FEATURED INSIDE:

- OPC Foundation Joins EDDL Project
- Demonstration of Integrated Fieldbus Architecture
- Suppliers Report on Technology Advances
StoneL connects your process.

**ValvePoint™** valve communication and control for discrete automated valves feature ultra-reliable solid state sensors integrating FOUNDATION Fieldbus and other field-proven bus communication protocols.

**FieldLink™** process networking solutions include a broad array of FOUNDATION Fieldbus components consisting of protected drop connectors, power supplies, I/O modules, cable and more -- enabling you to build cost effective hazardous area compliant bus networks.

Find out how you can connect your valves, your instruments and your process using FOUNDATION Fieldbus with StoneL's ValvePoint and FieldLink solutions.

800-843-7866, ext. 36 • sales@stonel.com • www.stonel.com/welcome
Advances in Fieldbus Technology
By Bernd Schuessler, Pepperl+Fuchs

Advances in modern fieldbus technology allow it to satisfy virtually any process automation application requirement. As a result, this technology is on the rise in production plants, and is steadily gaining acceptance in process automation applications.

Such advances are resulting in reduced cost in terms of installation, start-up and maintenance, more information from intelligent field devices, and reduced wiring and cabinet space requirements. Advances in fieldbus technology also enable to perform predictive and preventive maintenance in combination with an asset management system.

Used in concert with an asset management system, fieldbus technology eliminates costly and unnecessary maintenance trips to the field. Using fieldbus technology, devices can be diagnosed and calibrated from the control room. Additionally, the status of the device is always available, thanks to digital diagnostic capabilities that allow for proactive maintenance rather than reactive repair.

Fieldbus technology also allows the user to distribute most of the equipment into the field. New topologies make it possible to combine intrinsically safe and general-purpose applications on the same segment. This is possible by using a high power, non-I.S. trunk connection in combination with either segment protectors or FieldBarriers. Segment protectors are short circuit-protected junction boxes that guard the main trunk as well as other spurs from shorting out when a single short occurs on one of the spurs. This is vital in fieldbus installations where a single short could easily bring down an entire segment with up to 16 devices.

Fieldbus segment protectors can be used in general purpose or Class I, Division 2 applications. Most segment protectors are Division 2 mountable, and some even feature non-incendive outputs that allow live maintenance, under power, in a Division 2 area when used with either I.S. or non-incendive rated field devices.

FieldBarriers combine the features of a segment protector and an I.S. barrier in a field-mountable package. Historically, I.S. fieldbus barriers were installed in the control room. With a FieldBarrier, the user can take full advantage of the distributed architecture of fieldbus by utilizing a high power, non-I.S. trunk connection.

When using FieldBarriers, attached field devices can either be FISCO (Fieldbus Intrinsically Safe Concept) or entity based. Using non-I.S. trunk connections for either segment protectors or FieldBarriers allows the user to run a single trunk cable out into the field. This simplifies installation while maximizing cable length and the number of instruments that can operate on a single segment.

Additionally, a new generation of fieldbus power conditioners and power hubs has arrived that will make bus segments even more reliable, while supplying sufficient power to the instruments. Some of these new devices feature what’s called “CREST” (Cross talk & REsonance Suppression Technology); CREST basically offers the advantages of an isolated fieldbus power supply at a lower cost.

Power hubs offer simplex or redundant fieldbus power conditioning, plus online physical layer diagnostics. This provides end users with advanced diagnostic information for noise level, current consumption and voltage levels, as well as ground fault detection. It allows users to maximize system uptime, decrease unexpected shutdowns and perform predictive preventive maintenance, while reducing unnecessary maintenance trips to the field.

Lastly, as the technology continues to progress, more densely packed network capabilities will deliver more information at higher speed, while open standards will ensure that a fieldbus system will not become obsolete.

www.FieldConnex.info
sales@us.pepperl-fuchs.com
330-486-0002
Fieldbus and Smart Device Integration: Powerful Combination for Productivity Improvement

The demand for true interoperability and integration of control systems and intelligent field devices has grown significantly as fieldbus technologies have matured and developed. The number and frequency of applications that require the implementation of multiple fieldbuses have increased in a number of industries.

ABB has executed a number of recent projects that have required a combination of fieldbus technologies to achieve the integration and availability of information from the plant or mill floor that is desired by customers in the process industries.

An example of this is Alunorte, in the Pará state of Brazil. Alunorte is presently one of the five largest alumina refineries in the world. It began its production with two lines in 1995, utilizing ABB's Master technology. When a third line was added in 2003, the Master technology was evolved to fully integrate with an ABB Advant control system for all lines.

Alunorte further enhanced its automation by adding ABB's System 800xA when it began its most recent expansion project. The Extended Automation system utilizes fieldbus communications (FOUNDATION fieldbus for instrumentation and Profibus for MCCs, drives, intelligent relays, breakers and third party controllers), as well as ABB's Real-Time Production Intelligence (Real-TPI) product. Real-TPI identifies losses, whether they are maintenance, operational or even losses due to problems in the process. It allows Alunorte's operators to determine the root causes of the losses, in order to eliminate them. This contributes directly to production increases and greater equipment availability.

This expansion will allow Alunorte to produce up to 99% of the operational time, slashing downtime to just one percent, making the plant the largest, most efficient alumina production facility in the world when installation is completed in 2006.

"Customers are repeatedly telling us that they want consistent, full-featured integration of intelligent field devices regardless of the automation system they are integrated with, to maximize the availability and performance of plant manufacturing assets," said Mark Taft, senior vice president, systems marketing, ABB Inc., and board director for the Fieldbus Foundation.

ABB has traditionally provided support for prevailing fieldbus and smart device integration technologies, such as FOUNDATION fieldbus, Profibus, HART, EDDL, FDT/DTM and OPC, in its automation systems and field devices. Open fieldbus technologies help customers implement Reliability Centered Maintenance in process manufacturing facilities. Making use of the intelligence resident in smart field devices is one key component in implementing this objective. Performance information from these devices, when combined with information from diagnostic tools such as vibration analysis, loop performance monitors, present a composite view of asset health to help customers to better plan and execute their maintenance activities.

Technologies such as EDDL and FDT/DTM help facilitate interoperability between smart field devices in a multiple vendor environment, and with the host automation system. ABB embraces EDDL-based technology as a means to provide parameterization and diagnosis for intelligent devices, regardless of the fieldbus utilized (HART, Profibus, FOUNDATION fieldbus) in multi-vendor system/field device installations. ABB also uses and will further develop the open FDT/DTM technology to enable consistent and rich integration of more sophisticated device applications, like valve diagnosis and multivariable transmitters, that cannot be accomplished with EDDL technologies alone. EDDL and FDT/DTM technologies provide standardized methods to interact with intelligent field devices and expose the resident information they provide. These technologies provide complimentary approaches to respond to customers' needs to access information from field equipment and smart devices from multiple suppliers.

"FDT/DTM and EDDL are complementary efforts aimed at achieving that goal, and for that reason, ABB embraces and is implementing both of these approaches in its control systems and field device offerings," said Taft. "The objective is to deliver the technology solutions that our customers want and need to improve their operations."

www.abb.com/controlsystems
Systrumentation

Truly integrated Control and Instrumentation…only from ABB

Only ABB delivers the extended automation functionality that gives you the visibility and control that you need to run your plant more efficiently—saving you precious time, resources and money.

Find out how truly integrated control and instrumentation can save you money…get your free copy of our white paper at www.abb.com/systrumentation

ABB is Control magazine’s #1 worldwide supplier of process instrumentation and controls
System 800xA is a 2004 Control Engineering Editors’ Choice award winner
ABB is Frost & Sullivan’s Sensors and Transmitters Customer Value Enhancement Award Winner
Emerson Announces Support of Enhanced EDDL In Its AMS™ Suite And 375 Field Communicator

Emerson Process Management has announced that its industry-leading asset management applications and tools will make full use of the enhancements to the Electronic Device Description Language (EDDL). Enhanced EDDL enables users of Emerson's AMS™ Suite: Intelligent Device Manager and 375 Field Communicator to take full advantage of the intelligence in HART and FOUNDATION fieldbus instruments and valves.

The enhancements to EDDL enable users to interact with their intelligent devices in new ways. Graphs, charts and calculations assist in the configuration of devices including complex instruments such as digital valve controllers, radar level gauges and multivariable meters. The enhancements also support storage of historical data from field devices for troubleshooting and diagnostics.

"The EDDL enhancements bring additional benefits to users who have made AMS Device Manager the most comprehensive and widely used asset management application in the world," said Craig Llewellyn, president of Emerson's Asset Optimization division." AMS Device Manager has the largest installed base, offers the broadest open connectivity to host systems, and the richest set of diagnostic applications for both HART and FOUNDATION fieldbus devices.

