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Highlights of the 2016 Emerson
Global Users Exchange

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by the Editors of
Control



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EMERSON BRINGS CERTAINTY TO OPERATIONS

New Automation Solutions unit seeks to elevate customer performance to Top Quartile.

Paul Studebaker

Austin is the live music capital of the world, home of the U.S. Grand Prix, and headquarters of Emerson's Systems and Solutions business, so it's the perfect place for company management to kick off the 2016 Emerson Global Users Exchange. "Time here is well spent getting fresh ideas, making good connections, finding the energy and urgency to solve tough problems and work with rapid technology change," said Steve Sonnenberg, chairman, Emerson Automation Solutions.

2016 has been a difficult year for industry. Low energy prices have affected oil and gas, and despite low feedstock costs, refining and chemical industries have been affected by low demand. "One bright spot is life sciences, where we've seen growth and investment," Sonnenberg said. "At Emerson, our philosophy is to never let a challenge be wasted—in slow times, do things to make things better when the economics turn around."

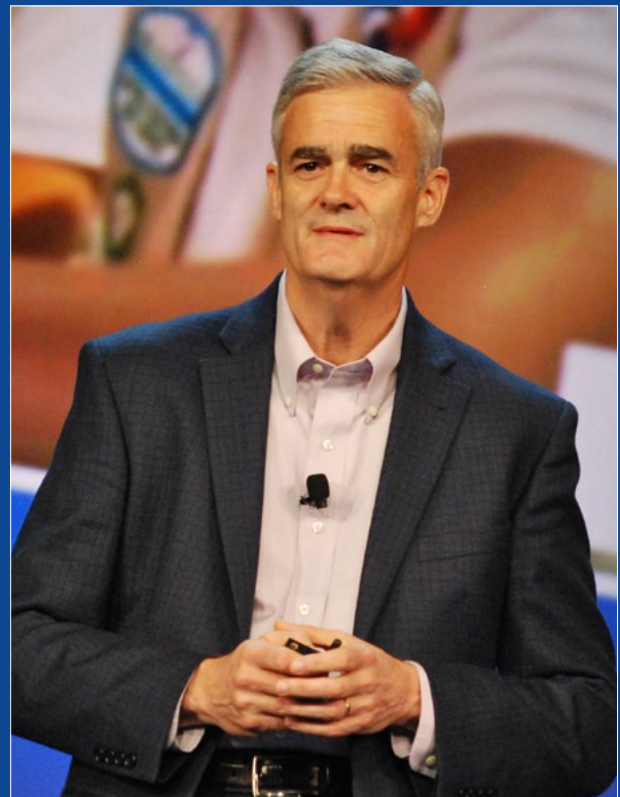
Emerson has transformed its internal structure to focus on two business platforms, combining its Emerson Process Management and Industrial Automation businesses into one: Emerson Automation Solutions. "We're continuing the same sales, support, engineering and services as in the past, and now we can better address life sciences, food and beverage, and packaging industries," Sonnenberg said. "We're working harder to be a trusted partner."

Emerson also has made strategic acquisitions including Pentair Valves and Controls. "This adds pressure management, isolation valves and controls, and gives us the most complete valve offerings and services in the world." Other

recent acquisitions include Permasense (wireless corrosion monitoring) and FMC (blending and transfer).

"In my new role as chairman, I get to decide exactly what I work on," Sonnenberg said. Along with examining potential acquisitions, he's been visiting customers around the world, "seeing their passions and concerns," he said, to help the company continue "earning trust, listening, and being your problem solver."

Sonnenberg's former role is being filled by Michael Train, executive president, Emerson Automation Solutions, who, along with experience as president, global sales;



"By helping customers leverage the best practices and strategies of Top Quartile performers, Emerson is able to help customers improve their earnings as much as 15%."
Michael Train, executive president, Emerson Automation Solutions.

president, analytic group; president, Asia Pacific; and playing Elwood at the Emerson Exchange music jams, speaks Japanese, and enjoys working on 1960s muscle cars.

"In the fall of 2008, Steve took over from John Berra, who presided during the first digital transformation and redefinition of automation systems," Train said. "Steve focused on customer service, listening, partnering and advising, and brought faster delivery and more efficient engineering services.

He expanded our offerings to the industry's most complete, allowing us to win and succeed in complex projects such as Shell Prelude and BP Whiting."

Certainty opportunities

At last year's Exchange, Emerson introduced the concept of Top Quartile Performance, a management-focused initiative to identify how top producers perform. It introduced levers--incremental improvements in products, engineering and services that result in big improvements in performance—and announced Project Certainty, a system of products, engineering, and services to improve success of large, complex projects.

Top Quartile is defined as achieving operations and capital performance in the top 25% of peer companies. "Compared to a fourth-quartile company, a top-quartile company spends less than half the cost and needs half the time to execute a project," Train said.

Now, Emerson is taking the concept into operations. "Many companies have had OpEx programs for years. They're good, but not good enough," Train said. "The pressure to meet KPIs has never been higher. Many companies feel they need to be in the top quartile just to survive."

