In a World of Choices, FOUNDATION™ Brings it All Together.

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As a world leading provider of industrial communication products for process automation, Softing actively supports FOUNDATION™ fieldbus technology since its beginnings.

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President’s Letter

Project Gemstone: A New Era of FOUNDATION Fieldbus

It’s clear from the first few months of 2013 that FOUNDATION fieldbus is entering a completely new era. Next year will be our twentieth anniversary of the Fieldbus Foundation, and according to our own internal analysis at the foundation, we have an installed base approaching $10 billion worldwide of products and systems.

You may have noticed that the Fieldbus Foundation has been working on many projects that are centered on making the whole fieldbus experience easier to use and play well with other technologies. Our goal at the Fieldbus Foundation has always been to listen to the end users and provide a managed infrastructure for process automation that allows users to focus on their processes and their plants, not the technology that ties everything together behind the scenes.

At the same time, we have experience built up by our “power users” over two decades of using FOUNDATION fieldbus. As an end user-driven organization, we are taking all of this feedback from our dedicated end user customers, suppliers and engineering partners and driving it into a continuous improvement process to make the technology easier and easier to use.

Technology should work, be easy to use, and be interoperable. Users need the right work processes to guide them in its successful application. They want to be able to combine devices from different networks together and manage them effectively, with minimal effort. Applications should be designed to be easy to use and results should be achieved quickly. Our power users have taught us a lot about the technology and how to make it better, and we believe the best way to do this is through a continuous improvement process.

We at the Fieldbus Foundation have dubbed this continuous improvement effort “Project Gemstone.” Encompassing a wide range of FOUNDATION fieldbus development efforts, Project Gemstone covers many of the initiatives the Fieldbus Foundation is already working on today. This includes FOUNDATION for Remote Operations Management (ROM), Field Device Integration (FDI) Cooperation, and ISA108 intelligent device management. FOUNDATION for ROM technology allows users to integrate their WirelessHART®, wired HART®, ISA 100.11a devices, remote I/O, and Modbus communication into the FOUNDATION fieldbus managed infrastructure. FDI is working towards a single device integration package that will provide all the benefits of Electronic Device Description Language (EDDL) and FDT/DTM technology. The ISA108 standards effort is working towards defining recommended work processes for intelligent device management, regardless of communication protocol. To this same end, the foundation’s new usability team is focusing on how to make fieldbus device replacement easier and faster than ever.

Project Gemstone will drive an innovation strategy enabling plant owners to focus more on what technology can do for them and their business, versus how they should manage the technology itself. The project’s focus on standards-based solutions will also make it easier for automation suppliers to develop new fieldbus-based products and applications. In addition, the Fieldbus Foundation’s testing and registration process is designed to ensure FOUNDATION fieldbus devices, systems and components all work together as they should.

We are off to a strong start in 2013. With a great turnout at our General Assembly in Shanghai, the successful first field demonstration of FOUNDATION for ROM technology at Petrobras, and the launch of Project Gemstone, the future looks very promising indeed.

All the best,

Richard J. Timoney
President & CEO
Fieldbus Foundation
We create the solution

automation

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Simplify processes

FieldConnex

The best solutions are usually very simple.

Process automation is very much like other aspects of life. Complex systems are driven by astonishingly simple processes. Consider fieldbus. It offers straightforward communication from the control system to each field device. Control commands, closed loop control, and monitoring enable the management of the most complex processes.

FieldConnex® goes one step further. It simplifies the installation and the infrastructure, allowing you to design a fieldbus topology for your specific application. The High-Power Trunk, for example, transmits data and supplies power using only one cable and limits energy at the spur rather than the fieldbus trunk cable. Our Advanced Diagnostic Module in combination with a powerful commissioning wizard continuously monitors the fieldbus physical layer providing precise and detailed analysis. Intelligent components from the specialists who simply know what fieldbus is all about.

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Protecting your process
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AG-181 SYSTEM ENGINEERING GUIDELINES AVAILABLE
The Fieldbus Foundation offers our AG-181 FOUNDATION Fieldbus System Engineering Guidelines to help end users get on the “Fast Track to Fieldbus.” This comprehensive document describes how FOUNDATION fieldbus devices are specified, installed, configured, commissioned, and maintained.

To download the AG-181, please visit: www.fieldbus.org/About/FoundationTech/Resources

FIELDBUS REPORT is written and produced by Industrysource – The Industrial Marketing Resource (www.indsource.com).

FIELDBUS REPORT is published by the Fieldbus Foundation, 9005 Mountain Ridge Drive, Bowie Bldg. – Suite 200, Austin, TX 78759 (Phone 512-794-8890, Fax 512-794-8893). Address all correspondence to Editorial at the same address. Printed in the United States. © 2013 Fieldbus Foundation. All rights reserved. The contents of this publication may not be reproduced in whole or part without consent of the copyright owner.
With over 380 attendees, the Fieldbus Foundation’s 2013 General Assembly — held the week of March 14th in Shanghai — was the largest fieldbus-related event held in China in recent history. The General Assembly is the foundation’s biggest event all year and includes the annual End User Advisory Council meeting, board meeting, and business meeting.
The highlight of this year’s gathering was the end user seminar, attracting over 380 attendees (mostly end users), who were treated to a wide variety of presentations from a number of automation professionals in China.

Fieldbus Foundation President Rich Timoney opened the General Assembly by presenting a plaque to one of the distinguished fellows in the world of Foundation fieldbus, Mr. Huang BuYu, deputy chief engineer of Sinopec Engineering, a key early advocate of fieldbus technology in China.

Fieldbus Foundation Chairman Dr. Gunther Kegel then introduced the event’s keynote speaker, Sinopec Engineering Vice Chief Engineer Lin Rong, who discussed his company’s ongoing experience with Foundation fieldbus throughout the plant lifecycle. Mr. Lin has more than 26 years of professional engineering experience on large-scale petrochemical projects. He recently served as an instrumentation & control (I&C) team leader for the feasibility study, PMC and EPC phases of the FUJIAN Refining & Ethylene Project, which is a joint venture of Aramco, ExxonMobil and Sinopec.

Industry throughout China was represented at the Fieldbus Foundation’s 2013 General Assembly in Shanghai.

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Mr. Huang BuYu, deputy chief engineer of Sinopec Engineering, a key early advocate of fieldbus technology in China, with Fieldbus Foundation President & CEO Rich Timoney.
Yokogawa contributed to the Fieldbus Foundation’s 2013 General Assembly in Shanghai as a Tier I sponsor, and presented multivariable devices, including the EJX910 differential transmitter and digitalYEWFLO vortex flowmeter, which contribute to reductions in device count and field wiring. Yokogawa demonstrated its wide range of capabilities with Foundation fieldbus based on its long history with the technology.

Emerson Process Management was one of 17 companies that sponsored the Fieldbus Foundation General Assembly in Shanghai. China is an important market for process automation and over 250 registered attendees demonstrated this fact. The keynote speaker was Lin Rong, vice chief engineer for Sinopec Engineering Incorporation (SEI). Other end users provided case studies covering Foundation fieldbus best practices for installation, commissioning, operations and maintenance.

Rockwell Automation has been a long-time and continuous supporter of Foundation fieldbus, and the company was proud to be a part of the 2013 General Assembly in Shanghai. Regional support from the Rockwell Automation Process and Oil & Gas teams helped attendees discover the recently released Foundation fieldbus linking devices for the PlantPAx process automation system, which received Fieldbus Foundation host registration in 2012.

During the Fieldbus Foundation’s General Assembly in Shanghai, R. STAHL presented its full product range for fieldbus installations in hazardous areas Zone 1 and 2 with various isolating and non-isolating device couplers. Specially, the company’s unique and very compact eight-spur isolating device coupler was of interest to visitors. Also attracting attention was its modular fieldbus power supply system with integrated physical layer diagnostics and diagnosis communication module for online access to all physical layer values via the H1 network.

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He has also led and/or assisted on 12 technical research and development (R&D) projects for SINOPEC and SEI. Mr. Lin was named councilor of the China Instrument and Control Society in 2011. He holds a Bachelor of Chemical Process Automation degree from Zhejiang University.

