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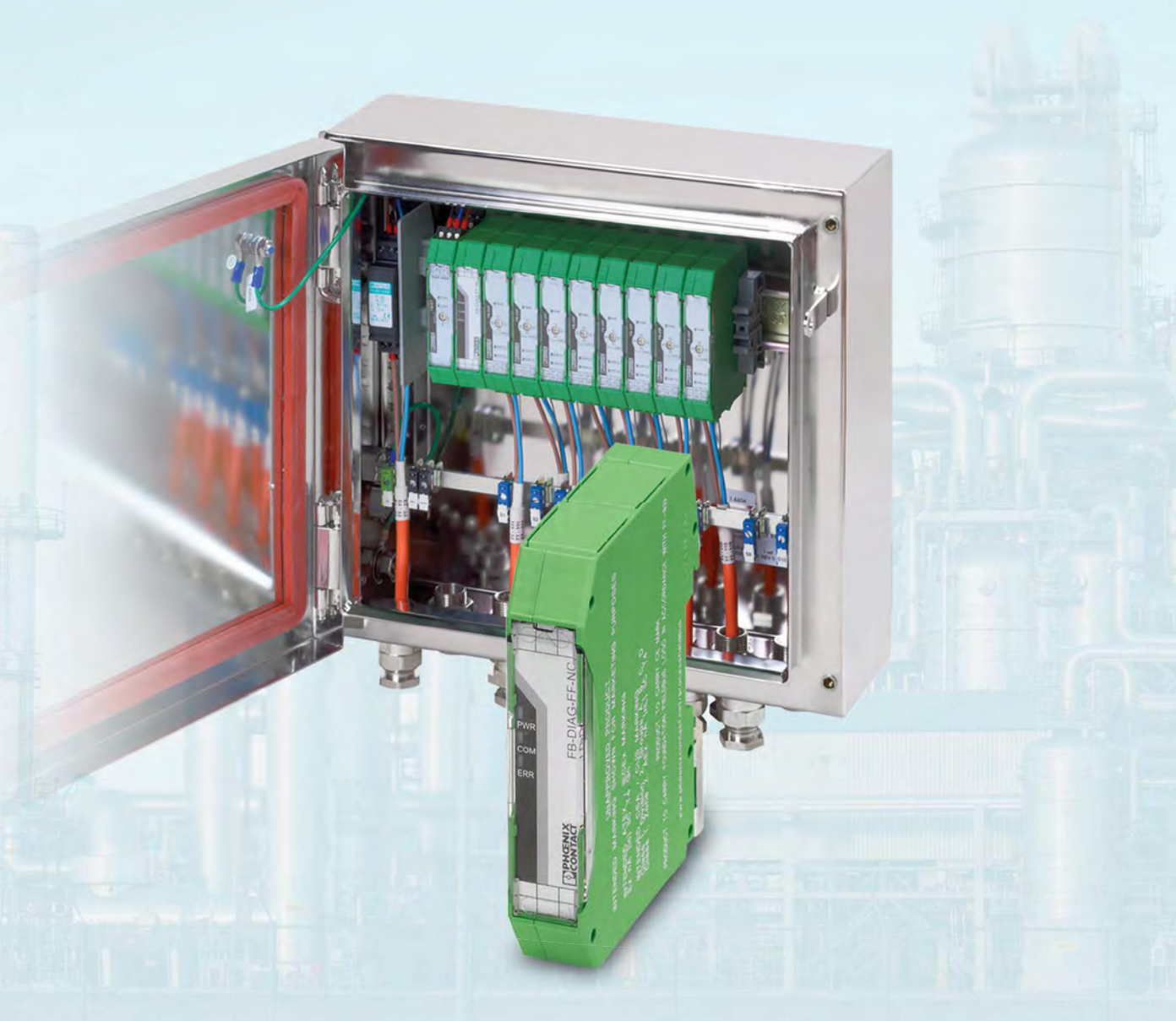
PROMOTING EXCELLENCE IN PROCESS AUTOMATION • CON

Worth its weight

Registration assures performance
of HART, FOUNDATION Fieldbus
and FDI technologies



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Rising value



OUR ROLE AT FieldComm Group has expanded since combining the Fieldbus Foundation and HART Communication Foundation. With the addition of FDI technology, our strategic importance in “simplifying the complexity” of process automation systems grows. As the integration technology of choice for many protocols, it is enabling users and suppliers to focus less on the underlying protocol and more on the data.

This is not to say protocols are less relevant, in fact quite the contrary. In talking to users, I hear one common theme, that regardless of IIoT initiatives, future architectures or newly available protocols, no one is “ripping out” field devices. These field devices are delivering data through robust protocols trusted by users to meet their performance, interoperability and security needs. In fact, it becomes increasingly clear that the IIoT will require many protocols.

So what does the future plant and enterprise look like at the field device level in the next 10 years? I think it is fair to say we will see a combination of HART, FOUNDATION Fieldbus, HART-IP, WirelessHART and many others. Physical layers will include 4-20 mA, Ethernet, wireless and maybe more. The key to IIoT now becomes how we integrate these various protocols and what we do with the data they provide.

To develop standards, we use a collaborative working model that leverages hundreds of volunteer subject matter experts from more than 340 member companies. We also partner with organizations like the OPC Foundation to create “information models” that help extend field device information from the OT world to IT side where many users are less familiar with the origin and meaning of process data. FDI is one such standard that helps “simplify the complexity.” Use cases such as asset management, analytics, monitoring and diagnostic support across enterprises all require a common model to compare like information, regardless of protocol. The protocol is how it gets there, however, the use cases only care about the information!

Our cover article focuses on product registration and conformance services. As devices, hosts, and architectures become more complex, assured adherence to standards at the protocol and information model level is a requirement for maximizing captured value. In the past year, our verification team has completed new or updated registrations for nearly 200 products. Trust me, registration is worth its weight in gold!

By continuing to build on the “gold standard” of our protocols, bridging them to the IoT and ensuring they conform to these standards, the industry can seize this data revolution to achieve improved performance in their operations and enterprises. FieldComm Group will be there to help each unique user capture the value of this revolution by meeting them where they are today and getting them there with many solutions from our technologies and from our members. ●



Ted Masters

President and CEO
FieldComm Group

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Registration assures value

The path to a registered checkmark is rigorous, but smooth



FOUNDATION Fieldbus and HART provide valuable information and powerful communications, but these capabilities can be incomplete and integration may be difficult if the software and hardware are not designed and engineered to conform with the specifications. The FieldComm Group helps users avoid problems by offering assistance to suppliers in the form of consultation and testing services. Products that pass the tests conform to the specifications, are registered and may display the “Registered” logo associated with its implemented technology, which assures the specified functionality and interoperability.

“Testing and registration is very important,” says Sean Vincent, director, technical services, FieldComm Group. “It provides third-party verification of conformance to standards, which results in better products that perform reliably and predictably for the end user.”

This recognition is important both to suppliers and users. “Third-party registration provides peace of mind to the specifying engineer—the manufacturer says it’s good, and the FieldComm Group says it meets the certification requirements,” says Eric Wible, director of engineering, Fluid Components International (FCI).

“For suppliers, the customers will not spec you if you don’t have it,” Wible says. “For the user, if there is any issue in bringing the instrument up on startup, you’ll get the full attention of the FieldComm Group as well as the manufacturer.”

Device manufacturers agree that registration benefits everyone. “Users benefit from such tests because they know that field devices provided by Endress+Hauser will properly work in their system environment,” says Lukas Klausmann, senior marketing manager, Industrial Communication, Endress+Hauser “Furthermore, risks in plant opera-

tion, as well as during commissioning and startup, will be reduced.”

As a field device and solutions provider, Endress+Hauser benefits from testing because it ensures proper integration of field devices and solutions in different system environments and industries. “Based on FieldComm Group compatibility, Endress+Hauser makes further tests with the field device in our own test lab with all major systems to ensure that additional device-specific benefits are available for the users in their environment,” Klausmann adds.

In short, says Scott Saunders, president and CEO, Moore Industries, “It’s another layer we have to go through, but if I put myself in the customers’ shoes, and I always do, I want to know that device in service will work with another vendor’s device.” The net result is a user that can choose the best-in-class product for his/her application.