Top-quartile companies recognize safety, reliability, productivity and energy/emissions as "the four horsemen of OpEx," Train said. Improvements in these areas could save industry significantly since "approximately one trillion dollars in company value is lost every year to suboptimal operating performance."

For example, compared to industry averages, top-quartile companies have "three times fewer recordable safety incidents," Train said. They spend half as much on maintenance, with 4% higher uptime. Their operating costs are 20% lower, they emit 30% less greenhouse

gases, and consume 15% less energy.

"By helping customers leverage the best practices and strategies of Top Quartile performers, Emerson is able to help customers improve their earnings as much as 15%," Train said.

Operational certainty

Despite years of operations improvement programs, many producers are increasingly disappointed with nominal improvements achieved. Due to limited peer benchmarking and uncertainty about which approaches will yield the greatest improvements, companies are trapped by decades-old work practices that fail to take advantage of advanced digital technologies, resulting in stagnant financial performance.

Recognizing this opportunity, this year, Emerson Automation Solutions announces Operational Certainty, a consulting practice plus expanded project execution methodologies and resources.

"Manufacturers are stuck in a 'grind it out' mindset, frozen in a paradox of needing dramatically better results yet being risk-averse to try new approaches," said Train. "Companies lack the confidence in knowing which investment option will move the needle on financial performance. Operational Certainty provides a clear roadmap."

With its industry expertise, consulting services, comprehensive automation technologies portfolio and new Industrial IoT solutions, Emerson is able to help customers extract greater value from their investments and deliver measureable results to the bottom line. Train said, "We know precisely what behaviors are delivering industry-leading performance and what is required for other companies to reach those levels."

To help customers establish path to Top Quartile performance, Emerson starts with Operational Certainty Workshops, consultant-led sessions that help them pinpoint causes of poor performance, prioritize actions that can yield the improvement and establish a scalable work plan for achieving those results.

"Emerson introduced Project Certainty at precisely the right time, when the industry was desperately seeking new ideas for improving capital projects," said Train. "We believe the same is now true for Operational Certainty."

EXXONMOBIL ROTTERDAM EXPANSION SAVES WITH EMERSON

Refinery streamlines project execution with main instrument vendor approach.

Jim Montague

It's good to get your ducks in a row, but, if you happen to be expanding ExxonMobil's Rotterdam Advanced Hydrocracker (RAHC), that's about a million ducks, so it might be good to get some help.

To streamline its project management and procurement process to help to mitigate risk and accelerate deployment on the \$1.2-billion brownfield project, ExxonMobil is using an innovative main instrument vendor (MIV) approach. This program relies on Emerson Automation Solutions to go well beyond the typical supplier role and participate in a global framework agreement with standardized parts and models, pre-fixed pricing structures, coordinated specification and procurement and verified testing and commissioning. The MIV also works closely with Fluor, which is the project's engineering and procurement construction (EPC) company. It handles engineer documents, loop diagrams and other essential tasks.

The RAHC expansion is presently in the detail engineering stage, and it is expected to begin construction late in 2017. It will expand Rotterdam's hydrocracker to upgrade heavier byproducts to lighter, higher-value products, such as EHC Group II base stacks and ultra-low-sulfur diesel. This expansion builds on recent, similar projects at ExxonMobil's facilities in Baytown, Texas, and Singapore, which produce EHC Group II.

Amit Verma, instrument group lead, safety and automated systems, ExxonMobil Research & Engineer-

ing, and Steve Newton, global account manager, Rosemount, Emerson Automation Solutions, presented "Top 10 ways ExxonMobil mitigated project risks on Rotterdam hydrocracker project" at the Emerson Global Users Exchange in Austin, Texas.

Instrumentation project risks

Before developing its MIV program, ExxonMobil faced an array of issues and risks that threatened to compli-



"It can be a struggle to get the right people on projects, but we and the EPC were also facing accelerated and compressed schedules, interfacing with many vendors." Amit Verma, ExxonMobil Research & Engineering on the Rotterdam expansion.

cate and delay its RAHC project. Verma reported these include accelerated project schedule, coordinating multiple instrument vendors, project management/vendor stewardship, resource limits, quality control, cost controls, process data quality, getting specification right the first time, managing change orders and construction and commissioning.

“It can be a struggle to get the right people on projects, but we and the EPC were also facing accelerated and compressed schedules, interfacing with many vendors,” said Verma. “There are just a lot of challenges on this project and additional risks caused by its accelerated schedule. These include added manpower needed for developing multiple specifications, increased engineering burden on the EPC and ExxonMobil, managing procurement and lead times and speeding up bid evaluations. However, the resources for coordinating and completing all these tasks are limited, and the risk is something may slip somewhere, increasing costs and delaying the schedule.”

Traditionally, ExxonMobil and its EPC used multiple vendors, which multiplied their project management, project execution and procurement interfaces. This made them all more complex; increased administrative liability for procurement, expeditors and engineers; led to ineffective order tracking; and required stewardship by multiple field contractors. “The more vendors we had, the thinner the resources we had to cover them, but we had to ensure adequate resources for us and the EPC without jeopardizing product quality and the schedule,” explained Verma. “So, we developed a technical readiness process and a global framework agreement, which standardizes equipment parts and models on an approved manufacturer list (AML), and sets up a pre-agreed/fixed pricing structure. We’re also striving to get more process performance data for devices right the first time to minimize change orders and costs.”

