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OCTOBER 2020

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TED MASTERS
President & CEO,
FieldComm Group

THIS YEAR'S CHALLENGE has been about conducting business as usual in highly unusual times. I am happy to report that FieldComm Group (FCG) has risen to the challenge. The efforts of our volunteers along with our dedicated staff have collaborated to build a FCG technology strategy that paves the way for user digitalization efforts. Check out the center spread in this supplement for a great visualization.

A few years back, we developed HART-IP to help provide a high-speed digital backhaul for the more than 50 million HART-enabled devices installed in your facilities. The industry is now working on technology that will bring secured, powered, two-wire, IP-enabled networking to HART-IP devices at the field level, truly enabling the world's most widely adopted process automation protocol for digitalization in the 21st century.

Ethernet-APL is the enabling technology for high speed networking to field devices It's only a physical layer, but its use with automation protocols like HART-IP or FCG's OPC UA-enabled Process Automation Device Information Model (PA-DIM) will enable a major change in the capabilities of process instruments. This combination enables an architecture that aligns with present day IT structured-data standards. The instrument itself can support PA-DIM or, as is the case with industry's installed base, PA-DIM can be mapped from a protocol like HART. In either case, integration is vastly simplified—helping to bridge the IT/OT gap.

It's highly gratifying to see end users fully embrace our technologies as has this year's Plant of the Year winner, Dow Chemical - Texas Operations. Starting in 2014, Dow began a program to bring intelligent asset management systems to their operation. In the ensuing period, while integrating tens of thousands of HART, FOUNDATION fieldbus and *Wireless*HART instruments across the largest chemical complex in the Western Hemisphere, Dow has saved tens of millions of dollars by boosting overall equipment effectiveness (OEE) and trimming instrumentation-related production losses by 80%. Finally, Dow is now embracing FDI as they have realized the benefits of the FDI Device Package, including readily accessible documentation and easy access to up-to-date configuration files and drivers.

All of these efforts are driven by the knowledge of our internal team and volunteers from member organizations. Our unique position as the leader in process automation communication standards allows us to continue to develop technology that advances the industry, while enabling integration with other system.

I hope you are as excited as I am about the technology direction of FieldComm Group as you learn more from the articles in this supplement. If you are not already involved, come join us!

Industry prepares for Ethernet to the field

Advanced physical layer poised to unify IT/OT architectures

It's been nearly 10 years since the process automation community first began investigating a protocol-neutral advanced physical layer (APL) that would extend Ethernet over the process industry's last mile—providing connectivity with broadly distributed, two-wire, loop-powered field instruments in potentially hazardous environments. Today, we've also reached the last mile in that decade-long journey to make high-performance field device connectivity a practical reality.

Referred to as Ethernet-APL, the technology was successfully tested in trials at BASF in 2019, and a multi-vendor prototype network was shown at last November 2019's NAMUR General Meeting. And at the ARC Advisory Group Forum in February 2020, ABB showed an implementation that effectively eliminated all gateways and protocol conversions from a level gauge all the way to a corporate network level (see sidebar, below). Automation suppliers are targeting ACHEMA 2021, to be held next June in Frankfurt, to show commercial products based on the standard.

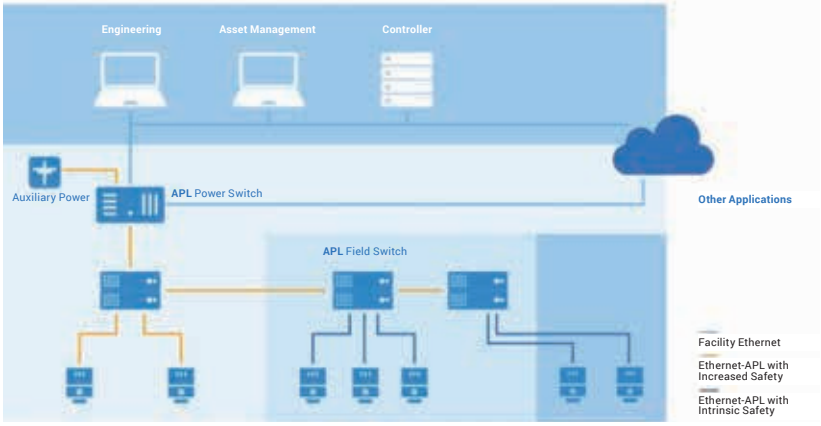
Ethernet-APL is a significant technical achievement in that it dramatically increases the

COMPLEMENTARY OPENNESS AT FIELD AND SYSTEM LEVELS

In many ways, the interoperability and openness promised by Ethernet-APL together with the OPC UA-based Process Automation Device Information Model (PA-DIM) at the field level complements the system-level efforts represented by the O-PAS standard from the Open Process Automation Forum (OPAF), Modular Type Package (MTP) concepts and the NAMUR Open Architecture (NOA) model. And at the ARC Advisory Group Forum, held in February, 2020, ABB showed a demonstration unit designed to illustrate just how these models can work together to provide an unprecedented level of openness and interoperability—from field devices up through process automation systems. In the physical demonstration, an ABB level gauge communicated via OPC UA over Ethernet-APL to a Phoenix Contact APL switch interfacing directly to an Ethernet-based O-PAS Connectivity Framework, or OCF, that included ABB programmable logic controllers (representing distributed control nodes, or DCNs controlling MTPs), local control panel and Virtual DCN. The demonstration also showed how this architecture could readily accommodate the MTP "Operational Orchestration System" communicating with multiple MTPs, that is, pre-automated modular process units designed to be easily added, arranged and adjusted according to production needs. This architecture also readily accommodates the NAMUR vision of a parallel path for non-control instrument data to other plant applications, such as for condition monitoring or asset manage-