Flawless FOUNDATION

Test cases are written in software, and automated testing tools exercise the permutations. Here, a FOUNDATION Fieldbus device is undergoing a physical layer review.

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TESTING IS A PROCESS, NOT AN EVENT

Before a hardware or software product is registered, it is tested to ensure that it not only communicates the specified parameters as expected, but that it does so in many different possible scenarios and under adverse conditions often found in industrial networking applications.

There are required capabilities, such as read/write, and optional capabilities for various devices. “The specifications tell you many things about possibilities, and the tests verify single or multiple implementations of those possibilities,” says Vincent.

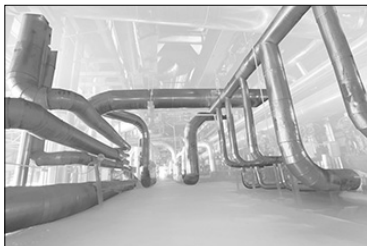
Test cases are written in software, and automated testing tools exercise the permutations. “Along with the positive cases, where we make sure it works, we test many more negative cases using erroneous information, and simulate mistakes and network malfunctions to make sure the device tolerates and recovers from error conditions, and keeps working,” Vincent

says. “This makes sure the devices are robust.”

The registration process starts long before the test date. “Most projects start with the specifications. The vendor’s development team gets training and serves as the primary developers, but others may help,” Vincent says. “Questions are answered by FieldComm Group and the vendors’ trained experts.”

As they develop the product, vendors can use quality assurance (QA) test tools to be sure the performance is there early in the process so they can raise issues and resolve questions. “Being engaged with the tools and tests along the way really shows at the end test,” Vincent says. “Development may take months or years, so we view it as a long-term partnership. There are many options, and we expect questions along the way.

“We try to make everything clear so people pass the first time. Discrepancies are caught early during the test process.”



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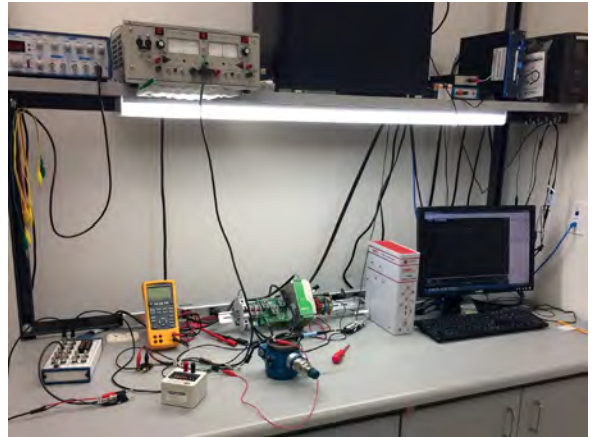
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The test backlog, or queue, has been eliminated. "All tests are done on a schedule now. We schedule them based on clients' start dates and plans," Vincent says. "We schedule up to a year in advance, but there are generally openings within a week or two."

The registration process and test labs are not adversarial. "They help and support both users and registrants, and I must mention, you don't have to be a member to register a product," Vincent says. "It's a partnership of vendors, the FieldComm Group and users. We help by performing audits and providing education. When a test fails, it's usually due to an oversight or misunderstanding. It's a chance for us to work together to resolve it."

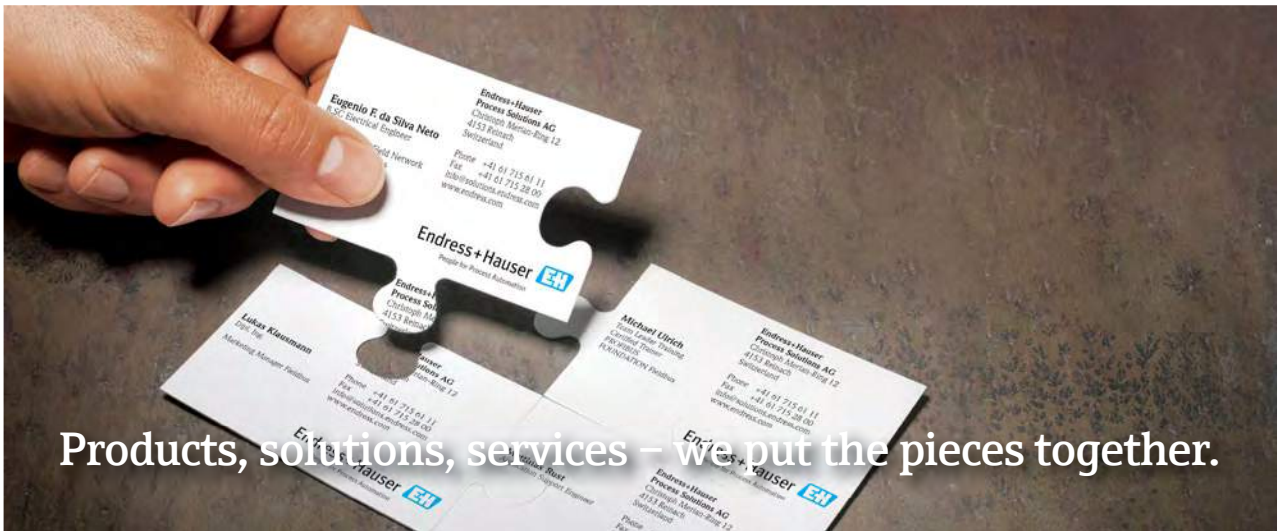
COOPERATION ASSURES SUCCESS

"The process of certification testing is important because suppliers can verify whether the device meets



HART monitored

The process instrument manufacturer must fully understand the test protocol, the specification, and how it applies to their instrument. Here, a HART instrument is being tested for registration.



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the specification and ensure the device is stable and reliable,” says Huixuan Yu, senior engineer, Microcyber, which produces registered products for WirelessHART. “During the process of testing, suppliers can get a better understanding of the technology for research and development of related products in the future.”

For example, Microcyber purchased the relevant test equipment from the FieldComm Group and tested its device before the official certification test. During testing, “We and the FieldComm group exchanged feedback to validate the latest, upgraded test system,” Yu says. “After the test was completed in our facility, we submitted the device to the FieldComm Group for official testing, and received authorized certification.”

The process instrument manufacturer must fully understand the test protocol, the specification, and how it applies to their instrument. “They may fail several times and have to go back and tweak it, but they can apply those learnings to the next model,” says FCI’s Wible. “Understand the test protocol, and things will go smoothly. There’s always some frustra-



Look for the label

The “Registered” mark means the product is tested, approved, has the specified capabilities and will function as expected, without surprises.

tion, but you need to really know it to get certified, and the users understand that.”

Moore Industries concurs. “FieldComm Group supplies the toolkit, we can do all the communications testing here, work out any kinks and bugs, then send it to the lab,” says Saunders. “It saves us on service and support—we don’t want to sell an \$800 instrument, then spend \$5,000 getting it up and running.”

Once registered, Yu says, “Devices approved by the FieldComm Group are quality-assured, and suppliers can use the ‘Registered’ mark in literature, documentation and marketing materials. Users prefer to choose registered devices.” ●

CERTIFIED TRAINING

Companies seeking customized training frequently turn to Lee College Center for Workforce and Community Development (www.lee.edu/workforce). The center is home to several FOUNDATION Fieldbus-certified training programs that teach students how to build and configure fieldbus segments and devices. The Fieldbus Center is one of only eight certified training sites in the world, boasting a multimillion-dollar pilot plant and several modern micro-plants outfitted with all the technology found in today’s modern industrial environments.

Registered products offer more than predictable performance—they also can be expected to have a common set of features. This makes it easier to learn how to use them, and that knowledge transfers to unfamiliar devices and brands. “Registration means you can be confident it will operate the way you want it to,” says Chuck Carter, retired director and now instruc-

tor, Lee College. “It also means that once you learn to work with these systems, you can take it to the bank. They work the same way around the world, and across brands.”

Certified training shows you all the capabilities the instruments have in common. “Vendor-based, uncertified courses may only show you the vendors’ features,” Carter says. “As an instructor, if a pressure transmitter is registered, I know it will work a certain way and I can teach it using a consistent operability and approach, with best practices.

