



# Control Valves & Actuators Features & Characteristics

## Training Program



### Introduction:

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This course highlights the most important features and characteristics of control valves and actuators. Combinations of valves and actuators are used in just about every process around the world, and the proper understanding and utilization of them is crucial to efficient operations and control. This course has been designed in such a way as to empower delegates to think practically about valve and actuator installations, in a manner that allows them to consider, select and install the best piece of equipment for the application at hand.

The course emphasizes the important aspects of valves and actuators, and lead to a greater understanding of flow aspects pertinent to these devices. In some cases, the differences between certain valves and actuators can be quite large, whilst in others, the variations are very subtle. Delegates are taught to focus and differentiate between the various devices that are available, and how they fit into the greater scheme of things. This exposure, most certainly, will promote greater confidence in the ability of delegates to make informed decisions, as well as to assist in decisions that are made at a higher level. This course will feature:

- Valves in P&IDs, installation and maintenance considerations, and cavitation and noise control
- Different types of valves, and their suitability to a variety of applications
- Actuators, valve positioners, filters, regulators, I/Ps, and other associated hardware
- Understanding the valve coefficient and determining the correct valve size and type
- Optimizing the use of control valves, using digital controllers

## Who Should Attend?

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Mechanical Engineers, General Supervisors, Consulting Engineers, Design Engineers, Foremen, Supervisors, Technicians, Maintenance Personnel, Engineers of all disciplines, Supervisors, Team Leaders and Professionals in Maintenance, Engineering and Production Managers, Maintenance Personnel, Heads of Maintenance and Operation, Chemical Engineers, Equipment Specialists, Technical Engineers, Operation Engineers, Planning Engineers, Process Engineers, Reliability Specialists, Boiler Plant Construction Managers, Consulting Engineers, Design Engineers, Insurance Company Inspectors, Operation, Maintenance, Inspection and Repair Managers, Supervisors and Engineers, Plant Engineers, Senior Boiler Plant Operators, Repairers and Installers, 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, personnel with a vested interest in applications that require or utilize valves

## Course Objectives:

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**By the end of this course, delegates will be able to:**

- Determine the best device to drive and operate an assortment of valves
- 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
- Get control valves to operate optimally in the field, using an assortment of techniques

## Course Outline:

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### **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

### **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

### **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

### **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

### **Using Valves in Cascade, Ratio, Dead-Time Dominant, Non-Linear and PLC-Controlled Processes**

- 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