Integrating Devices into Process Control Systems

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Rockwell Automation
Process Solutions User Group (PSUG)
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Today’s Agenda

- PlantPAx Field Device Integration
  - Environment
  - Specific Solutions
- Process Device Integration Tools
- Asset Management
Automation Architecture Overview

Plant Network

Device Network
A World of Connectivity

Rockwell Automation

Encompass Product Partner

Endress+Hauser

metso automation

Mettler Toledo

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An Established Foundation . . .

- Strong communications infrastructure
- Support for multiple field device integration options
- Process and Power Devices over EIP backbone

**RELIABILITY**

**FLEXABILITY**

**CONSISTANCY**
Field Device Integration Today

- Smart instrumentation and intelligent I/O bridge the traditional separation between automation systems and field devices

- Results of using Intelligent Devices
  - Network-based instrument configuration
  - Increased diagnostic coverage
  - Predictive and enhanced preventive maintenance
  - Remote servicing
Field Device Integration Today

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PT100 has a loose wire

AI100 has high torque
Field Devices are Information-Rich

**FlowMeter:**
- PV: Mass Flow Rate
- SV: Totalizer 1
- TV: Density
- FV: Temperature
- Volume Flow
- Std. Volume Flow
- Target Flow
- Carrier Flow
- Calculated Density
- Totalizer 2
- Set Flow Units
- Reset Totalizers
- Set Range
  - Zero & Full Scale
- Change K Factor
- Change Pipe Diameter
- Set Flow Direction
- Set “Low Flow Cutoff”
- Make Density Adjustments

**Motor:**
- Thermal Overload
- Phase loss
  - Enhanced sensing
  - Adjustable Delay
  - Imbalance sensing
- Phase reversal
- Ground fault
- Jam detection
- Stall detection
- Hours of operation
- Underload detection
- Current imbalance
- Short circuit protection
- Thermistor monitoring
- RTD monitoring
- Power Factor
- Arc Protection
Today’s Automation Project
The Challenge: Plug and Play Integration

... into a single operations, maintenance and life cycle management environment
Scalable HART Solutions Meet Standards

- HART Communication Foundation: Rockwell Automation I/O is HART 7 Forward and Backward compatible

- ControlLogix 16 Channel
- CompactLogix 4 Channel
- Flex I/O 8 Channel
- Point I/O 2/4 Channel

I/O Density

Controller Power
1756 HART I/O Modules

- ControlLogix (1756) HART I/O module
  - Supports 2, 3 & 4 wire transmitters
  - SIL2 Certified
  - Marine Certified
  - HART 7

- 1756-IF16H - 16 channel differential analog
  - Current Signal Only
  - Dedicated Modem

- 1756-IF8H - 8 channel differential analog
  - Current and Voltage Signal
  - Shared Modem

- 1756-OF8H - 8 channel analog output
  - Current and Voltage Signal
  - Shared Modem
Flex and FlexEx HART I/O Modules

- The Flex Family
  - Remote I/O
  - EtherNet/IP or ControlNet Networking options
  - Horizontal or Vertical Mounting
  - Modular 2 piece design
  - Removal & Insertion Under Power

- Flex 8 Channel Input and Output

- Flex 8 Channel Input and Output Isolated
  - 120 V Continuous, 1000 Vac, 60 seconds

- Flex Ex 8 Channel Input and Output Modules
  - For Cl1Div2 / Zone 1
Compact HART I/O Modules

- 4 Channel Input and Output Modules
- Current and Voltage Signal
- 500 VDC Isolation ch-ch, ch-backplane
- View device information and PV scaling without HART handheld
- Add-On Profile for Logix5000 automatically establishes HART communications
- Sample Project at www.SpectrumControls.com
Point HART Input Modules

- Flexible solution for process applications
  - Two or four channels of current and HART protocol input
  - Seven module filter settings: 15, 20, 50, 60, 100, 250, 1000 Hz
  - 2 and 4 wire device support
  - Removal and insertion under power (RIUP)
  - DTM is coming soon

- Robust, Plug and Play Operation
  - 4 to 20mA current input, 16 bit resolution
  - Auto-scanning of HART variables (PV, SV, TV, FV)
  - HART Modem per channel
  - Hart Pass-Through Messaging
  - Fault reporting
  - 24V Fault Protection
Innovating to Meet Industry Challenges

- Wireless Access to HART Data

802.11N
Upto 3KM
Conventional WirelessHART Applications

- Retrofit installations to enable Asset Management
- Cost-efficient installation on tank & silos
- Add devices easily to optimize process
- Connect moving equipment
- Gain access to remote areas overcoming hurdles
Innovating to Meet Industry Challenges

- Conventional Solution

Or

- Wireless Access to HART Data

Dependent upon the amount and density of instrumentation
Rockwell acquisition of Hiprom:

- About Hiprom:
  - a leading process control and automation systems integrator headquartered in Johannesburg, South Africa
  - focused on process control systems and automation systems integration for the mining and mineral processing industry

- Acquisition announced 18 Jan 2011, completed April 2011

- The newly acquired entity will do business as Hiprom, a Rockwell Automation business

- Provide Profibus PA solution for Rockwell Automation Integrated Architecture and PlantPAx Process Automation System