“At the same time, over the years we have come across certain concepts and pieces of equipment that are great answers. If it were not in a particular vendor’s offerings, they wouldn’t tell you about it. I want the users to have the best information, so I tell about it whether the system I’m teaching on has it or not, so users can make good business decisions.”

Information reigns

The process automation cloud relies on FieldComm Group technologies



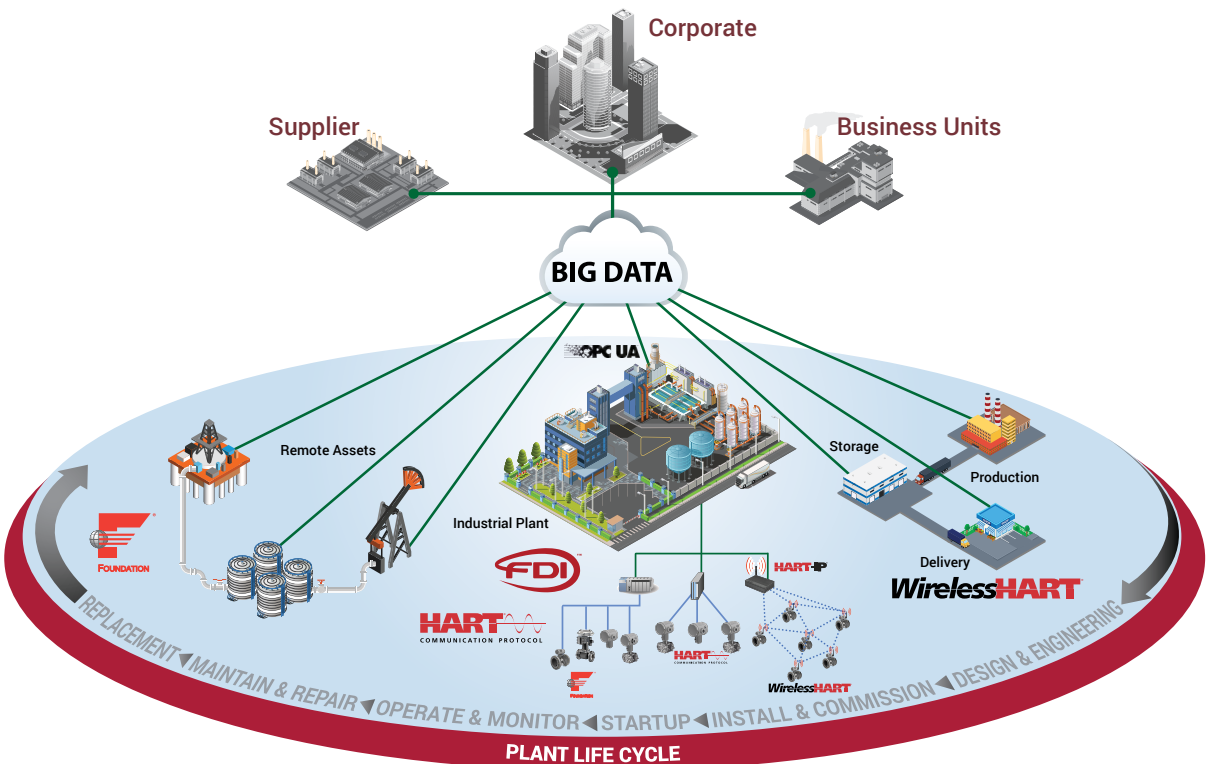
IT SEEMS THAT everyone is talking about the fourth industrial revolution—Industrie 4.0, the Industrial Internet of Things (IIoT) and connecting the plant floor to the cloud. As a result, we’re seeing a fog of alternative technologies and standards competing for the attention of engineers, manufacturers and vendors, and rightfully so, as the ability to gather and analyze information is key to driving increased value in process manufacturing.

But regardless of where the data ends up, much of it must come from the plant floor and at the interface between the process and the IT networks. There, says Scott Saunders, president and CEO, Moore Indus-

tries, “Our job is to provide customers with data and the capability of smart instruments to support predictive modeling, asset management and reduced calibration.” This is where you find FOUNDATION Fieldbus, HART and FDI technologies.

SHARED DATA, LEVERAGED RESOURCES

For remote applications, “It’s very easy to add cloud connectivity for visibility into device health, to be sure everything is working,” says David Lincoln, digital leader, measurement and analytics business unit, ABB. “In the control system environment, a local cloud is useful for data gathering, analysis and local trending.



For example, tracking how many times a valve opens and closes is a low-cost addition. Then you can share valve operating data with one valve expert across the organization, or with a vendor service technician sitting miles away, through the cloud.”

“We make the data available, and the customer decides how to use it,” Saunders says. “Most use an intranet for IIoT, not an immediate jump to the cloud over the Internet, due to security concerns. That’s their responsibility, they can decide that technology. Our next two or three products will have Ethernet running Modbus TCP, Ethernet IP or HART-IP. We make IP available to them, they decide how high they want to go. OPC UA? XML? It’s up to them.”

For field instruments outside a control system, “The cloud provides the connection and a technician can analyze the entire fleet,” says Neil Shah, product manager, control systems technologies, ABB.

Within a control system, with no additional connectivity or infrastructure, “Data may be locked into the system. We need to convert it to get it out to the experts for analysis,” Shah says. “For that, we can use device management tools.” FieldComm Group’s FDI technology is made for the job (p. S-13). Shah says, “FDI is open, and enables us to draw on data not just from ABB devices, not just from ones that are not already connected, and not just from a single source.”

Capabilities found traditionally in FOUNDATION

Fieldbus and HART portable communicators are now connecting to the cloud to save device configurations, share configuration data, perform automatic backups, and make the latest data and configurations equally as available remotely as they are locally. Saving trend data to the cloud allows users to troubleshoot device issues with colleagues anywhere in the world, and gives global access to process performance data.

“Our DevCom2000 Smart Device Communicator and our DevCom Apps all support HART-IP. This allows access to all HART devices in the network through an Ethernet connection to the WirelessHART gateway. The user can download HART device configurations and make parameter changes,” says Jeff Dobos, president, ProComSol. “Now we’re adding functionality for online use. You can view the entire network hierarchy on one screen showing measurement values, device status, and record and store the data locally or in the cloud.”

“Our software also can save trend data—for any period you want—to the cloud to share with colleagues all over the world,” Dobos says. “You can do it from the office or home, you don’t need to go into the plant.”

OPC UA DELIVERS DATA EVERYWHERE

For a significant group of suppliers, the default solution for connecting disparate devices, packages and systems is OPC UA. “The big thing right now is OPC. It’s a big, open platform for Ethernet and the Internet,” says Saunders.

As part of a continuing partnership between the OPC Foundation and FieldComm Group, the OPC UA information model is a part of the framework upon which FDI is built. “This allows complex information rendered in device package to be seamlessly communicated to disparate applications and devices,” says Tom Burke, president and executive director, OPC Foundation. It allows a generic application to connect to the corresponding device or host application and consume data without any knowledge of the underlying protocol of the device. Much like plug and play in the consumer electronics business.

“End users consistently tell us that they have no interest in replacing their field devices,” says Ted Masters, CEO of FieldComm group. This is hardly surprising given the large installed based (40 million or more

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*ESD: Emergency Shut Down



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units) and long lifecycle of field instrumentation. Technologies like FDI and OPC UA allow for creation of “digital twins” for the field instrumentation that can then be mapped into a variety of application formats. Masters continues, “When we give management presentations, our computers probably have three or four different ways of connecting to a projector. Most users don’t care if VGA, HDMI, DVI, or wireless connections are used, as long as the image on the computer is rendering properly by the projector. It’s the same in process automation. Many, slightly different, protocols will continue to operate in plants worldwide, but the information delivered by those protocols must be standardized for consumption by all process applications. This is the ultimate goal of the FDI and OPC UA information models.”