"Similarly, the 375 Field Communicator is the only handheld that supports both HART and FOUNDATION fieldbus devices, independent of manufacturer," continued Llewellyn. "By embracing the enhanced EDDL functions in updated versions of these de facto standard tools, Emerson enables users to further leverage the intelligence available in field devices."

AMS Device Manager and the 375 Field Communicator are key elements of Emerson's PlantWeb® architecture. The enhancements to EDDL technology relieve device developers of the burden of designing and programming a graphic display system that must run under a variety of platforms and operating systems, from PCs to small handhelds. Instead, developers can use the common graphic display capabilities afforded by the EDDL enhancements.

The increased value of enhanced EDDL is not limited to new intelligent devices. Instrumentation suppliers can extend this capability to existing HART and FOUNDATION fieldbus devices by creating enhanced EDDs for these devices. AMS Device Manager and the 375 Field Communicator can be easily updated by users to add the new enhanced EDDs as they become available.

The HART Communication Foundation, Fieldbus Foundation, and Profinbus Users Group support the enhancements to EDDL. The OPC Foundation, the standard for host-level data exchange for process automation, has also endorsed it. No other approach has received this level of industry support.

For more information, go to www.emersonprocess.com.
If you could predict tomorrow’s stock prices, 
you’d be golden. 
If you could predict tomorrow’s problems in your plant, 
ditto.

See potential problems before they hit, with PlantWeb\textsuperscript{®} digital plant architecture. With PlantWeb, you’ll have a network of predictive intelligence throughout your plant, from measurement, control and mechanical equipment to control and asset management software. So you’ll be on top of what might happen next. Learn more at EmersonProcess.com/PlantWeb
OPC Foundation Joins EDDL Project Advancing Interoperability And Data Integration

Fieldbus Report recently talked to Stephen Mitschke, manager of products for the Fieldbus Foundation, and Tom Burke, president and executive director of the OPC Foundation, about the Electronic Device Description Language (EDDL) cooperation project. This groundbreaking effort will have a major impact on the future of the industrial automation industry.

**FR:** Stephen, we have read that the OPC Foundation has joined the EDDL cooperation team. Before we get to why and what is taking place, can you tell me us what exactly is EDDL? Why is it important to fieldbus users; what is the value proposition?

**SM:** EDDL is an acronym for Electronic Device Description Language. EDDL is a descriptive technology defined in the International Standard, IEC 61804-2. Today, three organizations — the Fieldbus Foundation (FF), HART Communication Foundation (HCF) and Profinet Nutzerorganisation e.V. (PNO)—use EDDL technology. EDDL provides the semantics, or description of data parameters in a device to a host application. The technology provides all the necessary information to the host application for device setup and maintenance, such as parameterization, as well as helpful procedures (methods) for calibrating the device.

EDDL has been around for over 10 years and has several benefits for manufacturers and users of smart devices. First, the technology is operating system independent. Being text-based, an Electronic Device Description (EDD) will interface to any host operating system. What that means is that it is not tied to a specific automation system or operating system. This gives users the freedom to choose any operating system for their host, such as Windows or Linux.

A second key benefit to users is that EDDL has a robust revision control mechanism built in. This assures users they are installing the correct support files for the corresponding version of the device installed, even when multiple versions of the same device are present.

A third benefit is that EDDL is an international standard. Today, there are over 15 million devices in the field built on EDDL.

**FR:** We understand that a cooperative team comprised of the FF, HCF and PNO organizations has enhanced EDDL. What brought all of you together?

**SM:** FF, PNO and HCF all share a common descriptive language. There is approximately 95% overlap among the respective organization’s use of EDDL. Some differences exist because of the different device features. For example, FF devices contain function blocks and, therefore, need specific language elements to support these objects. But basically, EDDL is EDDL regardless of the communication protocol being used.

By cooperating, FF, PNO and HCF realized that they could standardize on a superset specification that would be used by all three organizations. Without this standardization the three organizations would have separately enhanced EDDL-leading to three divergent descriptive languages. FF, PNO and HCF recognized that they could make life simpler for manufacturers and users by collaborating.

About a year ago, FF, PNO and HCF formed a cooperative team to extend EDDL in the areas of graphic visualization and persistent data storage.

**FR:** To date, what results have been achieved by the team?

**SM:** As I mentioned, the original goals were graphic visualization and persistent data storage. Visualization improvements come in two main areas. First, the

**Continued on p. 11**
Behind the Scenes Work Creates Satisfied Fieldbus Customers

A primary goal of the Fieldbus Foundation is interoperability—integrated plug & play behavior on open technology. A "triangle of testing"—consisting of the foundation, device suppliers, and system suppliers—ensures that end users reap the benefits of this open technology. Device suppliers test and register their devices with the foundation, the foundation tests protocol and stack technology, and systems suppliers focus more on consistent control and system behavior.

This testing mitigates potential risk in implementing a wide range of control applications suited especially for Foundation fieldbus technology. Systems can grow to include tens of thousands of devices. In addition, more end users are implementing "control on the wire," where basic control loops are operating in fieldbus devices. With so much variety in customers' expectations and experience, control system supplier testing reassures end users that the fieldbus interoperability performs as expected.

Honeywell is committed to this spirit of cooperation developed within the "triangle of testing." With a dedicated fieldbus interoperability lab, Honeywell engineers work closely with the foundation and device suppliers to ensure our mutual customers reap the full benefits of fieldbus technology. Significant "behind-the-scenes" work goes into obtaining and testing devices, and resolving issues or problems if found. The end result is a transparent integration of fieldbus open standards into the Experion™ Process Knowledge System (PKS). Honeywell's interoperability lab is also a first step in integrating device supplier domain knowledge into the system through Honeywell's PKS Advantage™ Program.

Tested fieldbus devices are listed on Honeywell's Fieldbus Interoperability Support webpage at www.honeywell.com/ps. This webpage informs and supports our customers with posted device description files, along with any special instructions to ensure a successful implementation.

See how a PKS stacks up against a DCS visit our website www.honeywell.com/ps
© 2005 Honeywell International, Inc. All rights reserved.
MooreHawke, the company formed from a recent acquisition by Moore Industries of Hawke International’s fieldbus products, has announced the world’s only truly redundant FOUNDATION fieldbus H1 interface system. Called TRUNKSAFE™, the system maintains communications between the DCS and field devices without interruption in the event of either an open-circuit or short-circuit cable fault. No modification is required to fieldbus devices, or to DCS-level software with segment-powered H1 cards. Highly critical process loops can use FOUNDATION fieldbus technology without worrying about simple cable failures. This allows full access to the advanced diagnostics and uninterrupted measurement and control communications. More importantly, users can see real cost reductions, while simultaneously increasing system availability. Designers no longer need to restrict highly critical loops to individual segments. With the TRUNKSAFE™ Redundant Fieldbus Interface System, four critical loops can be driven with one failsafe segment, with only a quarter of the traditional system hardware required.

One of the restricting factors in the use of FOUNDATION fieldbus technology is that the physical layer used for H1 networks does not naturally allow for redundancy. Fieldbus power supplies and H1 interface cards can provide for redundant-connection field segments, but all device communications within those segments are absolutely dependent upon the performance and integrity of a single twisted-pair cable. The TRUNKSAFE system generates a simple H1 wiring loop between a pair of H1 cards, with field device connections being provided by a TRUNKSAFE Device Coupler.

In operation, each H1 card within a redundant pair is connected to one leg of the segment, and wired out into the field, where each leg is connected to the TRUNKSAFE Device Coupler. Conventional fieldbus devices are also connected to the TRUNKSAFE Device Coupler. Segment termination is provided at each TRUNKSAFE Power Conditioner, so the entire fieldbus segment is conventional, with a terminator at both ends, power conditioners feeding the segment and one of the two H1 cards reading the data from field devices.

The TRUNKSAFE Device Coupler has a unique ‘switch-off on spur fault’ mechanism. No matter how many spur faults arise, no additional loading will sit on the segment to draw down the power supply. In addition, the system’s Device Coupler has MooreHawk’s patented auto-terminator, but in a normally-working segment (no cable faults), that terminator is inactive.

**Cable Break (Short or Open):** TRUNKSAFE’s Power Supply detects the fault, and isolates power in that leg. At the same time, power is switched off to the H1 card. This forces all LAS and HSE functions to continue via the H1 card on the healthy leg. At the same time, the Device Coupler detects the cable fault and activates its auto-terminator locally, maintaining communications on the healthy leg. The DCS detects the failure of one of the H1 cards and issues a system level alarm. Individual hard-wired alarms may be taken from the TRUNKSAFE Power Supply as well.

**Fault Removal:** The TRUNKSAFE Power Supply and Device Coupler maintain a low-level trickle current into the faulty leg to allow detection of fault removal. Each unit automatically resets if the cable integrity is restored.

This functionality allows TRUNKSAFE to maintain all H1 communication functions, and provide for an automatic reset once those faults are removed - a truly redundant configuration!

www.minet.com/moorehawke
Connect, Protect, Power and Terminate. We’ve Got You Covered.

