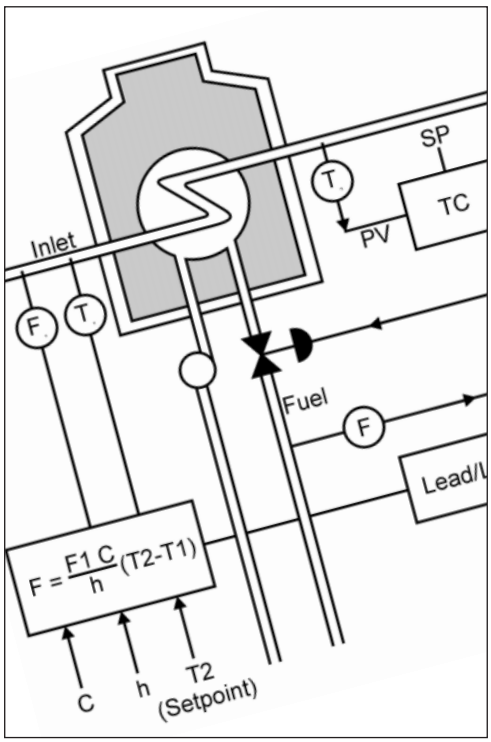
Practical

PROCESS CONTROL AND TUNING OF INDUSTRIAL CONTROL LOOPS



YOU WILL LEARN HOW TO:

- Apply the fundamentals of Process Control
- Set up efficient Process Control systems
- Set up cascade and feedforward systems
- Tune loops effectively
- Apply open and closed loop tuning rules
- Deal with stiction, hysteresis and non linearities
- Correct problems with dead time
- Troubleshoot tuning problems

WHO SHOULD ATTEND:

- Instrumentation & Control Engineers
- Process Control Engineers
- Mechanical Engineers & Technicians
- System Integrators
- Consultants
- Operators monitoring & controlling processes
- Installation & Maintenance technicians
- Energy Management Consultants
- Electrical Engineers
- Electricians
- Automation Engineers

IDC TECHNOLOGIES

Technology Training that Works

THE WORKSHOP

This workshop is designed to give you a solid understanding of the essentials of Process Control and skill you and/or your staff, in the latest procedures for the tuning of Industrial Control Loops using a minimum of mathematics and formulas.

A clear review of the principles and essentials of Process Control is given thus allowing you to gain the skills to tune a wide variety of controllers. Tuning controllers is an exact science that requires precise configuring of the process controller using the correct procedures. When the controller is set up correctly this is called tuning.

The aim of this workshop is to provide and/or enhance the skills required to tune a controller for optimum operation. An optimally tuned processed loop is critical for a wide variety of industries ranging from food processing, chemical manufacturing, oil refineries, pulp and paper mills, mines and steel mills.

Although tuning rules are designed to give reasonably tight control, this may not always be the objective. Some thought needs to be given when retuning a loop as to whether the additional effort is justified as there may be other issues which are the cause of the poor control. These issues will be discussed in some detail in the workshop. At the end of this workshop you will have the skills to troubleshoot and tune a wide variety of process loops.

PRE-REQUISITES

This is not an advanced course, but one aimed at the fundamentals. Basic electrical concepts and some knowledge of instrumentation would be useful.

PRACTICAL SESSIONS

Throughout the workshop, simulation software is used to simulate real loops and to give you a minimum of twelve real hands-on exercises in a safe practice environment.

You will see the simulated process output respond to your input and configuration changes on the loop controller. You will reinforce and apply the concepts learnt using real field test data in simulation.

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

BASIC CONTROL CONCEPTS
- Typical Manual Control
- Feedback and Feedforward Control
- Block Diagrams

INTRODUCTION TO INSTRUMENTATION
- Selection and Specification of devices
- Pressure Measurement
- Flow Measurement
- Level Measurement
- Temperature Measurement

INTRODUCTION TO CONTROL VALVES
- Basic Principles
- Rotary Control Valves
- Ball Valves
- Characteristics and Specifications

FUNDAMENTALS OF PROCESS CONTROL
- Processes, controllers and tuning
- PID controllers - P, I and D modes of operation
- Load disturbances and offset
- Speed, stability and robustness
- Gain, dead time and time constants
- Process noise
- Feedback controllers
- How to select feedback controller modes
- *Practical Session*

DAY TWO

FUNDAMENTALS OF TUNING
- Open loop characterisation of process dynamics
- Default and typical settings
- General purpose closed loop tuning method
- Quick and easy open loop method
- Fine tuning for different process types
- Simplified lambda tuning
- *Practical Session*

DAY TWO CONT.

THE DIFFERENT TUNING RULES
- Ten different rules compared
- Tables of typical tuning settings
- When to use them/when not to use them
- Rules of thumb in tuning
- *Practical Session*

TUNING OF VALVES
- Hysteresis
- Stiction
- *Practical Session*

DAY THREE

AUTOMATED TUNING
- Self tuning loops
- Adaptive control
- *Practical Session*

TUNING OF MORE COMPLEX SYSTEMS
- Cascade systems - tuning of them
- Feedforward, ratio, multivariable systems
- Interactive loops tuning
- Dead time compensation
- Practical limitations
- *Practical Session*

GOOD PRACTICE
- Good practice for common loop problems
- Flow control loop characteristics
- Level control loop characteristics
- Temperature control loop characteristics
- Pressure control loop characteristics
- Other less common loops
- *Practical Session*

WORKSHOP OBJECTIVES

At the end of this workshop participants will:
- understand the fundamentals of Process Control
- know the fundamentals of tuning loops - both open and closed loop
- get the best PID settings right first time
- know where to troubleshoot to achieve optimally tuned control loops
- be able to apply step-by-step descriptions of the best field-proven tuning procedures
- know the typical procedures for troubleshooting tuning problems
- tune more control loops in less time with consistently excellent results
- be able to apply the practical rules of thumb for tuning systems
- be proficient at tuning with a detailed knowledge of Open Loop Tuning and Closed Loop Tuning (including such classics as Ziegler Nichols Tuning and Lambda Tuning)
- be able to determine the minimum settling time for a control loop
- know the optimum amount of filtering or dampening to apply to the measurement
- know why and how to size valves for best control loop performance
- be able to handle problems such as valve hysteresis, stiction and non linearities
- be able to tune complex loops ranging from cascade to feedforward
- know when to use derivative control for the best tuned loop
- understand cascade loops and feedforward control
- be able to identify and correct problems with dead time in the process