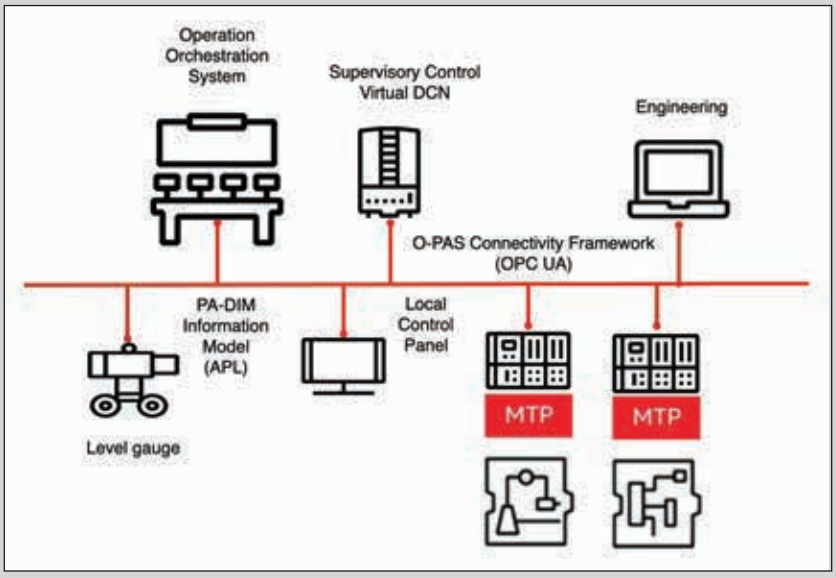
bandwidth available for digital instrument communications, as well as simplifies the network architecture in one fell swoop. At 10 Mbit/s, Ethernet-APL clocks in at more than 300 times faster than the fastest current fieldbus protocols. This means that transmitting 100 parameters to an instrument in the field takes mere seconds. And, since it's Ethernet, the standard effectively facilitates top-to-bottom cybersecurity and the use of other IT-native software tools, while eliminating the need for gateways or protocol conversion from the field device all the way to enterprise business systems and the cloud.

Significantly, the consortium developing Ethernet-APL counts among its supporters four of the process industry's key communications standards development organizations—FieldComm Group, Profibus & Profinet International (PI), ODVA and the OPC Foundation—as well as a dozen process automation companies that



APL BRINGS ETHERNET TO THE FIELD

Figure 1: Ethernet-APL dramatically increases digital bandwidth to field instruments in hazardous and non-hazardous areas.



ment. "We see APL as enabling the field device to take a more active role in an open process automation architecture," explains Luis Duran, global product line manager for safety, ABB, and Business Working Group representative to OPAF. "In this architecture, that level gauge could just as easily be a final control element," he adds.

together represent considerable clout in the global marketplace: ABB, Emerson, Endress+Hauser, Krohne, Pepperl+Fuchs, Phoenix Contact, Rockwell Automation, Samson, Siemens, Stahl, VEGA and Yokogawa.

FIELDCOMM GROUP AND ETHERNET-APL

As one of the three founding standards development organizations tasked with bringing Ethernet-APL to market, FieldComm Group has taken an active role in defining compliance and registration policies for devices that claim to support the standard.

Ethernet-APL represents a step change for instrumentation technology in that never before has a 10mBit/sec data pipe be available at the field level. And while HART-IP is an established technology in the infrastructure layer where *Wireless*HART gateways, and wired multiplexers can connect to Ethernet networks with HART-IP, the instrumentation layer represents the last mile of connectivity.

HART-IP enabled instruments represent perhaps the simplest path of migration to an Ethernet-APL network. The configuration software used by millions of technicians and engineers, remains the same. The asset management system software also remains the same. In other words, migration from HART instrument to HART-IP instruments, will be a low-risk, low-cost proposition.

To simplify development of HART-IP instruments, FieldComm Group offers a developer kit that includes communications hardware, a sample flow device application, and open source software for the HART-IP client and server software components. (Visit store.fieldcommgroup.org.)

AN SECURE ONRAMP TO DIGITAL TWINS

Even as the APL Project has been working to extend an IIoT-sized expressway to field instruments, work has progressed on complementary standards from the software and systems side of the world that are poised to take full advantage of that new bandwidth. Notable among these are FDI and the OPC UA-based Process Automation Device Information Model (PA-DIM)—which both promise to bring new order and value to the digital field.

"FDI and PA-DIM are all about making it easier for software systems throughout the enterprise to consume information provided by instruments," explains Paul Sereiko, director of marketing, and product strategy FieldComm Group. "Ethernet-APL is all about replacing gateways and remote I/O with Ethernet switches to facilitate the routing of the information from the device to the enterprise system. Ultimately, it's possible that the higher speeds enabled will lend themselves to feature enhancements for FDI and PA-DIM that further simplify device integrations."

"As a technology, FDI and PA-DIM are designed to help lower the bar for pulling information from field devices," adds Andy Kravitz, flow transmitter marketing manager and APL working group representative for Emerson. "Given that Ethernet-APL increases the bandwidth to individual devices, we expect the combination of all of these technologies will help drive customers to more fully utilize the capabilities of our devices more easily than ever before. This will enable field devices to easily integrate with every level of the process data ecosystem from the control system all the way to the cloud."

Ethernet-APL and PA-DIM in combination offer the possibility to access data from the field in a parallel communication path to the control integration, notes

Lukas Klausmann of Endress+Hauser. "This second-channel approach supports the concept of NAMUR Open Architecture (NOA) without influencing core automation processes," Klaussmann says. "This is the basis of plant-wide availability of data, and its easy interpretation without need for device-specific drivers. The possibilities of such digital services are numerous, and offer extensive support for optimization efforts and efficiency improvements in a process plant."

The fact that Ethernet-APL supports the full Ethernet stack means that all the additional features of the IEEE world are available to increase usability, says ABB's Merlin, citing Link Layer Discovery Protocol (LLDP), an out-of-the-box tool available once you're part of the Ethernet ecosystem.

"The general multi-protocol capability of Ethernet is far-reaching," Merlin says. "It makes the secure bridging between OT and IT world a lot easier. And due to universal applicability of OPC UA from field level to cloud, Ethernet-APL is a cornerstone to connect physical assets to their digital twins."

EXTENDED STANDARDS

Ethernet-APL is based on the IEEE's recently approved 802.3cg-2019 (10BASE-T1L) standard, which effectively extends the 802.3 Ethernet standard to include single-pair wiring over distances up to 1,000 meters with the optional provision of power to devices. Ethernet-APL is of particular importance to the process industries because its focus is on extending 10BASE-T1L for use in hazardous areas.