**ROUTE-MASTER™ Series 100 Fieldbus System**
- Intrinsically-Safe Isolated Power Supply and Device Couplers
- Unique magnetic interlock key allows fieldbus devices to be removed or added under power
- Patented Automatic Segment Termination
- Auto-resetting short circuit protection
- Diagnostic LEDs
- DIN-rail and complete field-mount packages
- Powers 2, 4 or 8 fieldbus segments
- Delivers up to 350mA of isolated, redundant and conditioned power per segment
- Modular carrier board design makes it easy to add and subtract segment power conditioner modules
- Optional three element surge protection per segment

**FPS200 High-Availability Fieldbus Power Supply**
- Delivers up to 350mA of isolated, redundant and conditioned power per segment
- Modular carrier board design makes it easy to add and subtract segment power conditioner modules
- Optional three element surge protection per segment

**TRUNKGUARD™ Series 200 FOUNDATION Fieldbus™ and PROFIBUS PA Device Couplers**
- General Purpose Non-Incendive Installations
  - 4-, 8-, 10- and 20-spur models
  - Patented Automatic Segment Termination
  - Auto-resetting short circuit protection
  - Diagnostic LEDs
  - DIN-rail and complete field-mount packages
- Zones 1 & 2 Flame-Proof Installations
  - Unique magnetic interlock key allows fieldbus devices to be removed or added under power
  - Patented Automatic Segment Termination
  - Auto-resetting short circuit protection
  - Diagnostic LEDs
  - DIN-rail and complete field-mount packages

**TRUNKGUARD™ Series 300 FOUNDATION Fieldbus™ and PROFIBUS PA Device Couplers**
- Delivers the highest segment current in the industry in Intrinsically-Safe applications (350mA)
- 4-, 8-, 10- and 20-spur models
- Patented Automatic Segment Termination
- Auto-resetting short circuit protection
- Diagnostic LEDs
- DIN-rail and complete field-mount packages

**ROUTE-MASTER™ Series 100 Fieldbus System**
- Intrinsically-Safe Isolated Power Supply and Device Couplers
- Delivers the highest segment current in the industry in Intrinsically-Safe applications (350mA)
- 4-, 8-, 10- and 20-spur models
- Patented Automatic Segment Termination
- Auto-resetting short circuit protection
- Diagnostic LEDs
- DIN-rail and complete field-mount packages
More Than Just Instruments

The CNOOC and Shell Petrochemicals Company Limited (CSPC) are building a new integrated petrochemicals complex in South China’s Guangdong province. This is one of the largest capital investments for a Sino-foreign joint venture project to date in China, and Endress+Hauser will deliver a significant fraction of the field instrumentation.

The new complex usesFOUNDATION fieldbus technology, which is expected to reduce maintenance cost and increase plant availability through its advanced instrument diagnosis and performance management features. Due to Shell's strategic position onFOUNDATION fieldbus and the project size, it was very important that a supplier had a comprehensive range ofFOUNDATION fieldbus products.

Johan Veerman of CSPC wanted more—instruments with advanced diagnostic capabilities to support start-up and operation and a field instrument supplier with the expertise to integrate the field equipment into the system. “In such a huge project we must minimize potential risks,” said Mr. Veerman. “We cannot rely on promises but we have to ask for proof.”

Host Interoperability Support Test (HIST)

Every instrument had to pass the Host Interoperability Support Test (HIST) with the Yokogawa Centum 3000 system, the DCS selected for the project. Endress+Hauser devices were among first to do this. They also offered the required diagnostic capabilities. Consequently, the company was seen as a good partner who would help remove risks. They would take responsibility for the system integration and not just offer “instruments only.”

According to Thomas Reiner of Endress+Hauser, “We understand these requirements very well. For us, open communication standards and system integration are an essential part of our offering—not just a necessary evil. Endress+Hauser tests its devices, all relevant DCS and PLC systems, and many third-party field devices in its fieldbus laboratory in Switzerland. The customer benefits from advice and training independent of the system and its manufacturer.”

Functional safety

With their concept for Instrumented Protective Functions (IPF), Shell has been a pioneer in functional safety and has set standards for the whole industry. Endress+Hauser started to implement the relevant practices at a very early stage, so that all new instruments have a rating of at least SIL 2. Test reports are available for Endress+Hauser products, providing quantitative data from an independent organization for the design of safety loops. “Endress+Hauser provides the level of support we require in such a project. We therefore feel very safe in working together with them,” said Johan Veerman.

“People for Process Automation”

For CSPC, it was extremely important to have competent people where the business was—on site. They worked with different contractors in different parts of the world—each one being responsible for a certain part or process of the plant. The contractors were supported by CSPC-resident engineers working together with the contractors in the contractors’ offices.

Endress+Hauser created a project organization similar to that of CSPC with local contact persons at the contractors’ sites. When the various engineering teams finally moved over to Guangdong, the local Endress+Hauser organization was there to support CSPC with installation, start-up and training of local staff.

Endress+Hauser is convinced that people make the difference nowadays, understanding real customer need, contributing to the customer’s operational task and improving the customer’s competitive position. To be “People for Process Automation” means more than just instruments.

www.cnoocshell.com
www.endress.com
OPC Foundation Joins EDDL Project (continued from p. 6)

EDD developer can now better organize parameters and include helpful images in the EDD file. Instead of seeing a flat list of parameters, users will see parameters organized into windows, pages and groups. And, as with the current EDDL technology, the actual rendering of these enhanced parametric displays is done by the host application to maintain a consistent look and feel. This is important for usability and training of operator and maintenance personnel.

The second visualization enhancement comes with the addition of charts and graphs. These charts and graphs will enable enhanced device setup and maintenance for complex devices such as radar level gauges or valve positioners. The device developer does not need to be burdened with developing the entire graphic system. Instead, the EDD developer uses EDDL constructs (keywords) to define the characteristics of the graphs, and the host application renders it in a consistent look and feel.

Persistent data storage is another feature that will significantly improve and simplify device setup and maintenance. The persistent data storage feature allows the EDD to instruct the host system to safely store data for later retrieval. The EDD itself does not access the underlying file system, but rather instructs the host system on which items to store. This decoupled approach preserves the integrity of the underlying host system.

Persistent data storage is ideal for advanced diagnostic applications where a previous state of a device can be compared to the current state of a device. For example, the EDD can instruct the host application to store a reference valve signature and later load and compare it to the current signature to diagnose changes in valve performance or characteristics.

FR: We know that OPC has now joined the cooperation project. How do you see the team's efforts going forward?

SM: The team will continue its standards-based work to extend the interoperability and integration of data from the device to enterprise applications without the costs and risks incurred by using custom software drivers at every layer of the system architecture.

OPC's integration with the EDDL technology will provide far richer information to OPC client applications using standard, platform independent interfaces. These client applications will work across a wide range of systems throughout the enterprise.

FR: You mentioned the cost and risk of custom software drivers. Please explain what you mean.

SM: I am sure that Tom will do a better job of explaining it than I can, but let me try from the Fieldbus Foundation's perspective.

Process plants are kept in operation for a significant period of time, often for more than 15 years. Software lifecycles are significantly shorter, with an abundance of revisions and changes. These version changes at the operating system level can create significant risk for the user. Device integration must not reduce the availability of the system as a whole.

Custom software drivers introduce several variables that inevitably lead to integration issues. New customer software may not operate with the old system software and the new system may not operate with the older customer software. The operating system may also affect interoperability. Furthermore, revision control may be an issue if not properly managed and documented, and/or if revisions are not backward compatible.

That is the beauty of EDDL: it is operating system independent and backward compatible. If the operating system is versioned up, the existing EDD files will continue to work. No lost time, productivity or cost is incurred versioning up the EDD. No new driver is necessary, which eliminates the need for testing and verifying compatibility.

FR: Tom, could you briefly describe the technology specified by the OPC Foundation and the new features introduced with the Unified Architecture (UA)?

TB: The initial objective of the OPC Foundation was to essentially specify a standard set of Microsoft-based software interfaces to support the exchange of runtime control data. With UA, we want to integrate those interface specifications and extend the use of OPC beyond the runtime data. The main objective of UA is to create a richer data model, to provide for platform independence and to enhance integration support between the plant floor and the enterprise systems.

FR: But don't you provide for the exchange of control data today across the interfaces?

TB: The existing OPC specifications essentially provide for the exchange of control data across multiple independent interfaces. Each interface is specified to support a particular type of data, such as runtime parameter values, alarm notification and historical data. UA is intended to not only consolidate these various OPC interface specifications, but also provide additional information to the client so that it can understand and process the data received. Today, the client receiving the data from the server can only display the information received without human intervention. There is not enough descriptive information available to allow the client to automatically process the data in any way. For example, when a client browses through a server's parameters, it may see one labeled "PV." But don't you provide the label is a free-format text field that the client can only display. The label names the value, but names are server-specific and require human interpretation. In other words, the client software will not know it is the Process Variable parameter; it will take a user to make that determination.