Other General Assembly speakers included:
- Mr. Wei Hua, China Blue Chemical Ltd, CNOOC, “Foundation Fieldbus Installation and Commissioning”
- Mr. Liu Zhiqiang, Guixi Smelt, “Foundation Fieldbus Project Best Practices”
- Mr. Huang Weibo, Sinopec Beijing Yanshan, “The Importance of Training”
- Mr. Bai Guo Hua, Laizhou Power Plant, “Foundation Fieldbus in the Power Industry”
- Mr. Ye YingMin, Shanghai SECCO, “Foundation Fieldbus Diagnostics and Maintenance.”

Fieldbus Foundation Global Marketing Manager Larry O’Brien gave a presentation on the current market outlook for fieldbus products and services, as well as an update on Foundation for Remote Operations Management (ROM) technology, and Dave Glanzer, director of technology development, spoke about the foundation’s overall technology roadmap. These presentations are available online at www.slideshare.net/Fieldbus-Foundation. Video from the event can viewed on the Fieldbus Foundation’s YouTube Channel.
The Fieldbus Foundation conducted the first live demonstration of its FOUNDATION for Remote Operations Management (ROM) technology at the Petrobras research and development facility (Cenpes) in Rio de Janeiro, Brazil. Held on April 30, 2013, this important event was attended by Petrobras company executives and automation industry media from around the world.

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The first development of its kind integrating remote input/output (I/O), ISA 100.11a, WirelessHART®, wired HART, and H1 fieldbus protocols into a single standard data management environment, FOUNDATION for ROM extends the capabilities of FOUNDATION fieldbus to countless wired and wireless devices installed in some of the world’s harshest and most remote locations. This open, non-proprietary solution provides a unified digital infrastructure for asset management in applications ranging from tank farms and terminals to pipelines, offshore platforms, and even original equipment manufacturer (OEM) skids.

Whether operating on a wired or wireless High Speed Ethernet (HSE) backhaul network, the FOUNDATION for ROM solution enables end users to pull device data into the FOUNDATION fieldbus infrastructure, which provides a single source of data management, diagnostics, alarms and alerts, data quality control, control-in-the-field capability, and object-oriented block structure.

Industry leader evaluates the technology

Petrobras is interested in specifying FOUNDATION for ROM technology for the ambitious projects it is undertaking in the upstream and downstream hydrocarbon industry. The company has a record-setting $224 billion capital spending plan through 2015, with most of the investments targeted at the upstream sector on the highly publicized Pre-Salt area of the Santos Basin.

The Petrobras Centro de Pesquisas Leopoldo Américo Miguez de Mello, also known as Cenpes, is the largest oil and gas research center in the Southern Hemisphere. During the press day event, a series of tests were performed with a FOUNDATION for ROM system installed on a distillation process pilot plant to evaluate the use of fieldbus-based ROM devices with wireless protocols for remote applications.

Miguel Borges, Senior Equipment Engineer at Petrobras, believes FOUNDATION for ROM can be an enabling technology for remote applications on Petrobras’ offshore platforms. “The Fieldbus Foundation’s ROM solution is attractive to us, since we want to gain access to diagnostic information from devices installed at our remote sites,” said Borges. “Petrobras is committed to investing in this type of technology, and is seeking the most effective solutions available in the marketplace.”

Reliance Industries (India) has also agreed to host FOUNDATION for ROM field demonstrations, and additional end user demonstrations in Japan, the Middle East and Europe are being planned.

Purpose of the field demonstration

Running on one of many of the Cenpes pilot plants, the Petrobras field demonstration offered a look at the full functionality of FOUNDATION for ROM, including wireless device integration, remote I/O integration, and wireless backhaul capabilities. This demonstration is the first step to show the capabilities of FOUNDATION for ROM before it is specified for commercial projects. The ROM solution enables end users to diagnose, either locally or remotely, the condition of their automation assets and then optimize predictive and preventive maintenance strategies.

FOUNDATION for ROM equipment is installed on an existing distillation column unit in the Cenpes pilot plant area. The project was completed through a cooperative effort between
Petrobras and local Brazilian automation suppliers sponsoring the ROM initiative. The Cenpes installation is an excellent example of the value of installing FOUNDATION for ROM and FOUNDATION fieldbus in an existing plant. The existing distillation column already has many analog and HART field devices installed. Petrobras was able to install a number of additional measuring points with a very small hardware footprint through a combination of FOUNDATION fieldbus H1 and wireless devices. The installation includes three types of FOUNDATION for ROM devices — wireless gateways, process controllers connected to FOUNDATION fieldbus H1 devices, and conventional remote I/O.

Borges said, “For Petrobras, the primary objective of this live demonstration at the pilot plant PC3 was to verify that we could access and use remotely, with ROM, all the operational functionalities available locally. Another objective was to check the interoperability of ROM devices of different manufacturers over the backhaul.”

He added, “ROM provides very easy and quick integration, and is transparent to the user.”

The demonstration took place inside the Center for Collaborative Visualization (NVC), also known as “The Egg,” a spherically-shaped building that houses a center for high-fidelity 3-D training simulation. Because of the remote capabilities of FOUNDATION for ROM, participants were able to use the meeting room as a virtual control room, showing live video feed from multiple locations in the pilot plant and wireless device diagnostic information all within the FOUNDATION fieldbus infrastructure. Information from the pilot plant in another part of the Cenpes compound was communicated across the High Speed Ethernet (HSE) wireless backhaul network to the virtual control room in the meeting room over standard Ethernet hardware and wireless equipment, as well as standard cyber security appliances.

The press day event started off with some introductory words from Petrobras Cenpes Executive Manager Marcos Isaac Assayag and the introduction of participating vendors and press from Fieldbus Foundation Marketing Manager Larry O’Brien. Fieldbus Foundation President and CEO Rich Timoney and Chairman Dr. Gunther Kegel also provided some key opening remarks.

According to Dr. Kegel, the world of automation is entering the age of Cyber Physical Systems, or the “Internet of Things” for automation, if you will. FOUNDATION for ROM is an enabler for cyber physical systems in process automation because it has the ability to consolidate diagnostic information from a number of disparate networks and can manage that information effectively in a single infrastructure that can be shared wirelessly through standard Ethernet and IP technology.

**ROM brings it all together**

Fieldbus Foundation Marketing Manager Larry O’Brien gave a brief description of how FOUNDATION for ROM does this, as well as the business requirements addressed by ROM. According to O’Brien, FOUNDATION for ROM was designed to enable fieldbus connectivity to remote I/O and the leading industrial wireless protocols, and is the first successful integration of ISA100.11a, WirelessHART, wired HART, and wired H1 protocols into a milestone. This remote I/O features a full hazardous area certification and supports conventional I/O signals. R. STAHL supplied H1 physical layer products such as device couplers, digital I/O couplers and the cabinet used for the installation of equipment. With three representatives actively involved in FOUNDATION for ROM committees, R. STAHL supports this important technology development.

**YOKOGAWA**

Yokogawa has contributed to the FOUNDATION for ROM project from the beginning, including the development and validation of specifications for the ISA100.11a gateway and wireless HSE backhaul. Since this technology can integrate several kinds of field devices — including wireless — into the FOUNDATION fieldbus infrastructure, Yokogawa promotes Foundation for ROM as a key concept for process automation. For the Petrobras demonstration, Yokogawa provided an ISA100.11a gateway and ISA100.11a devices to demonstrate the highly configurable, available and open capability of FOUNDATION for ROM.
single standard environment without sacrificing the diagnostic capabilities of existing wireless devices. Instead, these capabilities are mapped into the FOUNDATION block structure to provide a standard environment for data management and quality, eliminating techniques that are highly customized and much more costly to maintain throughout the plant lifecycle.

O’Brien indicated that FOUNDATION for ROM takes full advantage of the FOUNDATION fieldbus HSE-based network, which shares the same architecture as the H1 field network technology. With FOUNDATION for ROM, the HSE backhaul network is the “glue” that brings other networks together into a single managed infrastructure.

John Rezabek, chairman of the Fieldbus Foundation End User Advisory Council (EUAC), then gave a presentation on the value of FOUNDATION fieldbus and FOUNDATION for ROM to the end user. Rezabek used the “Walled Garden” analogy of Apple to describe the proprietary approach that many have taken to process automation, stressing that the value of FOUNDATION fieldbus lies in the fact that it was created with the guidance of end users, and its evolution continues to be heavily influenced by the EUAC, FOUNDATION for ROM included.