The IEC PT 60079-47 technical committee is working on a technical specification called Two-Wire Intrinsically Safe Ethernet (2-WISE) to fulfill the requirement of intrinsic safety for loop-powered and separately powered devices in hazardous areas up to Zone 0, 1 and 2/Division 1 and 2.

To make engineering and verification of intrinsically safe loops as simple as possible, 2-WISE is inspired by the same Ex-concept as the well-established Fieldbus Intrinsically Safe Concept (FISCO). This concept is supported by successful tests executed at Dekra Testing and Certification GmbH. The final specification (IEC TS 60079-47) is expected in 2021.

In addition, Ethernet-APL defines port profiles for multiple power levels for use both inside and outside of explosion hazardous areas to ensure interoperability of field switches and field devices. These Ethernet-APL port profiles define multiple, precisely defined power levels that are specifically tailored to the needs of process industries and replaces power delivery via Power over Data Lines (PoDL), which is optional within the 10BASE-T1L standard.

"Compliance with this power profile concept is crucial in order to avoid hardware variances for field devices that could be installed in hazardous as well as unclassified areas," notes Lukas Klausmann, senior marketing manager, Endress+Hauser Digital Solutions. So, devices for Ethernet-APL and for standard single-pair Ethernet (SPE) won't mix and match in the same system in part because the Ethernet-APL field devices being developed won't support PoDL functionality.

On the positive side, Ethernet-APL will deliver more intrinsically safe power to field instruments. "This will enable instrument vendors to design two-wire instruments that today require four wires due to high power demand," says Michael Kessler, executive vice president, components and technology, Pepperl+Fuchs.

Finally, to ensure standards conformance, the APL Project will specify Ethernet-APL conformance tests to be integrated into the appropriate specifications of the relevant standards development organizations. ●

Dow Texas Operations named Plant of the Year

Dramatic advances in operational reliability underpinned by FieldComm Group technologies

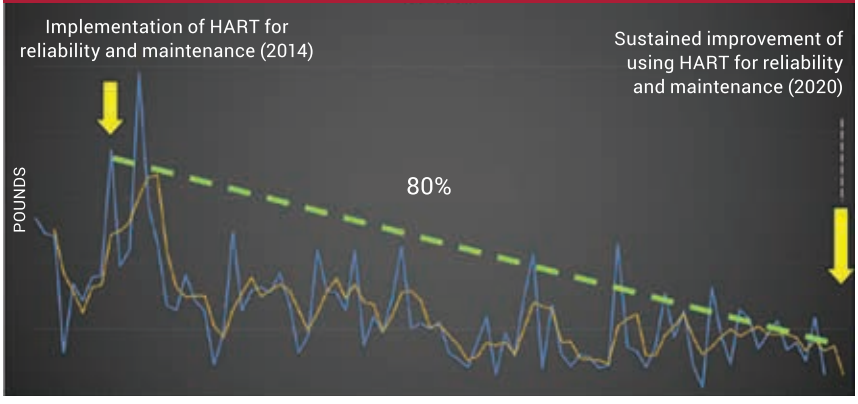
USING DATA TO make timelier, better informed decisions is a key tenet of digital transformation. And if one's seeking to understand the difference that data-based decision-making can make in process performance, one need look no further than Dow's Texas Operations (TXO), on the Gulf Coast in Freeport.

Over the past six years, integrated data flows from some 50,000 smart instruments have become central to the expansive site's reliability objectives, helping to save tens of millions of dollars by boosting overall equipment effectiveness (OEE) and trimming instrumentation-related production losses by 80% (Figure 1). These achievements, together with the organization's efforts to promulgate and sustain a culture of data-driven reliability at TXO—and across the rest of the global organization—have resulted in Dow-TXO being named the FieldComm Group Plant of the Year for 2020.

Dow-TXO is the largest integrated chemical complex in the Western Hemisphere. It comprises of four major facilities covering 20 square miles and includes more than 3,200 acres of waterways and pipeline corridors, 4,700 acres of reservoir operations and 9,500 acres used for grazing. The products manufactured here are transported by rail, truck, marine vessels and pipeline to customers around the world. The complex accounts for 30% of Dow's products sold in the United States.

While Dow-TXO standardized on HART smart instrumentation communications back in 2000, that investment really started to pay off in 2014 with the roll out of disciplined device

Reduction of Instrument Production Losses 2014-2020



RELIABILITY UP, LOSSES DOWN

Figure 1: Over the past six years, Dow's IAMS programs have achieved an 80% reduction in instrumentation-related production losses.

Representing the Dow Texas Operations team are (left to right) Rich Wells, vice president, Texas Operations; Ryan Powell, TES engineering director; John Thibodeaux, global improvement leader-instrumentation; and Josh Ruiz, maintenance manager, IE&A technical support. Also shown are Paul Sereiko, director of marketing, and Ted Masters, president & CEO, FieldComm Group.

integration reliability strategies and widespread implementation of a standardized Instrumented Asset Management System (IAMS) approach, according to Josh Ruiz, P.E., maintenance manager, reliability engineer and leader of this effort.

Using their IAMS, Dow-TXO has since commissioned/diagnosed more than 40,000 smart loops, achieving hundreds of thousands of dollars in cost savings. Dow also uses their IAMS to perform routine loop-checking and safety-instrumented-system (SIS) validation on more than 5,000 loops. It also leverages FieldComm Group's FDI architecture to streamline device integration efforts across the many varieties of smart instrumentation and device profile versions.