Settling on one MIV

To simplify supplier support with one-stop shopping, reduce configuration and calibration errors and manage multiple remaining vendors, ExxonMobil also ap-

pointed Emerson as its MIV, lead project manager and single point of contact for the RAHC expansion project. Consequently, Newton reported that Emerson hired its own dedicated project manager for the Rotterdam project, added offices at ExxonMobil, embedded more staff with its client and made sure its valve selection tool matched ExxonMobil’s tool. Besides project management, Emerson supplies not only its own products, but also brings in third-party devices in accordance with a predefined list from ExxonMobil.

“Being an MIV allows us to embed more experts with our EPC team and ExxonMobil, and so everyone was able to collaborate more quickly under one roof,” said Newton.

“This enabled more efficient project stewardship, and let us cut six or seven months off our schedule by combining instrumentation requirements into one package and removing former requirements for competitive bidding, which translated to more dollar savings,” added Verma. “This also allowed us to focus resources on technical selection, rather than bid evaluations, and reduce vendor interfaces, meetings and the EPC’s administrative project management burden. This was much easier than all the phone calls and emails we had before.”

“Besides coordinating testing documentation and logistics, having an MIV enabled more focused review meetings on process data with Intergraph’s SmartPlant Instrumentation (SPI) software for QA reviews,” added Verma. “It also allows deep dives by the MIV into control valve data and review cycles. This let us make sure process data was right, so the correct valves were selected before PO placement, and allow standardization across all valve orders. We also achieved standardization and approval during front-end engineering design (FEED) and further minimized change orders.

“Using the MIV format really took our relationship with Emerson one step further, and bringing Emerson’s project management expertise onboard further extended our efficiencies,” said Verma. “We’ll refine this model as we go forward, but we’re definitely going to do more of it in the future.”

PLANTWEB DIGITAL ECOSYSTEM TAKES USERS TO IIOT LAND

Emerson outlines its approach for realizing the Industrial Internet of Things.

Jim Montague

The travel brochure for the Industrial Internet of Things (IIoT) sure looks attractive—a paradise of connectivity and communications, delivering big data from all sectors, improved decision-making by users, and enabling new levels of efficiency, optimization, productivity and profit. Sounds great, but few process control users and their legacy applications have had the tools to reach the IIoT's sunny shores and take advantage of it, until now.

Like an airline opening a new and much-needed route, Emerson Automation Solutions announced Oct. 24 that it's leveraging decades of digital automation expertise to launch its expanded Plantweb digital ecosystem. Unveiled at a press conference on the first day of Emerson Global Users Exchange 2016 in Austin, Texas, the Plantweb digital ecosystem is a scalable portfolio of standards-based hardware, software, intelligent devices and services for securely implementing IIoT to help users achieve measurable performance improvement.

"We've been improving operations performance for many years, and many of today's efforts such as IIoT are built on older practices and technologies. In fact, process automation is a unique lever for connecting operations to business performance and its data, connectivity, analytics, expertise and mobility. That sounds a lot like IIoT, but we've already been doing it for awhile," said Peter Zornio, chief strategic officer, Emerson Automation Solutions. "In 1997, Emerson revolutionized the automation landscape with Plant-

web, the first field-based digital plant architecture. Now, we're doing it again by harnessing the power of IIoT to give customers the technology foundation for Operational Certainty."

Zornio added that the Plantweb digital ecosystem can help users participate in Emerson's recently launched Operational Certainty program, which provides a clear, scalable business case for investing in IIoT by targeting specific business challenges for achieving measurable success with limited effort or cost.



We're harnessing the power of IIoT to give customers the technology foundation for Operational Certainty."
Peter Zornio, chief strategic officer, Emerson Automation Solutions.

“We’ve heard from customers and industry analysts alike that there’s a paradox creating gridlock for customers today,” added Zornio. “Market volatility is driving a cautious, ‘grind it out’ mentality, yet company operating performance goals demand new, transformational thinking and action. Technology is offering a vast set of new options, yet customers are left wondering how and where to begin this digital transformation. Users know that IIoT can help access all kinds of devices and data, and it sounds great, but then they ask: ‘How can it apply to my processes and deliver real return on investment (ROI) to my business?’ They also don’t want another big IT initiative, and want to start small and get real, focused ROI. This is not a revolution; it’s an evolution.”

