MERCURY

Control Valves & Actuators - Control & Safety Systems



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Introduction:

This training seminar is a highly interactive introduction to the most important features and characteristics of control valves and actuators. Valve and actuator combinations are used in every process around the world, and understanding and utilizing them correctly is essential for efficient operation and control. This training seminar is designed to provide hands-on thinking about valve and actuator installations, enabling participants to consider, select, and install the best equipment for the application at hand.
This Control Valves & Actuators Training Seminar will highlight important aspects of valves and actuators, leading to a better understanding of the flow aspects associated with these devices. The differences between valves and actuators can be very large or very subtle. Participants will learn to note and distinguish the differences between the various devices and how they fit into the larger scheme of things. With this experience, participants will be better equipped to make informed decisions and to help make decisions at a higher level.

Targeted Groups:

- Key instrumentation personnel involved in valve maintenance
- Senior management and staff responsible for valve and actuator selection
- Mechanical and electrical staff that come into contact with valves
- Process control engineers requiring a high plant availability, often affected by valves
- Designers, industrial engineers and staff responsible for plant safety
- All personnel with a vested interest in applications that require / utilize valves

Course Objectives:
At the end of this course the participants will be able to:

- Comprehend the inner operation of most commonly utilized valve types
- Decide on the best valve to use, for specific applications
- Determine the most cost effective valve size
- Determine the best device to drive and operate an assortment of valves
- Get control valves to operate optimally in the field, using an assortment of techniques

Targeted Competencies:

- Valve Principals, Purposes, Types, Control Signals and Flow Conditions
- Valve in P&IDs, Leakage, Valve Characteristics and Valve Size Calculations
- Valve Software, Actuators, Positioners, Cavitation & Noise Control & SIS
- 3-term Controllers and Loop-tuning for Processes Containing Control Valves
- Using Valves in Cascade, Ratio, Dead-Time Dominant, Non-Linear and PLC-Controlled Processes

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Course Content:

Unit 1: Valve Principals, Purposes, Types, Control Signals and Flow Conditions:

- Valve Principles, Valve Purposes and Control Signals used with Valves
- Flow Conditions in and around Valves
- Reynolds Numbers
- Cavitation and Flashing and How This Influences Valve Selection
- Associated Equipment - Pertinent to Valves
- Definitions and Principles of Operation of the Major Types of Valves

Unit 2: Valve in P&IDs, Leakage, Valve Characteristics and Valve Size Calculations:

- Continuation of the Definitions and Principles of Operation of more Major Types of Valves
- Additional associated Equipment - Pertinent with Valves
- P&ID Diagrams associated with Valves
- Valve Leakage and Valve Leakage Rate Calculation
- Valve Inherent Characteristics and their importance once installed
- Performing Manual Calculations - for Valve Sizing

Unit 3: Valve Software, Actuators, Positioners, Cavitation & Noise Control & SIS:

- Software Used to Size Control Valves
- Assorted Actuators and their Properties and Characteristics
- Valve Positioners
- Cavitation and Noise Control - in and around valves
- Valves and How They Fit into Pressure Relief and Safety Instrumented Systems SIS
- Using Digital Controllers - with valves

Unit 4: 3-term Controllers and Loop-tuning for Processes Containing Control Valves:

- Understanding and Implementing the Right Controller Action - for fail-safe valves
- Understanding all of the Variables - associated with three-term control
- Open Loop Tuning - for controllers that act on control valve loops
- Closed Loop Tuning - for controllers that act on control valve loops
- Trial and Error Tuning - to optimize control valve performance

Unit 5: Using Valves in Cascade, Ratio, Dead-Time Dominant, Non-Linear and PLC-Controlled Processes:

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- Setting-up a Cascade Loop - using a single valve and multiple controllers
- Setting-up a Ratio Loop - using a Single Valve and Multiple Process Variables PVs
- Dead Time Dominant Loops - how this affects the valve performance, and how this is corrected
- Using a Control Valve in a process that exhibits different responses in different zones
- Combining PLCs - for valve control