CLOUD CONNECTS VIA OPC

On the cloud side, evidence that OPC UA is the key to field-to-cloud connectivity comes from Microsoft. “We’ve been investing quite heavily in a platform for Industrie 4.0, Made in China 2020 and the IIoT,” says Erich Barnstedt, software engineering lead, Microsoft. “My team owns the industrial vertical for Azure IoT, and OPC UA is the only open industrial protocol we support to bring data to the cloud and all its services. All the back-end services understand OPC UA. And OPC UA is open-source, which is a big change. Supporting open-source is a winning strategy.

“Everything is gravitating to OPC UA, and we want everyone to support it.”

Instead of having many protocols to provide and support, it’s just one OPC UA interface. “It takes less than a week to become compatible with a huge number of devices,” Barnstedt says. “FieldComm Group offers an entire ecosystem of devices compatible with FDI technology. It’s protocol independent and al-

lows my group to simply support OPC UA.

“At the NAMUR conference [in November], they’ll have a joint demo using OPC UA to connect FieldComm Group technologies to Microsoft Azure, showing how you can quickly get insights into machine data from the cloud with a few clicks.” ●

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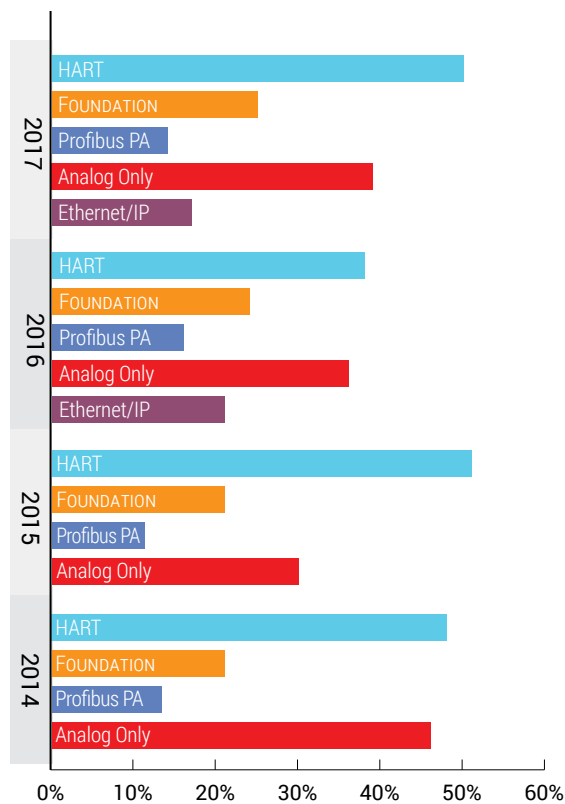
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Users Weigh In

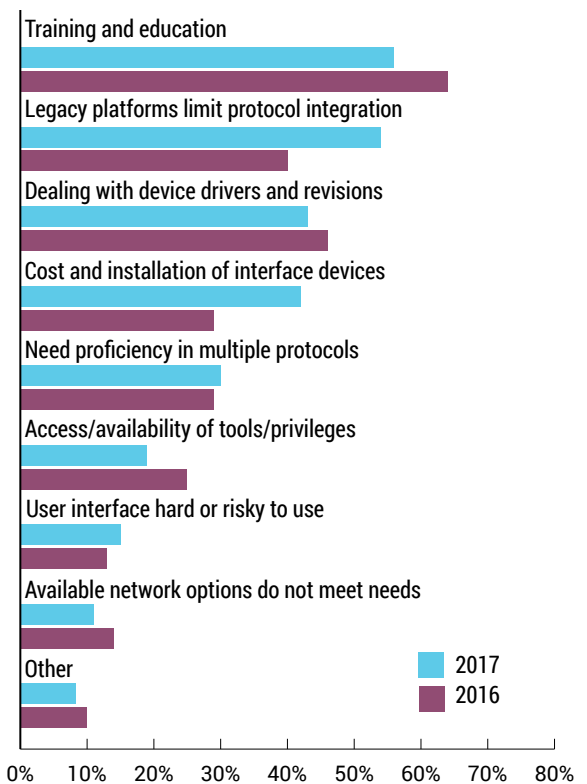
This year's annual protocol survey was completed by 133 members of *Control's* primarily North American subscriber list representing the process industries including Food, Chemicals, Pharmaceuticals, Primary metals, Petroleum, Utilities, etc.



Percent of installed wired devices by protocol



Major challenges to device integration



How connected are your digital protocols?

"Which of these statements describes your usage. (Please check all that apply.)"	HART		FOUNDATION	
	2016	2017	2016	2017
Permanently for real-time process systems	36%	44%	50%	66%
Occasional via handheld	59%	61%	39%	37%
Occasional via PC	41%	34%	33%	23%
Permanently for off-line activity	23%	17%	15%	14%
Permanently for real-time enterprise systems	10%	12%	15%	9%

FDI scales new heights

Field Device Integration specification expands for greater capabilities



THE FIELD DEVICE Integration (FDI) specification and ecosystem isn't resting on its laurels.

"FDI packages and hosts help bring field device information to control and upper-management systems, so their key is providing better interoperability, saving time and reducing headaches for users," says Achim Laubenstein, integration technology director at the Field-Comm Group. "However, as FDI packages and hosts from ABB, Em-

erson, Siemens and others begin to arrive, suppliers want to use the FDI information model and OPC UA to connect to other communication protocols, get data to the enterprise level via Microsoft Azure, and participate in the Industrial Internet of Things (IIoT) and Industrie 4.0."

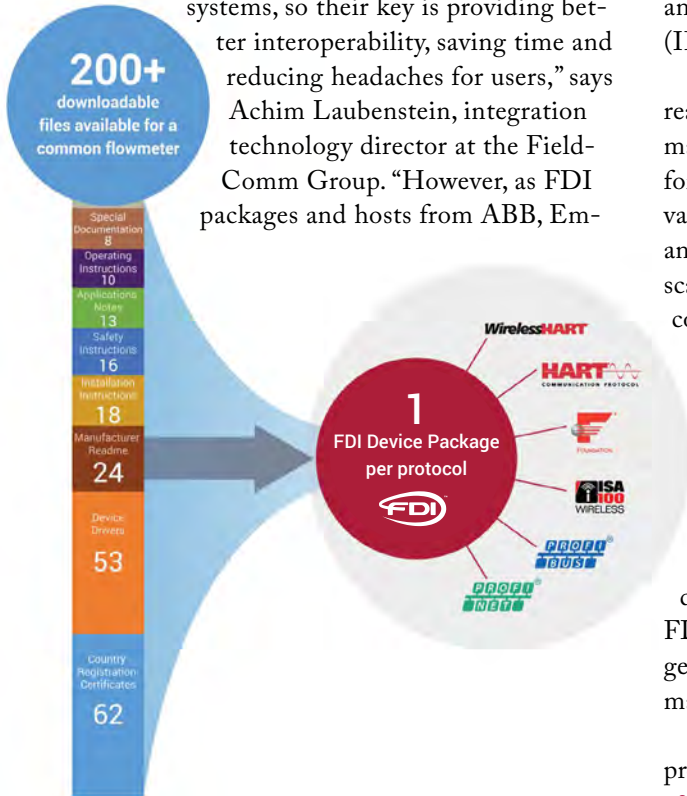
FDI was conceived to bring previously hard-to-reach data into uniformly reported and displayed formats, to help improve decisions and increase profits for process automation companies. It merges the advantages of an FDT Device Type Manager (DTM) and Electronic Device Description (EDD) in one, scalable software device package to help manage the complete lifecycles of basic and sophisticated components, including commissioning, configuration, diagnostics, calibration, maintenance and other functions.

"The clear benefit of FDI is its simplified drivers for different host systems," says Michael Bückel, product manager at Endress+Hauser's Flowtec division. "Where we used to have many drivers for many different host systems in place, FDI shrinks it to just one package that's needed to get a device up and running or for operations and maintenance."

In addition to simplifying the device management process, FDI will also enable:

- Open access to cloud-based computing services via jointly developed OPC UA information models,
- Offline configuration,
- A device package repository,
- Security, and,
- Communication servers for automation protocols.

These initiatives will enable FDI (published as the IEC 62769 standard) to fulfill its mission statement: ONE device – ONE package – ALL tools.