**How the demo equipment operated**

The second half of the day consisted of presentations from Petrobras personnel and the Fieldbus Foundation’s demo project leader for Brazil, Libanio De Souza from Smar in Brazil. Renato Ogeda, equipment manager at the Cenpes plant, gave an overview of the Cenpes facility. De Souza then gave a demonstration of the ROM functionality, including more details on how FOUNDATION fieldbus brings diagnostic information from devices on other wireless and wired networks through the FOUNDATION block-based structure.

FOUNDATION for ROM adds a new function block to provide an efficient way to bring large concentrations of discrete and analog field I/O back to the control room using HSE communication. The new Association Block can aggregate 64 discrete inputs/outputs and 16 analog inputs/outputs. There is also a new function block for WirelessHART that includes HART statuses. FOUNDATION for ROM may be embedded into existing devices including RTUs, controllers, PLCs, PAGs, and wireless gateways.

Device status is reported using the NAMUR NE 107 framework, based on five states:

- **Normal**: valid output signal
- **Maintenance Required**: still valid output signal
- **Out of Specification**: signal out of the specified range
- **Function Check**: temporary, non-valid output signal
- **Failure**: non-valid output signal

This creates consistent status reports for operators who can then view remote data for further analysis.

The actual demo equipment included FOUNDATION fieldbus H1 devices, a number of wireless devices, several ROM devices, and the wireless backhaul network. Fieldbus H1 devices were connected to a Smar FOUNDATION for ROM controller. FOUNDATION fieldbus H1 device suppliers include Emerson Process Management, Pepperl+Fuchs, Smar, Stonel, Westlock, and Yokogawa, as well as a fieldbus indicator from Beka. Discrete I/O from R. STAHL is also installed. H1 devices are connected to fieldbus device couplers and integrated power supplies from Pepperl+Fuchs, MTL, and R. STAHL.

In addition, a number of wireless devices on both the WirelessHART and ISA 100.11a networks are installed in the demo, and their diagnostic data is integrated into the host system and plant asset management system. WirelessHART devices from Emerson and Smar are connected to a FOUNDATION for ROM wireless gateway from Smar. Yokogawa and Honeywell have supplied ISA 100.11a devices that are connected to a Yokogawa ISA 100.11a gateway.

FOUNDATION for ROM conventional remote I/O is provided by R. STAHL. The conventional remote I/O, process controller, and wireless gateways are all connected to the HSE wireless backhaul network through managed switches from Belden and Phoenix Contact. The demo setup also shows the integration of cybersecurity for automation with the installation of automation firewalls from Belden and Phoenix Contact.

The HSE wireless backhaul network uses backhaul WiFi radios from Belden and MTL. All the wireless backhaul network hardware is standard hardware with no modifications. OPC and video data are also transmitted over the wireless backhaul network, which connects to a remote control room location with a Smar FOUNDATION fieldbus host system and plant asset management system.

The functional demonstration included accessing device diagnostics in wireless devices, including device status. Integration of video was demonstrated through observation of a control valve to determine if the valve was open or closed. A temperature sensor for a HART temperature transmitter was also pulled to show how the diagnostic alert would be visible in the same context as a FOUNDATION fieldbus H1 device.

**Demonstration sponsors**

With increasing implementation of digital control technologies across the process industries, as well as the growth of industrial wireless and network protocols, the success of the Fieldbus Foundation’s open automation infrastructure is sometimes taken for granted.

The global marketplace is still experiencing double-digit growth in the sales of products and services related to Fieldbus. The technology remains a preferred choice for both new construction and plant retrofit projects.

Perhaps now is a good time to revisit the key performance advantages that have made Fieldbus technology the leader in digital process fieldbus communications.

Fieldbus is a real-time digital communication network designed specifically for process control applications. It replaces analog 4-20 mA and on/off signals for connecting instruments like transmitters, analyzers, control valve positioners, and on/off valves to distributed control systems (DCS), programmable logic controllers (PLC), remote terminal units (RTU), and other automation systems.

As 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 technology takes automation to the next level by making control loops entirely digital from end-to-end — from transmitter to positioner — without intermediate analog signals, and by communicating multiple signals from multiple devices on the same pairs of wires. It also enables new, more powerful devices, including intelligent two-wire on/off devices with predictive diagnostics.

Fieldbus H1 technology provides an all-digital solution from the sensor to actuator, completely eliminating the need for analog 4-20 mA signals and significantly reducing the overall amount of equipment needed. It also takes the place of proprietary protocols previously used with electric actuators/motor-operated valves (MOV), gas chromatographs, and tank gauging systems. Communication is time-synchronized and scheduled to ensure deterministic closed-loop digital control. Multiple devices, each with multiple I/O signals, share the same bus.

Fieldbus supports long cable lengths to junction boxes far into the field, as well as long spurs for devices. Fieldbus-based control systems employ two-wire twisted pair cable and provide intrinsically safe or non-incendive device power suitable for all hazardous areas. Unrestricted access to field device intelligence enables centralized configuration/setup and diagnostics for all field instruments, including discrete sensors and actuators. This solution also supports temporary masters such as handheld field communicators, laptops/tablets, and documenting calibrators.

Unlike other digital architectures, Fieldbus was designed from the ground up to enable control-in-the-field (CIF) strategies across the plant.

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

Reduced Hardware Requirements:
Lower overall capital expenses

Today, some automation projects are adopting various alternatives to traditional I/O and marshalling technology. But why make physical marshalling smarter or better when you can eliminate it entirely? Many of the functions provided by hardware in a conventional control system are no longer required by a Fieldbus system, or are handled through software instead.

Fieldbus technology was developed to provide a solution for VirtualMarshalling™ — software-based distributed I/O connectivity — in which devices provide multiple signals over the same two terminals. Instead of relying on custom hardware configurations to accomplish the functions of traditional marshalling, Fieldbus accomplishes these tasks through a software-based structure. All signal linking (block to block) is done in software without hardwiring. This approach allows late addition of feedback and auxiliary measurement and control signals without the need for additional wiring, as well as change of
devices without switching I/O cards. Burnt shunt resistors are also eliminated. More devices can be added without laying more cable.

FOUNDATION fieldbus is particularly well-suited for expansions at existing sites, which are running out of tray capacity.

**Smaller System Footprint:**
**Easier design and implementation**

Rather than use individual wires for each device signal, FOUNDATION fieldbus connects multiple devices in parallel on the same pair of wires recognized by address. A single pair provides both power and communication, and can be intrinsically safe or non-incendive if required. Long distance is also possible. Field junction box hardware is rugged and encapsulated for harsh outdoor field conditions, some even passive and optionally zone 1 certified.

FOUNDATION technology reduces the need for cable, cable trays, I/O cards, and associated labor for installation, as well as the effort of cutting, stripping, crimping, labeling and connecting at every intermediate point. For example, a bus with 10 instruments — and an average of three signals per device — can take the place of 30 pairs of wires and I/O channels. The resulting cost is even lower than remote I/O and local mounting.

In addition, FOUNDATION fieldbus simplifies the integration of devices with multiple signals for operation and feedback. This includes electric actuators/MOVs and discrete devices such as intelligent two-wire intrinsically safe on/off valve actuators. In the past, these devices required one pair of wires and one I/O channel for each signal, meaning as many as 3, 6, 12 or more pairs per device. In comparison, FOUNDATION fieldbus enables a single pair of wires to support multiple devices, resulting in drastic wiring reduction. The reduced number of I/O cards for auxiliary signals also translates into fewer I/O cabinets, a smaller footprint, and reduced weight.

Since all device signals can now be employed at lower cost, plants can fully utilize device capabilities without being limited to a subset of signals and functionality. Continuous feedback and bumpless transfer (a feature in virtually all PID controllers preventing a sudden jump in output when the controller’s mode is switched from manual to auto) on hand operation also becomes available for all valves. Thanks to FOUNDATION technology, transmitters, control valves, and two-wire on/off valves are able to share the same bus. As a result, there is no need to select I/O card or barrier types, since all devices use the same single type of interface card and barrier, and have the same entity parameters — simplifying selection. At design time, it is not necessary to know the exact type and quantity of signal for each device to determine I/O requirements.