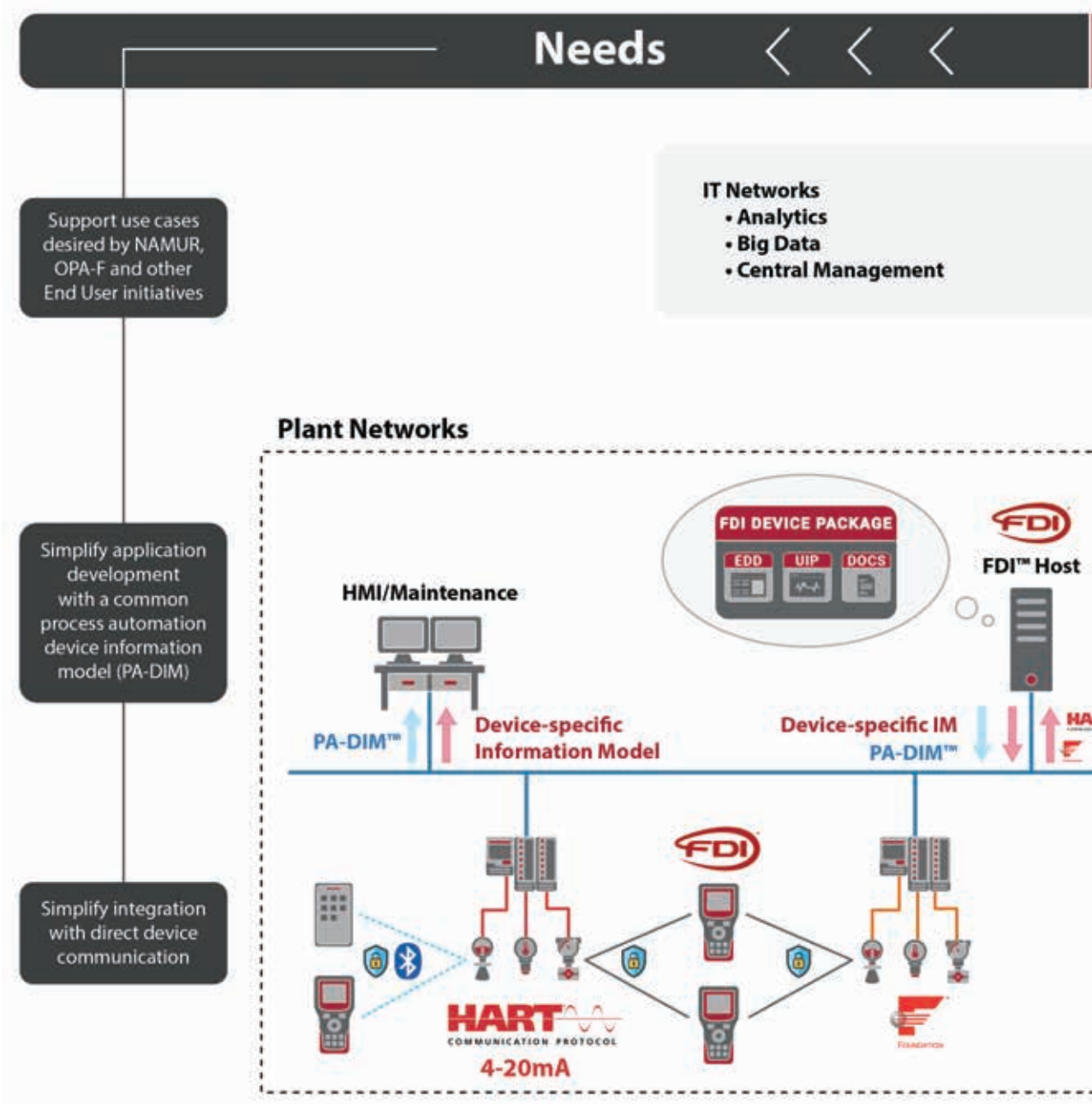
MOBILE DATA ACCESS

Dow is also transforming digital mobility by outfitting instrumentation and electrical personnel with HART-enabled tablets. The Dow I&E tablet, qualified for use in Class 1, Div. II hazardous environments, establishes HART communication locally with instruments then displays, logs and downloads the variables during proof tests and other diagnostic procedures. Harnessing mobile digitalization allows Dow-TXO to automate and document modern tasks, such as OSHA compliance, even on legacy analog distributed control system (DCS) installations.

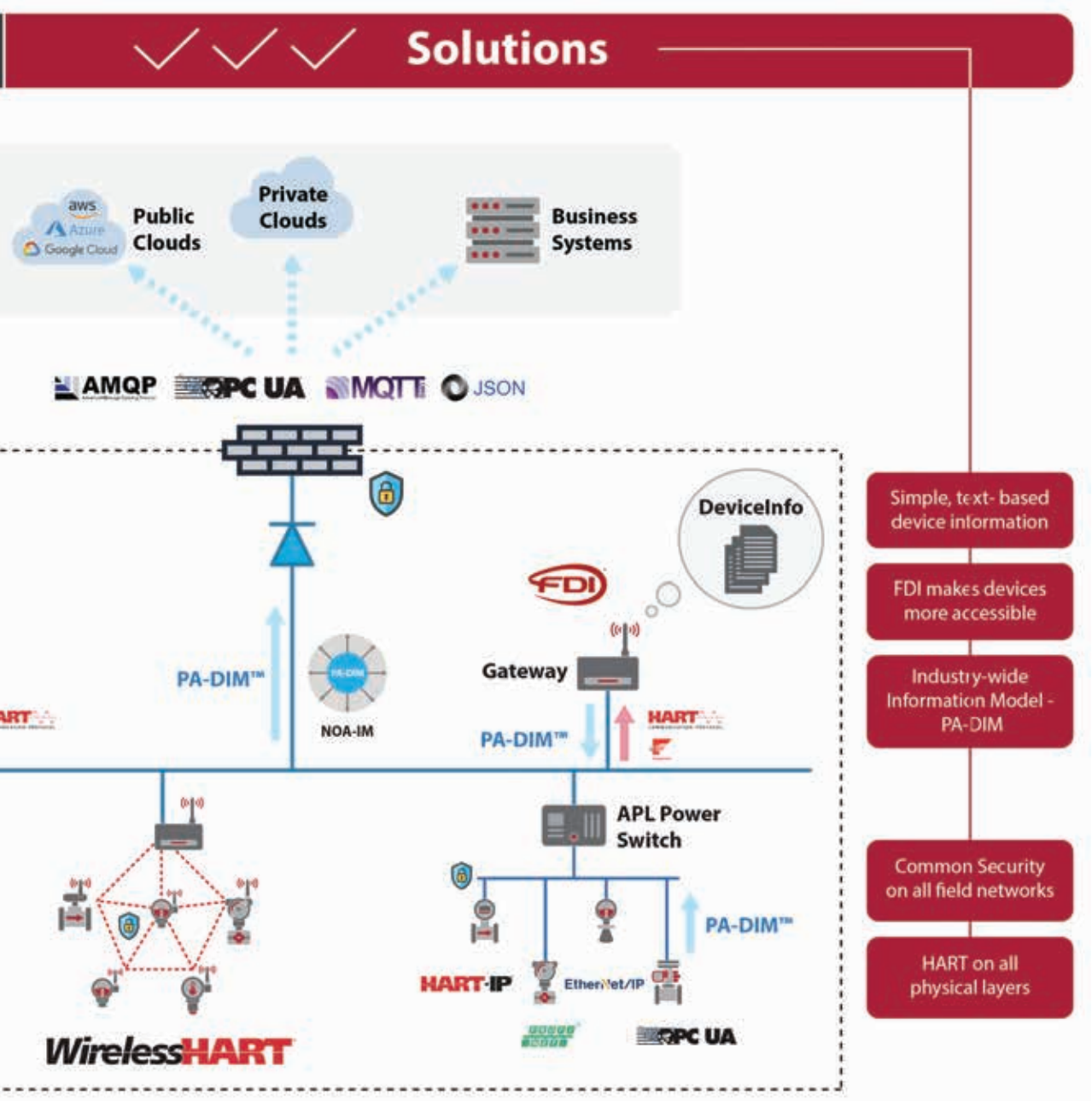
Dow-TXO also continuously monitors some 10,000 critical instruments remotely, alerting the company's subject matter experts to developing instrumentation issues and allowing manufacturing operations to continue safely and reliably. Dynamic dashboards flag any instruments that are in failure or out of

