intelitek ▶▶ ®

Process Control

Process Control gives students a solid understanding of the fundamentals of instrumentation and industrial process control. Using ProcessMotion advanced 3D-modeling simulation control software, students gain hands-on experience with the measurement and control of pressure, liquid level, flow and temperature processes. Students use ProcessMotion software to control a virtual training panel to optimize the parameters for PID control and tuning. The Process Control course series teaches students control methods of open loop, on/off loop and three-element (PID).

Course List

Process Control Temperature

The Process Control Temperature course enables students to practice the control temperature processes, including heat exchanger and heated tank processes. Students raise and lower water temperature to preset levels using manual control and auto-tuning methods. They control the flow rate through the heat exchanger using a motorized valve, and create variable demand and supply disturbances by introducing cooled water from the reservoir tank.

Course Outline

- Introduction to Process Control
- Introduction to ProcessMotion Simulation Software
- Block Diagrams and Gain
- Calculating Process Gain
- Heating Element Control
- First Order Systems
- The Temperature System Time Constant
- Controlling the Temperature System Using Open Loop Control
- Introduction to On-Off Control
- On-Off Control - Tasks
- Controlling the Temperature System Using On-Off Control
- Proportional Control
- First Order Systems Under Proportional Control
- Controlling the Temperature System Using Proportional Control
- Proportional Integral Control
- Controlling the Temperature System Using Proportional Integral Control
- PID Control
- Controlling the Temperature System Using Proportional Integral Derivative Control
- Controller Selection and Design
- Designing Controllers for the Temperature System

Process Control Level

Level Control course delivers hands-on experience with the measurements and control of liquid level. Students raise and lower water to preset levels using manual control and auto-tuning methods. They learn how flow rate affect a preset level. Students create variable demand and supply disturbances by manipulating the panel's loading pump.
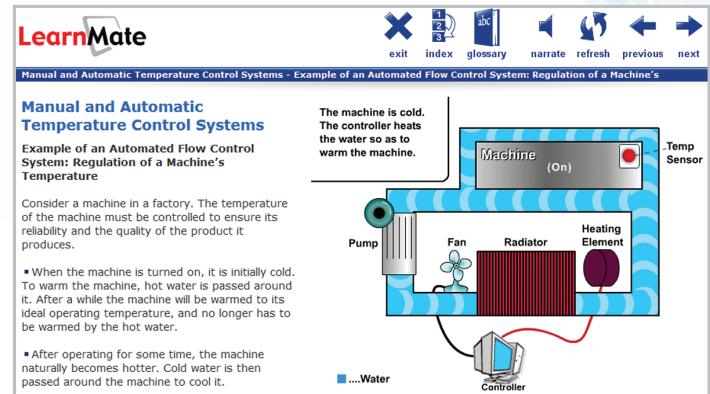
Course Outline

- Introduction to Level Control
- ProcessMotion Simulation Software
- Block Diagrams and Gain
- The System Block Diagram and the Final Control Element Gain
- Calculating System Gain
- First Order Systems
- The Level System Time Constant
- Controlling the Level System
- Using Open Loop Control
- Introduction to On-Off Control
- On-Off Control - Tasks
- Controlling the Level System
- Using On-Off Control
- Proportional Control
- First Order Systems Under
- Proportional Control
- Controlling the Level System
- Using Proportional Control
- Proportional Integral (PI) Control
- Controlling the Flow System
- Using PI Control
- Proportional Integral
- Derivative (PID) Control
- Controlling the Flow
- System Using PID Control

Process Control Flow

Flow control course serves to demonstrate and teach the measurements and control of liquid flow processes. Flow Process Control course gives students hands-on experience raising and lowering water flow rates to preset levels using manual control and auto-tuning methods. Students create variable demand and supply disturbances by opening an outlet valve along the supply pipe.

