

HART Based Instrumentation & Control

COURSE DESCRIPTION

COURSE DESCRIPTION

Automatic Process Control is being used in almost all the industry verticals today. Each industry has special emphasis on process control for improvement in safety, quality, efficiency and productivity with reduction in material wastage and energy consumption. With the advent of Microcontroller technology, field instrumentation has become intelligent with many SMART features. HART protocol based instrumentation is internationally established as a de facto standard for exploring the benefits of technology. These intelligent devices are either interfaced with control systems (DCS/PLC) or used in standalone and provide numerous advantages viz. improved accuracy, reduced installation, operating and maintenance costs etc. This is an introductory course, which aims to build a good understanding about the basics of HART based SMART instrumentation & process control. It covers details of sensors, the control loop components and focuses on providing inputs related to use of intelligent instrumentation for process control.

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. A brief introduction to Field bus technology would help the participants to enhance their exposure related to latest developments in the SMART instrumentation.

COURSE OBJECTIVES

Upon Completion of this course the participant will be able to

- Understand concepts of open and closed loop control, feedback control
- Understand working of Control Loop Components
- Learn fundamentals of SMART Instrumentation & Control
- Understand HART protocol and its applications
- Learn various HART based instruments used for measurement of process parameters covering principle of operation, specifications, etc.
- Have knowledge on SMART instrumentation Design and Selection
- Gain knowledge on PID control strategy and its real life implementation
- Know the art of utilizing benefits of HART based SMART instrumentation & control
- Have a brief exposure to Field bus technology

WHO SHOULD ATTEND

Instrumentation, Electrical, Mechanical and Process Engineers, Project Engineers, Maintenance engineers, supervisors, and technicians interested to acquire the knowledge in the field of SMART instrumentation & control. The course will definitely be beneficial for the all the other department people concerned with the plant operations, maintenance and safety. It could be also useful for the procurement and quality personnel.

Training Methodology

Training will be delivered mainly through lectures with emphasis on practical examples and case studies. Experienced instructor is provided to guide the participant using demonstrations and assignments so that they are prepared to work confidently with the SMART Instrumentation & Process Control.

THE INSTRUCTOR

Mr. Sudhir Panditrao has done his graduation and masters in instrumentation engineering with specialization in process instrumentation. During his professional career spanning 22 years, Mr. Panditrao has worked in the areas of instrumentation and automation design, detailed engineering, projects, installation and commissioning at site for variety of industry applications. He has experience of working in the Middle East as a profit center head that included international projects, sales and marketing in instrumentation and industrial packaging. He has worked as a consultant to various leading international organizations. Mr. Panditrao has carried out training in the areas of instrumentation,

industrial automation, PLC, DCS, SCADA, advanced process control, automation project engineering etc. for many professionals, students and professors from several leading companies, engineering colleges and institutes. He has worked as an Asst. Professor with one of the leading technical institutes and has published many papers. He is associated with number of institutes as a visiting faculty and is a member of board of studies and postgraduate recognized teacher at University. He has presented a paper at IEEE Conference on Advance Process Control at Vancouver, Canada in May 2005.

COURSE OUTLINE

Module 1

Background and Evolution of Process Control/ Automation
Basic Concepts - Open /Close loop
Continuous and Discrete Control
Introduction to Control Loop Components
Conventional Transmitter
I to P Converter, Control Valves, Actuators and Positioners

Module 2

Standard Signals
Loop Wiring and Checking Concepts
Sensors and Transducer and its Characteristics
SMART Transmitter
Fundamentals of SMART instrumentation & control
HART Protocol Introduction

Module 3

ISO OSI 7 layer communication structure
HART protocol principle of working, specifications, merits and limit
Hand Held Communicator
Multidropping concepts
Various features of HART based instruments
Applications of intelligent features of SMART instrumentation

Module 4

Process Characteristics, Lags in Control loop
Controllers and Control Actions
ON-OFF
Proportional
Integral
Derivative
PID Controllers: algorithms, forms, terminology, and selection
Microprocessor based controllers
PID in HART based SMART devices

Module 5

SLPC
Current Scenario - PLC and DCS based automation
Introduction to Field bus technology
Comparison of HART vs. different field buses
SMART valves
SMART valves applications and specifications