(continued on p14)

FieldComm Group Technologies Rapidly Evolving Process



Play a Critical Role in the Automation Ecosystem



(continued from p11)
specification, and one unit's IAMS installation even paid for itself in less than three weeks.

Today's I&E tablets for local troubleshooting as well as system-level diagnostics and remote monitoring capabilities have their roots in a data-driven, 2014 effort to systematically address repeat maintenance and production losses tied to instrumentation, Ruiz explains. Instruments found to be troublesome were studied via online and offline scans, meter verification, alert logs and echo curves. During commissioning phases of old and new equipment a baseline signature was captured for critically ranked instrumentation such as control valves, radar gauges and Coriolis flowmeters. "This data is now proactively used to determine control valve health and to detect coatings on stilling wells and fouling of Coriolis tubes. "Validating that HART data was beneficial allowed us to invest in more IAMS software and hardware, including wireless, HART multiplexers and I&E tablets," Ruiz says.

Other productivity-boosting success stories achieved with the Dow-TXO approach to IAMS include:

- A digital control valve flagged as not stroking properly. Control Valve Software diagnosed the actuator diaphragm was leaking and the root cause.
- Twelve flowmeters were written up as failed during field testing during unit commissioning. The equipment was

scheduled for expedited and costly replacement so as not to delay start-up. Using the Dow I&E tablets for diagnosing, the twelve flowmeters had confirmed problems ranging from bad linearization, plugged Coriolis tubes to failed electronics. The tablets were able to resolve the issue and avoid spending any additional money to get the unit operational.

- A valve's HART positioner online data scans revealed DCS pulsing and the actuator spring range to be inadequate. Correcting the problems headed off poor process control performance and premature valve wear.
- A steam conditioning control valve was found to be providing inadequate blending of steam and water. The IAMS diagnosed and identified a worn plug, packing issue and high heat on the positioner, allowing for an expedited custom repair and start-up without any loss of production time.
- Smart meter verification on magmeters and Coriolis flowmeters has allowed Dow-TXO to optimize maintenance costs. *In situ* verification of proper instrument operation often justifies not removing a meter for calibration or other maintenance activities, increasing overall reliability and reducing costs. *In situ* testing also flagged an inaccurate

Coriolis meter that was removed and fixed.

- The nearly 1,000 FOUNDATION fieldbus instruments that monitor furnace coils on one unit use Venturi flowmeter variables to forecast plugging, driving timely alerts for maintenance.
- *Wireless*HART replaced hardwired infrastructure in poor condition due to corroded conduit and wiring. Chosen for easy implementation, high reliability and significant cost savings, the bill for *Wireless*HART was only $20,000 vs. $250,000 for replacement conduit and hardwiring.
- Fifteen *Wireless*HART position monitors enable control room operators to confirm manual block-valve position resulting in over $300,000 savings (production loss avoidance, valve automation, DCS install) for a $35,000 investment cost.

SCALABLE, SUSTAINABLE

Following on proven IAMS success at Texas Operations, Dow has standardized on IAMS across their global facilities, both greenfield and brownfield re-automation projects. Dow's standards now require automation project scope to include IAMS equipment, services and plant personnel training. Dow has created sustainability goals which incorporate value cases, cybersecurity reviews, management-of-change (MOC) processes and competency training—all with the aim of supporting the IAMS program as an evergreen initiative across the entire global organization.

"The next priority is sustainability," says Dow's Ruiz. "Through the combination of our reliability program and IAMS, Dow has accomplished an 80% reduction in losses by continually challenging to improve year over year." Sustainability plans ensure the IAMS initiative is widespread, and used in every project.

Mobile solutions also are central to the company's long-term vision, to bring experts closer to the equipment.

"As a global company, leveraging our internal global experts through the use of the Internet-connected I&E tablet has optimized diagnosing and fixing of instrument and electrical equipment," Ruiz adds. "The ability to collaborate with internal experts and share visual information by way of a camera-equipped tablet takes us from practicing innovation to leading it."