Consequently, identifying the appropriate data from a server requires a significant amount of human interaction with the client application.

FR: So, how will working
Foxboro I/A Series System Provides Universal Device Management Capability for 250+ Field Device Types

**DEVICE MANAGEMENT BEGINS WITH EDDL**

With the number of registered FOUNDATION fieldbus devices rapidly approaching the 300 mark, the capability to manage multiple field device types within a common environment is becoming more critical than ever. Foxboro is responding with expanded capabilities to manage any vendor’s field device. Device Descriptions (DDs), written in Electronic Device Description Language (EDDL), provide the device specific information to manage any device. Through DD Services, the Device Descriptors give the Foxboro software the help strings and choice lists that make configuring device blocks simple. The DDs also provide the methods used to easily calibrate and setup a device during commissioning, popping up dialogs for user interaction and helping display a message view of the interaction with the device. Simply copy in the DD files from the device vendor and the Universal Device Manager is ready to universally manage any field device compliant to ITK 4.6 or greater.

But device management needs to provide operational savings beyond just saving time in configuring and commissioning devices. More functionality than what the device vendors provide in the DDs is needed. The Universal Device Manager adds value by letting customers use the device descriptions to create their own tools and screens for monitoring the operational performance of field devices. After copying in the DD files, the user customizes device management screens for each device model. These screens can trend device data; provide diagnostic watch windows; compare device and host databases; show device errors; and provide hyperlinks to call up instruction manuals, specifications, drawings, pictures, word documents, web pages and any other Windows® tools to assist in maintaining the field device. Unlike stand-alone device maintenance packages, Foxboro’s software further boosts the efficiency of maintenance personnel by integrating device management into a common engineering and maintenance suite that handles both field devices and everything else in the system.

**Advanced predictive diagnostic management continues with FDT**

Beyond the essentials, FOUNDATION fieldbus offers opportunities for extensive advanced device diagnostics and enables predictive maintenance. The challenge is how to achieve this when devices come from different vendors than the host system. "As diagnostics become more and more advanced, each of the nearly 300 devices needs its own specialized user interface," says Charlie Piper, fieldbus product manager at Invensys Foxboro. "The market has recognized the device vendor has the best expertise to create the advanced user interface." User interfaces from the device vendors that plug into the host have become critical to advanced device management in the same way that web pages are critical to the Internet experience. Foxboro supports the FDT standard because it specifies the APIs that let third-party user interfaces drop into host systems. Foxboro’s device management system is the first device management system for FOUNDATION fieldbus to be FDT-compliant. Maintenance plug-ins from leading device vendors are supplying advanced valve diagnostics such as multi-point step tests, deadband tests, analysis tests, and much more! www.foxboro.com/ff
There are those who promise advanced diagnostics for their fieldbus systems. Problem is, you have to use their devices—and only their devices to get any benefit. Well forget it. Push performance past the usual threshold with the I/A Series® system. This Foxboro® system offers the first and only management application with the superior diagnostics of FDT technology with the basic Device Description technology for configuration and commissioning. And will support upcoming enhanced DDs from device vendors not committed to advanced FDT diagnostics. Ultimately providing truly open, advanced diagnostics for any device, from any vendor.

Combined with ease of engineering and maintenance, plus the industry's best fault tolerance—you get the most advanced, most open solution available. More importantly, you get a control system with FF that delivers real lifetime economic benefits. More performance. More uptime. Less cost. There's a reason Foxboro FDT technology is the leader. It's called Know-How. To learn more visit foxboro.com/ff-fdt.

The difference is Know-How.
The Fieldbus Center at Lee College was chosen to perform the Factory Acceptance Testing (FAT) for the Fieldbus Foundation’s recent HSE/Flexible Function Block demonstration held at the International Specialty Products (ISP) BDO facility at Lima, Ohio. The purpose of the demonstration was to show users that they could look forward to even greater capabilities in integrating a variety of fieldbus solutions for their control needs; it also demonstrated another interesting element critical to its success.

In the months, and even years, leading up to "Press Day" in Lima, the Fieldbus Center at Lee College, serving as the Factory Acceptance Testing site, was an integral piece of the demonstration puzzle and was delighted to also be in a position to observe the interaction each person brought to the process. The concept had to be proven and this called for obtaining systems, software, and hardware. Then came assembling, researching, developing, testing, and finally, configuring the system at the Fieldbus Center. Only then could it be put in place and site accepted at the Lima facility.

On May 19, 2005, the Fieldbus Foundation successfully demonstrated the full implementation of its open, integrated FOUNDATION fieldbus architecture for the industrial automation trade press. The ISP demonstration showed that FOUNDATION fieldbus H1 could successfully integrate with High Speed Ethernet (HSE), Flexible Function Block (FFB) technology, and OPC to provide an open, interoperable plant infrastructure to further improve process performance.

What proved interesting to this achievement was that the demonstration's success clearly called for a mixture of technical, administrative, and support services. This meant the project would have to bring together people from a variety of countries, with diverse skills, interests, agendas, and even primary languages. It can be stated conclusively that, with the spirit of common cause driving them, every manufacturer, user, educator, and organization involved came to the plate and helped that cause. While not without debate, the team worked harmoniously, often at the expense of personal time, sales pressures, company affiliations, and a plethora of differences such a diverse team brings with it. This is not always a small achievement and highlights the 'hidden demonstration' within the functional demonstration that took place at ISP—when working towards a common goal, the power of cooperation can accomplish great things.

Chuck Carter
Fieldbus Center at Lee College
832-556-4446
www.knowthebus.org
MAKE THE RIGHT CONNECTION

Learn It All At The Fieldbus Center.

If you're ready to get started with FOUNDATION™ fieldbus, there's no better place to go than the Fieldbus Center at Lee College.

People learn best by seeing and doing. That's why our certified fieldbus training courses emphasize hands-on design, installation and maintenance instruction in a realistic, complete multi-vendor industrial environment.

Courses Include:
• Complete Fieldbus Training
• Experienced Instructors
• State-of-the-Art Facilities
• A Hands-On Approach
• Concepts & Implementation Training

Contact Us Today
(832) 556-4446
fbcenter@lee.edu
www.knowthebus.org

ON-SITE OR CUSTOMIZED COURSES ALSO AVAILABLE

This project is supported, in part, by the National Science Foundation and Lee College.
During the research phase of their curriculum development project, SAIT interviewed many engineers and technologists to learn of their experiences particular to fieldbus systems design and engineering. It came as no surprise to learn that choosing to implement fieldbus systems into a new capital project indeed has an effect upon documentation deliverables and the sequence of their creation.

Many of the documents that are traditionally part of a design package have, to some degree, undergone changes of a simple nature. However, there are entirely new drawings that have also been added. Naturally, any time that documentation changes are necessary, debate ensues as to the best methodology and symbology to use. Thankfully, much of the hard work is behind us and standards are beginning to solidify.

There is, however, one area that, until a design team has completed at least one project, remains rather difficult to predict. This relates to scheduling of decisions and deliverables. Many engineers have determined what needs to be done, however the question remains, when during the project schedule must it be accomplished?

For example, much of the configuration relating to process control strategies has traditionally been reserved for completion at the end of the detailed design phase. Firms are learning that, since fieldbus systems have the ability to perform control functions automatically at a field device level, these configuration decisions must be discussed at a very early stage of front end design. Additionally, these configuration parameters should be reviewed at HAZOP.

For those unfamiliar with fieldbus Status Options and Control Options, there is a pleasant surprise that awaits when configuration choices are presented for selection and applicability. These options are very powerful and can provide layers of reliability and control that have never before been integrated at the field level. Sadly, many projects have sped by this aisle of accessories without ever stopping to browse. Indeed, many have come to a knowledge of available options long after the time has passed to properly address their application. This is not to say that Status and Control Options cannot be incorporated at a later phase. However, choosing to implement at a later date requires the reconvening of designers and engineers that were once already available at a very early stage of the design project.

Another example of the scheduling conundrum is manifest during Factory Acceptance Testing (FAT). Once again traditional thinking might leave the end user with some unproven features that may get left until site acceptance testing is performed. Many fieldbus providers are now endorsing integration functionality testing during FAT. In order to accomplish this task, it is requisite to have test configurations prepared and available during FAT.

Recommendations include having at least one of every fieldbus device that has been selected for installation. As well, enough hardware should be present to model each of the fieldbus segments including all network components, cable lengths, device couplers, and fieldbus devices.

By choosing to do integration functionality testing during FAT, those individuals that have been tasked with building the system configuration will be challenged to have a fully integrated test configuration available at an earlier stage of the project. There is, however, an enormous benefit in doing this. Those that have can attest that commissioning and start-up have been greatly accelerated. So much so, that a few facilities have even started up early!

www.sait.ca/fieldbus
FOUNDATION™ fieldbus Certified Professional (FFCP)

SAIT provides Certified FOUNDATION™ fieldbus training at our accredited facilities in Calgary.