Emerson reports that its new expansion makes Plantweb the most comprehensive, integrated IIoT portfolio in the process industries. This will allow Plantweb users to use IIoT to expand digital intelligence to their entire manufacturing enterprise, while also providing an architecture for on-premise applications. Beyond secure process control, safety and asset management systems, the Plantweb digital ecosystem supports enterprise-wide operations with an expanded portfolio consisting of:

- Pervasive Sensing field instruments, including a new non-intrusive temperature sensor, as well as new sensing technologies for corrosion detection, medium-voltage electrical protection, and hazardous, gas-leak detection and others;
- Secure First Mile family of software, security devices, flexible servers, gateways, data diodes and services. It’s based on a set of architectural approaches and designs that allow users to selectively connect secure data from protected control and operation systems (OT) to operational performance applications in the cloud environment (IT). The portfolio gives experts immediate access to the information they need, whether it’s on premise, in a private company cloud network, or at a third-party service provider;
- Plantweb Insight software includes IT-friendly

applications with analytics for monitoring asset health. These applications can run independently of existing business systems and DCSs, and provide a simple, powerful entry point to IIoT. They’re ideal for proving an IIoT strategy and gaining business impact. Plantweb Insight can be deployed as a single asset class, and scale to a wide range of assets, each with low entry cost and simplified setup. Virtual machine-based deployment also makes Plantweb Insight a low-IT-requirement application;

- Plantweb Advisor software includes a robust suite of integrated, analytical, expert applications for asset health, performance modeling and facility-wide energy optimization. Its main applications—Health Advisor, Performance Advisor and Energy Advisor—are scalable to thousands of assets across multiple facilities for enterprise-wide equipment and energy analytics. These applications can also run at a user’s site, in a firm’s private cloud network, or on a third-party cloud service.
- Asset Management Suite (AMS) ARES includes an easily deployed software asset management platform, which aggregates asset health from multiple business systems, and pushes this data via desktops and mobile devices to relevant plant personnel, depending on their roles and responsibilities;
- Always Mobile gives mobile professionals secure, anywhere/anytime access to role-based tools, analytics and dashboards. The program extends the reach of Plantweb by adding mobility to the AMS and DeltaV process automation platforms. Its DeltaV Mobile application lets users securely and remotely monitor processes and receive notifications on user-selected process alarms. Its AMS Trex Device Communicator gives maintenance technicians a consumer-quality user experience in a rugged tool built to withstand harsh industrial environments to isolate and repair problems without interrupting production. Its AMS Asset

View persona-based alert system ensures that reliability personnel receive important and relevant alerts to ensure asset health;

- Connected Services are Microsoft-, cloud- and IIoT-enabled services that provide real-time monitoring of asset health, energy consumption and other operational parameters. They allow Emerson experts to constantly monitor and report on asset and operational performance, prioritize repair, and conduct asset trending. The services are scalable, leverage existing technology investments, and use Microsoft and Emerson's advanced security capabilities; and
- Microsoft Azure and IoT Suite—on which Emerson has standardized—enable its Connected Services, and allow expansion of its Plantweb digital ecosystem to provide a secure, flexible platform

for private cloud networks and third-party, cloud-service relationships

Thanks to adopting the Plantweb digital ecosystem, especially Connected Services, on 148 steam trap transmitters, Zornio reported that Denka Singapore's resin plant has saved 7% on its consumption and energy demand for steam, and is proactively identifying and repairing more failed traps than it could with its former reactive inspection procedure.

Zornio concluded, "There's a lot of talk about the promise of IIoT, and Emerson is delivering on its promise today with a compelling, flexible business case in Operational Certainty and the most robust, scalable technology and service platform with the Plantweb digital ecosystem. Emerson is putting the ROI in IoT."

NATURAL GAS PIPELINE REDUCES OPERATION RISK BY \$3.4 MILLION

FortisBC project eliminates single point of failure, boost system reliability.

Mike Bacidore

FortisBC serves more than 1 million customers with natural gas and electricity in British Columbia. But almost two-thirds of FortisBC's customer base is located in the greater Vancouver area and Vancouver Island.

"We wanted to show how important it was to the organization, so we created a risk analysis of our transmission assets and prioritized our work," Loge said. "Risk is the probability of failure multiplied by the consequence of that failure. Because of a lack of re-

dundancy in the pipe, it was a high consequence."

Ensuring the security of supply was top priority. "We wanted to remove any single point of failure in the station," Loge explained. "We wanted remote operation and wanted to meet the current design standards for seismic requirements. The station was originally built in the 1950s and '60s, with upgrades throughout the years."

Numerous stakeholders, including the operations group, engineering and asset management, gathered

“We wanted to remove any single point of failure in the station.” FortisBC’s Andrew Loge on reducing risk with a bypass system for redundancy.

together and brainstormed how to meet the objectives, which yielded four viable options.

“First, we looked at operations and maintenance changes—manning the station to monitor operations and increase response times, inspect existing pipe condition and recoat pipe to industry best practices to deter external corrosion,” said Loge. “But, if we found a flaw on a nonredundant piece of pipe, how do we fix it without disrupting service?”

The second option was making station modifications, such as installing new pipe and four new block valves. It still left a small section of inlet piping as a single point of failure.

The third option, an internal station bypass, would remove all single-point-of-failure pipe and valves from the complex. “The bypass would be decoupled from the facility, and it would cost about \$8.6 million,” explained Loge.

An external station bypass, the fourth option, would locate a new control station and pipeline externally for 100% redundancy and system resiliency. “It would be completely decoupled and the cost estimate was well above \$40 million,” said Loge.

