



Practical Aspects of Process Control & Instrumentation

This course gives a practical introduction to the principles of measurement and control of process plant.

It is a hands-on course and participants will have the opportunity to explore the set-up and tuning of control loops using simulation and other computer-based training packages.

This is offered as a 5 day course.

Suitable for: Engineers and Technicians who require a practical introduction to measurement and control systems on process plant. It will also be useful to anyone working in the process industries who would like to understand the techniques used in measurement and control and who have not had the opportunity to learn about them before.

Key Topics Covered:

- Principles of Control
- Measurement Principles (Flow, Pressure, Temperature, Level)
- PID Control
- Control Tuning
- Control Techniques
- Computer Control Systems - SCADA, PLC
- Control Valves equipped with Positioners and feedback transmitters.

Day One

1. Introduction to Instrumentation & Process Control

- Flow Diagram
- EMCS block diagrams
- Binary, Digital, and Analogue signals.
- Simple shift register building up of a control system.

2. Introduction to PLC

- Introduction to CoDesys editor
- Simple ladder programming techniques.

3. Exploration of the training Kit

- Measurement principals of available flow transmitters, totalizer, PT100, Ultrasonic level, pressure transmitter.
- Kit instrumentation Calibration methods



All exercises are to be programmed via PLC – Industrial Ethernet Communication from Computers
All exercises require adjusting Gains, derivatives and integral errors via PID, PI controllers whenever required.

Day Two

4. Flow Control Loops

- Control of Flow via a Control Valve- SCADA Operation
- Control of Flow Via Pump RPM (inverter) –SCADA Operation
- Control of Flow Via 5/3 Solenoids and Double acting actuators - SCADA Operation
- Advantages and Disadvantages of all previous technologies.

Day Three

- Totalizing Flow via a totalizer in requesting specific fluid batches- SCADA Operation

5. Level Control Loops

- Control of rising level in a tank via control valve and ultrasonic transmitter– SCADA Operation
- maintaining tolerance level of level via pump – SCADA Operation
- Digital control of level measurement via capacitive sensors in a tank- SCADA Operation
- Low/High switching points in relation to pump actuation - SCADA Operation

Day Four

6. Sizing tools for Control Valves

- Sizing software ARI-VASI for sizing of control valves.
- Working with an oversized valve-SCADA Operation
- Adjusting the control valve size and monitoring flow differences – SCADA Operation.
- Partial cavitation, flashing and maximum cavitation criteria across control valves
- Variant plug designs to reduce flow problems.
- Selection of Actuators

Day Five

7. Pressure Control Loops

- Maintaining a constant pressure before the control valve –SCADA Operation

8. Temperature Control Loops

- Pulse switch modulation of heater power to maintain stable temperature via PT100- SCADA Operation
- Digital control of temperature – SCADA Operation.