Courses required to receive FFCP include:
- FOUNDATION™ Fieldbus Essentials for Instrumentation Professionals
  One-day certificate course: Overview of FF technology.
- FOUNDATION™ Fieldbus Discovery for Instrumentation Professionals
  Two-day hands-on certificate course: Configuration, Diagnostics and Implementation.
- FOUNDATION™ Fieldbus Practices for Instrumentation Professionals
  Three-day hands-on certificate course: Design, Engineering, Documentation and Commissioning.

Customized Training

SAIT is a world leader in FOUNDATION™ fieldbus training. From Alaska to Australia, we provide customized and certified site training for clients around the globe.

Our mobile training units and our leading-edge lab provide you with flexible, professional fieldbus training to meet your business’ every need.

For more information visit: www.sait.ca/fieldbus
Email: peter.leliveld@sait.ca Phone: (403) 284-8967
with the EDD cooperative team help this situation? What is the value proposition for end users by combining EDDL with UA?

TB: EDDL is a technology used to describe control data. The synergism achieved by combining these two technologies will enable the team to meet the objectives of richer OPC Client applications and platform independence. By combining EDDL and OPC, the client cannot only access the data, but also the data descriptions. This allows for the development of more sophisticated, platform independent client applications, such as complex diagnostics.

Let me explain a little further. A significant part of UA is the support for type models. Type models are technologies used to describe data commonly referred to as type descriptions. These descriptions are used by the client to automatically recognize and process the data, minimizing the required human intervention. UA allows type descriptions to be integrated into a server, but does not define the type description technology. That's where EDDL comes in—it's a perfect fit. The net effect is a reduction in the configuration of the OPC interface, richer information and platform independence.

FR: What motivated the OPC Foundation to join this cooperative effort?

TB: As I mentioned earlier, the goal for UA is to essentially develop a specification that is platform independent and built upon open standards. As you know, our existing specifications are built around Microsoft Windows. As we move forward with UA, we are following the W3C standards that are supported in Microsoft Net strategy. This will insure platform independence and full compatibility with Microsoft platforms. EDDL is not only platform independent, but also communication protocol independent; plus it is an International Standard.

Considering that OPC servers support access to data from millions of devices already using FF, HCF and PNO communication technologies, and that these devices use EDDL to describe data, it is natural for OPC to use EDDL as its type description. This will provide access not only to the data, but also to the EDD descriptions that already exist.

FR: Tom, how do you think UA will be enhanced through your involvement with the EDDL cooperative team?

TB: The same vision that drove the technology development of these organizations is essentially what drives the OPC Foundation. Users want to see open systems providing connectivity and interoperability. UA extends what these groups have done at the device level to the enterprise level. When we are done there will be open, vertical and horizontal connectivity and interoperability of applications built on standards such as EDDL and OPC UA that users can depend on. Without this standardization, industry would have to create a community of software developers to support all the different systems, each with a unique set of software drivers.

With this effort between OPC and the cooperative team, the vision of delivering information from the plant floor to the top floor will be realized.

FR: You have described the benefits to instrumentation users, but how will this effort affect device suppliers? Are there benefits for them as well?

TB: The main benefit to suppliers is the ease of integrating their system with components of other systems. Via EDDL, the client application can automatically discover what kind of data another system has and use it accordingly. Imagine the benefit of writing a complex diagnostic package and having it transported across various hosts. The diagnostics can cover the devices and/or the process. The results can be integrated with both the control and enterprise systems. A new frontier of innovation will be opened!

FR: Tom, any last comments?

TB: Essentially, our end users are going to be the real winners when this project is completed. We believe the combination of OPC and EDDL really is the only logical approach to resolve the issues associated with interoperability and data integration.

FR: Thanks to both of you for sharing your insights on this important topic:

www.fieldbus.org
www.opcfoundation.org
At a recent technology gathering conducted at the ISP Chemicals (formerly BP) plant in Lima, Ohio, industry leaders gathered to see a complete, integrated Foundation fieldbus architecture implementation. This included H1, High Speed Ethernet (HSE) and Flexible Function Blocks (FFBs), implemented in a critical process operation. The fieldbus controls actuated a series of butterfly valves used on a vapor recovery system.

Smar is first with HSE and Flexible Function Blocks

Smar was once again “First in Fieldbus” at the Lima installation, providing the first commercial products implementing HSE and Flexible Function Block technology. After careful consideration, two manufacturers, Smar and Softing, were chosen to supply Flexible Function Block Linking Devices. Smar provided a complete solution integrating HSE Linking Devices, OPC servers, Flexible Function Blocks, and H1 fieldbus devices. The powerful SYSTEM302 solution simplified device networking, and provided seamless access to the process and field devices.

Smar’s recognized expertise in Foundation fieldbus was instrumental in the development of Flexible Function Block technology. FFBs reside at the fieldbus “User Layer,” along with standard function blocks. These blocks are application-specific and enable control strategies that traditionally run on PLCs to be performed in fieldbus control systems. Examples of such applications include: supervisory data acquisition, batch control, interlocking, logic sequencing, burner management, coordinated drive control and Input/Output (I/O) interfacing.

Smar linking devices also provide true system redundancy by maintaining independent controllers on separate backplanes. This insures operational continuity even if a controller or a backplane fails.

Open fieldbus solution can replace proprietary platforms

With the help of Smar’s fieldbus experts, end users can move from proprietary systems and protocols, to a totally interoperable HSE implementation. As pioneers in the technology, no vendor anywhere can match Smar’s experience and leadership in Foundation fieldbus.

Gain a competitive advantage today. Join leading end-users who are installing Foundation fieldbus—and choosing Smar.

www.smar.com
Open Wiring. A better way to wire your plant.

With TURCK’s rugged, industrial-grade cable, you can eliminate the extensive labor and expense of running conduit throughout your plant. TURCK cable meets Open Wire specifications for fast installation and system uptime. It also has distinct performance advantages versus conduit, most notably in the elimination of moisture buildup in conduit and instrument enclosures that causes corrosion and failures—not to mention the ability to withstand industrial environments. Further savings are realized with factory-molded, IP-rated, keyed connectors that connect instantly without requiring certified personnel. Save time and money. Make the switch.

Call us with your next application: 1-800-553-0016
email: process@turck.com
www.turck.com/pp/process
**National Instruments Fieldbus Software Tools**

**FIELDBUS CONFIGURATION SOFTWARE**

NI-FBUS Configurator

NI-FBUS Configurator is a famous Windows® application tool for complete configuration of FOUNDATION fieldbus segments in online and offline mode. An easy-to-use, multi-window interface covers all aspects of fieldbus configuration.

NI-FBUS Configurator automatically detects devices when you connect them to fieldbus and they appear online. You can automatically or manually configure device tags and addresses as required. With the DD and CFF files imported, NI-FBUS Configurator can create and configure the virtual devices in an offline interface without connecting to physical devices.

When connected to a fieldbus network or creating virtual FOUNDATION fieldbus devices in offline mode, NI-FBUS Configurator displays all the function blocks available within a device. NI-FBUS Configurator recognizes all standard blocks as well as any manufacturer-specific custom blocks found in a device and included in the device description.

Fieldbus monitor software

NI-FBUS Monitor is a 32-bit Windows application for monitoring of traffic on FOUNDATION fieldbus networks. NI-FBUS Monitor requires a National Instruments fieldbus interface device to connect to an H1 network. It is useful for system diagnostics because you can selectively capture and view different types of data packets on the fieldbus. Fieldbus packets have many fields of information encoded within them. NI-FBUS Monitor gives you the flexibility to view packets in symbolic, hex, and simple formats. You can choose the packet decoding that provides the information most useful for the job you are performing. You can easily specify the fieldbus packet types in which you are interested, again determined by the information you are trying to gather.

Using the live list display, you can determine which devices are active on the fieldbus. This is a quick and easy tool for assessing the operating status of devices on the bus.

www.ni.com/fieldbus
Ohio Chemical Plant Demonstrates Power Of Integrated Fieldbus Architecture

Recently, a group of automation industry leaders and trade publication editors gathered in Lima, Ohio, for an up close look at how FOUNDATION fieldbus benefits a Brownfield installation. But this was no routine gathering of the control technology community. Held at the world-class International Specialty Products (ISP) 1, 4-butanediol (BDO) plant, the event culminated in a project that implemented the full, integrated FOUNDATION fieldbus architecture on a critical process operation. The live demonstration showed how FOUNDATION fieldbus technology raises efficiency and benefits plant operations, providing a competitive advantage to controls and instrumentation end-users.

The Lima Press Day demonstrated how FOUNDATION fieldbus technology raises efficiency and benefits plant operations, providing a competitive advantage to controls and instrumentation end-users. The Lima Press Day demonstrated how FOUNDATION fieldbus H1, High Speed Ethernet (HSE) and Flexible Function Block (FFB) technology, integrated with OPC, forms an open, interoperable plant infrastructure for both Brownfield and Greenfield projects-improving process performance and delivering significant Operating Expense (OpEx) and Capital Expense (CapEx) savings.