“Options 3 and 4 met all of the objectives we had,” Loge explained. “Then we did a financial analysis. We looked at the project cost and the risk analysis. These two options both had more than 99% reduction in risk, so we decided on the internal station bypass because the cost was \$32 million less. Then we went back to our engineering group and explained project objectives.”

At this point Spartan Controls, an Emerson local business partner, was brought in to assist the engineering group with design and execution of the project. “The process needed performance over a wide range of flows,” said Reese Dawes, account manager at Spartan. “Noise was also a consideration because there are local residents and wildlife around the sta-



tion. Emission standards are becoming very stringent, so environmental concerns needed to be addressed, too.”

One objective was to optimize the real estate. “There was space around the station, but there wasn’t a lot of room to expand,” explained Dawes. “Any solution from a control-valve standpoint needed to be a small envelope. We needed to keep it in a single-valve train. Overpressure protection was critical. FortisBC wanted fail-safe and continued operation, so we needed to go through all the modes.”

The gas supply that feeds into the station from the transmission line is unodorized gas, so at that point it’s all odorized for leak detection.

“We needed accurate control from varying inlet pressures and flows,” said Dawes. “We looked at 30-year projected flow. We also wanted to reduce the differential pressure in the wide-open position across the system.”

For environmental considerations, Fisher low-bleed current-to-pressure transducers and pneumatic positioners were used. “It also became important when we talked about overpressurization strategies,” explained Dawes. “These are large pipelines and releasing into the atmosphere is not safe. We landed on a monitor-

ing device for overpressure protection. The monitor measures the downstream pressure.”

The project team then identified all of the failure methods for components, including loss of instrument air, power, PLC and RTU, instrumentation failure and main valve failure. “We included a redundant power gas backup for loss of air,” Dawes said. “For loss of power, PLC or RTU communication, the central-

ized gas control center can manipulate these. If any of those were lost, we do have the ability to do local control, which is why we used pneumatic positioners, so we could manually load the system and control it without any electronics.”

The project was completed on time and on budget in December 2015. Single-point-of-failure operation risk was reduced by an estimated \$3.4 million/year.

VISION TO REALITY: A ROADMAP TO IIOT

A stepwise approach to making the Industrial Internet of Things work for you.

Paul Studebaker

“**T**he Shell Prelude floating liquefied natural gas (FLNG) is the largest floating thing in the world, six times the size of an aircraft carrier, but it has only 100 people on board caring for it. How can they do this?” asked Jonas Berge, director, applied technology, Emerson Automation Solutions. “A team in Perth, Australia—1,100 miles away—watches over equipment and advises them. Along with the travel, cost and danger savings, those people in Perth get to go home at the end of the day and see their families. What’s that worth?”

Berge was speaking to a room packed with attendees of his session, “Modernize Your Plant with IIoT at Your Own Pace,” at the Emerson Global Users Group Exchange 2016 this week in Austin, Texas. “You’ve heard a lot about what people call the Industrial Internet of Things (IIoT),” he said. “Some plants are already benefitting.”

A classic example is the Shell Malampaya offshore platform in the west Philippine Sea, where smart posi-

tioners allow valves to be monitored from onshore. The information also goes to the company intranet, so Shell personnel around the world can log on, see it and help the platform personnel.

Remote coal seam gas fields in Australia have gas chromatographs that need to be working and in calibration. “Each day one is not can cost up to \$100,000,” Berge said. To check one takes a one- to three-day trip, and they’re usually OK. “Now, with IIoT, we can dial into the chromatographs, check their diagnostics and see which are fine and which need calibration.” That’s worth about \$6,000 per saved trip.

Emerson also is monitoring chemical plants from a center in Singapore. “Wireless monitors allow us to advise a Denka chemical plant within a couple of days if a steam trap needs service,” Berge said. “In the past, a trap could be leaking steam for a year before they discovered the problem. The program has reduced steam consumption by 7%.”

“Wireless monitors allow us to advise a Denka chemical plant within a couple of days if a steam trap needs service.” As an example of the Industrial IoT at work, Emerson’s Jonas Berge cited the no CapEx, pay-by-the-month service that has allowed the company to cut steam costs by 7%.

Berge defined six steps to put a plant on the IIoT:

1. Define or install plant-wide digital sensor networks
2. Instrument the assets
3. Deploy predictive analytics software on-premises
4. Review work processes
5. Enable a private internet of things
6. Introduce IIoT business models

Pervasive sensing calls for digital networks throughout the plant. “Using 4-20 mA for hundreds or thousands of additional sensors is impractical,” Berge said. “If you have fieldbus already in place, you can use it to add sensors. If not, consider WirelessHART to get additional measurements for reliability, energy efficiency and other uses. Replace manual data entry by automating data collection for applications like vibration, corrosion and power.”

Instrument the assets. Consider applications to improve results in reliability (maintenance), efficiency (energy and loss control), operations (productivity), and environmental, health and safety (EHS). “Operations and EHS will mostly be for on-premise consumption,” Berge said. “Reliability and efficiency are candidates for IIoT, where putting it in the cloud makes it possible to involve outside expertise.”

You want to install technology with a purpose, not indiscriminately deploy thousands of sensors. “So we conduct a plant modernization audit: Sit down with all the relevant departments and find out what they need,” Berge said. “This is not a site walkdown, just a meeting and interview. Based on that, we can figure out roughly how many sensors, and the network size.”

