WISCONSIN
UNIVERSITY OF WISCONSIN–MADISON

DDC Controls

Daily Topics Agenda

MONDAY (8 AM to 5 PM)*

Course Overview

Introduction to DDC Systems

- Basic elements of control
- Feedback concepts
- Loop response
- Terminology
- Types of hardware, software, and firmware

Introduction to the Controlled Systems: Part 1, Load Dynamics

The Nature of the Problem

- Developing a Simple Control Loop

Input and Output Data Flow

- AI, DI, and PI
- Analog to digital conversion
- Sensor types, applications, accuracy, stability, calibration, and other factors
- Safeties, limit devices, and power monitoring
- AO, DO, and PWM
- Digital to analog conversion
- Transducers; damper and valve actuators
- Configuring network data flow
- Important performance factors

TUESDAY (8 AM to 5 PM)

Inputs and Outputs: The Field Perspective

- Where We Came From
- Averaging Sensors, Thermal Lags, Position Effect Proxies
- Calibration Offset vs. Multi-Point
- Actuators
- Code Issues and Terminal Strips

System Architecture

- Network concepts
- Generic components
- Communication concepts
- Local vs. global information
- Installation issues

IT Considerations

Open Systems – the Myths and Realities

- Do you want an open system?
- Understanding IT vs. DDC
- Cautions and concerns
- Different levels of open systems
- Engineering issues

Cybersecurity

WEDNESDAY (8 AM to 5 PM)

System Architecture for BACnet

Programming Tools

- Types of programming
- Logic diagrams and programming symbols
- Designing control logic

Controlling Analog Processes

- PID Control
- Open Loop vs. Close Loop Tuning
- Lags and the Two Thirds Rule

Application Requirements: The System Concept

- Organizing your information
- Process by process approach
- Supervisory logic
- Working with System Diagrams

Controlling the Mixed Air Section

- Strategies and control logic
- Assessing an Economizer in the Field

THURSDAY (8 AM to 5 PM)

Controlling the Air Handling Unit Section

- Heating, cooling, humidification, and reheat

Controlling the Fan

Controlling Constant Volume Systems

Central Plants: Pump Interactions and Affinity Laws

- Controlling a Condenser Water System

VAV Systems

- Terminal Unit Basics
- Supply and Return Fan Flow
- Loads and Coil Discharge Temperatures
- Minimum and Maximum Flow Settings

FRIDAY (8 AM to 12 Noon)

Defining, Planning, Procuring DDC Systems

- Architecture; Types of Hardware
- Integration and/or Interoperability Concerns
- Operator Interfaces; Training
- Acquisition Strategies; Sole-Source vs. Multi-Vendor
- Open Protocols
- Key to Success

Specifying Your System

- System Descriptions
- Materials; Devices; Hardware & Software
- System Setup
- Specifying Commissioning of DDC

DDC System Commissioning

- Documentation Review
- Start-up Checks
- Functional Performance Tests (FPT)
- The Five Principles of DDC

*Registration/check-in takes place Monday 7:30 to 8 AM. Lunch is included from Noon to 1 PM Monday through Thursday.