FOUNDATION fieldbus was developed as an open environment primarily to integrate multiple systems, subsystems, applications and devices. The technology provides the "Freedom to Choose" and the "Power to Integrate" across the plant enterprise, enabling end-users to choose best-in-class automation solutions that work together seamlessly, regardless of their supplier.

Milestone event marks decade of fieldbus progress

The Lima BDO technology demonstration was a joint project initiated by BP Amoco Chemical Company, an indirect subsidiary of BP plc., and the Fieldbus Foundation. ISP, through one of its subsidiaries, acquired BP’s BDO operations in March 2005. The Lima plant has an annual capacity of 60,000 metric tons of BDO—a key building block for specialty chemicals products used in pharmaceutical, personal care, food, beverage, coatings, oil field and other applications.

The Fieldbus Foundation conducted the Lima event to showcase FOUNDATION fieldbus capabilities and benefits in complex control applications. The demonstration implemented HSE and FFBs in a plant environment, migrated non-Foundation fieldbus control systems, and deployed HSE in an interoperable, open system.

Witnessed by over 45 attendees, the ISP demonstration verified the system control, process accuracy, and integration possible when an end-user engages FOUNDATION fieldbus in a fully operational production system. The project success has sparked new concepts for further HSE product application, integration and development.


John Berra, chairman of the Fieldbus Foundation, called the Lima demonstration a milestone of FOUNDATION fieldbus progress over more than a decade. The success of the technology, according to Berra, reflects the commitment of automation equipment suppliers, both large and small, as well as the strong and well researched support of many end-user companies, such as ISP.

Continued on p. 27
Improving Productivity, Reducing Risk with a Collaborative Solution

Working together, global leaders Rockwell Automation and Endress+Hauser combine competencies to provide a wide range of pre-integrated, pre-tested, measurement, automation and information solutions based on global standards. We help you to:

**Reduce risk** with preferred integration between Endress+Hauser process instruments and Rockwell Automation’s Integrated Architecture.

**Improve decision-making and asset management** with seamless flow of information between key components of the manufacturing process, from the field device through the enterprise business system.

**Lower implementation and support costs** with a modular suite of services, software and infrastructure.

**Protect your investment** with assured interoperability with other vendors and longterm viability of solutions due to compliance with open standards.

**Automation and Instrumentation Leaders Delivering Real Value Through Integrated Measurement, Automation, and Information Solutions.**

Solutions that enable customers to acquire, transmit, control and record process information efficiently, and manage process operations safely, reliably and profitably.

**Endress+Hauser**

www.endress.com

**Rockwell Automation**

www.rockwellautomation.com
FOUNDATION fieldbus has been selected as the standard by the process industry. But many process applications involve hazardous gases or dusts, so an appropriate explosion protection technique for instrumentation is required.

To minimize the costs of designing, installing and maintaining instrumentation, most end users have adopted their own preferred hazardous area protection techniques. Let’s look at how these have been applied to fieldbus installations worldwide:

Japanese company Shin-Etsu is the largest PVC producer in the world. FOUNDATION fieldbus was chosen for a re-instrumentation program at its facility in Rotterdam, Netherlands, because it offered improved reliability of the process, simpler maintenance and superior diagnostics.

Shin-Etsu selected Honeywell’s Experion™ Process Knowledge System (PKS) controller for the fieldbus installation with redundant power to the fieldbus segments provided by the MTL-Relcom F650A power supply system.

For the field wiring, Shin-Etsu used Megablock wiring hubs to connect individual spur wiring to the trunk cables. A major benefit identified was the “SpurGuard” short-circuit protection feature, which not only maintains operation of the fieldbus segments during spur wiring faults, but also permits “live-working” on the spur in Zone 2 hazardous areas. The electronic current limitation in the short-circuit protection mechanism permits an “energy-limited” (Ex nL) classification, meaning that similarly certified Ex nL, or intrinsically safe fieldbus instruments, can be connected.

The world-scale SECCO petrochemical complex in Shanghai, China, a joint venture between BP Chemicals, Shanghai Petrochemical Company and Sinopec, successfully started up the 900,000 tons/year ethylene cracker in March 2005, with on-specification product within a record 10 hours 45 minutes. The installation is regarded as one of the world’s largest FOUNDATION fieldbus networks to date.

Working with the main automation contractor, Emerson, MTL-Relcom supplied redundant fieldbus power conditioners and Megablock wiring hubs integrated in robust Process Junction Boxes for use throughout the project. The Megablock’s Zone 2 certification allows connection to “non-arcing” and flameproof certified field devices.

The Bonny Island Terminal Project in Nigeria is a new development comprising 24 oil storage tanks for Shell Petroleum Development Corporation. A Yokogawa Centum system was selected with a fieldbus network of 6,000 devices, of which 1,600 are located in Zone 1 hazardous areas. Intrinsic safety was selected as the preferred protection method for the hazardous sector, with fieldbus power provided by MTL’s FISCO power supplies.

These are used in conjunction with 2-way and 4-way intrinsically safe Megablocks and terminators, to create fieldbus segments that may be “live-worked” throughout without gas clearance procedures. FISCO (Fieldbus Intrinsically Safe Concept) delivers more current to the fieldbus than the earlier “Entity” IS implementation, allowing as much as 265 mA per hazardous area trunk.

Electrical installations on the Nigerian coast are vulnerable to lightning-induced surge damage, so the engineering contractor, Hyundai, specified MTL fieldbus surge protectors.

FOUNDATION fieldbus was also chosen by Carbowil Spolka z.o.o. for its CO₂ production plant in Wloclawek, Poland. Part of the plant is classified as a Zone 2 hazardous area, and in order to maintain a uniform approach across the entire installation, an explosion protection method suitable for Zone 2 was required.

MTL’s FNICO (Fieldbus Non-Incendive Concept) power supplies and EEEx nL-certified Megablocks provided the ability to work on any part of the fieldbus segment while energized in the hazardous area. FNICO is an EEEx nL technique defined in the recently published IEC standard 60079-27. FNICO allowed the engineering contractor—Jacobs Belgie N.V.—to choose from both “Entity” and FISCO-approved intrinsically safe field devices.

For further information contact:
Roger Highton
MTL Instruments
e-mail: rhighton@mtl-inst.com
www.mtl-fieldbus.com
Can MTL offer you more?

More diversity, more world class Fieldbus products

Did you know that MTL-Relcom powers almost 75% of the world's Fieldbus systems?

It's true that we are also market leaders for electronic control and measurement devices for the protection of instrumentation in hazardous areas. But MTL can also offer you more... much more...

Today our product range is one of the most diverse and advanced in the process control industry. A perfect example of this diversity is MTL-Relcom's range of world class Fieldbus products, offering our customers the widest choice of fieldbus solutions available.

With MTL-Relcom there is a wealth of industry leading fieldbus solutions waiting for you to discover.

More choice, more innovation, more than you thought...

...more MTL.
Include Discrete Valves to Maximize Benefits of FOUNDATION Fieldbus

FOUNDATION fieldbus can add long-term value to manufacturing systems by simplifying maintenance, reducing downtime, and enabling better diagnostics for easier troubleshooting and predictive maintenance.

However, huge savings opportunities can go unrealized if discrete valves are not included in the fieldbus design and if device layout and segment design issues are not considered upfront. TopWorx, the expert and leader in connecting discrete valves to FOUNDATION fieldbus, offers recommendations for achieving maximum savings.

Why discrete on FOUNDATION fieldbus?

Using FOUNDATION fieldbus for on/off valves provides lower wiring costs, lower installation costs, easier troubleshooting, and a wealth of valuable diagnostic information. Such data can be used to analyze valve and actuator performance and provide predictive maintenance information that can result in significant savings for your FOUNDATION fieldbus project.

**Discrete valve controllers = maintenance savings**

Discrete valve controllers can provide tracking of valve cycles and measure the actual valve travel time to open and close. Based on this information, limits can be set, based on preference, for the maximum acceptable travel time or cycle count. When reached, DCS alarms are triggered, which alert maintenance staff that the valve and/or actuator are not performing properly. Repairs can be proactively scheduled, thus averting unplanned process shutdowns, costly process delays, and/or product corruption.

TopWorx Valvetop® discrete valve controllers have Discrete Input (DI) and Discrete Output (DO) blocks, which are contained within a FOUNDATION fieldbus sensor/communication module that is potted and sealed from the environment. Valvetop products are intrinsically safe and have a unique low power design, making it possible to include up to four devices on a single I.S. barrier. They are globally certified for use in hazardous locations and can be used in environments with temperatures as low as -50°C.