Deploy software applications. Much of the data needs no interpretation, just to be displayed to operators or supervisors. Some needs multiple measurements over time to be combined and calculated, such as a heat exchanger where flow, temperatures and differential pressures are

used to determine heat transfer coefficients. “Turn existing equipment into smart, connected assets,” Berge said. “For example, instrument a pump for pressure, flow, seal pressure, motor temperature, power, etc.”

Change standard operating procedures. “People have to change their behavior or it’s all no good,” Berge said. The same as you now Google, check Yelp and use a GPS before you set off to find a restaurant, you need to “Google your pump” before you go into the field. Equipment generates alarms—you need alarm management for maintenance similar to what you use for controls. “Set priorities and make alarms actionable, so they tell you what to do,” Berge said.

Enable a private intranet of things. Companies can put in centers of excellence to monitor equipment at multiple sites so they don’t need as many experts at each site. A single center can handle sites around the world, and the information is accessed only by company employees.

Use an Internet of Things. Outsource to experts such as Emerson and vendors of different types of equipment. “Emerson can now go beyond just giving you a report—we can go there and fix it,” Berge said. “We look only at the equipment information, not process data, so you’re not revealing any process secrets.”

There are multiple ways to do the necessary informa-



tion technology/operations technology (IT/OT) integration—the connection between the instrumentation and the internet. “Generally, both areas of expertise are involved, but there are ways of working around that,” Berge said. IIoT can be independent of the control system, so there is no connection, “like we do with the steam trap monitors at Denka,” Berge said. “It’s completely separate. They didn’t even buy any hardware—not a single screw. We provide the service on a per-point, per-month basis.”

In other cases, “We can send historian data directly to the cloud, or we can send up the DCS data,” Berge said. Either way, “We can use ‘data diodes’ so only the desired data leaves, and nothing comes in.”

It can all be done on a three-year plan. “If you haven’t already, try wireless, and have us help you do a modernization audit,” Berge said. “Make sure your solution is compatible with your existing equipment—there’s no need to bulldoze your historian or replace what you already have. And get started.”

ETHANOL GREENFIELD AWARDED RELIABILITY PROGRAM OF THE YEAR

Bristol-Myers Squibb and CMC Steel also finalists in annual Emerson Exchange event.

Dave Perkon

At the Ethanol Greenfield plant in Varennes, Quebec, production increased by 80%, yield improved by 11%, and even though production almost doubled in 10 years, there was only a 14% increase in maintenance cost.

All of this couldn’t have been achieved without a successful reliability program, and for its efforts the facility won the 2016 Emerson Reliability Program of the Year. “Since 2010, unplanned plant downtime is less than 1% per year; the percent of overtime was reduced by one-third; and schedule compliance increased by 10% to nearly 90% per year,” said Frédéric Thivierge, operations manager at Ethanol Greenfield. “The Greenfield reliability program has also been under budget for the past five years, and the annual planned shutdowns have been stretched to once every 18 months, adding four or five days of production per year.”

Also, over the past 10 years, Greenfield reduced energy costs by 26%.

Ethanol Greenfield was one of three finalists that presented at the Emerson Global Users Exchange in Austin, Texas. It competed through three rounds, which were not easy. To start, the participants had to fill out lengthy questionnaires about their reliability programs, host an Emerson consultant for a site visit and then prepare and deliver the reliability presentation twice at the Emerson Global Users Exchange event. Emerson experts moderated, and an experienced group, with literally billions of dollars of reliability experience, comprised the judging panel.

The two runners-up were Bristol-Myers Squibb in Devens, Massachusetts, and CMC Steel in South Carolina. During the session, the three companies with best-in-class reliability programs presented their reliability programs, highlighting the effective use of reliability-based technologies, effective work processes, integrated maintenance best practices, leadership commitment and return on investment.



Frederic Thivierge (left center) and Mathieu Fyfe-Leblanc (right center) of Ethanol Greenfield receive the 2016 Emerson Reliability Program of the Year from Emerson's Bruce Hawkins (left) and Nathan Pettus (right).

Michael Andrews, senior reliability engineer at Bristol-Myers Squibb, discussed the reliability program at this global bio-pharmaceutical company with \$17 billion in sales, of which \$4 billion is invested in R&D. Even though the site has fully integrated computerized systems for the lab and process areas, such as DeltaV process automation, Syncade and a fully integrated AMS Suite, Andrews pointed out that it isn't just about the technology and how you do reliability, but it's about "who" is reliability at a site.

Greg Evans, reliability engineer at CMC Steel, discussed how the five steel mills of this 100-year-old company, with 100% of what it manufacturers made from recycled steel, aim to be low-cost producers and how CMC's reliability program is helping them to get there. Evans related how CMC Steel has very good processes in place in the hot, dusty and dirty environment of the plant and how they've improve the overall equipment effectiveness (OEE) in the melt shop and rolling mill.

