Fieldbus Foundation
“Paradigm Change in Instrumentation Technology”

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Mumbai, India
26 September 2008
Welcome To The India Pages:

Welcome to the section of the Fieldbus Foundation website that is dedicated to the news, activities and events being conducted by the Fieldbus Foundation India Marketing Committee (FFIMC) in India. Use the tabs above to access the latest news and events program in the region.

The FFIMC was launched on 23rd May 2007 in Bangalore, India, with a goal to educate and promote Foundation fieldbus technology to Indian industries through the organisation of a wide range of marketing and training activities, including seminars, trade shows / exhibitions and end user demonstrations.

This committee and its members will play an important role in promoting the primary value propositions of Foundation fieldbus technology, which provides process integrity, business intelligence, and open and scalable integration of information across process manufacturing plants.

The Fieldbus Foundation End User Council for India was established during the ISA Expo Exhibition and Conference in Delhi in December 2007. FFEC-I is a subset of the regional Asia-Pacific End User Council.

Members of the Fieldbus Foundation India Marketing Committee:

- ABB
- Belden
- Emerson
- Endress+Hauser
- Eaton
- IFI
More than just a digital replacement for 4-20mA technology.

Supplier neutral and standards-based. Provides end users with a common framework to implement and manage strategies for operational excellence.

FOUNDATION technology is a unified infrastructure.
- Manages data, communication, plant assets, and plant events.
- Provides highly distributed control functionality and interoperability between devices and subsystems.

The scope of FOUNDATION technology really makes it a process automation infrastructure… one of the most advanced and scalable available.
Attributes Of A Managed Infrastructure

 ✓ Extensive Block Model
 ✓ Common Data
 ✓ Common Time
 ✓ Determinism
 ✓ Publish and Subscribe
 ✓ High availability
 ✓ Standards Based Control Network
 ✓ Network Management.

FOUNDATION technology incorporates all aspects of a Managed Infrastructure.

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Process Integrity

✓ Extensive Function Block Structure.
  • Enables control in the field for single loop integrity and higher process availability.

✓ Network management and Link Active. Scheduler.
  • Ensures the network will remain up and running.
  • Redundancy is available down to the I/O layer.

✓ Safety instrumented system (SIS).
  • New Blocks.
  • Revolutionizes the way that end users approach safety and critical control systems.

According to NIST (U.S. National Institute of Standards and Technology), the inability of control systems and operating personnel to control critical conditions costs the U.S. economy at least $20 billion a year.
FOUNDATION™ for Safety Instrumented Functions
End User Demonstration Project
20 May 2008
Amsterdam, The Netherlands
Background

- Fieldbus Foundation’s Safety Instrumented Function (SIF) technology fulfills the requirements of the IEC 61508 standard up to and including SIL 3
- With the TÜV Type Approval, FOUNDATION fieldbus provides a solution for SIFs in a wide range of plant applications
- FOUNDATION SIF specifications enable manufacturers to build fieldbus devices in compliance with IEC 61508
- Third-party test agencies such as TÜV will certify that devices are suitable for use in SIS applications
- End-users can choose SIF devices meeting the requirements of IEC 61511 from multiple suppliers, instead of being restricted to a proprietary safety system platform
Participants
Overview

- FOUNDATION SIF technology demonstration sites include:
  - Chevron, Houston, Texas, USA
  - Saudi Aramco, Dhahran, Saudi Arabia
  - BP, Gelsenkirchen, Germany
  - Shell Global Solutions, Amsterdam, The Netherlands
Demo Description

- Enhanced diagnostics through a fully integrated asset management system
- Less testing of final elements – able to take credit for real demand as test
- Smart testing/diagnostic and online testing/partial stroke testing
- Early detection of dangerous device failures
- Less spurious trips
Demonstration Rig

Instrument Air unit

IA supply

Blanket

Magnetrol

LZ

HH

SIEMENS

LZ

LL

H1

LZ

UZ 001

UZ 002

PST

Westlock

SIF

DCS

Yokogawa

Start/Stop/ Trip

P2

P2

P2

SMAR

HH

HH

E+H

2oo3

Emerson

PST

MCV

Yokogawa

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System Topology

[Diagram showing system topology with various components and connections, including softing devices, linking devices, and SIF protocols.]
Test Cases