Before and after

Before FDI, multiple integration products had to be implemented and maintained by the device manufacturers, supportive documents had to be searched and collected by the users, and several integration standards had to be supported by the system vendors. FDI-registered devices have one single FDI Device Package consisting of all the host needs to optimize the capabilities of each device.

“The FDI standardization team did an excellent job of writing the FDI specification—fully supported by the FDI Package IDE [Integrated Development Environment]—and it’s a huge difference from the past,” says Neil Shah, global product manager for fieldbus and asset optimization in ABB’s Industrial Automation division. “Where users previously had to tweak device drivers on each system and modify EDDs to comply with each supplier’s host, FDI makes EDDs independent of individual supplier protocols, and allows all instruments to work with any host.”

Shah reports there are presently three host systems that support FDI, including:

- Field Information Manager (FIM) from ABB;
- Instrument Inspector from Emerson Automation Solutions, and
- Process Device Manager (PDM) from Siemens

“They all have the same purpose of integrating field devices into systems, and also allow configuration, commissioning, diagnosis and parameterization,” explained Shah.

Despite its potential advantages, some suppliers are concerned that FDI means they’ll have to develop software for it in addition to the EDDs and DTMs they already write for their field devices, which continue to be deployed in systems worldwide.

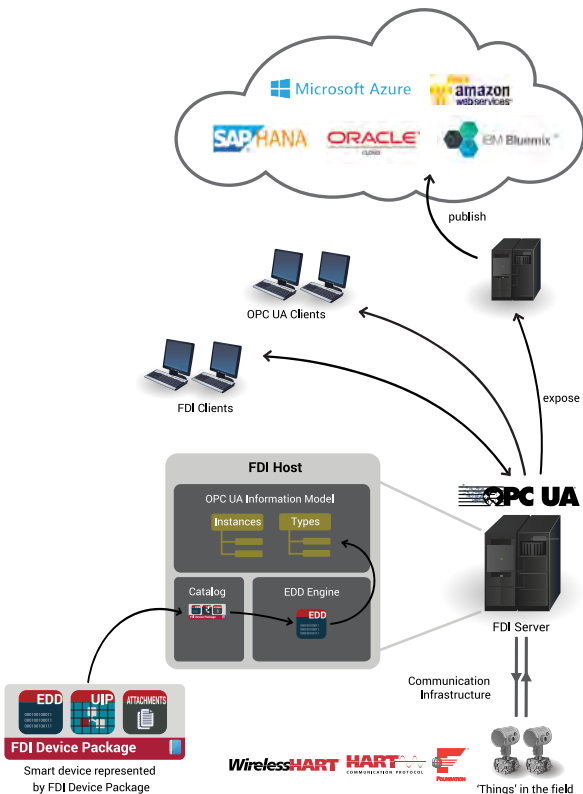
“FDI packages and hosts are at the beginning of their implementation cycle. They will eventually replace EDD and DTM,” adds Laubenstein. “We’ve already held several plugfests where different suppliers can compare and work hands-on with FDI packages and hosts, and we’re going to have more. We did confirm at the plugfests that FDI can achieve much better interoperability, and so our advice is to try FDI with OPC UA server because it’s ready for IIoT and Industrie 4.0.”

OFFLINE CONFIGURATION

One of the most sought-after capabilities in process control has been uncoupling configuration and other tasks from the components themselves, which allows this programming to be done remotely and completed before equipment is installed on plant floors.

“Offline configuration and user interface plug-ins (UIP) are so important because they let us create standardized configuration files, and download them to many devices, mostly when commissioning new plants,” says Dan Ryan, engineering program manager for Plantweb at Emerson and chair of the FieldComm Group Integration Working Group. “FDI lets us take device packages and work up configurations without the spreadsheets and manual processes we used to use. That’s a big savings in labor and time.”

Ryan explains that UIPs are equally useful because they enable enhanced interfaces for troubleshooting. UIPs are an optional part of an FDI device package. For



OPC UA is the key to the IIoT

An FDI Host implementing the Information Model Facet exposes a standardized OPC UA Information Model containing the complete device data, accessible via FDI Clients and standard OPC UA Clients/Servers. As part of the OPC UA infrastructure, the data can be used by Asset Management Systems or published into IIoT platforms and processors.

example, Emerson's Rosemount Radar Master Plus UIP provides annotated, interactive graphics, added graphical tools, and improved interoperability. "The UIP in FDI allows Radar Master Plus to be used on any FDI host," says Ryan. "There's more work to get FDI phased in now and it is a longer-term investment, but everything's going to be better with it."

Mani Janardhanan, program management director for Plantweb and IoT at Emerson, reports that FDI is beginning to enhance the capabilities of its products, including development plans for AMS Device Manager and the AMS Trex device communicator. "Our customers want a unified technology to communicate securely with their field devices from any platform, and FDI is that solution," says Janardhanan. "Emerson is already well down the path on FDI, we introduced our Instrument Inspector in 2016, and it's downloadable from our website. These solutions will make the offline configuration of plants and deployment better, which can help users and EPCs save man-years on commissioning."

INTEGRATING DISPARATE NETWORKS

Today's plants may contain a mixture of device technologies, some based on proprietary and open standards. FDI can access these devices using FDI Communication Servers. The Communication Servers integrate to the FDI Server using Communication Server Packages, allowing FDI to integrate these different networks within a single information model. This enables users to leverage their installed base of devices when migrating to the new FDI technology. FDI Communication Servers even support nested communication, where a remote device may be tunneled through a different protocol, supporting complete access to the embedded device data. Just like devices, communication servers are fully exposed in the FDI Server Information model. FDI Servers communicate with FDI Communication servers using OPC UA.

Cloud connectivity is enabled with the implementation of OPC UA on the FDI Server that exposes the FDI Information Model. The FDI Information model provides a consistent presenta-



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tion of the device (the “digital twin”) for enterprise applications, cloud based services, etc. The Information Model of each device is defined in the device’s “FDI Device Package” using EDDL technology.

Smitha Rao, co-founder of Utthunga Technologies, adds that, “FDI enables the secure and remote communication to the field devices using FDI Communication Server, which is built based on industry-proven OPC UA technology.”

DEVICE PACKAGE REPOSITORY

Because technicians configuring instruments don’t want to download software to each one individually, FieldComm Group is building a cloud-focused repository of all certified, FDI packages and secure EDD packages. This allows FDI-enabled devices to connect automatically, and check if they have any updates.

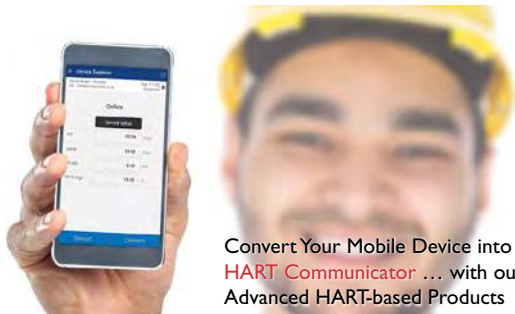
“The plan is to have an online system provide FDI device packages on request, which will give users quicker access to the latest versions,” says Endress+Hauser’s Bückel. “Again, that one device package can be installed in a user’s registered host system no matter what supplier it comes from, which makes that system simpler to maintain, and reduces lifecycle costs.”

Stephen Mitschke, director, FOUNDATION Fieldbus Technology, FieldComm Group, adds that the FDI Device Package and Repository initiative is similar to the way Microsoft Windows downloads updates without requiring its users to go and get any software. Though still being built and tested, the repository will be built on Microsoft Azure.

SUCCESSFUL SECURITY

To maintain security even as it establishes more connections to outside users and systems, Mitschke reports that the FDI specification uses multiple layers. Improving its security on an ongoing basis is another FieldComm Group initiative.

