Integrating E+H Flowmeters with ControlLogix via EtherNet/IP

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General Session and 15th Annual Meeting of Members

www.odva.org
Overview

- Company background
- Project requirements
- Hardware architecture
- Software solution
- Results
- Questions/Comments
Company Background

PREMIER

- Founded 1991
- 150 employees
- Regional presence in Midwest & Southeast
  - Smyrna, TN / Decatur, AL / Cincinnati, OH / Jackson, MS
- Rockwell Automation Solution Partner
  - Control / Process / Information
- CSIA certified system integrator
Company Background

General Mills

- 39,000 employees
- Sales $16.7 billion
- Focused on healthy, quality products
- Globally-recognized food manufacturer
  - Cheerios
  - Nature Valley
  - Pillsbury
  - Yoplait
  - Green Giant
Project Requirements

Choice of manufacturers

- Established partnerships
- History of successful installations
- Customer service
- Plant standard

Endress+Hauser

Rockwell Automation
Project Requirements

Application

- New production equipment
- Mass flow control
  - Ratio mixing
  - Batching
- Distributed controls with multiple PLCs
- Other devices on Ethernet field bus
  - Remote I/O chassis
  - VFDs
Project Requirements

Concerns/Drivers

▶ Cost
  • Justify additional cost for Ethernet option

▶ Schedule
  • Very aggressive commissioning schedule

▶ Complexity
  • Desire for maintainable solution
Traditional Architecture

Three twisted-pair cables

- One pulse signal to CFM module
- Two 4-20mA signals to analog inputs
  - HART option
Traditional Architecture

Benefits

- Known technology
- Can be diagnosed using existing techniques

4-20mA

Pulse

Main PLC Chassis

Remote I/O
Traditional Architecture

Disadvantages

- Installation errors
- Many I/O modules
- All configuration done at meters
- One-way communication

Pulse

4-20mA

4-20mA
New Architecture

One Ethernet cable

- Connected to same fieldbus switch as other devices
New Architecture

Benefits

- Only one cable to connect = faster install
- Simplified electrical schematics
- No k-factor calculations
- No additional CLX modules needed
- Two-way communication
New Architecture

Disadvantages

- New parts required for maintenance stores
- More switch ports necessary
- Code development required to take advantage of additional functionality
Software solution

PLC code

- Appears in I/O tree view
- Helps maintenance locate
- Consistent with other devices
- Easy to configure
## PLC code

- **Meaningful tag names**

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<thead>
<tr>
<th>Name</th>
<th>Value</th>
<th>Force Map</th>
<th>Style</th>
<th>Data Type</th>
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</table>
Software solution

PLC code

- Configuration tabs
  - Potential to download parameters to replacement instrument
Software solution

PLC code

Methods for communicating to meter

- I/O configuration
- Explicit messaging
Software solution

**HMI faceplates**

- Provides visibility into useful features
  - Units
  - Totalizer
  - Alarm conditions
  - Maintenance troubleshooting
Results

What went well

- Fast installation, configuration, & checkout
- Same meter interface as other installations
  - Benefit for maintenance
- Entering parameters through browser was more user-friendly than through meter interface
Results

Issues

- Required setup via secondary port
  - Still had to be at meter to configure
  - Wish this could be done through meter interface

- Units did not ship with latest firmware
  - E+H emailed updated firmware

- Baud/duplex settings not configurable
  - Must set switch to auto-negotiate
  - Newer firmware may fix this

- Configuration at meter not replicated back to PLC
Results

What will we do next time?

- Update to latest firmware
- Configure parameters through ControlLogix
- Use DHCP (default)
  - Assign IP address through managed switch
Conclusion

Beneficial solution for:

- Designs with multiple meters
- Minimizing PLC modules
- Simplified electrical schematics
- Faster installation schedules
- Providing more data to users
- Reducing replacement effort
Results

What do we love about EtherNet/IP?

- Standard connectors
  - Fewer wiring issues
- Speed
- Web interface
  - Configuration
  - Diagnostic info
  - Standard browser, not custom software
Results

What more do we want from EtherNet/IP?

► Add-on profiles for Logix
  • Meaningful tag names (versus generic arrays)
    – Use abbreviations to avoid lengthy tag names
  • Configuration tabs
► Uploadable EDS files
► Navigate through backplane to isolated fieldbus
► Troubleshooting tools
  • Speed/duplex mismatches
► Coordinated hardware/software revisions
  • Minimize releases
Conclusion

Questions/Comments