- **Level Transmitter**
  - High level trip
  - Low level trip (pump protection)
  - Measurement validation comparison (level radar device vs. DP level device) DCS
  - Dry probe diagnostic alarm

- **Temperature Transmitter**
  - Low temperature alarm/trip
  - Loss of temperature element with voting (1 out of 1 voting)
Test Cases (Cont’d)

- Pressure Transmitter
  - Loss of device with voting (2 out of 2 voting)
  - 2 out of 3 voting pressure trip

- Partial Stroke Test (PST)
  - Normal test scenario
    - Hybrid device (FOUNDATION fieldbus to DCS and DO)
    - FOUNDATION SIF device
  - Test scenario with safety demand interrupt
  - Shutdown on process demand (timing)

- Manual Trip – Push Button

- Device Maintenance – Temperature Transmitter
Test Results

1. Low Level Trip – Siemens SIF device – Successful
2. High Level Trip – Magnetrol level device – Successful
3. PST – Emerson valve SIF device – Successful
4. PST – Metso hybrid valve – Successful
5. PST – Emerson SIF device interrupted by plant ESD – Successful
6. Low Temperature Trip – Smar SIF temperature device – Successful
7. 2oo3 Operation – Yokogawa, Smar, and Endress+Hauser SIF devices – Successful
8. Loss of Temperature Probe (diagnostic) – Smar temperature device – Successful
9. MVC – Magnetrol SIF device vs. Endress+Hauser DP level device – Successful
10. High Pressure Trip (2oo3) – Yokogawa, Smar and Endress+Hauser SIF devices – Successful
11. High Trip on Siemens SIF device – Successful
12. Diagnostic Alarm from Magnetrol SIF device (dry probe) – Successful
FOUNDATION™ SIF Technology Demonstration

Summary

- FOUNDATION SIF solution will enable close integration of the complete emergency shutdown loop.
- Safety system integration will reduce installation costs and improve field device diagnostic information communicated directly to the logic solver.
- Enhanced safety diagnostics will increase plant integrity by ensuring maintenance is performed where and when it is needed.
- By utilizing smart online testing, plants will be able to run longer without shutting down for testing purposes.
Foundation Sif Technology Demonstration

Summary (Cont’d)

- **FOUNDATION SIF**
  - Allows Growth of FOUNDATION fieldbus content in projects (increase % I/O coverage) to better utilize technology benefits, both in project engineering and design and in the operational phase
    - FOUNDATION fieldbus for SIS
    - FOUNDATION fieldbus for F&G
    - FOUNDATION fieldbus HSE for analyzers
  - In this context, FOUNDATION SIF is a key initiative, strongly supported by Shell
  - FOUNDATION SIF will grow the diagnostics coverage factor in operating facilities, and as such, enhance the safety compliance aspect
Business Intelligence

✓ Support of business processes, production management, asset management and enterprise level applications.

✓ Provides enhanced capabilities for tracking, tracing, validation, and regulatory compliance for safety, continuous and batch/hybrid process applications.

FOUNDATION technology provides a high degree of business intelligence at the infrastructural level through publish/subscribe technology.
Typical Asset Lifecycle

- **Asset Performance**
  - Optimal
  - Normal
  - Out of Spec
  - Broken
  - Out of Service

- **Wear** (Start-up to Optimal)
- **Loop, Process Diagnostics** (Optimal to Normal)
- **Preventive maint.** (Normal to Out of Spec)
- **Proactive maint.** (Out of Spec to Broken)
- **Reactive maint.** (Broken to Out of Service)
- **Opportunity based maint.**
- **Predictive maint.**
- **Quality, accuracy info.**
- **Diagnostic based maint. will shorten repair time**