“All FDI packages have digital signatures, which authenticates that software is coming from a trusted source, and indicates if it’s been modified,” explains Mitschke. “The FDI environment can also be implemented as a client on a server architecture, in which case we can rely on OPC Unified Architecture (UA) and its certificate-based security. ●



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Predictive and proactive on the Pacific

Shell's huge Prelude LNG vessel is the first oceangoing Plant of the Year



Source: Shell

THE LEGENDARY BOY Scout motto is “be prepared,” but even they would need to play serious catch-up to equal all the design, setup, configuration, commissioning, testing, smart instrumentation and predictive/proactive maintenance integrated into Royal Dutch Shell's Prelude, the world's largest floating liquid natural gas (FLNG) production facility. In fact, though configuration and maintenance don't normally get as much glory as operational performance, Prelude's testing and evaluation of its processes have been so extensive that it's also earned the FieldComm Group's Plant of the Year Award for 2016.

Having recently completed its long sail from South Korea to the Timor Sea off Australia's northwest coast, Prelude is presently being stationed 200-km from the mainland. Once its connections to the local gas wells are established and final implementation is completed, it's scheduled to begin regular operations in 2018. The 488- x 71-m vessel's 14 production facilities, rising to about eight stories above the main deck and chock-full of FieldComm Group networking and technologies, will extract and process for transport about 3.6 million tonnes per year (Mtpa) of liquefied natural gas (LNG), 1.3 Mtpa of condensate and 0.4 Mtpa of liquefied propane gas (LPG) during its 25-year lifespan.

FIELDCOMM ON DECK

Beginning with Prelude's initial designs and continuing through to its construction and upcoming operations, Shell's engineers report that FieldComm Group technologies are essential in enabling the production

facilities to perform their advanced diagnostics, intelligent operations and predictive maintenance, and achieve their lifecycle benefits.

“FieldComm Group technologies are used extensively in every phase of the Shell Prelude FLNG project, and form the backbone of the intelligent predictive maintenance system,” says Kyle Dickson, control and automation engineer for Shell Prelude FLNG. “The use of device templates is delivering excellent conformity and quality assurance throughout the commissioning process. This has enabled a small team to achieve impressive loop check rates whilst maintaining exceptionally high levels of quality assurance. Once commissioned, equipment and unit modules have used the extensive diagnostics and alerts provided by both HART and FOUNDATION Fieldbus technologies to great effect, specifically avoiding numerous plant trips and enabling unprecedented levels of remote support and deep-level diagnostics.”

Rong Gul, senior automation engineer and subject matter expert (SME) for smart instrumentation and instrument asset management with Shell Global Solutions, reports that Prelude's process applications employ:

- More than 8,000 FOUNDATION Fieldbus devices, including 2,500 valve positioners, located on all control and monitoring devices, and connected only to the DCS;
- More than 4,500 HART devices connected to the DCS and PLCs via HART multiplexers, and used predominantly on devices connected to safety instrumented systems (SIS) and fire and gas (F&G) systems;

- ValveLink and FDT/DTM on all complex instruments like guided wave radar (GWR) and valve positioners; and
- WirelessHART on certain applications.

“In a nutshell, proactive maintenance was embedded from Day 1 on this project, rather than adding it as a work process on running facilities,” explains Gul. “Factory acceptance test (FAT) preparation and testing, training, templating, selection of smart instrumentation, rigid work processes, and a management and maintenance organization firmly supporting the technology are mandatory to make proactive maintenance succeed.”

TEMPLATES ENABLE “FIX BEFORE FAIL”

One of the most important tools used to prepare Prelude’s production facilities for consistent, optimal operations are default, commissioning or application-

specific parameters that enable diagnostic features, device options or other functions. For example, pressure, Coriolis or valve positioning devices can have hundreds of parameters, so parameter settings can be stored in corporate or onsite template files, depending on individual device types or how and where they’re applied. These parameters in templates allow users to:

- Optimize diagnostics;
- Select features and options;
- Ensure error-free downloads to devices;
- Identify application and commissioning parameters;
- Apply consistent work practices at sites to utilize smart instrument data; and
- Eliminate error messages and unnecessary troubleshooting during commissioning.

Consequently, these templates streamline commissioning because they can be used to apply standard configurations to hundreds of FOUNDATION Fieldbus



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

devices in a fraction of the time it used to require, which enables more effective and proactive maintenance at far less cost. "Using device templates ensures uniformity of device configuration, effectively reducing the number of commissioning parameters required to be checked by a factor of 20," says Dickson. "The principle of 'do it right, do it once' is guaranteed by correctly using FieldComm Group technologies. The removal of regret/rework has resulted in significant cost/schedule savings throughout the commissioning process.

"In addition, using advanced diagnostics and rationalized device alerts enables predictive and targeted maintenance execution. Being in a particularly remote, isolated location, Prelude depends on having a fully realized, remote-monitoring group of engineers, conducting surveillance and advising on device issues. Commonly, it's been possible to identify issues, specifically pertaining to control valves before the fault escalates and results in a plant upset or outage.

For instance, Prelude will draw 50 million liters of cold water from the surrounding ocean every hour to cool the natural gas, and help it bring it down to -162 °C. This is the temperature at which it liquefies into LNG and shrinks in volume to 1/600 of its gaseous state, which makes it much easier to transport. Smart devices performing this and other tasks on Prelude include control and safety valves; pressure, temperature and level transmitters for basic process control system (BPCS) and safety, flowmeters for BPCS and safety; fire and gas detection; and more.

Gul reports that implementing a proactive maintenance schedule for Prelude's applications and components represents a game changer from traditional maintenance planning, allowing proactive maintenance to make informed, condition monitoring decisions, rather than relying on traditional reactive maintenance. "Coupling predictive maintenance data from the asset management suite with the criticality assessment of the field equipment provides a rationalized report, enabling prioritized maintenance activities."

Gul adds the right parameter configuration of smart instrumentation and a fully functional IAMS

NCS-TT106x Temperature Module



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| ■ 0~4000Ω | ±0.70Ω |
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| ■ -100mV~+100mV | 0.02mV |
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are crucial to enabling Prelude's proactive maintenance schedule. Templates for all devices were configured during its FAT (Factory Acceptance Test) in Singapore, and Shell Global Solutions worked with Emerson Automation Solutions to develop required asset management functions. "As a result, FOUNDATION Fieldbus devices can be configured and loop tested six times faster compared to traditional 4-20mA HART devices," says Gul, who provides training onsite to make sure Prelude's operators have sufficient expertise in using the appropriate tools to diagnose and decipher alerts and other information.

COMMISSIONING AND LOOP CHECK SAVINGS

At the peak of its recent commissioning efforts, Dickson reports that Prelude's staff was performing more than 500 loop checks per week, and checking multiple streams of complex functions. The vessel's utilities plant was also running 24/7, which made maintenance

challenging. Thanks to using templates for its parameters, Prelude's staff and contractors achieved:

- Total time savings of 80% for device commissioning and loop checking across all devices that applied user configuration via templates and test devices using full-loop check procedure during FAT—not just commissioning devices in the asset management system;
- Time savings for the valve positioner loop check procedure was more than 80% for the full loop test;
- Tested all device types able to be tested in the FAT in less than three days, compared to previous test using traditional methods, which took more than two days to test just three device types; and
- Human error during FAT was identified quickly with reporting tool allowing for correction on the spot, whereas previously it was a tedious exercise to find a mistake with dozens of parameters and multiple screens.



HART and Modbus to FOUNDATION and Profibus

Fint is a worldwide provider of fieldbus technology helping manufacturers of instrumentation devices and system integrators to communicate on HART, WirelessHART, FOUNDATION Fieldbus and Profibus networks.



EU office: +47 22131910, US office: +1 (512) 794 1011 Fieldbus International AS, Ullern Alle 28, N-0381, Oslo Norway, www.fint.no

“All benefits as we’ve gained so far are on FOUNDATION Fieldbus only,” adds Gul. “On average, a trained team can perform a loop check on 20 FOUNDATION Fieldbus devices per day, including a mix of valve positioners to temperature transmitters, and maybe three to five HART devices.

REMOTE MONITORING, COLLABORATION

Beyond all the monitoring and control systems onboard Prelude, Shell is also establishing a Collaborative Work Environment (CWE) at its local headquarters in Perth, Australia. The facility will seamlessly meld telepresence; live/historical process data; live-historical diagnostics; document sharing; and wireless personal video feeds. It will also link Shell and its Global Vendor Support Center to support engineering to optimize production and minimize upsets by using scenario modeling and test runs of plant modifications.

