

# OIL AND GAS PROCESS INSTRUMENTATION MEASUREMENT AND SENSORS

### COURSE DESCRIPTION

This course covers basics of instrumentation sensors, transducers and related instrumentation used in the field of Oil & Gas and Petrochemicals. It elaborates sensor characteristics, various sensors and its working principle, specifications, and design and selection aspects used for sensing various process parameters along with merits and limitations of each type of sensor.

The course would also build the knowledge of the participants related to working principles of control loop components, the control strategies, and the PID controller fundamentals including the terminology, algorithms and tuning methods. A special emphasis on real life implementations, case studies and international standards would ensure participants to co-relate the theory with their day to day practice.

### COURSE GOAL

To enhance the participants' knowledge, skills, and attitudes necessary to develop and manage Oil and Gas Process Instrumentation program to build the knowledge of the participants related to working challenges.

### COURSE OBJECTIVES

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

- Learn the Process Requirements in the Oil & Gas & Petrochemical Fields.
- Understand working of Control Loop Components.
- Understand sensor characteristics and fundamentals.
- Have knowledge on sensor Design and Selection.
- Understand concepts of open and closed loop control, feedback control.
- Gain knowledge on PID control strategy and PID tuning
- Learn various sensors used for measurement of process parameters such as temperature, flow, pressure, level etc. covering principle of operation, specifications etc.

### WHO SHOULD ATTEND

- Instrumentation, Electrical, Mechanical and Process Engineers.
- Project Engineers, Maintenance engineers and supervisors interested to acquire the knowledge in the field of measurement and process control.
- All the other department people concerned with the plant operations, maintenance and safety.

### COURSE DURATION

5 Working Days

## COURSE OUTLINES

- Background and Evolution of Process Control/ Automation
- Oil and Gas Process Requirements
- Petrochemicals Process Requirements
- Basic Concepts – Open /Close loop
- Introduction to Control Loop Components
- Continuous and Discrete Control
- Introduction to ISA S 5 (Instrumentation Symbols)
- Sensor Characteristics.
- Principle of working, specifications, merits and limitations,
- Selection criteria for following sensors:
  - Temperature Measurement
  - Principle of working, specifications, merits and limitations,
  - Selection criteria for following sensors:
    - Pressure Measurement
    - Flow Measurement
    - Custody Meter Transfer
    - Meter Proovers
    - Principle of working, specifications, merits and limitations,
    - Selection criteria for following sensors: Level Measurement, Position Sensing, Weight Measurement, Speed Measurement
  - Process Parameter Switches: Pressure, Level, Flow, and Temperature Switches
- Control Loop Components
- Standard Signals
- SMART Transmitter
- I to P Converter
- Control Valves
- Actuators and Positioners.
- Controllers and Control Actions
- ON-OFF, PID
- Tuning of Controllers
- Operations and Maintenance Aspects of Sensors & Loop Components
- Troubleshooting of sensors
- Sensors and Instrumentation Engineering Aspects

- System Design Concepts
- Introduction to ISA TR 20
- Brief Introduction to Safety Systems and Related Field Instrumentation.

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