Best Practices in Six Dimensions

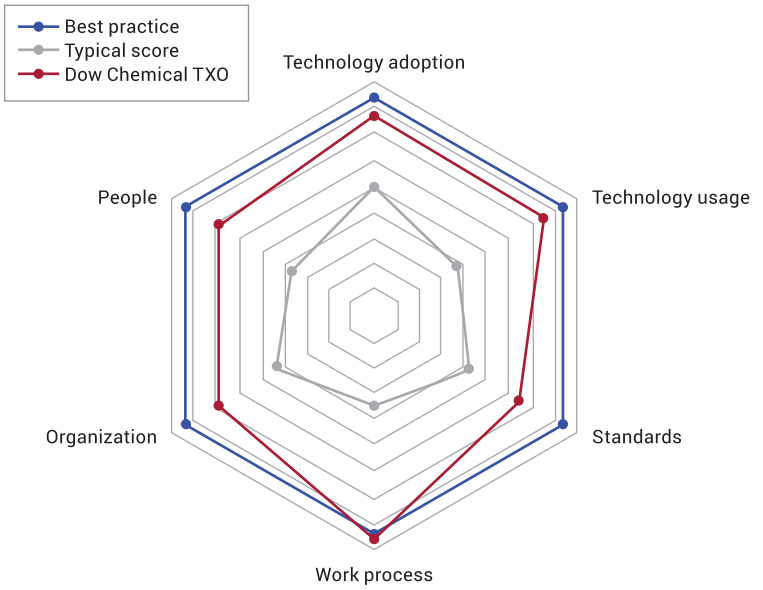


Figure 2: According to FieldComm Group's Intelligent Device Maturity Index, Dow-TXO is pushing the envelope of best practices when it comes to leveraging the capabilities of digital field devices. (For more information on assessing your own organization's Intelligent Device Maturity, see sidebar on p22.)

Users to make room for transformative tech

Industry is drawn to Ethernet-APL's higher bandwidth as well as the promise of a unified protocol and data model from device to the cloud

WHILE THE MIX of field communication technologies deployed in the process industries has changed little over the past two decades, recent end-user workshops and surveys conducted by the FieldComm Group and *Control* suggest that may be about to change. Many end-user organizations see the potential benefits of emerging digital transformation technologies such as Ethernet-APL and a common plant-floor-to-cloud software information model for process automation instruments and systems. And they're willing to give them a try.

TECHNOLOGIES LIKELY TO BE USED IN A NEW PLANT	
1. 4-20mA + HART	60.4%
2. EtherNet/IP (deterministic)	49.3%
3. WirelessHART	38.2%
4. FOUNDATION	20.1%
5. Ethernet-based (non-deterministic)	20.1%
6. Ethernet-APL (two-wire, intrinsically safe capable)	18.1%
7. Profibus PA	16.7%
8. Other wireless	15.3%
9. Other digital protocol	13.9%
10. Analog only	13.9%

Figure 1. When asked "Which of the following field instrumentation technologies would you be most likely to use in a new plant? (Please check all that apply)," Control readers indicated a diverse mix of technologies including Ethernet-APL, which is slated to see first commercial implementations in 2021.

Indeed, while 18% of *Control* readers from across the process industries list Ethernet-APL—the new two-wire, loop-powered Ethernet standard that accommodates intrinsic safety—as a technology "likely to be used in a new plant," it ranked number five among other options listed, including perennial front runner 4-20mA + HART (Figure 1).

Meanwhile, workshop conversations conducted by FieldComm Group representatives in late 2019 with oil & gas industry users in the Middle East and Asia confirm continued support for trusted fieldbus and 4-20mA + HART technology for safety and control applications, relegating likely Ethernet-APL usage to non-critical monitoring applications—at least for starters. Development of personnel skills as well as security (how?) and reliability (unproven) were cited as key concerns to be addressed prior to broader adoption.

CURRENT OPTIONS STILL IMPORTANT

Clearly, part of users' reticence toward embracing new field communications technology is a certain level of satisfaction with the current status quo. 4-20mA + HART and FOUNDATION fieldbus do what they were designed to do, and they do those tasks well.

Chief among the reasons cited by users to continue using traditional technologies such as 4-20mA + HART and FOUNDATION fieldbus is that they

DEVICE INTEGRATION STILL A CHALLENGE	
1. Legacy platforms limit direct protocol integration	51.4%
2. Training and education of staff	50.7%
3. Installing and dealing with device drivers and their revisions	41.5%
4. Need proficiency in multiple protocols, i.e. Modbus mapping	38.7%
5. Cost and installation of required interface devices, i.e., multiplexers or remote I/O	31.7%
6. Access and availability of the right tools or privileges	24.6%
7. User interface hard to use or risky to the operation	21.1%
8. Available network options do not meet our needs	19.0%

Figure 2. Despite professing overall satisfaction with current field communication options, device integration remains a challenge for many. Here, a ranking of key challenges by Control readers.

are well understood (require no new training) and are reliable and flexible, including backwards compatibility and interoperability with other equipment. These sunk investments—in intellectual property as well as installed base of systems and instruments—guarantee the continued use of current technologies for years to come.

But underutilization of HART instrument data beyond the process variable has long been a widespread complaint and opportunity. Over the past several years, *Control*'s reader surveys

have shown a stable two-thirds of users to have advanced beyond using HART data only during instrument commissioning or calibration and are using it for other purposes such as device diagnostics and conditioning monitoring. But that access is hard won, and FieldComm Group workshop participants indicate there is yet valuable data in their instruments that they are not using effectively. Users also indicate that getting the information from the device to the desired consumer of that information both inefficient and challenging.

SINGLE INFORMATION MODEL APPEALS

For example, while many end users indicate overall satisfaction with current instrumentation communication options, a full 75% of users paradoxically indicate that using devices from multiple vendors in the same system is "challenging" or "very challenging." Major obstacles identified by process automation professionals in Control's latest survey range from legacy systems with functionality limitations to the challenge of managing diverse device drivers and versions (Figure 2). So, apparently there's still some work to be done on this front.

The FieldComm Group's focus group discussions concluded that Ethernet-APL in conjunction with the OPC UA Process Automation Device Information Model (PA-DIM) was much more attractive to users than Ethernet-APL alone, which standardizes only the physical layer for field communications.

The dramatically simplified integration that Ethernet-APL/PA-DIM affords is important to end users during all phases of a plant's lifecycle. It also promises to improve the utility of operational technology maintenance and diagnostic software tools, which users recognize to be deficient to those available in the IT world. Further, higher bandwidth communications afforded by Ethernet-APL is especially important during instrument commissioning, end users note, but is important for more efficient maintenance and timely operational response as well.