Course Outline

- Introduction to Process Control
- Introduction to ProcessMotion Simulation Software
- Block Diagrams and Gain
- The System Block Diagram and Final Control Element Gain
- Calculating Process Gain
- First Order Systems
- The Flow System Time Constant
- Controlling the Flow System Using Open Loop Control
- Introduction to On-Off Control
- On-Off Control - Tasks
- Controlling the Flow System Using On-Off Control
- Proportional Control
- First Order Systems Under Proportional Control
- Controlling the Flow System Using Proportional Control
- Proportional Integral (PI) Control
- Controlling the Flow System Using PI Control
- Proportional Integral Derivative (PID) Control
- Controlling the Flow System Using PID Control
- Controller Selection and Design
- Designing Controllers for the Flow System

Process Control Pressure

The Pressure Process Control course offers students hands-on training in the measurement and control of pressure processes. Students raise and lower air pressure to preset levels using manual control and auto-tuning methods. Students learn how the E/P converter with the control valve affects a preset pressure in the air tank. They create variable demand and supply disturbances by manipulating the panel's valves.

Course Outline

- Introduction to Process Control
- Introduction to ProcessMotion Simulation Software
- Block Diagrams and Gain
- Calculating Process Gain
- Calculating the Final Control Element Gain
- First Order Systems
- The Pressure System Time Constant
- Controlling the Pressure System Using Open Loop Control
- Introduction to On-Off Control
- On-Off Control - Tasks
- Controlling the Pressure System Using On-Off Control
- Proportional Control
- First Order Systems Under Proportional Control
- Controlling the System Using Proportional Control Proportional Integral Control
- Controlling the Pressure System Using PI Control
- PID Control
- Controlling the Pressure System Using PID Control
- Controller Selection and Design

ProcessMotion

ProcessMotion software is an outstanding tool for demonstrating and understanding level, flow and temperature process control, with an emphasis on the process itself.
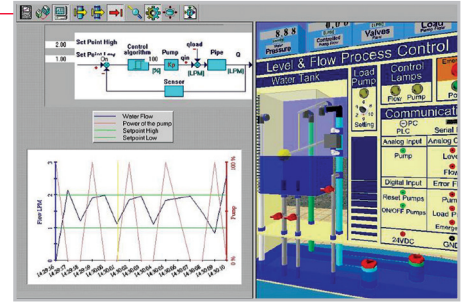
Standard Features

Level and Flow

- Lets user define control variables: set-point, high and low limits, Kp, Ki, Kd
- Lets user define control type: open loop, closed loop, P, PI or PID.
- Lets user define process variables (for simulation): number of open valves, tank volume.
- Provides real-time, dynamic simulation and measurement charting: Dynamic 3D solid model of the ProcessLine Level and Flow panel.
- Allows graphs and process data to be recorded, saved to file, replayed and exported to spreadsheet software for analysis
- Provides fully functional offline simulation of control processes.
- Users can create their own process control applications in any standard programming language.

Temperature

- Lets user define control variables: set-point, high and low limits, Kp, Ki, Kd
- Lets user define control type: open loop, closed loop, P, PI or PID.
- Lets user define process variables (for simulation), such as number of open valves and tank volume.
- Provides real-time, dynamic simulation and measurement charting.
- Allows graphs and process data to be recorded, saved to file, replayed and exported to spreadsheet software for analysis.

- Lets user define control variables: set-point, high and low limits, Kp, Ki, Kd
- Lets user define control type: open loop, closed loop, P, PI or PID.
- Lets user define process variables (for simulation), such as pressure and tank volume.
- Provides real-time, dynamic simulation and measurement charting.
- Allows graphs and process data to be recorded, saved to file, replayed and exported to spreadsheet software for analysis
- Provides fully functional offline simulation of control processes.
- Users can create their own process control applications in any standard programming language.

Computer Requirements

- Pentium 4 Dual Core with 3 GHz
- 1GB RAM
- 100 MB available disk space
- Windows XP SP3 / Vista / 7 - 32 or 64bit

Ordering Information

Software

ProcessMotion	63-9238-0000

Curriculum

LM7 Content, Virtual, Process Control, Temp	77-3041-0002
LM7 Content, Virtual, Process Control, Flow	77-3043-0002
LM7 Content, Virtual, Process Control , Pressure	77-3044-0002
LM7 Content, Virtual, Process Control, Level	77-3045-0002

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