“Perth CWE is connected using fiber-optic links to Prelude, which will only be staffed during normal work-hours,” explains Gul. “Hence, it’s more suited for reliability and day-to-day work planning, rather than ad-hoc problem identification and troubleshooting, especially after normal working hours.”

Just as the templates save time, Gul adds that Shell and Prelude are also embracing the Industrial Internet of Things (IIoT) because it can:

- Improve safety by helping Prelude’s predictive maintenance program and advanced, remote diagnostics capabilities reduce field time for personnel.
- Improves reliability by increasing equipment and plant availability, which is critical for Prelude’s single-train LNG application; and
- Assist production with live data feeds to Shell’s dynamic simulator and predictive models, and providing a full, live view of all process and diagnostic data.

“We’re aligning our work processes and organization to a fully connected, remote LNG plant made possible by IIoT,” says Dickson.

“However, our goal of fix it before it breaks will still depend predominantly on the right alert configuration, criticality ranking, and swift reaction on identified device alerts,” concludes Gul. ●



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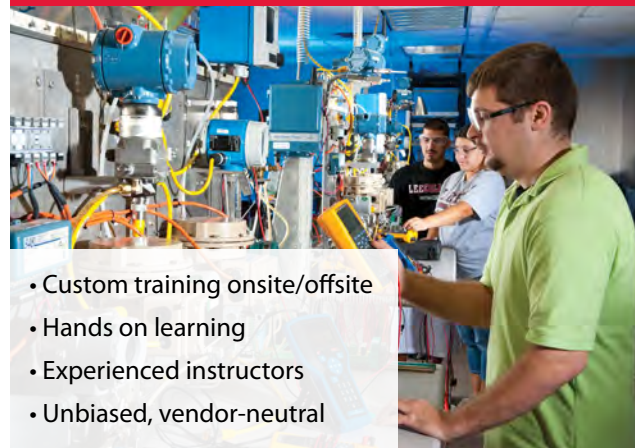
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FieldComm Group, fieldcommgroup.org

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Meggitt Sensing Systems, www.wilcoxon.com.

SIL 3-CAPABLE SSX AND SST SAFETY ISOLATORS



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The SSX and SST protect safety systems by isolating an SIS from basic process control systems so that disconnections or other failures don't impact the safety system. While most isolators "strip off" HART data, the SSX and SST pass along HART data to asset management systems, programming devices or host systems.

Moore Industries, www.miinet.com/ssxsst

ETHERNET HART MULTIPLEXER



Phoenix Contact's new Ethernet HART multiplexer provides a simple way to parameterize and monitor up to 40 HART devices on an Ethernet network. The GW PL ETH series features a modular design and is an up-to-date replacement for the widely used RS-485 HART multiplexer solution. It offers integration via HART-IP, Modbus TCP, or PROFINET. Additionally, using the included CommDTM, the multiplexer and connected HART devices can be integrated into an FDT Frame application.

Designed for applications like partial-stroke testing, valve diagnostics, and batch-data transfers, the multiplexer features a HART master on each channel for the fastest possible updates and execution times.

For more information, visit www.phoenixcontact.com and enter #1567 in the "Search" bar.

Phoenix Contact, www.phoenixcontact.com

Recently Registered Technology

These products have been registered since July 30, 2016. View an additional 44 FOUNDATION Fieldbus and 38 HART devices that have recently received updated certifications by visiting go.fieldcommgroup.org/registration-all.

New Registered Host Systems			
Protocol	Manufacturer	Type	Model / Host Name
HART	Honeywell Process Solutions	Host	FDM
New Registered Devices			
Protocol	Manufacturer	Type	Model / Device Name
HART	ABB	Flow Transmitter	FCXxxx
HART	ABB Automation Products GmbH	Mass Flow	FCXxxx
HART	ABB Ltd	Analytical Water Transmitter	AWT210
HART	Anderson	Level Transmitter	L3
HART	Anderson Instrument Co. Inc.	Level Transmitter	L3
HART	AUMA Actuators, Inc	Actuator	DREHMO i-matic
HART	Badger Meter Inc.	Flow Transmitter	RCTX
HART	Balluff Automation	Level Transmitter	BMD_1H,1L
HART	Balluff GmbH	Level Transmitter	BMD_1H,1L_SIL
HART	Beijing Huakong Technology Co Ltd	Temperature Transmitter	HK-H600T
HART	Cameron	Flow Transmitter	G3-LEFM
HART	Cameron	Flow Transmitter	CamCor
HART	Chengdu Action	Gas Detector	AEC2232bX
HART	Chengdu Action	Gas Detector	GQ-AEC2232bX
HART	Crowcon Detection Instruments Ltd.	Gas Detector	XgardIQ
HART	Crowcon Detection Instruments Ltd.	Gas Detector	Xgard Bright
HART	Draeger Safety AG & Co. KGaA	Gas Detector	PIR 7x00
FOUNDATION Fieldbus	Eaton Electric Ltd.	MTL IS Megablock	F2xx-IS
HART	ELMETRO GROUP	Mass Flow	Flomac
HART	Emerson Process Management	Pressure Transmitter	WPG Wireless Pressure Gauge
HART	Emerson Process Management	Flow Transmitter	8800D
HART	Emerson Process Management	Temperature Transmitter	3051S Diag
HART	Emerson Process Management	UGL Detector	Incus Ultrasonic Gas Leak Detector
FOUNDATION Fieldbus	Endress+Hauser	4-wire Coriolis Flowmeter	Promass 300/500
FOUNDATION Fieldbus	Endress+Hauser	4-wire Magnetic Flowmeter	Promag 300/500
HART	Endress+Hauser	Flow Transmitter	Promag 400
HART	Endress+Hauser Process Solutions	Level Transmitter	Micropilot FMR6x
HART	Endress+Hauser Process Solutions	Analytical	Liquiline Compact CM82
HART	Fisher Controls	Level Transmitter	DLC3100
HART	Fisher Controls	Level Transmitter	DLC3100
HART	Flowline	Level Transmitter	ECHOPRO LRxx
HART	Fluid Components International	Flow Transmitter	ST50 product family
HART	Fluid Components International	Flow Transmitter	MT100 Series
HART	Foxboro by Schneider Electric	Level Transmitter	244LD
HART	Fuji Electric Co., Ltd.	Ultrasonic Flowmeter	FST
HART	Fuji Electric Co.,Ltd.	Flow Transmitter	FST
HART	Gasensor Technology Pte Ltd	Analytical	GQ-CE8900
FOUNDATION Fieldbus	General Electric	Ultrasonic Flowmeter	XMT1000
HART	General Electric	Ultrasonic Flowmeter	XMT1000 UFM
HART	GODA Instrument	Level Transmitter	GDRDXY
HART	Heinrichs Messtechnik	Flow Transmitter	UMF3
HART	Hoerbiger Automatisierungstechnik Holding GmbH	Actuator	TriVAX
HART	Honeywell	Temperature Transmitter	STT 700 Smartline Temperature Transmitter
HART	Honeywell	Temperature Transmitter	STT 700 Smartline Temperature Transmitter

