



**Training Program:**  
**Fieldbus Technology in Industrial Automation**

# WHO SHOULD ATTEND?

This five-day instructional program covering the educational needs of Instrumentation and Control Engineers & Technicians, Operation Engineers, Process and Utility Supervisors, and Technical Supervisory personnel taking a first look of fieldbus technology. No specific prerequisite training or experience required for registration.

## DESCRIPTION:

This course provides an overview of the fieldbus technology in industrial automation. The eighties was the decade in which automation technology made a fundamental leap in quality. The parallel wiring that was conventional until then was contrary to the need for complex communication with increasingly more digitized field units that ensured greater intelligence of the functional components in the field. Gradually, solutions with conventional wiring technology were displaced by advanced field bus technology.

## COURSE OBJECTIVES:

**Participant will be able to:**

- Describe the benefits of using fieldbus technology
- Understand the difference between fieldbus technology and the traditional communication technologies.
- Describe how does data get where it's needed -- and when it's needed
- Determine when a function block or communication action begins?
- Describe how do you avoid overlapping communications when you have more than one loop on the same segment?
- Explain how can you accommodate both fast and slow loops?
- To manage the internal processing that turns the inputs into

- To identify both the source and the nature of a problem – often before it affects the process – diagnostics can actually reduce the effort required to keep your process and equipment running as they
- Describe how does the Fieldbus Foundation define interoperability
- Identify the major external factors affecting fieldbus network stability
- Describe the parts of a fieldbus system can be made redundant
- Explain where is control most reliable, in a field device or in the host system
- Identify the difference between a branch layout and a tree layout
- Identify the advantages of pre-assembled cables and connectors
- Identify which project engineering standards that will change as a result of adding fieldbus
- Identify the new information that will be required on instrument specification sheets
- Describe what should be added to a P&ID to accommodate fieldbus
- How can a host system apply information about the status of the field signal
- How can a host system reduce the effort required for device commissioning
- How does control location affect purchasing
- How can control in the field increase reliability
- Can fieldbus handle critical loops
- What are the steps associated with the commissioning of fieldbus devices
- What are the expected resistance and capacitance values for fieldbus wiring
- What's one way to determine the possible cause of a communication error

## COURSE OUTLINE:

### 1) Introduction to FOUNDATION fieldbus

- What is FOUNDATION fieldbus?
- The digital bus advantage

- An established standard
- Interoperability
- Safe and effective process control

## 2) **Fieldbus communications**

- The communications model
- Physical layer
- Data link and application layers
- User layer
- Scheduled communications
- Unscheduled communications
- Parameter status
- Application clock
- Link active scheduler
- Device address assignment
- Find tag service

## 3) **Loop scheduling**

- Basic scheduling
- Multiple loops on the same segment

## 4) **Fieldbus blocks**

- FOUNDATION fieldbus function blocks
- Basic FOUNDATION fieldbus function blocks
- Advanced FOUNDATION fieldbus function blocks
- How do function blocks get into devices?
- Instantiating blocks into devices
- Device descriptions

### 5) **Diagnostics with fieldbus**

- More than device maintenance
- Equipment diagnostics
- Loop diagnostics
- Improving plant performance
- Reducing process variability
- Improving process availability
- Enhancing safety and environmental compliance
- Managing alarms and alerts

### 6) **Fieldbus Interoperability**

- Field-device interoperability
- Testing devices for interoperability
- When device capabilities evolve
- Host-system interoperability
- Off-line interoperability

### 7) **Reliability and redundancy**

- Total system reliability
- How much redundancy is enough?
- Transmitter redundancy
- Valve and piping redundancy
- Control redundancy
- Host redundancy options
- Other redundancy options
- Link active scheduler and backup LAS

**8) Network wiring fundamentals**

- A fieldbus advantage
- Basic segment design
- Wire types and segment lengths
- Total segment length
- Mixing wire types on a segment

**9) Network wiring options**

- Tree and branch topologies
- Combining conduit and armored cable
- Non-conduit options: tree
- Non-conduit options: branch
- Using existing wiring and junction boxes

**10) Segment hardware**

- Required and application-dependent components
- Power supply
- Power conditioners
- Terminators
- Repeaters
- Intrinsic safety barriers

**11) Project engineering standards**

- Field device specifications
- Segment design practices
- P&IDs
- Loop sheets
- Segment design drawings

- Cable schedules
- Installation practices
- More on installation practices
- Project schedules

## **12) Choosing a host system**

- Supplier experience
- Designed for fieldbus
- Access to validated device data
- Fieldbus redundancy options
- Interoperability testing
- Ease of commissioning and testing
- Predictive maintenance

## **13) Control design**

- Plant philosophy
- It's more than PID
- Control modularity
- Field control location
- Potential exceptions
- Maintenance and purchasing considerations

## **14) Segment design**

- Designing for loop criticality
- Mission-critical loops
- Highly important loops
- Normal-importance loops
- View-only or data acquisition loops
- Process modularity

- Multivariable devices
- Host system considerations
- Design resources

### **15) Commissioning**

- Using pre-configured devices
- Using unconfigured devices
- Tagging devices
- Attaching devices
- Calibration and scaling

### **16) Checkout and troubleshooting**

- Wiring check
- Voltage check
- Signal check
- Signal waveforms
- Recognizing common errors