All in all, the FieldComm Group workshops revealed that end users are much more willing to consider new technologies than expected. Conversations indicated strong realization that digital transformation is coming and change is mandatory.

There is, however, great concern about workforce knowledge gaps between current technology and new technology. A key impediment in adoption will be the ability of end users to build the skillset within their workforce that will be required to deploy and take advantage of digital technology.

Security will be a key component in any decision to adopt new technology. Specifically, users recognize their own knowledge gaps about security, and feel that vendors are also not as well informed about security as they would like them to be. Before any new technology is adopted, proof of security will be required. ●

Transitioning to an all-digital field

Far from throwing a switch, industry's adoption will unfold over time

AS WITH ANY new technology intended to replace trusted, serviceable technologies and entrenched work practices, the adoption of Ethernet-APL—especially for brownfield facilities—will take time to gather momentum, even with the most compelling of value propositions.

Indeed, despite the commercial availability of fully digital, intrinsically safe field communication options for more than two decades now, the majority of process instruments currently installed still communicate their process variables via an analog, 4-20mA electronic signal officially standardized back in the 1970s. A just completed survey of *Control* readers indicates that in the typical process plant a full 70% of installed instruments rely on such analog loops, although many benefit from a bidirectional communication boost offered by HART, a 1980s-era digital protocol superimposed atop the analog, 4-20mA signal.

"We don't believe that end users with FOUNDATION fieldbus or Profibus PA installations will start ripping out field instruments to install Ethernet-APL," says Paul Sereiko, director of marketing at FieldComm Group, referring to users of the process industries' first-generation digital field protocols. "We doubt a refinery unit will consider upgrading until their existing assets are at end of life. Early adopters are much more likely in more flexible process applications, such as life sciences, and food and beverage." And for plants with sunk costs in analog instruments, I/O modules—and personnel comfortable with using them—wholesale conversion is a tough sell for them as well.

BROWNFIELD INROADS

Instead, the first incremental applications of Ethernet-APL within existing facilities are likely to be in the realm of monitoring and diagnostics, rather than for control or safety applications. Analytics-driven algorithms that rely on instrumentation data beyond the process variable are one arena where the higher speed of Ethernet-APL communications will prove particularly useful, according to Stefan Bollmeyer, R&D technology manager for fieldbus and I/O, ABB Measurement & Analytics. "Occasional diagnostics are fine, but if time-synchronous data beyond the process variable is needed, that's where 4-20mA + HART sees its limits."

For those plants seeking to perform primarily asset monitoring tasks with existing instrumentation, a best first step would be to take advantage of currently available technology—that is, adding HART multiplexers to the I/O, then using an FDI server to covert that data into OPC UA/PA-DIM for consistent communication with other enterprise systems. Then, for situations where the performance of Ethernet-APL devices is desired, simplify connectivity by adding your APL field switches to a pre-existing Ethernet I/O network. "You can mix Ethernet-based I/O with APL switches on the same network," Bollmeyer explains.

RECENT FIELDCOMM GROUP TECHNOLOGY REGISTRATIONS

Testing and registration is key to interoperability and ensures specific devices and systems conform to the same standard. FieldComm Group is one of the only automation industry organizations with a registration program requiring mandatory testing of critical elements of its technologies. Today, FieldComm Group's testing and registration effort encompasses FDI, FOUNDATION and HART host systems and field devices, as well as physical layer components such as power supplies, cables, and device couplers. One of the founding principles of FieldComm Group is the support of interoperability—the ability to operate multiple devices from multiple manufacturers, in the same system, without loss of functionality.

Products bearing the FOUNDATION or HART Product Registration symbols have undergone a series of common tests administered by FieldComm Group. End users can select the best device for a specific measurement or control task and know that device will provide a consistent level of functionality and interoperability regardless of the host system or other devices used. Testing and registration enables a user to achieve the best return on their investment. FDI-enabled products further ensure that products can be integrated in a consistent and familiar way across varying systems—thus enabling enterprise-wide support and data access to operate more effectively.

Nearly 100 registrations of products ranging from actuators to temperature transmitters were completed between July 16, 2019 and September 1, 2020.

For a listing of these recently registered products,
visit www.controlglobal.com/assets/FieldCommRegistrations2020.pdf.
For a complete list of all registered hosts and devices,
visit the Product Testing and Registration section of www.fieldcommgroup.org.

"Then, you can talk directly to your APL devices, and save the extra engineering in between."

Once confidence has been gained in Ethernet-APL's use in monitoring applications, one may choose to start wiring new devices to this infrastructure instead of expanding traditional I/O, ultimately swapping out existing I/O in favor of Ethernet-APL. On the positive side, you should be able to tap into your host system using whatever Ethernet-based protocol it already supports. "The availability of existing protocols over APL on the host side will help speed adoption," Bollmeyer notes. "There are no prerequisites."

"Within a traditional fieldbus plant, Ethernet-APL will be a good choice for a new plant area, or possibly a major unit revamp where barriers and protectors can be swapped against APL switches," Bollmeyer adds. "In the second case, at least you shouldn't have to run new cables, since existing fieldbus cabling should support Ethernet-APL."

CHECK YOUR INTELLIGENT DEVICE MATURITY LEVEL

In order to help industry end users benchmark their use of intelligent devices and instrument asset management systems against best practices, FieldComm Group has developed an Intelligent Device Maturity Index. Answer a brief, confidential survey, and FieldComm Group subject matter experts will help you identify opportunities for improvement, and what steps can help move your facility to a desired future state. The survey is organized into four sections about you and your company, technology, standards and work processes and organization and people. Your individual responses will not be shared outside of the FieldComm Group organization, although aggregated responses may be shared for comparison purposes.

To see how you stack up, visit www.surveymonkey.co.uk/r/38VR3RG or use the accompanying QR code.

GUIDELINES FOR CABLE RE-USE

Speaking of cable re-use, Ethernet-APL requirements for IEC 61158 Type A shielded, twisted-pair cables are in line with established fieldbus practices, notes Andy Kravitz, flow transmitter marketing manager and APL working group representative for Emerson. "The APL working group is preparing a set of engineering guidelines to help users select the correct cabling for a given APL application," Kravitz says.