**Reduced Device Count:**
**Lower wiring and installation costs**

FOUNDATION fieldbus instruments are not limited to transmitting single values in real time. Instead, the technology supports multi-point devices such as multi-channel temperature transmitters with eight sensor inputs, which are ideal for temperature profiling applications, as well as multi-point indicators. For dual sensor temperature transmitters, both channels can be used for control loops.

The fieldbus solution allows eight-channel temperature transmitters to take the place of many hardwired transmitters, thus reducing the overall device count as well as associated wiring and I/O card points. These and other innovations offering installation cost benefits are not possible with hardwired signals.
Open Network Standard: Fewer protocols and greater interoperability

Proprietary protocols were eliminated years ago for simple transmitters and valve positioners. Now, FOUNDATION fieldbus can also eliminate these protocols for electric actuators/ MOVs, gas chromatographs and tank gauging systems.

These fieldbus devices integrate with intelligent device management software for setup/configuration and diagnostics just like transmitters and valve positioners, enabling predictive maintenance and doing away with special software. Devices also share the same bus infrastructure, eliminating the need for separate networks, gateways, and drivers.

As an open network standard, FOUNDATION fieldbus eliminates single vendor dependency, which limits the ability to interchange or replace existing instruments with third-party devices. This means different brand equipment can share the same network or serve as second-source replacement devices.

Faster Commissioning: Reduced labor and associated errors

With FOUNDATION fieldbus, time-consuming manual commissioning tasks and their associated errors are no longer a concern. The same is true of 4-20 mA ranging and signal distortion; traditional five-point loop tests are replaced by a simple plausibility check. Technicians can automatically confirm the correct device type (model and manufacturer) has been installed. This applies to not only transmitters and positioners, but also discrete devices such as intelligent two-wire on/off valves and electric actuators.

High Signal Integrity: Better resolution and increased accuracy

FOUNDATION fieldbus’ pure digital signals eliminate the digital-to-analog (D/A) and analog-to-digital (A/D) conversion required in devices and systems utilizing 4-20 mA technology. Fewer conversions lead to higher resolution and accuracy. Errors due to current calibration differences between transmitter output and DCS input are also eliminated. This is particularly important in flow and level applications such as tank gauging, where small percentages correspond to significant revenue.

Using fieldbus, measurement values transmitted digitally cannot be distorted and integrity errors are immediately detected. This compares with “on-scale” errors associated with 4-20 mA signals, which are often due to undetected ground loop or current restriction issues. Unlike discrete signals where open or short circuits may not be recognized, bus communication errors are easily identified.

Greater Signal Fidelity: Increased awareness of abnormal situations

FOUNDATION fieldbus devices are designed to transmit measurements as a real number in engineering units (not scaled by range), which are received — unaltered — by a control system at the other end. Transmitter configuration downloaded from the DCS is done as part of the device replacement process, thus ensuring the units, range, and other settings are correct. This approach eliminates the process variable skew that sometimes results from mismatched 4-20 mA range settings between transmitters and the control system. Operators gain confidence that the reading, controls, and alarms in the system are correct.

With fieldbus, measurement values are also transmitted over the full sensor limit with greater precision and are not limited to a narrow 4-20 mA portion. As such, they do not saturate at the normal control range, but go beyond, providing valuable information during abnormal conditions.

Tighter Control: Faster response and less variability

Transmitters, controllers, and valve positioners are digital — so it only makes sense to have pure digital signals between them. A digital bus running 25 times faster than earlier hybrids of analog and digital allows a closed loop that is digital and time-synchronized from end to end, from sensor to valve. Fieldbus communication is deterministic and real-time, offering control response times faster than 150 ms in some cases.

Elimination of analog input (AI) and analog output (AO) cards and their associated scan delays and jitter also improves control response time, particularly compared to remote I/O with additional network and link delays. Reductions in process variability allow set points to be moved closer to the optimal point of operation, with less “comfort margin.” Improvements for each transmitter and valve, loop, and process unit contribute to better plant performance.

Real-time Signal Status: Fewer trips and increased availability

FOUNDATION fieldbus delivers real-time signal validity indicating if the value is good for control, uncertain, or bad (fault). The status is then propagated as part of the same data structure as the value, eliminating the need for separate data mapping. This enables process problems to be distinguished from device problems, thereby minimizing nuisance trips of the control loop on sensor failure and increasing availability. The valve status includes limit conditions for override windup protection, fault state, bumpless transfer and more — further improving control.

More Powerful Devices: New and robust instrument functionality

The electronics in FOUNDATION fieldbus two-wire devices are not restricted to operation on 4-20 mA. The result: bus-powered instruments are able to consume more power, enabling new and more powerful functionality. Examples of such devices include two-wire radar level transmitters with frequency modulated continuous wave modulation, two-wire eight-channel process temperature transmitters, two-wire tank gauging multi-spot

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Major Automation Companies Remain Committed to Fieldbus

**Emerson Process Management** has released version 5.3.0 of its Segment Design Tool. This tool is designed to verify the physical and electrical parameters of a FOUNDATION fieldbus segment, operating under an H1 card on a DeltaV™ controller. This release has added support for the Windows® 7 operating system, support for both simplex and redundant H1 cards of S series with integrated power supply, and numerous field devices from a variety of manufacturers.

**Endress+Hauser** offers a complete set of services to design, engineer, install, commission and maintain a fieldbus network, taking responsibility and guaranteeing the overall performance of the solution. The company is a competent and reliable partner for any fieldbus project.

**Rockwell Automation** provides a robust, user-friendly FOUNDATION fieldbus solution helping to lower overall cost of ownership. The linking devices support 16 different H1 topologies, including multiple fault tolerant options with ring dual H1 media and redundant linking devices. A built-in power conditioner reduces the need for additional specialized hardware. Access to device-specific features, such as partial valve stroking and diagnostics for empty pipe detection, are also available in the PlantPAx HMI.

**Softing** has played a leading part in the FOUNDATION fieldbus specification work. The company was first to implement the FOUNDATION H1 protocol and developed the PC interface used for the H1 protocol verification in 1995. Today, Softing is a leading supplier of protocol stacks and embedded communication modules for FOUNDATION fieldbus devices and host systems worldwide.

**Yokogawa** is a communication network with the highest potential for improving plant productivity. Yokogawa has been developing multivariable devices so that users can enjoy the merits of fully digital communication. The company’s multivariable pressure transmitter, EJX910/930, is capable of measuring differential pressure, static pressure and temperature, and outputs mass flow rate by calculating these variables — eliminating extra pressure transmitters and temperature sensors. Its vortex flowmeter, digitalYEWFLO, also outputs mass flow rate using a built-in temperature sensor and accepts inputs from other pressure transmitters through FOUNDATION fieldbus without the need for additional wiring.
temperature transmitters with water bottom level measurement, two-wire intelligent on/off valves, and two-wire field indicators.

Powerful function blocks in fieldbus instruments provide computation and arithmetic whenever there is a need to calculate or compensate a value in the device so that it may be shown on a local display.

**Enhanced Diagnostics: Improved operations and maintenance programs**

The digital nature of FOUNDATION fieldbus supports centralized device configuration/setup, diagnostics, and viewing of internal variables. The technology also allows two-wire devices to drive more powerful electronics and firmware, ensuring more sophisticated self-diagnostics. This includes statistical process monitoring (SPM) for multiple variables across the bus and continuous valve performance diagnostics not found in 4-20 mA devices.

Faster communication also means diagnostics and configuration/setup pages load faster.

Predictive diagnostics with fieldbus is available from two-wire intrinsically safe intelligent on/off valves and other discrete devices not digitally integrated in the past. In addition, the technology employs NAMUR NE107-compliant device alarm rationalization to notify the right person without alarm flooding.

**Simple Online Upgrades: Easier access to new technology**

FOUNDATION fieldbus instruments not only communicate faster than older hybrid analog/digital devices, but they also have the speed necessary to allow firmware download from the system. Devices with dual memory banks switch bumplessly to new firmware.

