Oil and Gas Fieldbus Seminar

Foundation Fieldbus

Freedom to Choose, Power to integrate
What does it do?

- Integrates sensors & actuators into automation systems
  - Sensor- and actuator-to-boardroom information integration
  - Field devices become information servers
  - Expanding the view on the process

- Enables significant TCoO reductions
  - Plant construction - CAPEX
    - Cabling, barriers, cabinets
  - Plant operation - OPEX
    - More information, validation
  - Plant maintenance - OPEX
    - Diagnostics, unified tools
Market Distribution

Data from ARC

Over 12,000 Systems & 1 Million Devices

EMEA 44%

NA 27%

AP 24%

LA 5%
Market Distribution

Over 12,000 Systems & 1 Million Devices

- Oil & Gas: 17%
- Refining: 15%
- Chemical: 23%
- Petrochemical: 10%
- Pharmaceutical: 3%
- Food & Beverage: 4%
- Pulp & Paper: 5%
- Electric Power: 10%
- Mining & Metals: 3%
- Water & Waste: 4%
- Other: 6%
- Water: 4%
- Other: 6%

Data from ARC
A Foundation Fieldbus system

- SAS Operator console
- Controller
  - Redundant FF Card
  - 1-LAS
  - 2-LAS
- Power Supply
- Junction Box
- H1 FF Bus
  - 3-LAS
  - AI
  - PID
  - AO
Communication Scheduling

Time Critical Function Block Execution (Scheduled)

Function Block Communication (Immediate)

Function Block communication is immediate

Request/Response Communication (Unscheduled)

Macrocycle

70%

30%

AI

PID

AO
Control in the field:
- Reduced variability
- Higher (Loop) availability

Slide courtesy of SAIT
Flowmeter - example

Device firmware upgrades – Eliminates hardware replacements
Fieldbus System Engineering

Engineering

Device Specification

Provided by Device vendor

Capabilities File of Devices

DD of Parameters

Network Design

Function Block Linkage

Input

Reference

Engineering Environment

Output

System Design

Value Files to be Downloaded

Device Configuration

Host Configuration

Segment Design

- Decide:
  - Link Active Scheduler
  - PID Allocation
  - Function blocks in Devices
  - Wiring Topology
  - No. of Devices
  - Check (engineering tools)
    - Total Power Consumption
    - H1 Communication Cycle
    - Voltage Drop
Commissioning Costs Without fieldbus:

- Individually ring out wiring
- Attach device
- Verify communications
- Verify link to control strategy

2 hours / device for 2 technicians
Commissioning Costs With fieldbus:

- 25 minutes / device for 1 technician.
- Check segment wiring
- Attach device
- Drag-and-drop commissioning
- Confirmation done via live data
Field device maintenance strategies

- Break-down maintenance
  - Device did fail unexpected

- Preventive maintenance
  - Scheduled maintenance
  - Time interval based – needed or not

- Predictive maintenance
  - Build-in diagnostics (Maintenance Indicators) alert maintenance
Path to field device maintenance management

Field based "information servers"
- actuators, elements, valves, connections
- Field Performance Diagnostics
- Level 3
- Local
- Device Diagnostics
- Level 2
- communications
- Self
- Communications Diagnostics
- Level 1
- Plant Diagnostics
- Level 4
- Regional
- process equipment
- Field based "information servers"
Enhanced EDDL improves Data Access

Enhanced User Interface
- Parameter Organization
- Images
- Better interoperability

Graphing System
- Support for Charts and Graphs

Persistent Data Storage
- Archive and retrieve data
- Aids diagnostics executed by devices
Study Infraserv (Germany, 2002)

- NAMUR FuRIOS: Fieldbus and Remote IO comparison
  - 4% savings on Instrumentation and control budget
  - 15% savings when compared to point to point
  - Engineering: 4.7%
  - Commissioning: 0.5 hour per device

- FF evaluation:
  - Interoperability
  - Connection of new field devices
  - Interchangeability of devices and segments
  - Subsystem closed loop control (PID loop on H1)

- Conclusion: The FF technology is available and suitable for Chemical/Pharma applications in Germany
Reference: Gas Production

- First re-vamp project started in 1998 of total plants 30 (Gas field production) end 2010
- Start in 2004 with FF for all new plants, total 10,000 FF devices

- Fieldbus delivered
  - Estimated savings is €1 M to 2010 (after completion), including re-design of standard production plant to FF
  - Min. 130 k€ for CAPEX and total potential 850 k€ for OPEX
  - Major savings are:
    - more efficient maintenance based on predictive maintenance
    - more efficient commissioning, less cabling, less cabinets, reduction on the number of transmitters due to dual sensing technology
    - less process upsets due to improved monitoring of equipment status

Reference: Chemical

- Fieldbus delivered payback in < 24 months
  - process efficiency gains
  - Increase in throughput without added raw material

- Enables personnel to maintain ideal conditions
  - Advanced sequencing of Solvay towers
  - Operators have more understanding of process

SOURCE: – Phil Stoor
Technical Paper – Feb 07
FOUNDATION™ Fieldbus - Savings

- Capital Expenditures (CAPEX)
  - Less marshalling and I/O cabinets - smaller footprint
  - Multivariable transmitters

- Faster commissioning

- Operational Expenditures (OPEX)
  - Improved controllability
  - Reduced maintenance by "Predictive" Maintenance

- Device and process diagnostics
Conclusions

- Foundation Fieldbus provides
  - Freedom to Choose, Power to Integrate

- Foundation Fieldbus is field proven

- Foundation Fieldbus provides a lower Total Cost of Ownership

- Foundation Fieldbus is an enabling technology to
  - Include the maintenance discipline into the SAS
  - Support normally unmanned installations

- Foundation Fieldbus is the basis for Integrated Operations