NEW REGISTRATIONS

New Registered Devices			
HART	Honeywell Process Solutions	Level Transmitter	SLG700
HART	Isoil Industria S.p.A.	Flow Transmitter	MV110-MV210
HART	Isoil-Hemina	Flow Transmitter	MV110-MV210
HART	KOSO	Valve Positioner	KGP5000
HART	KOSO	Valve	KGP5000
HART	Koso Engineering Co. Ltd.	Actuator	KOSO_5400LA
FOUNDATION Fieldbus	Krohne Messtechnik	Differential Pressure Transmitter	OPTIBAR 7060
HART	Krohne Messtechnik GmbH	Coriolis Mass Flowmeter	MFC400S
HART	Krohne Messtechnik GmbH	Level Transmitter	OPTIWAVE x400/x500
HART	LIMACO	Level Transmitter	ULM
FOUNDATION Fieldbus	Magnetrol	Non-Contact Radar Level Transmitter	Model R86
HART	Magnetrol	Level Transmitter	Model R86 Pulsar® Pulse Burst Radar Level Transmitter
HART	Mettler-Toledo AG	Analytical	M400 2XH Cond Ind
HART	Mettler-Toledo AG	Analytical	M400 4-wire
WirelessHART	Microcyber Corporation	Wireless Development Tool	M1100S DEV-WH-X
HART	MTS Systems Corp.	Level Transmitter	LP-Series
HART	MTS Systems Corp.	Level Transmitter	LP-Series
HART	Nivo Controls Pvt. Ltd.	Flow Transmitter	MFI 860 NivoMag
HART	Oval Corporation	Flow Transmitter	ALTImass2
HART	Pentair Valves & Controls	Valve Positioner	AVID-T
FOUNDATION Fieldbus	Pepperl+Fuchs GmbH	Multi-Input / Output Device	DO-MIO-Ex12.FF
FOUNDATION Fieldbus	Phoenix Contact	Modbus to Foundation Fieldbus Gateway	GW PL FF/MODBUS
FOUNDATION Fieldbus	Phoenix Contact	Zone 1 Isolated Block Couplers	FB-8SP ISO / FB-12SP ISO
HART	Power-Genex Ltd.	Valve Positioner	SS235
HART	Private JSC Manometr-Kharkiv	Gas Detector	Safir
HART	RIKEN KEIKI	Analytical	GD-88
HART	rittmeyer instrumentation	Analytical	MGAH.360.x
HART	Rosemount	Magnetic Flowmeter	8712EM/8732EM HR7
HART	Samson	Electropneumatic Positioner	TROVIS SAFE 3793
HART	Samson AG	Temperature Transmitter	TROVIS 3793
HART	Schneider Electric/Eckardt	Valve Positioner	SRD998
HART	Schneider Electric/Foxboro	Temperature Transmitter	RTT15
HART	Schneider Electric/Foxboro	Temperature Transmitter	RTT15S
HART	Schneider Electric/Foxboro	Flow Transmitter	CFT51
HART	Schneider Electric/Foxboro	Pressure Transmitter	I/A Pressure S
HART	Shanghai Yinuo	Mass Flow	Mass flowmeter
HART	Siemens AG	Actuator	SIPART PS2
HART	Sierra Monitor Corporation	Gas Detector	IT Series
FOUNDATION Fieldbus	Softing AG	Linking Device	FG-200 HSE/FF Modbus
HART	SWAN Analytical Instruments	ph/Redox Transmitter	AMI pH/Redox
HART	Texas Instruments	Simulated Sensor	DAC8730
FOUNDATION Fieldbus	V.Automat & Instruments Pvt. Ltd.	Level Transmitter	401E-1
HART	Val Controls A/S	Intelligent Diagnostic Controller	IDC24
FOUNDATION Fieldbus	VEGA Grieshaber KG	Differential Pressure Transmitter	VEGADIF 85
HART	WIKA Alexander Wiegand SE & Co. KG	Pressure Transmitter	LF-LW-1
HART	WISE Sensing Inc.	Gas Detector	GT(X)-1100
HART	WISE Sensing Inc.	Analytical	GT(X)-1100
FOUNDATION Fieldbus	Yokogawa Electric Corporation	Temperature Transmitter	YTA610
HART	Yokogawa Electric Corporation	Temperature Transmitter	YTA610
HART	Young Tech Co. Ltd.	Valve Positioner	YT-3300
HART	Young Tech Co. Ltd.	Valve Positioner	YT-3400
HART	Young Tech Co. Ltd.	Level Transmitter	SPTM

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Fluid Components Intl. www.fluidcomponents.com

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YTA710 temperature transmitter is highly accurate. The sensor input can be choice of single or dual inputs. This input can accept thermocouple, RTD, ohms or DC millivolt inputs and converts it to 4-20 mA DC with HART 7 or Foundation Fieldbus signal for transmission. HART type is certified as complying with SIL 2 for safety requirements.



Yokogawa Electric Corporation
www.yokogawa.com/solutions/products-platforms/field-instruments/

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Microcyber's A1110 adapters connect 4-20 mA, HART and Modbus devices to WirelessHART, supporting loop, external power and battery. Using Microcyber WirelessHART technology to transmit additional HART information such as process and diagnostics data to host system is reliable, secure, flexible and smart.



Microcyber Corp.
www.microcyber.cn/industrialwireless/



Calendar

For up-to-date information, see "Events" on www.fieldcommgroup.org

Rockwell Automation Process Solutions User Group

Houston, TX, USA
November 13-14,
2017

ARC Industry Forum

Orlando, FL, USA
February 12-15, 2018

HART Fundamentals

Bangalore, India
February 12-13, 2018

Device Integration (EDD and FDI)

Bangalore, India
February 14-16, 2018

FieldComm Group Working Group Meeting

Bangalore, India
February 19-23, 2018

HART Fundamentals

Germany
April 9-10, 2018

Device Integration (EDD and FDI)

Germany
April 11-13, 2018

HART Fundamentals

Austin, TX, USA
April 23-24, 2018

Device Integration (EDD and FDI)

Austin, TX, USA
April 25-27, 2018

Advanced principles of FOUNDATION Fieldbus

Germany
May 15-17, 2018

Advanced principles of FOUNDATION Fieldbus

Austin, TX, USA
June 5-7, 2018

FIELDCOMM GROUP CURRENT COURSE OFFERINGS

Introduction to HART Protocol

Available Q1 2018, this self-paced, e-learning workshop covers the basics of HART communication protocol, as well as an overview of the HART market and technology.

HART Fundamentals and QA Testing Workshop

This workshop is an intensive two-day course covering all aspects of HART communication protocol. You will gain the information needed to develop new HART-enabled products, support existing products and design systems that utilize HART technology.

Device Integration - Writing EDD and FDI Package Workshop

An intensive three-day course where developers learn the step-by-step process for building a Device Description for a HART- or FOUNDATION Fieldbus-enabled device based on Electronic Device Description Language (IEC 61804-3, EDDL) for use across all DD-enabled host platforms.

Introduction to FOUNDATION Fieldbus

Available Q1 2018, this self-paced, e-learning course for developers, end users, marketing professionals and applications engineers assumes little or no prior knowledge of FOUNDATION Fieldbus, but students should be familiar with process control. Students will learn the basic concepts and terminology related to the FOUNDATION Fieldbus integrated architecture and gain a working knowledge of the technical foundation upon which the technology is built.

Advanced Principles of FOUNDATION Fieldbus

This workshop is an intensive three-day course covering all aspects of the FOUNDATION Fieldbus protocol. Students will learn the skills required to develop new FOUNDATION Fieldbus products, support existing products and design systems utilizing FOUNDATION Fieldbus technology.

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ONLINE COURSE
with Completion Certificate

FIELDCOMM GROUP
Connecting the World of
Process Automation

ENLIST AT go.fieldcommgroup.org/wirelesshart-bootcamp

Vibration monitoring

HART-enabled field configurable vibration sensor

- Digital & optimized for process control
- Three user configurable bands
- Integrates with existing controllers



Your Pathway to the IIoT



FDI - THE BETTER WAY OF FIELD DEVICE INTEGRATION

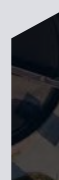
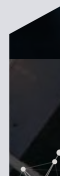
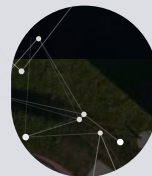
FDI unifies device drivers, configuration tools, diagnostics and documentation regardless of operating system with an independent and downloadable software package compatible with any FDI registered host system.

INDUSTRY WIDE SUPPORT AND INTEGRATION

Endorsed by leading end user groups like NAMUR and supported by all major automation system technologies including FOUNDATION Fieldbus, HART, PROFIBUS and OPC, FDI is making it easier for automation suppliers to develop and integrate intelligent devices.

FUTURE-PROOF INSTRUMENTATION INTEGRATION

Jointly developed over 5 years by the world's largest Distributed Control Systems suppliers – ABB, Endress+Hauser, Emerson, Honeywell, Invensys, Siemens, and Yokogawa – FDI is revolutionizing field device integration technology and best practices.



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FieldComm Group is a global organization with a mission to develop, manage and promote process automation standards. Learn more at fieldcommgroup.org