- In progress to provide Foundation Fieldbus solution, March 2012

- Achieve harmonization of fieldbus solutions
High Availability Profibus-PA Solution

- CIP Direct to Profibus-PA
  - CN2PAR
    - Redundant ControlNet
  - EN2PAR
    - Ethernet Embedded Switch
      - Linear topology
      - DLR – Device Level Ring
  - Profile support in RSLogix5000 (AOP)
  - Supports up to 24 field devices
  - Consumes only 4 connections
  - Redundant PA Media Support
  - Diagnostics
    - Linking Device
    - Physical Layer
    - Field Devices
  - Web interface
Well Integrated & Provides Valuable Information for Operational Efficiency
Foundation Fieldbus Solution Enhancements

Configuration Software

- RSFieldbus 2.05 released
- Improved Download & OPC Performance
- Upload
- Windows 7 & FT Activation Support

Ease of Use Tools

- Fieldbus Design Considerations Reference Manual
- Consolidated Information to Plan Foundation Fieldbus project
- Compliments Integration Documents used during implementation
High Availability Foundation Fieldbus Solution

- Redundancy at all levels, down to the field device
- Integrated Configuration for 16 field devices using 4 CIP connections
- Theoretically Unlimited VCRs: Virtual Communication Relationships
- Provides consistency across fieldbus solutions - uses same technology as EN2PA
  - Same Hardware platform
  - Protocol-specific Firmware and AOP

Planned for March 2012 Release
EN2FFR
CN2FFR

Preview at Automation Fair
Increasing Utilization of EtherNet/IP Devices

**Process Instrumentation**

- Endress+Hauser Strategic Partnership
- Reduced network layers for process instrumentation
- Worlds first EtherNet/IP mass flow meter released January 2010
- EtherNet/IP magnetic flow meter released January 2011

**Power Products**

- PowerFlex 755
- 1-1350 HP: CIP Motion w/CIP Sync
- Integration to Logix5000
- Unified PowerFlex and Kinetix user experience
- Automatic Device Configuration
Flexible Device Integration Choices

- **ControlLogix**
  - 8ch AI and AO
  - 16ch AI
- **Flex and Flex-Ex**
  - 8ch AI and AO
- **Compact**
  - 4ch AI and AO
- **Point**
  - 2 and 4ch AI

- **Redundant Linking Devices**
- **Support for redundant device network media**
- **Support for EtherNet/IP Device Level Ring and ControlNet Redundancy**
- **New FF Configuration SW**
  - FF iDTM for Asset Management
  - Redundant Linking Devices coming in March 2012
  - Consistency with Profibus solution
- **MCCs on EtherNet/IP**
  - E+H ProMass on EtherNet/IP
  - E+H ProMag on EtherNet/IP

Connectivity options across major device networks
Integration Tools Simplify Implementation of Smart Devices

Add-On Instructions and Global Objects

PlantPAx
Process Automation System

ViewSE and PanelView Faceplates

Integration Documents
Application Notes
Interoperability: Reduced Risk during Development, Engineering & Start-up

• Reduced Engineering Costs

• Faster Deployment Time

• Improved Quality

• Implementation Consistency

• Lower Total Cost of Ownership

• Ensures solid foundation for asset management

• Take integration time and money savings and apply to asset management activities
Device Information throughout the facility

- Using information available in connected assets

- Asset Management is integrating a variety of functionalities and bringing them together in new ways

- Device Data integrated throughout the organization
Automation Architecture to Empower Decision Making

-ARC Group
Asset Management

Calibration Management

- Paperless calibration management solution
- Stores device information, calibration procedures, calibration record
- Alerts when calibration scheduled

Condition Monitoring

- Data collection to assess the condition of plant floor equipment
- Used in solutions for maintenance, machine protection and increased machine performance
Asset Management

Change Management for 3rd Party Controllers

- Siemens S5 and S7
- Generic FTP
  - Robots
  - Camera
  - PVP
- BackUp and Compare
- Difference Reports
- Promote BackUp to Configuration

< Released Feb 2011

Asset Management for All FF and HART Devices

- Complete library of Foundation Fieldbus devices for Asset Management
- Also included other DTM updates

< Released June 2011
An Established Foundation . . .

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  **RELIABILITY**

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  **FLEXABILITY**

- Process and Power Devices over EIP backbone
  **CONSISTANCY**
Well Integrated & Provides Valuable Information for Operational Efficiency
Device Integration and Asset Management Themes

- Driving consistency and simplicity in the integration of smart field devices

- Strengthening a Flexible Process Networks Architecture with High Availability Options

- Industry accredited performance across the plant with scaleable solutions

- Well Integrated to provides timely information for Operational Efficiency

- Innovating to meet the challenges of real world application considerations
  - Wireless
  - Device Integration Technologies
Thank you!

• Gain Hands-On Experience at Automation Fair: Lab 14: PlantPAx Process Automation System: Field Device Interface and Asset Management

• Talk to the experts on the Automation Fair Show Floor: Process, Hiprom, Endress+Hauser, Spectrum Control, ProSoft, Pepperl+Fuchs, CISCO, Fluke, GE Energy MasonNeilan, Metso, Mettler Toledo, Molex

• For follow-up on a specific topic, provide your business card and topic to the speaker

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