Three years ago, winner Ethanol Greenfield merged maintenance and production departments under the same roof, creating synergy and better teamwork. It molded its reliability plan to reality and got people engaged, said Mathieu Fyfe-Leblanc, project leader, main-

tenance and reliability, at Ethanol Greenfield. "Reliability has to be part of the DNA of the plant," he explained. "All personnel should be engaged in reliability."

Any reliability program also requires a strategy, continued Fyfe-Leblanc. Assets must be available when needed, reaching the performance they're designed for or better in a cost-effective manner. "We like to call it a never-ending journey," said Fyfe-Leblanc. "Take a step back, and be sure there are no cracks in the foundation."

Greenfield's reliability program included many pieces, such as kitting, visual indicators, skills development, training and work procedures. 'Avoidable maintenance' team meetings ensured the failures or corrective actions were not repeated. Use of predictive maintenance was extensive and included vibration analysis, oil analysis, ultrasound motor greasing, motor condition and electrical signature analysis, ultrasonic wall thickness measurement and thermography. Significant use of wireless technology aided this program. Failure codes were also used and analyzed to determine the best area to work for the best payback.

"Reliability is not a goal," said Thivierge. "It's a way to be, to think, to act."

LOOK BEYOND CAPITAL COSTS TO FIND SAVINGS

Some upfront investments quickly pay off from a lifecycle perspective.

Mike Bacidore

A capital expenditure is incurred to create a future benefit, explained Mark Murphy, technical director, electrical & control systems engineering, Fluor Enterprises. Operational expenses are money spent to turn inventory into throughput. And lifecycle cost is the total cost of ownership.

“Lifecycle cost includes initial capital cost, installation and commissioning, operation, maintenance and loss of revenue due to failure,” explained Murphy during a presentation this week at the Emerson Global Users Exchange. “We need to look beyond the capital costs and look at what the cost of our project really is. We need to compare capital costs and lifecycle costs and explain why the lifecycle costs are more important. Some extra capital costs will improve reliability. Monitoring equipment such as for steam traps, relief valves, heat exchangers, cooling towers and rotating equipment—some of the expensive assets you have in your plant—will reduce lifecycle costs.”

Results based on a typical 25,000-bbl/day refinery include total \$7.7-10 million lifecycle-cost savings per year. The implementation cost would be \$4.8 million with an average return on investment (ROI) of seven months. “Capital costs shouldn’t be the only consideration,” explained Murphy. “If we want the plant to run for 20 years, we need to make sure those assets are going to be available to us over the next 20 years.”

There are two drivers in projects—lifecycle costs and capital costs. “The capital-cost driver usually wins out, but the lifecycle-cost driver has a slower slope,” said Murphy. “We

have potential for a larger savings over the life of the asset. Some of our largest expenditures go to field equipment, exchangers, piping, compressors and valves. Some technologies will give you value over the life of your plant. The wireless acoustic transmitter, the Rosemount 708, provides you with a lot of health information. It listens to what’s going on in the pipe. A failed steam trap can cause a lot of trouble.”

Steam traps remove condensate from piping, preventing erosion and corrosion and inefficient heat transfer. “They can stick closed or stick open,” explained Murphy. “By monitoring, we can listen to what’s happening



“Monitoring equipment such as for steam traps, relief valves, heat exchangers, cooling towers and rotating equipment—some of the expensive assets you have in your plant—will reduce lifecycle costs.” Fluor’s Mark Murphy on looking past capital expenditures to find the real cost of ownership.

in that steam trap. Twenty percent of traps cause about 80% of our issues. We can focus on those and make sure we know what's going on."

Another application for the acoustic monitor is relief valves. "It will tell us if that relief valve leaks," said Murphy. "In addition to savings on the installation of wireless devices for monitoring the relief valves, we have savings associated with fugitive emissions. We can make sure we know the relief valve is closed, and that's potential annual savings of \$3.2 million."

Cooling towers are another critical asset with the potential for savings. "Common threats to cooling-tower health are hydrocarbons leaking into the water, scaling of the water, corrosion, improper blowdown when chemicals build up in the water, biological growth in the water, high vibration or bearing temperature on fans and pumps, and restriction in the water flow," explained Ed Sanders, senior sales representative in Emerson's Rosemount business. "Cooling-tower monitoring is often remote, and repairs often come as a result of time-based manual monitoring. When you're checking the cooling tower manually, it's easy to miss issues that trending data would tell you."

There are approximately 200 process pumps in the average refinery, chemical or petrochemical plant, and most of them aren't monitored, added Sanders. "Only 10% of the most critical pumps have on-line health monitoring, and 40% of process pumps are considered essential," he said. "Every pump will fail or suffer degraded operation every 12 or 13 months. On pumps, we monitor cavitation, bearing failure, pump seal failures and abnormal operation. Information gets fed into the pre-engineered software algorithm, which can first pull together a baseline, and then you can have a trend and develop alerts and early warning systems."

"Electrical power also is important for critical asset monitoring," added Melissa Toten-Simmonds, senior sales representative in Emerson's Rosemount business. "If you don't have power, none of the monitoring will matter. The majority of critical assets in the field are greater than 25 years old, and less than 5% of installed critical assets have continuous monitoring integrated. The main factor for failures is temperature. IntelliSAW is a way of wirelessly monitoring electrical assets and reducing the impact of the three main power-failure modes—poor connection, insulation degradation and air dielectric breakdown."