Modern fieldbus devices are easily upgraded to take advantage of features and other improvements in new versions. These upgrades can be performed without going into the field to replace the entire circuit board or connect a laptop.

**Greater Ease of Use: Proven solutions for projects of all sizes**

FOUNDATION technology is continuously improving based on feedback from our strong end user advisory council. The FOUNDATION specification now includes NAMUR NE107-compliant role-based and prioritized device diagnostic alarms; backwards compatibility and easy device replacement; and graphically enhanced, device-level electronic device description language (EDDL) user interface and wizards. Constantly improved device interoperability testing kits (ITK) and host profile registration processes ensure that new devices and systems meet our specifications.

The FOUNDATION solution employs NAMUR NE107-compliant device alarm rationalization to notify the right person without alarm flooding.
Two months ago, we had a process redesign.
Last month? The I/O schedule changed...again.
Today, skids showed up and didn’t match spec.
And yet, our start-up isn’t changing.

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Field Diagnostics Module (FDM) from Phoenix Contact.

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- Installation in the field using our innovative modular concept
- Industry standard diagnostics
- Single channel flexibility
- Device management using DD, EDDL and DTM

To learn more visit www.phoenixcontact.net/processfieldbus
Conventional and Fieldbus Devices in a Common System

Integration of simple and smart instrumentation is easier than you think

As intelligent field devices are applied with more frequency throughout plant design, design cases occur where native bus-technology devices and simple field devices exist in the same control system. This article discusses one specific case, steam drain control, which can benefit from intelligent diagnostics on the control valves, but also works quite effectively with simple level switches. It is possible for users to combine more advanced FOUNDATION fieldbus devices with simple devices such as level switches to create a truly effective control solution.

continued on next page
Systemic Thinking

Many instrumentation and controls engineers think of the field device as an instrument and the DCS cabinet as the control system. With FOUNDATION fieldbus technology, however, the net effect of deploying configurable field devices is to extend the boundary of what we traditionally think of as the control system into the field devices themselves. This change in philosophy is most frequently discussed as the opportunity to deploy control strategies into the field devices themselves, labeled “Control in the Field.” While there are undoubtedly control applications where control in the field offers advantages, using only fieldbus-enabled devices in a field control strategy limits the overall possibilities for using intelligent devices as an extension of the control system.

A Case Study: Steam Drain Controls

Steam lines are typically fitted with low-point drains, which are implemented using a piping device called a drain pot. This is basically a section of pipe about the same diameter as the main line, connected via a tee connection and extending downwards from the main line. Liquid is formed when heat loss through the wall of the pipe causes steam to condense. Large amounts of liquid are formed during startup, when the bulk metal temperature of the piping components is below the saturation temperature for the steam flowing through the piping system. If this liquid is not removed from the piping system, the water can be entrained with the steam moving at high velocity down the pipe, causing mechanical damage termed “water hammer.” To alleviate this problem, liquid water is trapped in the drain pots located throughout the piping system, and drained through remotely operated valves.

One traditional control strategy for drain pot valve control involves a pair of level switches in the steam line drain pot. When the high switch detects liquid water, the control system sees the change in the switch signal and sends a command to open the valve. Depending on the line pressure, this may cause a partial open command or a full open command. When the high switch and the low switch both detect no liquid present, the control system commands the drain valve to close.

The Fieldbus Design

Typically, fieldbus technology application to this control system function would involve replacing
the valve with a fieldbus-enabled valve controller, and replacing the level switches with a fieldbus-enabled transmitter. This would typically be implemented with a FOUNDATION fieldbus Analog Output block for the valve control, with position feedback derived from the BKCAL_OUT of the block, with the “Use PV for BKCAL_OUT” option selected in the IO_OPTS parameter. An analog input block for the transmitter would be added, with logic in the control system to switch the valve to either partial or full open (depending on pressure) position when level exceeds the setpoint.

What brings this approach into question is that the level switches are relatively inexpensive, and can take the system operating temperature (1100°F) and pressure (2400 psig) without requiring additional piping components. Most continuous level technology would require additional piping components to protect the transmitter from the process conditions, which would mean added expense. It was also determined by the end user in this case that the level switches possessed sufficient reliability and would benefit only incrementally from the additional diagnostics that fieldbus would provide.

The Intelligent Field Device Solution

Fieldbus-enabled valves have entered the marketplace that have extended capability, including the capability to interrogate external switches. While these were intended for use with external limit switches for valve position, these valve capabilities provide an interesting solution to the drain valve control problem laid out above. The level switches can be wired to the valve controller, and switch position can be reported back to the control system using discrete input blocks. While this allows for the wiring reduction typically associated with digital device installation, it avoids the higher device and installation cost of level transmitters.

The main drawback of the approach selected is the larger number of function blocks required. Since the speed required for system response for this application is relatively slow (approximately one second), a sufficient number of devices can still be connected on the same segment to make the digital field device wiring cost benefit easily apparent.

The Horizon

Today, direct integration of simple devices like the limit switches into the local fieldbus valve is a cost-effective solution, and a great example of how you can combine conventional sensors and switches with a fieldbus control solution. Even more direct integration of simple devices is coming in the near future as the valve suppliers add new, higher density discrete blocks. Some intelligent valve suppliers have already begun utilizing the bitwise capabilities of the discrete data type described in the Fieldbus Foundation standards to reduce the number of blocks required to transmit a number of valve conditions. Ultimately, when you minimize signals, you improve the overall efficiency and performance of the network. The FOUNDATION fieldbus technical specification defines different ways for valves of all types, including actuators and positioners to communicate more than just open/close data.
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Latest Solutions for the Fieldbus Physical Layer

New ways to optimize fieldbus physical layer performance and reliability

The Fieldbus Foundation’s open, non-proprietary technology combines a reliable physical layer with a robust protocol. Even so, it isn’t uncommon to encounter a few problems due to simple wiring errors while commissioning a new plant. In addition, environmental conditions can cause deterioration, impacting the physical layer over time.
Problems with well-designed, properly installed and correctly maintained FOUNDATION fieldbus systems are infrequent, but when they do occur, determining the cause can be challenging. A fieldbus may appear to be functioning fine, even with multiple problems. Eliminating these problems before they lead to plant downtime saves time and money.

**Causes of physical layer faults**

The physical layer is what connects all the devices on a fieldbus segment together. It provides DC power to the devices and allows them to communicate with each other. The physical layer consists of four parts: cable, wiring blocks, terminators, and a power supply.

The most common problems associated with the fieldbus physical layer include:

- Missing or extra terminators
- Improper grounding of the cable shield
- Water/condensation in cables, junction boxes, devices, splices, etc.
- Unisolated fieldbus segments
- Connectors not securely plugged in
- Loose wires
- Damaged cable or wires
- Stray wire strands at wire terminations
- Screw terminals and hold-down screws inadequately tightened down

**Need for diagnostic information**

While FOUNDATION fieldbus instruments typically provide a large volume of diagnostic information about their status and overall health, the same was not always true for the physical layer network that interconnects them. The main purpose of physical layer diagnostics is to indicate maintenance or repair is required in order to avoid a failure of the network, so overall availability of the fieldbus system is maintained.

In a FOUNDATION fieldbus system, all signals are important for reliable control and this is part of the reason to have physical layer diagnostics. More specifically, physical layer diagnostics are necessary where the failure of a fieldbus segment could result in loss of life or production, or irreparable damage to plant and equipment.

For engineers and technicians working with fieldbus systems, diagnostics are a tool to verify the integrity of the network and the signals themselves. The most important consideration is whether signals are transmitted from “A” to “B” without change — and on time — in a way hosts and field devices can use them for control.

However, the functionality of diagnostics must vary depending on the situation. During a startup phase, the probability of faults involving wiring and interconnection is much higher than during the operation phase. Long-term experience in the industry suggests the majority of faults are related to wiring issues. Dedicated wiring verification tools can be used for quick rectification of the majority of faults, whereas more complicated faults can be identified with more elaborate diagnostic monitors.
Latest solutions for plant personnel

Fault behavior changes significantly during the operational phase of the plant. Most faults in this phase are due to external factors such as surges or degraded components (either electrical or mechanical). Monitoring of the relevant communication parameters is the appropriate means of response, combined with alarms to alert operators that communication might get disturbed if no action is taken. Predictive maintenance is the keyword, and system-integrated diagnostic tools are frequently the solution.