**Pre-defined templates = configuration savings**

Pre-defined and tested engineering tools take the guesswork out of configuration. Labor time can be reduced by adopting manufacturers’ templates as standard, or quickly modifying them to meet your specific application needs. Lower installation and engineering costs can result in significant savings.

TopWorx provides pre-configured module templates and standard faceplates at no charge to reduce configuration costs and streamline the installation and commissioning process.

**Partner with experience = installation savings**

It is critical to partner with vendors who understand your process requirements and have proven FOUNDATION fieldbus experience. Without this experience, most vendors will struggle to provide the level of knowledge and support needed for an effective transition.

TopWorx was the first to develop a FOUNDATION fieldbus discrete valve controller, and today has the largest installed base of FOUNDATION fieldbus on/off devices in the world. With extensive process experience and fieldbus expertise, the TopWorx Fieldbus Solutions Team can provide valuable insights to increase the efficiency of your communication and lessen the cost of your control system. They can assist with project definition, network design, device selection, configuration, commissioning and startup, and have the expertise to support your process after installation.

**Maintenance, configuration and installation savings = optimal benefits with FOUNDATION fieldbus**

The benefits of your FOUNDATION fieldbus project can be great, such as reduced cabling and shorter cable lengths to spurs, lower wiring and installation costs, easier troubleshooting, reduced downtime, and useful diagnostics to manage plant assets. Predictive maintenance can be greatly enhanced by including discrete valves, and partnering with experts can streamline your configuration and installation process and result in a highly efficient and cost effective project.

**About TopWorx**

TopWorx offers a complete line of high-performance process automation products, including Valvetop® discrete valve controllers, Networx™ field networking solutions, and GO Switch® leverless limit switches.

TopWorx
3300 Fern Valley Road
Louisville, KY 40213 USA
502.969.8000 tel
502.969.5911 fax
www.topworx.com
Demonstration shows benefits of control in the field

For the demonstration application, ISP deployed a field-based automation architecture with FOUNDATION fieldbus. A fieldbus system consisting of H1 field devices and HSE linking devices was installed on a vapor system. Plant engineers distributed most process control logic into field devices rather than the legacy method of centralizing control in traditional computer control systems. The fieldbus controls actuated a series of butterfly valves used on the process.

The Lima demo highlighted the amazing features of FFB implementation by unifying host-resident logic of discrete and analog field devices residing on H1, co-existence of diverse control systems from various manufacturers with HSE, and the interoperability of alternate HSE linking devices and associated controllers. In addition, the demo integrated existing FOUNDATION fieldbus devices to high-speed batching and sequencing of discrete systems, as well as the use of FFBs in discrete and hybrid applications.

The Lima BDO FOUNDATION fieldbus installation is believed to present the most extensive use of “truly distributed” control with algorithms running in 83 of the architecture’s 85 digital valve controllers. In addition, all dual-element transmitters use on-board signal-select blocks.

Seventy-one fieldbus segments served 350 fieldbus instruments and valves handling 130 feedback loops. Each of the process’s 400 discrete devices was hardwired to the automation system process controllers. Therefore, the entire system, with the exception of an emergency shutdown function, was covered by a single operating platform.

User describes advantages of an open, interoperable architecture

According to John Rezabek, lead controls engineer for the Lima facility, the fieldbus demonstration project provided valuable, real-world experience for end-users seeking to replace proprietary control systems with an open, interoperable fieldbus architecture enabling robust, reliable control at the field level.

“Having implemented the demonstration project in a mission-critical part of an operating process, we feel confident that we have passed a milestone in the development of fieldbus HSE and truly distributed control,” said Rezabek. “The distinct advantages of implementing H1 and HSE in lieu of proprietary networks will become increasingly apparent, as our leading suppliers develop products to make this technology accessible to their customers everywhere.”

Fieldbus Foundation President and CEO Richard Timoney acknowledged the contributions of all demonstration project participants. “Thanks to the efforts of leading automation equipment suppliers and end-users, the future of true plantwide distributed control is here today,” said Timoney. “As seen in the BDO demo application, industrial manufacturers can eliminate the constraints of proprietary legacy systems and realize the benefits of a modern, open, fieldbus-based control environment.”

The FOUNDATION fieldbus network architecture allows control to be distributed to the field at the H1 level, or in HSE linking devices, which integrate H1 fieldbus segments into a high-speed Ethernet backbone. The linking devices function like a multiplexer between HSE and H1 channels, interconnecting field devices to each other and to other hosts, and are an essential component for integrating system communication with direct I/O access and advanced control applications.

By migrating control functionality to the field, and implementing distributed FOUNDATION fieldbus linking devices through the HSE communication protocol, end-users can restore single-loop integrity to their process and achieve a control system that is easier to define, engineer, procure, test, install and maintain.

FFBs provide solution for instrumentation integration

Developed for the FOUNDATION fieldbus HSE (100)
**Ohio Chemical Plant (continued from p. 27)**

Mbit/s) technology program, but also compatible with H1 (3.125 kbit/s) fieldbus systems, FFBs are a key component of the FOUNDATION architecture that simplifies plantwide information integration. FFBs, which are application-specific, bring the full instrumentation integration part of the fieldbus solution into play. They reside at the fieldbus User Layer along with standard function blocks, and provide a menu of control strategies such as supervisory data acquisition, batch control, Programmable Logic Controller (PLC) sequencing, coordinated drive control and Input/Output (I/O) interfacing, including gateways to other plant device networks.

The use of FFBs creates a powerful resource to move control functionality to the field-level. For example, with FFBs running in an HSE linking device, a single physical device can support batch and logic control. With this approach, users can choose to eliminate proprietary unit controllers. Unlike other solutions requiring a master-slave link, this technology places process node aware logic local to the optimized task.

Two types of FFBs—pre- and fully configured versions—are now available. The Fieldbus Foundation released specifications for the pre-configured FFBs in March 2000. Specifications for the fully configured FFBs were released in September 2001 after completion of field tests at the Lee College Fieldbus Center in Baytown, Texas, USA.

Pre-configured FFBs have a predefined number/type of I/O parameters like standard function blocks, but the algorithm is configurable. Since the I/O is predefined, the Electronic Device Description (EDD) is also predefined. The initial FFBs of this type, Multiple Input/Output (MIO) blocks, have eight analog or discrete parameters per block: MAI, MAO, MDI, and MDO. MIO blocks are used for remote I/O interfacing and simple gateway applications. Fully configured FFBs are used for more complex applications; they allow both the number/type of I/O parameters and the algorithm to be configured. In this case, the configuration tool generates the EDD “dynamically.” FFBs are created using programming tools based on standards such as IEC 61131-3. Once created, FFBs are instantiated and connected to other blocks just like standard function blocks.

Results underscore return on fieldbus investment

For end-users such as ISP, the business benefits of a FOUNDATION fieldbus-based control solution are well documented. Charlie Gasparetti, ISP’s BDO manager, said the use of fieldbus enabled the Lima plant to realize savings not only in construction costs, but also in the types of facilities and equipment needed for the project. He noted that ISP management is convinced that sufficient savings were obtained to look for future installations of the technology.

Plants installing FOUNDATION fieldbus realize cost savings from design flexibility due to the open, standards-based technology and broad functionality of field devices, as well as greater system reliability without the need for costly redundant components. In addition, FOUNDATION fieldbus is the only technology allowing end-users to achieve a true distributed automation architecture. Doing so frees valuable plant resources for real-time production control.

FOUNDATION fieldbus not only takes advantage of today’s intelligent instrumentation to provide reliable, deterministic control; but also reduces wiring requirements, decreases engineering and commissioning time and costs, and lowers installation and equipment costs.

Unlike traditional control technology, FOUNDATION fieldbus delivers system self-diagnostics supporting proactive device maintenance. Fieldbus diagnostics are the key to implementing advanced asset management solutions.

By enabling significant operational improvements, FOUNDATION technology is the answer to achieving bottom-line benefits such as: reduced downtime, greater manufacturing flexibility, reduced process variability, increased productivity, improved asset utilization, reduced maintenance costs, higher quality products, and improved safety and regulatory compliance.

[www.fieldbus.org](http://www.fieldbus.org)
The deployment of FOUNDATION fieldbus and PROFIBUS-PA devices for process automation applications is rapidly growing, due to the comprehensive advantages of these technologies. However, the number of field devices with either 4-20 mA or HART interfaces that are in use is currently still great.

Despite this constant increase, many manufacturers today still do not have any field devices with the newest fieldbus interfaces in their portfolios. Perhaps this is because the investment costs of protocol stack integration and the corresponding hardware design changes overshadow the initial expected increases in sales of these new devices.

Consequently, the door to the rapidly emerging FOUNDATION fieldbus and PA market remains closed for many manufacturers. This often manifests itself in the manufacturer's inability to quote on new customer projects.

