Practical
PROCESS CONTROL
for Engineers & Technicians

YOU WILL LEARN:

- **The fundamentals of process control and the latest techniques**
- **Tuning of PID control loops**
- **How to connect cascade loops**
- **To understand cascade loops and feedforward control**
- **How to correct long dead-times in a loop**

Perform 10 hands-on, practical exercises using professional simulation software which is yours to keep

WHO SHOULD ATTEND:

- **Electrical Engineers**
- **Instrumentation Engineers**
- **Instrumentation & Process Technicians**
- **Control Technicians**
- **Automation Engineers**
- **Process Engineers**
- **Chemical Engineers**
- **Mechanical Engineers**
- **Energy Management Consultants**

IDC TECHNOLOGIES

Technology Training that Works

THE WORKSHOP

This practical two-day workshop covers all the essentials of process control and tools to optimise the operation of your plant and process, including the ability to perform effective loop tuning.

Practical Process Control is aimed at engineers and technicians who wish to have a clear, practical understanding of the essentials of process control and loop tuning, as well as how to optimise the operation of their particular plant or process.

These persons would typically be primarily involved in the design, implementation and upgrading of industrial control systems. Mathematical theory has been kept to a minimum with the emphasis throughout on practical applications and useful information.

PRE-REQUISITES:
Basic electrical concepts would be useful.

WORKSHOP OBJECTIVES

On successful completion of this workshop you will be able to:

- specify and design the analog loop requirements for a plant using PID control
- identify and apply the essential building blocks in automatic control
- apply the procedures for open and closed loop tuning
- tune control loops with significant dead-times
- demonstrate a clear understanding of analog process control and tune analog loops
- explain concepts used by major manufacturers using current technology in the process control field

ON-SITE TRAINING

✔ **SAVE** over 50% by having an IDC workshop presented at your premises.

✔ Customise the training to **YOUR** workplace.

✔ Have the training delivered when and where you need it.

Contact us for a **FREE** proposal.

THE PROGRAM

DAY ONE

INTRODUCTION

BASIC CONTROL CONCEPTS
- Typical manual control
- Feedback and feedforward control
- Block diagrams

INTRODUCTION TO SENSORS AND TRANSMITTERS
- Selection and specification of devices
- Pressure transmitters
- Flow meters
- Level transmitter
- Temperature sensors
- *Practical session*

INTRODUCTION TO CONTROL VALVES
- Basic principles
- Rotary control valves
- Ball valves
- Control valve characteristics and specifications

BASIC PRINCIPLES OF CONTROL SYSTEMS
- On/Off control
- Modulation control
- Principles of closed loops control
- PID of control moves
- *Practical session*

STABILITY AND CONTROL MODES OF CLOSED LOOPS
- Cause of instability in control loops
- Change of stability through PID control modes
- Methods to improve stability
- Principles of closed loop control tuning
- *Practical session*

IDEAL PID vs REAL PID
- Non-field-interactive or ideal PID
- Field-interactive or real PID
- Distinguish between process noise and instability
- Selection of ideal or real PID
- *practical session*

TUNING OF CLOSED LOOP CONTROL
- Tuning constants calculation according to Ziegler and Nichols
- Open loop tuning procedure
- Closed loop tuning procedure

DAY TWO

TUNING OF CLOSED LOOP CONTROL (CONT.)
- Damped oscillation tuning method
- Fine tuning of practical control loops
- Tuning considerations for controllers with saturation and non-saturation output limits
- *Practical session*

CASCADE CONTROL
- Equation types for cascade control
- Initialisation and PV-tracking
- Use of multiple outputs in cascade control
- Tuning procedure for cascade control
- *Practical session*

FEEDFORWARD CONTROL
- Feedforward balance - a control concept
- Tuning procedure for feedforward control
- *Practical session*

COMBINED FEEDBACK AND FEEDFORWARD CONTROL
- Concept of combined control with incremental algorithms
- Tuning procedure for combined control
- *Practical session*

LONG DEAD-TIME IN CLOSED LOOP CONTROL
- The problem of long dead-time in closed loops
- Use of process simulation for process variable prediction
- Tuning procedure for control loops with long dead-time
- *Practical session*

ALARM HANDLING AND PROCESS SECURITY

RANGE OF CONTROL AND INSTRUMENTATION IN INDUSTRIAL PROCESS CONTROL

PRACTICAL APPLICATIONS
- PLC systems
- Stand alone loop controllers
- *Practical session*

EXPERT SYSTEM AND MODEL BASED SELF TUNING CONTROLLERS
- Basic auto tuning
- Expert system control
- Model based adaptive control

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Excellent, enthusiastic, wealth of knowledge.
Presented in interesting, entertaining manner.

Kevin Legce

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