It is important to distinguish tools such as oscilloscopes and spectrum analyzers, which are useful to fieldbus instrument designers, from tools that are beneficial to field personnel. The tools employed by field personnel need to be geared to getting a new fieldbus segment up and running or diagnosing a problem if the segment starts showing excessive error counts. These tools should be geared to workers who may have only a passing knowledge of fieldbus and digital technology in general. The diagnostic tool should answer the question, “What is the probable cause of the problem and what needs to be done to fix it?”

Today, a variety of solutions are available to help process plants diagnose potential faults in the physical layer of their fieldbus systems. These solutions range from the very complex that require a high degree of knowledge and interpretation from the end user, through to hand-held units that do the majority of the interpretation for you.

For the plant operator, it is essential not to be overloaded with irrelevant information that does not contribute to the rectification of the problem. The tool in use is required to gather only the relevant data and turn it into a meaningful message to enable the user to take appropriate action.

At this point of time, human decision skills are still required to deal with most fieldbus physical layer issues. However, these skills should be at a minimum level, so trained but available personnel are able to perform the required action. It is meaningless to provide tools that deliver information that only expert personnel with years of experience can operate, since such personnel may not be available or are simply too expensive.

Loose or damaged wiring can result in fieldbus physical layer faults.

Vendors Help Make Fieldbus Installations Robust and Reliable

Using Emerson’s DeltaV fieldbus H1 interface card with integrated power, the fieldbus trunk cable from the field junction box lands directly on the H1 card in the system cabinet and completely eliminates the intermediate marshalling cabinet for separate power supplies. This drastically reduces the system footprint to approximately half compared to other solutions. Marshalling of multiple signals each from multiple devices is done “virtually” from software.

When fieldbus physical layer parameters are on the edge of tolerance, often the disturbance is originating in the field. Why not analyze the bus precisely in the environment that is affecting it the most? The Field Diagnostic Module from Phoenix Contact mounts in the field junction box and measures all of the standard diagnostics. Fast, accurate and in real-time could be the difference between maximizing performance and reliability, or jeopardizing the integrity of the process.

Good and simple physical layer diagnostics improve the reliability of fieldbus installations, but until today, a costly and complex diagnostics system had to be installed. With the R. STAHL fieldbus power supply with integrated physical layer diagnostics, effective diagnostics are now accessible to end users without additional cost for installation or software. Each fieldbus power supply continuously measures physical layer values such as jitter, noise and unbalance in the background. These values can be easily displayed on a PC or sent to an engineering workstation via the H1 network.

In addition to providing a Fieldbus Foundation-registered host system, Rockwell Automation has the tools for a robust physical layer. The H1 interface includes integrated power conditioners that can increase system reliability and reduce overall cost. Redundant junction boxes enable fault-tolerant H1 topologies, including an H1 ring and redundant H1 networks. The H1 physical layer becomes easy to troubleshoot with tools like a built-in oscilloscope. This solution also enables network power monitoring.
With recent updates to the Fieldbus Foundation’s Foundation for Safety Instrumented Functions (SIF) technical specifications, device developers can take advantage of an H1 dual-mode device capability, which greatly simplifies the process of developing field instrumentation employing the SIF protocol.

This is good news for end users who are anxious to start realizing the benefits of Foundation technology and its advanced diagnostic features in their plant safety systems.

Most of the failures related to safety systems do not happen within the logic solver, but can be traced to failures at the field device or control valve. The Fieldbus Foundation’s solution provides the most sophisticated diagnostics for safety devices and a truly digital path for safety system instrumentation.

With the dual-mode H1 device capability, instrumentation manufacturers can bring new safety products to market without having to design two entirely different devices. Developers can implement H1 devices with SIF features activated or de-activated. More importantly, this means plants will only have to stock one type of device that can be used as either a process device or a safety device.

When SIF mode is selected, the device will behave as specified by the SIF specifications; otherwise, it will function as a normal H1 instrument. To ensure conformance to safety standards, the two modes cannot run concurrently in the same device.

The latest Foundation for Safety Instrumented Functions release also includes a number of updates to the system architecture, application model, protocol, function block and device interoperability test kit (ITK) profile specifications, as well as a new application note on macro cycle calculation.

Foundation fieldbus is an ideal platform for advancing standards-based safety instrumented functions. Multiple Foundation for Safety Instrumented Functions pilot projects are taking place at locations around the world with different end users. These companies, along with other major industrial firms, are encouraging the automation equipment industry to develop safety-approved products for their initial installations.

Additional information about the Foundation for Safety Instrumented Functions technical specifications is available on the Fieldbus Foundation’s website at www.fieldbus.org.
James O. Gray Scholarship Celebrates 10th Anniversary

Program marks a decade of support for fieldbus educational opportunities

With global adoption of Foundation fieldbus continuing to grow, there is a greater need for skilled professionals trained in this innovative technology. New jobs are being created as the process automation industry switches to an all-digital architecture and replaces older analog systems.

In 2003, the Fieldbus Foundation, supported by its members, founded the James O. Gray Educational Scholarship Fund to expand the opportunities for students preparing for employment in the evolving automation field. The scholarship honors the memory of Jim Gray, a long-time leader in the Fieldbus Foundation who passed away in 2002. Invensys/Foxboro employed Gray for 25 years as sales and marketing manager. In addition to being very active within the foundation from its inception, he served as secretary of the board of directors, member of the executive committee, and member of the U.S. marketing committee.

The James O. Gray scholarship program established a perpetual $250,000 endowment fund providing scholarships to students seeking a career in the industrial automation profession. Since its inception a decade ago, the program has funded 29 educational scholarships for students around the world.

According to Fieldbus Foundation President and CEO Richard Timoney, the James O. Gray scholarship fund has played a valuable role in shaping the future of the automation workforce. “During recent years, industrial organizations around the world have faced a very significant challenge: keeping pace with the accelerating retirement rate for experienced technicians and operators,” said Timoney. “The James O. Gray Scholarship has contributed to the industry’s ability to replace these highly skilled professionals.”

Timoney added, “Our scholarship program provides strong support for educational programs that train students in the latest control and instrumentation technologies. Through this effort, we can keep our industry strong by enabling the education of tomorrow’s plant personnel.”

Educational institutions currently participating in the program and choosing the qualified recipients include: Lee College (Baytown, Texas, USA), Southern Alberta Institute of Technology (Calgary, Alberta, Canada), University of Miskolc (Miskolc, Hungary), Shipping and Transport College (Brielle, The Netherlands), King Mongkut’s Institute of Technology Ladkrabang (Bangkok, Thailand), Singapore Polytechnic, (Singapore) and Waseda University (Tokyo, Japan).

The Fieldbus Foundation Scholarship Awards Committee selects the educational institutions to receive awards. These institutions then choose the qualified student recipients, who are eligible for awards of up to $1,000 per year. Expenses covered by the award are limited to tuition, books, and lab fees.

Information about the various levels of support for the James O. Gray scholarship program is available on the Fieldbus Foundation’s website, at www.fieldbus.org/scholarship.

The late Jim Gray of Invensys/Foxboro is honored by an educational scholarship in his name.
People In Fieldbus: Terry Blevins

Profiling one of the early pioneers of the FOUNDATION fieldbus protocol

In this inaugural installment of “People In Fieldbus,” Fieldbus Report profiles Terry Blevins, a long-time development engineer and technologist for Emerson Process Management and one of the early proponents of interoperable digital control systems.

Blevins played an important role in the groundbreaking research of the Interoperable Systems Project (ISP) in the early 1990s and later helped develop the FOUNDATION fieldbus user layer specification.

Blevins currently serves as a principal technologist in the future architecture team at Emerson Process Management. He received a Bachelor of Science degree in Electrical Engineering from the University of Louisville in 1971 and a Master of Science in Electrical Engineering from Purdue University in 1973. In 2004, he was inducted into Control Magazine’s Process Automation Hall of Fame. Terry is an ISA Fellow.

Fieldbus Report: How did you first become involved with the Fieldbus Foundation?