Flexible interfacing

To solve this dilemma, Softing has developed a flexible, attractively priced solution for the direct integration of a FOUNDATION fieldbus or PA interface into an existing HART field device. A small board, which is also available as an intrinsically safe variant, comprises all the components that are necessary for interfacing to FOUNDATION fieldbus and PA. The interface to the field device is implemented via UART, I²C or SPI. In addition, digital and analog inputs and outputs can be freely used.

On the software side, ready-made templates are available, which can be customized to the device manufacturer's specific requirements. The device class is irrelevant.

This approach mainly addresses those HART device manufacturers who do not yet support fieldbuses and who do not want to miss these new sales opportunities. The board is integrated into the manufacturer's existing hardware before the HART modulator. The ready-made templates translate the Universal and Common Practice commands to FOUNDATION fieldbus or PA. The required user-specific commands are also taken into account.

Thanks to its EEx precertification, the board can be used in devices in Zone 0 (and Division 1) without additional effort. For more information, e-mail us at ken.hoover@softing.com.

Hart Device Manufacturers Take Notice!

Yamatake is a leading manufacturer in the field of measurement and control, renowned for attention to safety and the environment. We build close on-site partnerships with our customers, working together to tackle new challenges, and always aiming to create new value by providing innovative lifecycle solutions. Yamatake – developing the next generation in automation technologies.
Smart Valve Positioners: Empowerment Of Control Valves

Smart fieldbus effectively utilizes the intelligent capabilities of digital devices, and reduces the Capex/Opex of process and manufacturing automation systems. It also drastically improves plant safety, controllability and maintainability.

Yamatake is now promoting this valuable technology to provide a variety of smart field devices and field-based solutions. Offering measurement and control expertise in the process, manufacturing and building automation industries, Yamatake has been providing sensors, actuators and control systems for 99 years.

Smart valve positioners

Yamatake’s smart valve positioners offer unique benefits. The valve positioner should be treated as the cornerstone of plant operation since it controls gas, liquid and slurry flow directly through control valves. Valve positioner performance will affect a plant’s productivity and quality directly.

With over 70 years of experience in developing and manufacturing control valves, Yamatake has made use of the latest digital technologies to produce smart valve positioners for more than a decade. The product line now includes integral and remote models for linear and rotary valves, with analog, smart (DE), HART and FOUNDATION fieldbus output for various receiving systems.

Yamatake fieldbus positioners feature such diagnostic functions as stick slip detection for predicting degradation from sticky slurry flow, and total stroke monitoring for estimating probable failure cause by friction. Diagnostic results provide guidance for control valve maintenance. Standard functions include zero/span adjustment, auto setup for operating characteristics and dynamic characteristics, and user flow characteristics setup.

Smart valve diagnostic system — Valstaff

Yamatake also supplies a smart valve diagnostic system—Valstaff—that uses diagnostic data from smart valve positioners to monitor deterioration in performance, triggering alerts when necessary.

Valstaff provides the following benefits:
- Reduces scheduled maintenance work since deterioration diagnostic results identify which control valves need attention
- Facilitates preventive maintenance for control valves by direct monitoring of performance in real-time
- Enables early detection of abnormal or unanticipated control valve operation. A customer who installed this smart valve diagnostic system reported that downtime for maintenance was reduced by over 600 hours per year.

Hybrid and remote solutions

Yamatake now offers a hybrid smart valve positioner, which supports 4-20 mA analog and fieldbus signals simultaneously. This means that control can be left to a conventional DCS system with analog output, while meeting the needs of those who want to use fieldbus-based diagnostics to facilitate facility asset management. Customers who are considering future adoption of fieldbus can thus go ahead and install this hybrid smart valve positioner now.

Remote-type valve positioners comprise a valve position detector that is separate from the valve positioner body. This is ideal for situations that demand high durability—for example, involving severe vibration or high temperatures—and is also suitable if the valve is installed at great height or in a very cramped position.

Yamatake will continue to provide field-level solutions, introducing new types of intelligent digital field instruments and asset management solutions. Yamatake also offers production information management solutions to meet global user demand for high quality, rapid delivery and significant productivity improvements. Yamatake is committed to delivering optimum solutions to its customers while enhancing fieldbus technology.

www.yamatake.com
Yokogawa And Shell Revive North Sea Platform With Fieldbus Technology

Shell Exploration and Production reduced their operating costs using Yokogawa and Fieldbus technology with an extremely cost effective, high reliability solution.

A major re-development of the Brent Alpha North Sea platform has been carried out to change the fundamental operating principles of the platform.

The control and operating philosophy of the Brent Alpha is that of ‘not normally manned’ control room. The Brent Bravo platform is manned 24 hours a day, and as such it has the prime responsibility for monitoring and controlling the wells and hydrocarbon fluids coming over from the Brent Alpha platform.

A mandatory requirement of the re-development was to reduce future operational costs. The Brent Field, operated by Shell U.K. Exploration and Production Ltd., on behalf of Shell/Esso, is located in 140 m of water approximately 160 km north east of Shetland. Discovered in 1971, first oil was produced in 1976 with gas transported via the Far North Liquids and Associated Gas System (FLAGS) pipeline to St Fergus in 1982. Brent is one of the largest hydrocarbon accumulations in the UK sector, with an estimated ultimate recovery of approximately 3,194 MMBOE (Million Barrels of Oil Equivalent).

The solution to meet the required operational cost reduction was to use a system that could be relied upon not only to provide continuous, safe and efficient operation but to report any out of specification operation to the adjacent Brent Bravo platform over 3 km away. Unmanned operation of a platform places stringent demands on the availability of a control system.

FOUNDATION fieldbus technology was selected as the technology that could provide the environment for ongoing cost reductions and incorporate future technology advances that would further reduce operational costs. Use of FOUNDATION fieldbus technology meant that Shell could now take advantage of Yokogawa’s real-time Plant Resource Management tool to manage all instrumentation calibration, device diagnostics and maintenance records.

Plant Resource Manager (PRM) minimises the Total Cost of Ownership (TCO) and maximises the Total Value of Ownership (TVO) through plant wide Fieldbus device management.

The core of the selected control and safety system is the Yokogawa CENTUM CS3000 Integrated Production Control system.

CS3000 integrates the high reliability with the open environment of IT/PC technology. Simplified and cost effective engineering, easy operation, superior control functions means that this control system will be competitive in today’s severe business environment. Its openness for integrating with Enterprise Resource Planning and Manufacturing Execution systems makes it easy to create a strategic management information system.

Yokogawa’s ProSafe-SLS safety system is used to provide both Emergency Shutdown (ESD) and Fire & Gas systems on the Brent platforms. ProSafe-SLS compliments the DCS to provide a complete control and safety system.

Part of the cost reduction program included an extremely short shutdown period of less than two weeks in which to change the operating philosophy of the platform and commission a complete control and safety system complete with all FOUNDATION fieldbus devices. To meet the shutdown schedule, parts of the system were installed and commissioned before the shutdown. This prestaging of the system including all FOUNDATION fieldbus devices was designed to ensure that no equipment would be installed on the platform without having been pre-tested in the format that would be used in the offshore installation.

Fieldbus is expected to reduce the life cycle total cost of ownership (TCO) of the platform through improved asset management.

www.yokogawa.com/fieldbus
The clear path to optimum control and asset intelligence: extremely reliable instrumentation networked with digital visibility

**Challenge:**
I want to select the best field networking technology that will give my plant a competitive edge.

**Solution:**
For every opportunity to renew and/or add field installations, Yokogawa recommends FOUNDATION Fieldbus. Our FOUNDATION fieldbus solutions provide you with the maximum opportunity to improve your asset utilization throughout the plant life cycle, leveraging reliable instrumentation and predictive digital intelligence.

Intelligent and Stable Field Devices
Yokogawa field devices are FOUNDATION Fieldbus ready and deliver accurate process measurement and advanced diagnostic information with low installed cost and near zero maintenance. Web-enabled technology allows these devices to continually upgrade their capabilities online.

Integrated Plant Resource Manager (PRM)
Yokogawa PRM enables you to manage your field assets centrally and with ease, integrating device information and device diagnostics information across different protocols and multiple suppliers. Maintenance is made easy and cost effective with PRM watching your assets on your behalf.

CENTUM CS 3000 R3 Fieldbus Host System
Yokogawa host systems are designed to help you harness the true power of FOUNDATION Fieldbus. CS 3000 scales easily from single-node system to a one-million-tag super large system, hosting the wealth of digital field information. The 99.999999% availability track record and VnetUP 1GB Ethernet control network brings you a powerful combination of system reliability and openness.

For more information about this product, go to: promo.us.yokogawa.com and enter key code ADA501.

www.yokogawa.com/us/
IMPROVE CONSISTENCY AND REDUCE COST WITH ONE SOLUTION. WE’LL SHOW YOU HOW.

LISTEN.

THINK.

SOLVE.

Broaden your view using the one architecture that unifies control disciplines and provides actionable information. You’ll stay informed and make more effective business decisions. See how Integrated Architecture can help you achieve operational excellence. RockwellAutomation.com/think/process.