

# INNOVATIVE VALVE AND ACTUATOR TECHNOLOGY: TROUBLESHOOTING AND OPTIMIZATION

*"Maximizing Reliability, Safety, and Performance in Flow Control Systems"*

## Schedule

Date	Venue	Fees (Face-to-Face)
16 - 20 Nov 2026	London - UK	USD 3495 per delegate

► **Available delivery methods:** Face-to-Face & Online Training

## Introduction

Valves and actuators are at the heart of industrial flow control systems, playing a critical role in process reliability, efficiency, and safety. With advancements in materials, automation, and digital diagnostics, valve and actuator technologies are evolving rapidly. However, troubleshooting failures, optimizing performance, and selecting the right configurations remain major challenges for engineers and maintenance professionals.

This intensive course offers practical and technical training on modern valve and actuator technologies. It combines theoretical insights with real-world troubleshooting tools, focusing on diagnostics, maintenance best practices, selection criteria, and system optimization techniques across a range of industrial applications.

## Objectives

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

- Understand the working principles of various valve types and actuation methods
- Troubleshoot valve and actuator failures using diagnostic and analytical techniques
- Select appropriate valve and actuator combinations based on system requirements
- Apply best practices in installation, calibration, and preventive maintenance
- Implement optimization strategies for reliability, safety, and energy efficiency

## Why Attend

- Gain hands-on knowledge of valve design, control, and failure prevention
- Stay updated with smart valve technology, diagnostics, and predictive maintenance trends
- Reduce unplanned downtime through root cause analysis and early detection
- Optimize valve-actuator performance for complex fluid handling applications
- Enhance plant safety and regulatory compliance with effective flow control strategies

## Target Audience

This program is designed for:

- Maintenance and reliability engineers
- Process, instrumentation, and control engineers
- Plant supervisors and operations managers
- Mechanical and piping engineers
- Technical professionals responsible for valve procurement and maintenance

## Individual Benefits

Key competencies that will be developed include:

- Valve and actuator selection, sizing, and specification
- Troubleshooting techniques for common operational issues
- Knowledge of smart actuators and diagnostics tools
- Skills in calibration, testing, and condition monitoring
- Understanding of failure modes and risk mitigation in valve systems

## Organizational Benefits

Upon completing the training course, participants will demonstrate:

- Improved equipment reliability and reduced downtime
- Lower maintenance costs through proactive troubleshooting
- Enhanced safety and environmental compliance
- Optimized energy usage in flow control systems
- Better alignment with industry standards (API, ISA, ISO) and engineering practices

## Instructional Methodology

The course follows a blended learning approach combining theory with practice:

- Strategy Briefings - Valve types, actuation technologies, and selection standards
- Case Studies - Failure investigations and reliability analysis across industries
- Workshops - Hands-on troubleshooting scenarios, actuator calibration, and testing
- Peer Exchange - Sharing best practices and field experiences in valve maintenance
- Tools - Diagnostic charts, selection guides, performance curves, and maintenance templates

## Course Outline

Detailed 5-Day Course Outline

**Training Hours:** 7:30 AM – 3:30 PM **Daily Format:** 3–4 Learning Modules | Coffee breaks: 09:30 & 11:15 | Lunch Buffet: 01:00 – 02:00

### Day 1: Fundamentals of Valve and Actuator Systems

- Module 1: Overview of Valve Types and Functions (07:30 – 09:30) • Gate, globe, ball, butterfly, plug, diaphragm, and control valves • Applications across industries and operating conditions
- Module 2: Actuator Types and Operating Mechanisms (09:45 – 11:15) • Pneumatic, hydraulic, electric, and smart actuators • Fail-safe positioning and control logic
- Module 3: Workshop – Component Identification and Function Matching (11:30 – 01:00) • Hands-on review of valves and actuators in process diagrams
- Module 4: Peer Exchange – Common System Design Mistakes (02:00 – 03:30) • Discussion on valve-actuator mismatches and design oversights

### Day 2: Troubleshooting and Diagnostics

- Module 5: Common Valve and Actuator Failures (07:30 – 09:30) • Leakage, stiction, cavitation, and seat wear • Positioning errors, calibration drift, and actuator failure modes
- Module 6: Root Cause Analysis and Diagnostic Tools (09:45 – 11:15) • Pressure testing, vibration analysis, thermal imaging
- Module 7: Workshop – Fault Tree Analysis for Valve Systems (11:30 – 01:00) • Create a diagnostic plan based on symptoms and data
- Module 8: Case Study – Failure Investigation Report (02:00 – 03:30) • Analyze a breakdown in a critical isolation valve system

### Day 3: Selection, Sizing, and Specification

- Module 9: Valve and Actuator Selection Criteria (07:30 – 09:30) • Pressure, temperature, flow, media compatibility, and control range
- Module 10: Sizing and Specification Standards (09:45 – 11:15) • API 6D, ISA 75, ISO standards for design and sizing
- Module 11: Workshop – Valve Sizing Calculations (11:30 – 01:00) • Use Cv, flow rate, and  $\Delta P$  to size control valves
- Module 12: Peer Exchange – Specification Challenges in Projects (02:00 – 03:30) • Field stories on incorrect selections and lessons learned

### Day 4: Preventive Maintenance and Optimization

- Module 13: Preventive and Predictive Maintenance Practices (07:30 – 09:30) • Lubrication, cleaning, calibration, and test scheduling
- Module 14: Smart Actuators and Diagnostics Integration (09:45 – 11:15) • Fieldbus, HART, and IIoT integration for monitoring and alerts
- Module 15: Workshop – Optimization Checklist for Reliability (11:30 – 01:00) • Develop a maintenance optimization plan
- Module 16: Case Study – Valve Reliability Improvement Project (02:00 – 03:30) • Evaluate results of a valve upgrade initiative

### Day 5: Safety, Standards, and Implementation Planning

- Module 17: Safety in Valve Systems and SIL Ratings (07:30 – 09:30) • Fail-safe design, fire-safe testing, and safety integrity levels
- Module 18: Implementation Strategies and Vendor Evaluation (09:45 – 11:15) • Procurement planning, lifecycle cost, and OEM selection
- Module 19: Final Project – Valve System Troubleshooting Plan (11:30 – 01:00) • Present a complete diagnostic and maintenance plan
- Module 20: Wrap-Up, Feedback, and Certification (02:00 – 03:30) • Course recap, evaluation, and certificate distribution

## Certification

Participants will receive a Certificate of Completion in Innovative Valve and Actuator Technology: Troubleshooting and Optimization, validating their expertise in advanced flow control technologies and their practical application in industrial settings.

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