Understanding Fieldbus

All-digital Infrastructure for Plant Automation

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MTL
Topics Covered

- What is FOUNDATION Fieldbus?
- Breaking the Limits of Analog Technology
What is FOUNDATION Fieldbus?
FOUNDATION fieldbus

- A digital communication network
- Real-time
- Designed specifically for process control applications
- Takes the place of 4-20 mA and on/off signals
- Connecting instruments to systems:
  - Transmitters, analyzers, control, valve positioners, and on/off valves
  - Distributed control systems (DCS), programmable logic controllers (PLC), remote terminal units (RTU)
All-Digital Solution From Sensor to Actuator

- Completely eliminating the need for analog 4-20 mA and on/off signals
Takes the Place of Proprietary Protocols

- Electric actuators/motor-operated valves (MOV)
- Gas chromatographs
- Tank gauging systems
Real-Time Deterministic Closed Loop Digital Control

- Time-synchronized and scheduled

Designed for process control
Ideal for PID loops
Schedule is automatically created
Multiple Devices with Multiple I/O Signals, Share the Same Bus

- Devices provide multiple signals over the same two terminals

One fieldbus device takes the place of on average 3 I/O signals

- Amperometric Analyzer 2 I/O
- Conductivity Analyzer 2 I/O
- Density Transmitter 2 I/O
- Flowmeter 2 I/O
- Flue Gas Transmitter 2 I/O
- Process Gas Analyzer 5 I/O
- Gas Chromatograph 25 I/O
- Interface Level Transmitter 2 I/O
- Control Valve Positioner 2 I/O
- Level Transmitter 1 I/O
- Multiple Sensor Temperature Transmitter 8 I/O
- Oxygen Transmitter 2 I/O
- pH Analyzer 2 I/O
- Pressure Transmitter 1 I/O
- Temperature Transmitter 1 I/O
- Mass Flow Meter 3 I/O
- On/Off Valve 3 I/O
- Electric Actuator (MOV) 16 I/O
Suitable for Large Plants

- Long cable trunk lengths to field junction boxes
- Long spurs for devices
Industrial Grade Wiring Components

- Field junction box hardware is rugged and encapsulated for harsh outdoor field conditions
- Some are passive
- Some are Zone 1 certified
Power and Communication

- Two-wire twisted pair cable
- Device power suitable for all hazardous areas
  - Intrinsically safe
  - Non-incendive
  - Flame proof / explosion proof
Unrestricted Access to Field Device Intelligence

- Centralized configuration/setup and diagnostics for all field instruments
- Including discrete sensors and actuators
Supports Temporary Masters

- Handheld field communicators
- Laptops/tablets
- Documenting calibrators
Supports Control-in-the-Field (CIF) - Control in Field Devices
Breaking the Limits of Analog Technology
FOUNDATION fieldbus Started with a Few Simple Ideas:

- Reduce cabling
- Simplify marshalling
- Enable real-time digital closed-loop control
- Ensure multi-vendor interoperability
- Expand device intelligence
- Allow diagnostics-based maintenance
- Liberate plants from proprietary protocols
Demonstrated at Plants Around the World

- The benefits of completely digital automation without the limitations of 4-20 mA and on/off signals are enormous.
Fieldbus Components

- Interface Card
- Fieldbus Power Supply
- Device Coupler
- Terminator
- Spur 120 m
- Trunk 1900 m
Engineering Unit Values
- No Range Set

- Range setting is reduced, if not eliminated, for most transmitters

123.45 mbar

No mismatch with range in the control system
Conclusion
Conclusion

- Reduced cabling
- Simplified marshalling
- Real-time digital closed-loop control
- Multi-vendor interoperability
- Expanded device intelligence
- Diagnostics-based maintenance
- Liberation from proprietary protocols

A comparable result cannot be achieved with 4-20 mA and on/off signals
Where Can I Learn More?

- www.fieldbus.org