control the flow rate, measure pressure and temperature, and ensure the capacity for maximum flow during emergencies.

Devices such as pumps and compressors, with various designs, often have flow control systems to regulate rates and pressures and to manage motor loads through variable-speed motors or couplings. Control valves are pivotal in the management of fluid flow, serving functions like pressure reduction, delivery rate control, back pressure control, and pressure relief.

Fluid flow measurement is a critical variable in the operation and control of fluid transport within piping systems and pipelines. Monitoring this data, which is often computerized, allows for checks on discrepancies, utilizing line flow balances on an hourly, daily, or weekly basis. The fluid flow control systems in process industries course delves into all practical aspects of industrial fluid flow measurements, analyzing results, and considering accuracy factors.

Fluid Flow Definition and Control Valve Application in Oil and Gas

The fluid flow control systems in process industries course provides an in-depth understanding of fluid flow, which is the movement of liquid or gas within a pipe or conduit. Managing this flow is critical to ensure efficient and safe operation in various oil and gas process solutions.

This course in fluid flow control systems in process industries will teach the target audience to understand that control valves are an essential component of fluid flow operations in any industrial process, as well as how to adjust the flow rate and maintain the desired process conditions.

Participants in the fluid flow control systems in process industries course will explore how fluid dynamics play a crucial role in the oil and gas industry, affecting flow control oil and gas strategies and shaping the design of process solutions.

Targeted Groups

- Engineers and technicians in oil and gas, chemical, and process industries.
- Process, mechanical, and chemical engineers.
- Engineers and technicians engaged in reactor and piping system operation.
- Design engineers, project engineers.
- Control, automation, and instrumentation engineers.

Course Objectives

By the end of this fluid flow control systems in process industries course, participants will be able to:

- Identify physical characteristics of fluids for various flow measuring techniques.
- Comprehend measuring techniques along with their capabilities and constraints.
- Grasp the principles of world standards and codes related to fluid flow measurement.
- Choose correct measurement techniques, estimating accuracy and uncertainty.
- Provide guidelines for diagnosing problems in the system based on flow monitoring.

Targeted Competencies

By the end of this fluid flow control systems in process industries course, the target competencies will be able to:

- Selection principles for appropriate fluid flow measurement in industrial applications.
- Set up guidance for measurements to ensure accurate results.
- Real-life examples of effective instruments for flow measurement of gases, liquids, and multiphase mixtures.
- The impact of fluid properties on flow measurement outcomes.
- Cost and benefit analysis for system monitoring.

Course Content

Unit 1: Fluid Flow Control in the Process Industry

- The significance of fluid flow control in the process industry.
- Classification of fluid flow measurement techniques.
- Types of fluid flow measurements.
- World standards related to fluid flow measurement.
- Physical properties of liquids, gasses, and multiphase fluids.
- Gas laws and the expansion of liquids.

Unit 2: Basic Principles of Fluid Flow in Pipes and Other Geometries

- The interplay between pressure and fluid velocity.
- Challenges in two-phase fluid flow.
- Techniques for measuring velocity and pressure.
- Utilization of flow meters based on differential pressure.
- The use of volumetric flowmeters.
- Mass flow meters, probes, and tracers.

Unit 3: Other Issues Related to Measurements

- Exploration of probes and tracers.
- Devices related to readouts.
- Overview of proving systems.
- Studies on fluid balance.
- The process of auditing flow measurements.

Unit 4: Installation of Instruments

- The influence of instrument installation on result accuracy.
- Understanding accuracy requirements and related complications.
- Discussions on uncertainty and statistical methods.
- Calibration processes for measuring instruments.
- Maintenance practices for meter equipment.
- Recent technological developments.

Unit 5: Flow Control of Pumps, Compressors and Fans

- Applications of control valves in fluid flow.
- Flow control systems in pump stations.
- Managing flow in compressor stations.
- Aspects of flow control in pipelines.
- Pipeline monitoring systems and future trends.