Blevins: In 1991, I transferred from Emerson’s operations area where I was technical consultant on pulp and paper projects to a small group in our technology organization that was researching and developing the technology that would be used in our future control system — the DeltaV control system. I led the team that was looking at tools customers would use to work with the next generation controller and field devices.
As part of this effort, I joined the ISA50 application layer and the TC65 WG6 function block committee. These groups within ISA and IEC were exploring the use of function blocks for measurement, control and calculation, and how to distribute this capability to field devices. Because of my work in these areas, I was asked to be on the Interoperable Systems Project (ISP) team for the development of the user application specification. Many of the ideas initially explored in ISA50 and TC65 WG6, such as function block mode and status, were further refined and incorporated into this specification.

A few years later the Interoperable Systems Project was combined with other fieldbus efforts to form the Fieldbus Foundation. The ISP user layer specification became the basis for the Foundation fieldbus specification for the function block application process. I continued as the team lead for this specification.

FR: What were the key milestones for Foundation technology over the years?

Blevins: The Fieldbus Foundation’s technology is the result of many people and companies working together to define standards that enable the creation of interoperable digital field devices. Agreement on a standard for the fieldbus physical layer in the early 1990s was a major milestone. Publication of the FOUNDATION specification and introduction of the interoperability test kit (ITK) were also key factors in FOUNDATION fieldbus being adopted by all major control system and instrumentation manufacturers.

FR: How would you describe FOUNDATION fieldbus’ position in today’s automation marketplace?

Blevins: FOUNDATION fieldbus is a key technology within the process industry. This is especially true in new plant construction, where its use can dramatically reduce the cost of installation. Companies that have installed FOUNDATION technology realize the benefits that fieldbus provides over older technologies.

FR: What advice do you have for end users who are considering their first FOUNDATION fieldbus project?

Blevins: When undertaking a FOUNDATION fieldbus project for the first time, it is important that the people involved in design, installation, checkout and maintenance of the system be trained on basic fieldbus principles. As with any new technology, this training helps facilitate a smooth installation.

FR: What is your current role at Emerson Process Management, and what are your plans for the future?

Blevins: I am currently a principal technologist in Emerson’s future architecture team. My work focuses primarily on research and development of tools for process control and analytics. In this role I often work with customers in field trials — something I enjoy. I have a blog, which can be found at www.ModelingAndControl.com, where I address topics and developments that impact future process control systems.

One thing I realize in talking to customers and other manufacturers is that the process industry faces a significant challenge of training new engineers to replace the engineers who are retiring. Within Emerson, I teach process control in a boot camp that is used to train new engineers.

I have recently co-authored two books, published by ISA, that may be used in training programs: Control Loop Foundation — Batch and Continuous Processes and Advanced Control Foundation — Tools, Techniques and Applications. The reader may go to the book’s web site to perform workshops and/or view a YouTube video that shows the workshop solution.

Thus, through these efforts, I am trying to help address this need for training on process control. Over the next few years I hope to continue my work in these areas.
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### Upcoming Fieldbus Foundation Events Worldwide

Where to find seminars, road shows and technology exhibitions

No matter where you are located, it’s easy to find an event related to FOUNDATION™ fieldbus. The Fieldbus Foundation has planned an expanded worldwide program of fieldbus educational seminars, road shows, technology exhibitions and other informative activities. These events serve the needs of process automation end users, device developers, engineering firms and other interested stakeholders. Make plans now to attend an event in your area.

#### Events in the Americas

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<td>Perth, Australia</td>
<td>May 15, 2013</td>
<td>FOUNDATION Fieldbus End User Seminar</td>
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<tr>
<td>Perth, Australia</td>
<td>May 16, 2013</td>
<td>Sales Force Training</td>
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For the latest event information, please visit the “Newsroom” page at www.fieldbus.org and click on “Events.”
Fieldbus Product Highlights

AZBIL OFFERS NEW MAGNETIC FLOWMETER WITH UNIQUE SCALE DIAGNOSTIC

The MagneW3000 PLUS+ electromagnetic flowmeter provides a longer operation period for scaling applications through the extremely smooth PFA liner. It has been proven in the field.

The new scale diagnostic capability on the MagneW3000 PLUS+ FOUNDATION fieldbus converter with the latest ITK 6.1 provides more benefits by offering the optimum maintenance timing for scaling applications. The MagneW3000 PLUS+ fully complies with the FOUNDATION fieldbus technical specifications. Its built-in AI control function block provides process variable for the regulatory control.

Scale diagnostic function (optional): It is known that flow measurement errors appear when there is scale on electrodes. The enhanced Azbil signal-processing algorithm provides diagnostic capability for scale on electrodes. It allows earlier predictive maintenance and minimizes downtime of the customer’s production system due to flow measurement error by scale on electrodes.

AZBIL • www.azbil.com

FFeasy — RAPID REALIZATION OF FOUNDATION FIELDBUS H1 TRANSMITTERS

Softing’s FFeasy significantly reduces the implementation effort to set up your field device as a FOUNDATION fieldbus interface. The FFeasy software includes a mapping tool based on Microsoft Excel, which simplifies the customized mapping of the parameters. Furthermore, a FOUNDATION fieldbus starter kit for the realization of a small network and the flasher toolset are part of the FFeasy package.

The software has a FOUNDATION ITK certification and is based on the Softing standard hardware solution FBK-2 which has already passed a physical layer test and a conformance test (CTK). A FOUNDATION fieldbus H1 transmitter product, being developed based on the FFeasy kit, only requires the short and cost-effective re-certification process at a Foundation fieldbus certification lab.

Available solutions for a fieldbus connection allow the use of an existing serial interface (UART) with MODBUS or HART protocol as a FOUNDATION fieldbus connection.

SOFTING • industrial.softing.com/index.php?id=1811

YOKOGAWA RELEASES FIELDMATE™ R2.06 VERSATILE DEVICE MANAGEMENT WIZARD — FEATURING FDT2.0 SUPPORT AND A NEW ALARM SETTING FUNCTION

Yokogawa will release the FieldMate™ R2.06 Versatile Device Management Wizard in May. FieldMate is a versatile software program for configuring, adjusting, and managing a wide variety of field devices in factories and other production sites. This upgraded version supports the latest FDT2.0 interface, and features a new alarm setting function with a user-friendly graphic interface that conforms to the NE 107. The product features are as follows:

1. FDT2.0 support — FieldMate R.06 supports the latest version of the FDT interface, FDT2.0. Backwards compatible with FDT1.2, FDT2.0 improves device response time and performance. Common function components are available that make the development of FDT2.0-compatible software more efficient. An industry first, these FDT2.0-compliant DTM drivers are for two important Yokogawa product series, the EJA-E and EJX differential pressure and pressure transmitters. Yokogawa plans to develop FDT2.0-compliant DTMs for other Yokogawa products.

2. Easy-to-use alarm setting function — Sensors generate huge alarm data that must be categorized, organized, and promptly sent on to operators and maintenance staff so they can quickly respond to any abnormal condition occurring in a plant. Conventionally, various settings must be made for each type of alarm, which can be a very complex and difficult process. The new alarm setting function that comes with FieldMate R2.06 automatically organizes the alarm data in accordance with the NE 107, simplifying the task of making these settings. A user-friendly graphical interface further facilitates this process.

Fieldbus Product Highlights

TRULY INTEGRATED CONTROL AND INSTRUMENTATION ... ONLY FROM ABB

Only ABB delivers the extended automation functionality that gives you the visibility and control you need to run your plant more efficiently — optimizing your precious time, resources and money. Find out how truly integrated control and instrumentation can save you money ... get your FREE copy of our asset optimization white paper at: www.abb.com/ysiinstrumentation.

ABB • www.abb.com/ysiinstrumentation

EMERSON RELEASES THE FIRST CORIOLIS FLOWMETER CERTIFIED TO ITK 6.0

Emerson’s Micro Motion transmitter with FOUNDATION fieldbus connectivity is now certified to the latest Interoperability Test Kit. Through continual commitment to being at the forefront of the latest standards and interoperability testing, Emerson is able to be the first to offer technology improvements to users.

Micro Motion 2700 transmitters with FOUNDATION fieldbus are now shipping with device revision 7.0, which is the newly ITK 6.0 certified version. This newest version offers several features for users to fully realize the benefits of the enhanced functionality in the FOUNDATION fieldbus protocol. Notable improvements include additional function blocks, improved block execution times, and NE 107 alert standardization.

