Supra

Unique Self-Learning System

Chemical Engineering

CBT on

Industrial Process Control

Module 6 in Chemical Engineering Series

During the last decade, the field of Process Control has become increasingly important in chemical, pharmaceutical, petrochemical plants, oil refineries, and related industries. This is because process control can help a chemical business through:

- Improved product quality
- Increased production rates of desired products
- Reduced production rates of unwanted byproducts
- Reduced consumption of utilities
- Reduced environmental pollution
- More stable plant and equipment operation
- Smoother plant start-ups and shut-downs
- Increased automation and modernization

All of the above areas are of immense interest to a chemical business. Good process control results in both monetary (tangible) and intangible benefits. Monetary benefits typically range from 0.5% - 8% of the plant's gross profit margin, which is quite substantial and hence the need and value of process control.

The Industrial Process Control CBT module is the result of years of practical control room experience and academic background on process control. The authors have focused on producing a CBT package that combines the best of both practical control room experience and academic process control theory.

This module is designed to train process engineers, process control engineers, control room operators, university students, supervisors and managers on the basics of industrial process control. The module will help to develop the ability to quickly apply modern practical process control techniques to implement control strategies in the plant.

The module will also help in choosing the most appropriate process control tool for a given control problem based on the nature and uniqueness of a process.

Whether you are a process or process control engineer, project engineer or a student, you will find immense value from this Industrial Process Control CBT module. The process control area today overlaps almost all other inter-related industrial disciplines. A working knowledge of process control is vital for effective teamwork in both new plant engineering design and daily plant operation.

Module Contents *(Study Time 75 hrs)*

Part I. Primary Process Control

1. **Overview of Modern Industrial Process Control**
2. **Process Control Variable Definitions**
3. **Primary Control and The PID Algorithm**
4. **PID Algorithm - Additional Options and Parameters**
5. **Cascade PID Algorithm**
6. **Override Control Strategies**
7. **PID Modes and PID Activation Procedure**
8. **PID Tuning Procedures and Control Quality**
9. **Process Control Schematics**

Part II. Advanced Process Control

10. **Disturbances, Feedforwards and Decouplers**
11. **Process Signal Filtering and Control Valve Checkout**
12. **Dead Time Compensation and Model-Based Control**
13. **Control Schemes Using Discrete Signals**
14. **Model Predictive Control and Rule-Based Control**
15. **Handling Nonlinearities**

Part III. Lab Sessions

16. **Lab Sessions (Practical Exercises)**

Lab Sessions with PITOPS™ Simulator

PITOPS™

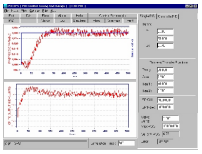
In the Lab Session, several simulation exercises are run with the proprietary process control software **PITOPS™ (P**rocess **I**dentification and Controller **T**uning **O**ptimizer **S**imulator). These lab sessions using PITOPS™ will enhance your understanding of the fundamentals of process control and its application to industrial problems.

PITOPS™ is a complete process control simulator that behaves like the real plant. The user can configure process control loops ranging from fast flow loops or compressor surge loops to slower pressure, temperature loops, and very slow loops like those controlling online distillation purities. It can model zero order ramp and higher order transfer functions.

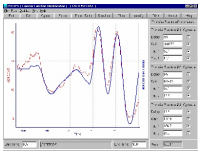
PITOPS™ simulates complex cascade loops, feedforwards and model based control schemes. It also provides complete IMC (internal model control) and DTC (dead time compensation) schemes.

Furthermore, PITOPS™ allows simultaneous identification of multivariable transfer functions with both open-loop or closed-loop data.

The combination of PITOPS™ and all the CBT theory material provides a totally novel form of modern practical process control training.



PID Simulation in PITOPS fully matches DCS action



Three-Input Simultaneous Multivariable Identification using Closed-Loop Data

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