



Technology Training that Works

Fundamentals of Instrumentation, Process Control, PLCs and SCADA for Plant Operators and other Non- Instrument Personnel

LIVE ONLINE COURSE

WHAT YOU WILL LEARN:

- The fundamentals of instrumentation and process control
- The basics of PLCs and SCADA systems
- An ability to troubleshoot simple problems with instruments, PLCs and SCADA systems
- An ability to understand simple plant documentation such as P&IDs
- How to work effectively with your instrumentation plant colleagues

WHAT'S INCLUDED?

- Four 50 minute live, practical sessions with your instructor and attendees
- The full technical eBook manual for "Fundamentals of Instrumentation, Process Control, PLCs and SCADA for Plant Operators and other Non-Instrument Personnel" which includes course slides, cases studies, calculations and practical exercises
- Four hours of additional in-depth video sessions covering many additional areas – yours to keep and watch at your convenience

THE COURSE

This course offers a great opportunity to walk out with a great grounding in the basics of this exciting field which is rapidly changing the way all plants operate. The constant drive to cut costs means that as an operator you will increasingly have to have more skills and know-how in the plant instrumentation and process control area.

The topics covered begin with an introduction to instrumentation and measurement ranging from pressure, level, temperature and flow devices followed by a review of process control including the all important topic of PID loop tuning. You will also learn about PLC and SCADA systems where the important topic of industrial data communication networks are also examined – again from a very simple understandable point of view. Finally, the course is rounded off with a review of reading and interpreting simple plant documentation such as P&IDs so that you can see and understand the operation of the plant through the documentation.

After completing this course, you will have a strong understanding of the key concepts in instrumentation, process control, SCADA and PLCs.



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WHO SHOULD ATTEND?

Anybody with an interest in gaining know-how in the full range of instrumentation, process control, PLCs, SCADA and P&ID documentation, this will range from operators, trades personnel, procurement staff, sales staff, technicians and engineers from other backgrounds/disciplines, such as mechanical, electrical and civil. Even the plant secretary who is keen to have a good understanding of the key concepts would benefit. Managers who are keen to understand the key workings and the future of their plants would also benefit from this workshop.

PREQUISITES:

The workshop is presented in easy to understand practical language. All you need to benefit from this workshop is a very basic understanding of mathematics and some electrical theory. Contact us for comprehensive pre-course reading and preparation if you are unsure about your level of understanding.

COURSE OUTLINE

This is an intensive online course. The course is split up in to two sections – Live sessions and recorded lectures. All 8 hours will be provided upon course completion for review.

LIVE SESSIONS

SESSION 1

PRESSURE MEASUREMENT

- Principle of pressure measurement
- Pressure transducers and elements

LEVEL MEASUREMENT

- Principles of level measurement
- Simple sight glasses
- Hydrostatic pressure
- Ultrasonic measurement
- Electrical measurement
- Density measurement

TEMPERATURE MEASUREMENT

- Principles of temperature measurement
- Thermocouples
- Resistance Temperature Detectors (RTDs)
- Thermistors



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SESSION TWO

FLOW MEASUREMENT

- Principles of flow measurement
- Open channel flow measurement
- Oscillatory flow measurement
- Magnetic flow measurement
- Positive displacement
- Ultrasonic flow measurement
- Mass flow measurement

FUNDAMENTALS OF PROCESS LOOP TUNING

- Processes, controllers and tuning
- PID controllers
- Gain, dead time and time constants
- Process noise
- General purpose closed loop tuning method

SESSION THREE

SCADA SYSTEMS HARDWARE

- Remote Terminal Unit (RTU) structure
- Analog and digital input/output modules
- Master site structure

SCADA SYSTEMS SOFTWARE

- Fundamentals
- Components of a SCADA system
- Software – design of SCADA packages
- Configuration of SCADA systems
- Building the user interface

SESSION FOUR

DRAWING TYPES AND STANDARDS

- Understanding diagram layouts and formats
- Cross references
- P&IDs fundamentals

CONCLUSION

- Summing up and revision of key concepts
- The future

RECORDED LECTURES

RECORDING ONE

INTRODUCTION

- Overview of instrumentation and control
- Key building blocks of PLCs and SCADA systems
- Outline of the workshop



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INTRODUCTION TO PROCESS MEASUREMENT

- Basic measurement concepts
- Definition of terminology
- Measuring instruments and control valves as part of the overall control system

RECORDING TWO

INTRODUCTION TO CONTROL VALVES

- Introduction
- Definition of a control valve
- Cavitation
- Flashing

DIFFERENT TYPES OF CONTROL VALVES

- Globe valves
- Butterfly
- Eccentric disk
- Ball
- Rotary plug
- Diaphragm and pinch

RECORDING THREE

FUNDAMENTALS OF PLCs

- Introduction to PLCs
- Alternative control systems – where do PLCs fit in?
- Why PLCs have become so widely accepted

FUNDAMENTALS OF PLC HARDWARE

- Block diagram of typical PLC
- PLC processor module – memory organisation
- Input / output section – module types
- Power supplies

FUNDAMENTALS OF PLC SOFTWARE

- Methods of representing Logic
- Ladder Logic basics
- The basic rules for programming
- Simple PLC programs

INTRODUCTION TO SCADA SYSTEMS

- Fundamentals
- Comparison of SCADA, DCS, PLC and smart instruments
- Typical SCADA installations
- Definition of terms



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RECORDING FOUR

BASICS OF DATA COMMUNICATIONS BETWEEN PLC AND SCADA SYSTEMS

- Twisted pair cables
- Fibre optic cables
- Public network provided services
- Industrial Ethernet
- TCP/IP
- Fieldbus
- Modbus
- LAN connectivity: bridges, routers and switches
- SCADA network security