EMERSON PROCESS MANAGEMENT • www2.emersonprocess.com/en-us/brands/micromotion/Pages/coriolis-flow-density-measurement.aspx

NEXT GENERATION OF FOUNDATION FIELDBUS DEVICES AVAILABLE

Endress+Hauser offers NE 107 diagnostics in FOUNDATION fieldbus devices for all measuring principles: flow, level, temperature, analysis and pressure.

NE 107 itself is a requirement for self-monitoring and diagnosis of field devices and classifies existing diagnosis messages into four categories that help the user make a quick decision on the actions to be taken.

Thanks to its simplicity, NE 107 is being increasingly demanded from users and manufacturers alike.

ENDRESS+HAUSER • www.endress.com

FCI MASS FLOW METER WITH FOUNDATION FIELDBUS PROTOCOL

The next-generation ST100 Series thermal dispersion flow meter for air/gas flow measurement and plant communication from Fluid Components International (FCI) features the FOUNDATION fieldbus protocol. It is the first triple variable flow instrument that measures mass flow, temperature, and pressure. In addition to flow rate and totalized flow and temperature, pressure measurement up to 1000 psi (70 bar) is available. An on-board data logger stores 21 million readings on a removable card.

FCI — FLUID COMPONENTS INTERNATIONAL • www.fluidcomponents.com

HONEYWELL'S FOUNDATION FIELDBUS SOLUTION

Honeywell’s FOUNDATION fieldbus solution provides an efficient cost-effective bridge between the rich information that resides in every fieldbus device and the extensive features and benefits offered by Experion® PKS Orion. Field Device Manager is tightly integrated with the Experion Process Knowledge System (PKS), providing valuable user benefits from the project phase, through commissioning, and over the full life cycle of the plant. Users can add new device DDs in seconds, enabling Experion PKS Orion and FOUNDATION fieldbus technology to work together to optimize operations, minimize process downtime, and support better business decisions.

Careful attention to detail has provided unparalleled ease of use as well as performance unmatched in the industry. Fieldbus devices have a lot to say and Experion ensures that every word is clearly heard and gets to the right people to keep your plant running in a safe, efficient, and cost-effective manner.

Contact your local consultant for more information.

HONEYWELL • www.honeywellprocess.com
Fieldbus Product Highlights

MODBUS TO FOUNDATION FIELDBUS CONVERTER, IT’S READY FOR YOU!

As one of the leading suppliers of premium industrial communication products, Microcyber has developed a MODBUS to FOUNDATION fieldbus converter (NCS-MF105). As a MODBUS host, NCS-MF105 communicates with the device with MODBUS-RTU interface, and it can achieve read/write operation for MODBUS register data via FOUNDATION transducer blocks, and convert MODBUS data to FOUNDATION communication system via standard AI, AO, DI, DO function blocks.

MICROCYBER • www.microcyber.cn/en/productxy.asp?id=476

REDUNDANT FOUNDATION FIELDBUS PHYSICAL LAYERS

One difficulty still remains with fieldbus technology: all segment communications and power integrity are vulnerable to a single broken, twisted wire pair. The MooreHawke TRUNKSAFE Fault-Tolerant Fieldbus System provides a cost-effective, yet highly reliable, strategy to maintain continuous communications between field devices and a host system in the event of any single point failure on a FOUNDATION fieldbus physical layer. TRUNKSAFE is compatible with all FOUNDATION fieldbus host systems.

MOOREHAWKE • www.miinet.com/moorehawke

PEPPERL+FUCHS INTRODUCES THE LATEST IN FIELDCONNX® DIAGNOSTICS AND ACCESSORIES

The latest line of FieldConnex® diagnostic products and accessories by Pepperl+Fuchs includes Diagnostic Segment Protectors, Moisture Detection Sensors, Surge Protection, and Ethernet Gateway with FOUNDATION-H1 node connection & control I/O for cabinet monitoring. These improvements mean increased fault tolerance and availability of fieldbus networks for you. This also means that you can take control of the cabinet’s temperature, humidity, and fans through extra I/O now available in the Pepperl+Fuchs hardware.

With FieldConnex® Diagnostics and Accessories you can simplify everything from planning, installation and commissioning to operation and plant upkeep by utilizing the latest in technology by Pepperl+Fuchs.

PEPPERL+FUCHS • www.fieldconnex.info

PHOENIX CONTACT RELEASES NEW SOLUTIONS FOR FOUNDATION FIELDBUS

Phoenix Contact has added two new families to its ever-growing process infrastructure portfolio. A new line of preconfigured junction boxes makes it easy to connect and protect process instruments, and a redundant fieldbus power supply can prevent downtime in critical applications. In the field, FB-….SS stainless steel and FB-….AL aluminum enclosure assemblies include internal components for trunk connection, termination, surge protection and flexible shielding for easy connection. The user can snap in the necessary type and number of modular device couplers (FB-2SP or FB-ISO), based on the hazardous area and isolation requirements. This reduces installation costs by avoiding unused capacity and minimizing enclosure size. At the same time, a one-to-one coupler to instrument relationship increases operational integrity.

PHOENIX CONTACT • www.phoenixcontact.net/processfieldbus

INTEGRATE FOUNDATION FIELDBUS TECHNOLOGY TO THE PlantPAx PROCESS AUTOMATION SYSTEM

The PlantPAx system from Rockwell Automation allows use of devices from many vendors. This flexibility includes fully integrating FOUNDATION fieldbus to any ControlLogix® platform through linking devices 1788-EN2FFR and 1788-CN2FFR. These modules, which provide a direct link from EtherNet/IP or ControlNet to the FOUNDATION fieldbus H1 device level network, enable seamless data distribution and execution of process control as part of a registered FOUNDATION fieldbus host system.

ROCKWELL AUTOMATION • www.rockwellautomation.com

FIELDBUS PHYSICAL LAYER SOLUTIONS

A good and simple physical layer diagnostics improves the reliability of fieldbus installations, but up to today, a costly and quite complex diagnostics system needs to be installed. With the R. STAHL fieldbus power supply with integrated physical layer diagnostics, such diagnostics is now accessible for everybody without additional cost for installation or software. Each fieldbus power supply continuously measures the physical layer values like jitter, noise or unbalance in the background. The values can be easily displayed on a PC or sent to an engineering workstation via H1 network.

R. STAHL • www.r-stahl.com
Evolving Solution Builder in Industrial, Building and Life Automation

The azbil Group provides its customers with timely solutions via an integrated structure that extends from planning and development to maintenance and service, capable of responding rapidly to customer needs.

We supply the best solution, tailored to the customer’s needs, to building management, factories and plants process automation, and even down to life line, gas and water, measurements in residential area.

Driven by the Group philosophy of “human-centered automation”, the azbil Group strives to utilize its measurement and control technologies to realize safety, comfort and fulfillment in people’s lives and societies whilst contributing to higher energy efficiency and the global environment protection.

Under azbil, the Group strives to realize safety, comfort and fulfillment in people’s lives and contribute to global environment preservation through “human-centered automation.” To realize this,

**We create value together with customers at their site.**
We pursue our unique value based on the idea of “human-centered.”
We think towards the future and act progressively.

Yamatake Corporation changed its name to Azbil Corporation on April 1, 2012.

Azbil Corporation
http://www.azbil.com/
Analog and digital device networks provide communication capabilities, but stop there. FOUNDATION™ technology is about much more than just communication. It is a forward-looking automation infrastructure for outstanding operations: from engineering, to operations and maintenance.

- Fully digital technology providing transmission of multiple process variables and incorporating NAMUR NE107 recommendations for managing diagnostic data.

- Object-oriented block structure allowing for implementation of control in the field, improved data management, and support of alarms and alerts.

- FOUNDATION for Remote Operations Management (ROM) integrates both ISA 100.11a and WirelessHART® devices, remote I/O, and other network technologies specifically for remote applications across a High Speed Ethernet wireless backhaul network.

- FOUNDATION for Safety Instrumented Functions (SIF) provides much-needed digital diagnostics for process safety systems and devices.

Learn more about today's world-class solution for industrial automation.

www.fieldbus.org