

# THE A TO Z OF PROCESS AUTOMATION

## Introduction

This is a macro-level course covering all aspects of Controls and Instrumentation from the simplified basic principles to complex computer based plant automation systems. The course is meant for those who need to know about process control but are not instrumentation specialists. The course is designed for process specialists, engineers and project managers who have to interact with control system engineers for engineering or operation.



## Course Content

No.	TOPIC	DESCRIPTION
1.	<b>Basics of Process and its Control Characteristics</b>	<ul style="list-style-type: none"> <li>• Basic Concepts and Definitions</li> <li>• Basic Control Loop – The five elements</li> <li>• Process Characteristics and Dynamics</li> <li>• Degrees of freedom for Control</li> <li>• Examples and exercises</li> <li>• Terminologies and Symbols</li> </ul>
2.	<b>Measuring Means</b>	<ul style="list-style-type: none"> <li>• Brief description of Measuring Techniques</li> <li>• Temperature Measurement</li> <li>• Pressure Measurement</li> <li>• Flow Measurement</li> <li>• Analysis and Properties Measurement</li> </ul>
3.	<b>The Control Loop</b>	<ul style="list-style-type: none"> <li>• Control Loop Type</li> <li>• Analysis of Common Control Scheme / Loops</li> <li>• Basic Regulatory Control Loop</li> <li>• Controller Mechanism</li> <li>• Lead, Lag, Dead Time</li> </ul>
4.	<b>Control Algorithm</b>	<ul style="list-style-type: none"> <li>• On-off Control</li> <li>• PID Controller</li> <li>• Proportional Control</li> <li>• Integral Control</li> <li>• Proportional plus Integral Control</li> <li>• Derivative Control</li> <li>• Proportional plus Derivative Control</li> <li>• Proportional plus Integral plus Derivative Control</li> </ul>
5.	<b>The Final Control Element – Valves</b>	<ul style="list-style-type: none"> <li>• The control valve</li> <li>• Principle of operation</li> <li>• Control Valve Components</li> <li>• General Categories of Control Valves</li> <li>• Valve Actuators</li> <li>• Valve Positioners and Accessories</li> <li>• Valve Characteristics and Selection</li> <li>• General Selection Criteria</li> <li>• Control Valve Performance and flow characteristics</li> <li>• Control Valve Engineering</li> </ul>

No.	TOPIC	DESCRIPTION
6.	<b>Control System Application in Practice</b>	<ul style="list-style-type: none"> <li>● <b>Boiler Control Overview</b> <ul style="list-style-type: none"> <li>▪ Overview of Boiler Control System</li> <li>▪ Boiler Control Schemes</li> <li>▪ Typical Pressure Control Scheme</li> <li>▪ Three Elements Feed Water System</li> <li>▪ Steam Temperature Control</li> <li>▪ Safeguarding Boiler Operation</li> </ul> </li> <li>● <b>Steam Turbine</b> <ul style="list-style-type: none"> <li>▪ Types of Turbine</li> <li>▪ Description of Control Systems</li> <li>▪ Control Applications</li> </ul> </li> <li>● <b>Centrifugal Compressor</b> <ul style="list-style-type: none"> <li>▪ Characteristic Curve and Definition of Surge</li> <li>▪ Surge Control</li> <li>▪ Surge Control at Constant Speed</li> <li>▪ Compressor Control with Variable Speed Drive</li> <li>▪ Surge Control for Gas Molecular Weight Changes</li> <li>▪ Incipient Surge</li> </ul> </li> <li>● <b>Distillation Column Control</b> <ul style="list-style-type: none"> <li>▪ General Principles</li> <li>▪ Typical Control System for Distillation</li> <li>▪ Pressure Control, Temperature Control And Product Quality Control Methods</li> </ul> </li> <li>● <b>Batch Process Control</b> <ul style="list-style-type: none"> <li>▪ Batch Versus Continuous Processes</li> <li>▪ Batch Automation Functions</li> <li>▪ Batch Control Strategy</li> </ul> </li> </ul>
7.	<b>Computers and Controls</b>	<ul style="list-style-type: none"> <li>● An Overview of Distributed Control System (DCS)</li> <li>● An Overview of Programmable Logic Controllers (PLC Systems)</li> <li>● Supervisory Control And Data Acquisition (SCADA) Overview</li> <li>● Open Control System</li> <li>● Fieldbus Applications</li> <li>● Modern Human Interfaces / Computer Interfaces</li> <li>● Fundamentals of Communication and Networking</li> </ul>
8.	<b>Safeguarding System</b>	<ul style="list-style-type: none"> <li>● Introduction and Major Safety Standard</li> <li>● Safety Life Cycle</li> <li>● Safety Instrumentation System</li> <li>● Fire and Gas Shutdown System</li> <li>● Basic Fire Concepts</li> <li>● Emergency Shutdown Systems</li> </ul>

### Methodology of presentation

- Microsoft Power Point with colorful slides packed with information.
- Highly interactive with total involvement of the participants .
- Interesting and Interactive Quiz Sessions, group tasks for better assimilation.