

CH762 - Control System Techniques in Equipment Design and Operations

Day 1

Morning

- Automatic Control Systems
 - Evolution of control systems
 - Principles of control systems
 - Block diagram representation and manipulation
 - Transfer function
 - Open-loop control
 - Feedback and closed-loop control
- Mechanical, Electrical and Fluid Power Control Components
 - Define mechanical vibrating elements
 - Electrical and electronic components
 - Liquid, gas flow and thermal control elements
 - Combined electro-mechanical and electro-hydraulic components

Afternoon

- Mechanical, Electrical and Fluid Power Control Components – *Continued*
 - Electrical circuits
 - Fluid circuits
 - Impact of resonant frequency
 - Potential sources of forced excitation
 - Illustrated examples to control output gain and bandwidth
 - Frequency and transient response
 - Analogy between mechanical, electrical and hydraulic control systems
 - Example problems and Class quiz
- Control Methods

- Analog and digital control

Day 2

Morning

- Control Methods – *Continued*
 - Regulator and follow-up methods
 - Process control
 - Sequential and numerical control
- Sensors for Detection and Measurement
 - Accuracy, sensitivity and speed of measurement
 - Signal conditioning
 - Discrete sensors and transducers
 - Continuous sensors

Afternoon

- Valve, Manipulator and Actuator
 - Proportional and pilot operated control valves
 - Pressure relief and direction flow control and servo valves
 - DC, induction and synchronous motors
 - Hydraulic and pneumatic cylinder and motor
 - Oscillating actuator
- Controller Design
 - Ramp and lag processes
 - Dead time, delay and compensation
 - Process characteristics
 - Ultimate cycle method of controller design
 - Self-tuning adaptive controllers
 - Concentration, temperature and level control in blending and heating process