PRACTICAL TUNING OF
INDUSTRIAL CONTROL LOOPS

WHAT YOU WILL LEARN:

- Fundamentals of tuning loops - both open and closed loop
- How to recognise the key characteristics of process plant from a control perspective
- Significance of dead time and transfer lags
- PID controller behaviours
- How to troubleshoot and identify problems
- Differences between ideal/real/interacting/non-interacting controllers
- Combination of control modes to use
- How to tune more control loops in less time with effective results
- Practical rules of thumb for tuning systems
- Ziegler Nichols and Lambda tuning
- How to recognise configuration deficiencies
- Optimum amount of filtering or dampening to apply to the measurement
- How control valves impact on control loop performance
- How to solve problems such as valve hysteresis, stiction and non linearities
- How to tune complex loops ranging from cascade to feedforward
- When to use derivative control for the best tuned loop

WHO SHOULD ATTEND:

- Mechanical, electrical and electronic engineers
- Technicians
- Electricians
- Control and instrumentation engineers
- Facility managers
- Installation and maintenance technicians
- Automation engineers
- Consultants
- Energy management consultants

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The Workshop

This workshop is designed to train you and/or your staff, in the configuration and tuning of industrial control loops using a minimum of mathematics and formulas. Controllers need to be carefully matched to the process to work optimally; this matching procedure is called tuning. Controllers that are not correctly configured and tuned will not perform optimally and will not reduce variability in the process as they should.

The aim of this workshop is to provide and/or enhance the skills required to configure and 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

Basic knowledge of instrumentation and process plant would be useful.

Please bring a calculator (or computer) and pen along to the course to assist with the calculations.

Simulation Exercises

Throughout the workshop, simulation software is used to simulate real loops and to give you 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.

The Program

FUNDAMENTALS OF LOOP TUNING
- 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

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

THE DIFFERENT TUNING RULES
- Different rules compared
- Typical tuning settings
- When to use them/when not to use them
- Rules of thumb in tuning

Practical Session

TUNING OF VALVES
- Hysteresis
- Stiction
- Characteristic selection and correction
- Positioner configuration and tuning

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

SUMMARY, OPEN FORUM AND CLOSING

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