Training programme on Instrumentation and Process Control

Course Contents

Instrumentation

1. Basics of Instrumentation
   - Temperature Measurement
   - Flow Measurement
   - Pressure Measurements
   - Control valve
   - Shutdown Valves

2. Basics of DCS
   - Point database
   - Graphics
   - PID and PFD diagrams
   - Tuning of Controllers   (Proportional, Integral and Derivative controller)
   - Manual, Auto and cascade mode operation.
   - Control room ambience.
   - UPS performance and connectivity with DCS and PLC.
   - Plant operation details
   - HARD WARE console operation.

3. Programmable Logic Controller
   - Dual Modular and Triple Modular Redundancy
   - Working of Interlock system explained
   - Emergency shutdown system of the plant.

4. Analyzers
   - Mass spectrometer
   - Working of SO2 ,NO2 ,Oxygen Analysers
   - Working and usefulness of Hydrogen Gas detector, LEL Hydrocarbon Gas detector and H2S Detectors
   - Working of Moisture Analyser

5. Historian and Alarm Management system.

6.Working of Furnace, Process Compressors, Turbines and Air compressors system

Process Control

   - Fundamentals of Advanced Process Controls
   - Basic concepts

- Process Identification
- Regulatory control principles
- Gain, Time constant and Dead time
- Closed Loop and Open Loop
- Feed-Forward and Feedback
- PID Control Concepts
- Controller tuning
- Basics of DCS Architecture and topology
- Major components of DCS
- Regulatory points, their various attributes and features
- The control network, sensors, controllers, MMI and their integration
- DCS Trends, History and major operational aspects of DCS
- Concepts of Inferential properties
- Development of Inferential properties–Principles and Techniques
- Development of Inferential properties–Methodology
- Advanced Regulatory controls
- Implementation issues
- Bias Update
- Basic Principles of Multivariable Control
- Advantage of MVPC over single loop
- Concept of CV, MV, DV
- Role of APC engineers in MVPC implementation
- Step testing, model building & FAT/SAT - Methodology and Significance
- Operational aspects of Multi-Variable APC

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The objective of this lecture is to help APC and Process / Production Engineers a basic understanding of the nuances of Process Control, controller tuning, Inferential Properties, and Regulatory Control, Various architectural and operational aspects of Distributed Control System. This will enable production / process engineers to fully exploit of DCS and regulatory system, operate the process units more efficiently and get full benefit of various features of process control system.

The objective of this lecture is to help APC and Process / Production Engineers a basic understanding of the nuances of Process Identification and Control, controller tuning, Inferential Properties, Advanced Regulatory Control, Multivariable Predictive Control, implementation issues, benefits and related aspects.