"As fieldbus cable has been designed for 31.25 kBit/second, but not all existing cable can be used for APL at the full cable length," adds Michael Kessler, executive vice president, components and technology, Pepperl+Fuchs. "Therefore, the APL port profile specification defines for different categories supporting spur/trunk cable length of 50m/250m, 100m/500m, 150m/750m and 200m/1,000m. Cable manufacturers have to specify their cable according to this classification."

TOWARD A UNIFIED ARCHITECTURE

Ethernet-APL vs. current fieldbus protocols doesn't have to be an all or nothing proposition, adds Michael Kessler of Pepperl+Fuchs. "Ethernet-APL switches have been demonstrated to provide Ethernet-APL spur interfaces with dual functionality, e.g., Profinet-APL and Profibus PA," Kessler says. "Theoretically, this is also feasible with a FOUNDATION fieldbus instrument where its data can be mapped on any Ethernet-based, real-time protocol. This dual-functionality is important to migrate existing plants to Ethernet-APL-based infrastructure. During the first years of market introduction of Ethernet-APL, existing FOUNDATION fieldbus or Profibus PA instruments may fill the gap of missing instrument functions with an Ethernet-APL interface."

Ultimately, Ethernet-APL is the key enabling technology to deploying OPC UA and PA-DIM in the field devices themselves, Kessler adds. "This will finally allow real plug-and-play since the device will come with an embedded information model—that means no need for any kind of device description. FDI, meanwhile, will allow the use of PA-DIM for legacy instruments. This will help with plants migrating from HART or fieldbus to Ethernet-APL."

WIRELESS PRESSURE RELIEF VALVE MONITORING APP

Emerson's Plantweb Insight Pressure Relief Valve application helps automate and eliminate the guess work for pressure relief valve (PRV) monitoring, making it easier to monitor valves and reduce preventable losses. The real-time app data enables users to proactively take corrective action and improve asset management, while ensuring regulatory compliance.

Emerson Automation Solutions
Emerson.com/Plantweb-Insight

NEW SMART ESD* DEVICE FOR SAFETY INSTRUMENTED SYSTEM

Azbil Corporation's Smart ESD Device 700 series (700SIS) is now available. Devices in this series act as the interface for an emergency shutdown valve in a safety instrumented system. They're compliant with the IEC61508 international standard for functional safety. The 700SIS has been certified for applications that require SIL (Safety Integrity Level) 3 according to IEC 61508. *ESD: Emergency Shut Down

Azbil
www.azbil.com/products/bi/iap/products/hfbs/index.html

HART-IP DEVELOPER KIT NOW AVAILABLE

FieldComm Group, the leading worldwide member organization for developers of process automation instrumentation and owner of the HART® Protocol announces the availability of a platform for HART-IP® enabled instruments - the new HART-IP Developer Kit. The kit is a great choice for anyone looking to start implementing HART-IP technology as a step towards digital transformation.

New HART-IP® Developer Kit

FieldComm Group
go.fieldcommgroup.org/devkit

NCS-TT106X TEMPERATURE MODULE

Microcyber's NCS-TT106x (HART/FF/PA) temperature module is a high performance fieldbus temperature transmitter with independent R&D communication controller. It supports multiple thermal resistances and thermocouples. Thermal resistance supports 2/3/4-wire connection mode, thermocouple can use cold end compensation function.

Microcyber Corporation
www.microcyber-fieldbus.com/product/temperature-transducer

ABB'S PXS100 PRESSURE TRANSMITTER

Discover the new pressure transmitter designed to deliver stable, and reliable performances. PxS100 features QR codes to increase efficiency and productivity of the customers by reducing the time needed in the field when something happens. ABB digitally enabled industry solutions are fine-tuned based on years of sector and customer insights.

ABB Inc.
www.abb.com/measurement

EVER WISH YOUR TEMPERATURE TRANSMITTERS COULD TALK?

Moore Industries smart HART dual input temperature transmitters "tell" you about impending sensor failure with features like Sensor Drift and Corrosion Detection. Bring predictive failure analysis right to the field.

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www.miinet.com/HART-Temperature

FIELDCOMM GROUP™

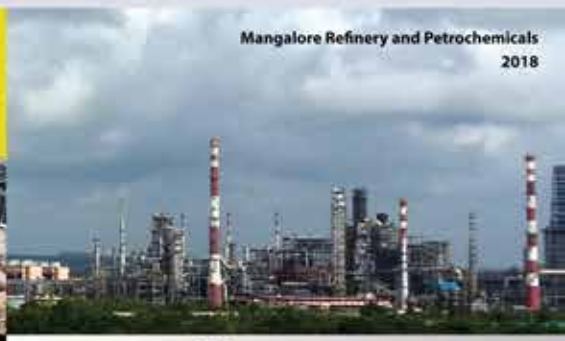
PLANT OF THE YEAR

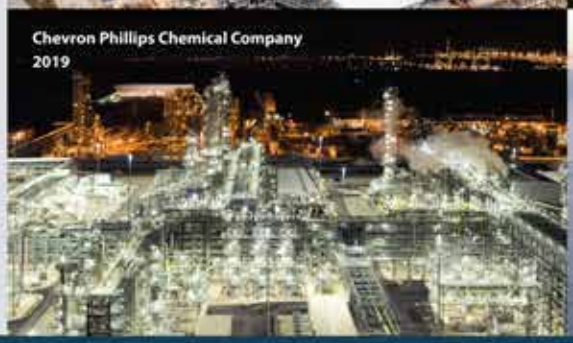
"We've completed a project that maximizes benefits of FieldComm Group technologies."

POWER UP WITH PLANT OF THE YEAR

FieldComm Group's Plant of the Year award is presented annually to end user companies to recognize exceptional or innovative use of FDI™, FOUNDATION™ Fieldbus and HART® technologies in real-time applications that improve operations, lower costs or increase availability. Details and nomination form are at go.fieldcommgroup.org/award.

WALK AMONG GIANTS!





NOMINATE YOUR PLANT TODAY!