Practical PID Control and Loop Tuning - IC-74

About the course:

This workshop provides instrumentation, automation, and process engineers and technicians with the basic theoretical and practical understanding of regulatory control systems and how this can be applied to optimize process control in terms of quality, safety, flexibility, and costs. Centered on the ISA-recommended PC-Control LAB simulator, participants will learn through active participation using exercises, questionnaires, and a series of 16 practical simulation sessions covering: process reaction; tuning methods; diagnostic tools; effect of different algorithms; surge tank level control; analysis of such problems as valve hysteresis, stiction and non-linearities and the impact on controllability; and integral windup. Learning about the practical applications of PID control. We were provided many examples." - Facilities I&E Engineer.

Designed For

Instrumentation, automation, and process engineers and technicians involved in specifying, installing, testing, tuning, operating, and maintaining regulatory PID control systems.

You will learn

- Describe such terms as process lag, capacitance, and resistance
- Explain the significance of the process reaction curve
- Identify the effects of filtering on loop performance
- Distinguish the effect of span on the system performance
- Analyze such problems as valve hysteresis, stiction, and non-linearities
- Evaluate the effects of proportional, integral, and derivative control
- Correctly apply both open and closed Loop Tuning according to Ziegler-Nichols
- Apply "as found" tuning

- Estimate the effects on loop tuning using a software-based loop analysis program
- Describe both cascade and feedforward control
- Explain split range control
- Identify and correct problems due to process dead time
- Discuss the top 20 mistakes made in the field of process control

Course Content

- Basic process considerations
- Process lag, capacitance, and resistance
- Process reaction curve
- 1st and 2nd order reactions
- Instrumentation cabling
- Filtering
- Aliasing
- Reaction masking
- Sensor placement
- Correct PV
- Effect of span
- Inherent and installed valve characteristics
- Actuators
- Valve positioners
- Testing procedures and analysis
- ON/OFF control
- Proportional control
- Proportional offset
- Reset
- Integral action and windup
- Stability
- Derivative action
- PID control
- Control algorithms
- Load disturbances and offset
- Speed, stability, and robustness
- Open loop reaction curve tuning method (Ziegler-Nichols)
- Default and typical settings
- Closed loop continuous cycling tuning method (Ziegler-Nichols)
- Fine tuning
- "As found" tuning
- Surge tank level control
- Split/parallel range control
- Cascade systems
- Feed-forward and combined systems

- Ratio control
- System integration

Course Duration

5 Days