**Predictive: RCM Reliability Centred Maintenance**

**Proactive: Condition Based Maintenance**
Impact of FOUNDATION Device Diagnostics

Predictive Maintenance ➔ Condition Based Maintenance

- Recognize the required changes in maintenance
- Training to implement new
- Increase Diagnostic coverage for Safety
- Improve Test intervals

REDUCE MAINTENANCE EFFORT / COST
IMPROVED PROCESS AVAILABILITY

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Conclusions (Cont’d)

- FOUNDATION fieldbus provides an excellent diagnostics platform to achieve optimized asset management.
- Ongoing GSES test program (including FOUNDATION SIF) focuses on diagnostics for process interfaces and valve positioners.
- Diagnostic information is a “must” to move from predictive to condition-based maintenance to enable cost reductions and process availability improvements.
Open Scalable Integration

- High Speed Ethernet (HSE) - The key to scalability.
  - Provides a mechanism to connect multiple H1 segments without gateways.
  - All of the functions that are available on H1 are also available on HSE.
- FOUNDATION systems can be expanded without the need to shut down the process.
- Devices can be added or swapped “hot”, and the technology supports online firmware downloads and upgrades.

FOUNDATION technology offers unlimited scalability, and can be implemented in the smallest to the largest process automation systems.

The openness of FOUNDATION technology and its non-reliance on a particular operating system or supplier platform make it easy to adopt new standards.
EDDL Cooperation Team
EDDLL Cooperation Phase 1

Phase 1 - Completed
➢ Graphing – Use EDDL for graphical display of static Y-t and XY data
➢ Charting – Use EDDL for graphical display of real-time data from device
➢ Enhanced User Interface – Use EDDL to describe screen layout
➢ Enhanced Data Storage – Use EDDL to securely store data on the host

Phase 1 Technical Specification is IEC 61804-3
Phase 1 Interoperability Guideline is IEC 61804-4
ECT Phase 2 Client Applications Step 2

Step 2 – User Interface

Optional OPC Client Device Application
OPC UA Interface
OPC UA

Complex Devices

EDD

Field Device Integration Concept

Graphical User Interface
DOM

Advanced User Function

Basic Device Methods
DIM

Data & State Model

Field Device Integration

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FDI Project General Status

- Use Cases and Requirement Reviewed with AIDA, NAMUR and WIB
- Use Cases and Requirements Approved by ECT Steering Committee
- Initial Top Level Requirements complete
- Initial Architecture Complete
- Detailed Requirements in progress
- Design and Specification in progress
HSE Remote I/O

FOUNDATION™ for Wireless
Develop use cases and requirements for HSE RIO including discrete I/O and gateways to other lower level networks (e.g. HART, Profibus, Modbus, ASI, DeviceNet, etc.) that are interoperable using function blocks and EDDL.

- Develop an project plan for HSE RIO which includes:
  - Solutions to the use cases and requirements using FOUNDATION™ technology.
  - Requirements for device interoperability and network configuration.
  - Development cost and schedule for validation of HSE RIO technical specifications
  - Device interoperability test and registration procedures

- Demonstrate interoperability of HSE RIO devices at end user sites.
✓ Develop use cases and requirements for device wireless communication in monitoring, control and safety applications that is interoperable using function blocks and EDDL. Use cases and requirements for host wireless applications such as hand held configuration and maintenance devices may also be developed.

- Develop an implementation plan which includes:
  - Solutions to the use cases and requirements using wireless communications technologies developed in accordance with ISA SP100 and future IEC work. The solutions must include requirements for device interoperability and network configuration.
  - Development and validation of profile specifications
  - Development of device interoperability test and registration procedures
WIO Phases

HSE-RIO Phase 1
HSE-Wireless Phase 1
Wireless Phase 2a
Wireless Phase 2b
HSE-RIO Phase 2

2007 - 2009
2010 - 2011

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Markets Served

>1,000,000 devices

Over 12,000 Systems
### Total Shipments of Fieldbus Solutions for Process Industries by Communication Protocol

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Figures in Million $
Market Distribution

Global

- EMEA: 44%
- AP: 24%
- NA: 27%
- LA: 5%
An Automation Infrastructure for Automation Excellence

Thank You