SHOW ME THE MONEY: HOW TO JUSTIFY AUTOMATION PROJECTS

Quantify risk and reward to get your next project approved.

Paul Studebaker

Developing the financial case for an automation project requires a perspective that goes beyond the system itself and considers potential gains from improvements in operations. "Expanding your view beyond the control system often lets you see significant opportunities for financial gains you can use to justify more and better automation," said John Dolenc, P.E., principal consulting engineer, Emerson Automation Solutions, to attendees of his session at Emerson Global Users Exchange this week in Austin, Texas.

Automation projects generally fall into three categories: replacing an existing system, taking advantage of

an identified opportunity, and acting on an idea for a potential opportunity. "System replacements are usually a question of when, not if," Dolenc said. Justification can be done on the basis of maintenance costs, lack of support (obsolescence) and risk.

"Whether or not it's driven by a system replacement, a new system can be a platform for performance optimization," Dolenc said. "Look at the full range of costs to see opportunities for optimization."

Start with causes of poor performance. "An EnTech study showed two-thirds of loops underperform, resulting in variation," Dolenc said. Poor performance also re-

“You can look at the financials in real time to maximize profit. When the operators can’t see this, they may run the plant well but lose money.” John Dolenc, P.E., Emerson Automation Solutions, on how automation impacts the bottom line.

sults when operators run the plant with too much of a “safety factor,” when batch operations are inconsistent, and when the operations organization lacks the information it needs to make decisions.

Poor performance also can be caused by deteriorating conditions, such as worn pumps and inefficient catalysts; human error; and lack of availability due to outages.

Believe that automation will help

“Most plants as-built do not have optimum measurements and controls,” Dolenc said. “Engineering and construction companies see I&C as overhead and give you the minimum needed to get you to sign off on the design.”

Perhaps the current system is not being used to its potential. “Many plants were originally designed with no DCS, just loop control—sometimes pneumatic—and the DCS was just designed to replace a panel board,” Dolenc said. “Now, we’re replacing those systems. Some plants want no improvements, and their designs are still based on single-loop control.”

Some of the potential values of modern automation can be had by optimizing unit performance. Advanced control is now easy to add, and consider adding support for performance management. “You can look at the financials in real time to maximize profit,” he said.

Real-time measurements at the operations supervisor’s or plant manager’s desk can help them to identify opportunities to increase profits. Reliability can be improved with key process measurements that allow you to see problems early and do troubleshooting.

Another opportunity is in logistics. “A lot of money can be had by improving inventory,” Dolenc said. “Typically 10% of inventory is tied up in vessels. That’s a lot of value.” Better control also can reduce variability, which helps to reduce cycle times and increase capacity.

Safety and environmental concerns can be addressed by



developing control and operating procedures that keep the plant in a safe state so the SIS never activates.

Show them the money

To convince the accountants, look at the financials and ask, “Where are we not performing?” Compare performance to the metrics and understand the accounting perspective before interviewing operations. Then speak to the operations supervisors, the production and process engineers and the controls engineers.

Understand your plant’s definition of OEE and consider how automation might improve it. Look at cost sheets and budget cost factors—the costs of material, energy and labor to make a pound of product. “If energy costs are allocated instead of actual, it may be hard to justify savings here,” Dolenc said. “And, if actual costs are distributed, you might do a good job of managing steam on a single unit, but it’s invisible to the accountants.”

Look at time-based demand. “The average demand may be below the capacity, but demand spikes may be higher,” Dolenc said. “Adding capacity may offer a significant return.”

Bear in mind, “the majority of systems are underused,” Dolenc said. “Find the opportunities and work on them. Many have small cost, are easy to justify and offer fast ROI.”

TRANSMITTER DIAGNOSTICS AND AMS PREVENT SHUTDOWNS AT LYONDELLBASELL

Listen to what your instrumentation is telling you

Paul Studebaker

Most plants are familiar with the cost of what some might call a lost profit opportunity (LPO)—when an unplanned unit shuts down and production is lost. “We define another kind of opportunity—a loss avoidance opportunity (LAO)—when proper use of smart instruments and AMS prevents an LPO,” said Ben Krueger, instrumentation engineer at LyondellBasell’s Channelview, Texas plant. “The object is to increase LAOs and reduce LPOs.”

Together with John Scott, executive account manager in Emerson’s Rosemount business, Krueger presented the session, “LyondellBasell Works to Prevent Unplanned Unit Shutdowns and Saves Money Utilizing Transmitter Diagnostics and AMS Alert Monitor on SIS Systems,” at Emerson Global Users Exchange 2016, this week in Austin, Texas.

One of several LPOs occurred when 3051SMV pressure transmitters in a two-out-of-two (2oo2) interlock tripped on RTD failure, causing a hard shutdown of five furnaces. Both of the dual-element RTDs failed simultaneously, and shutdown triggered a flaring event, “which we call, ‘burning money,’” Krueger said. A review of records from the plant’s Asset Management Suite (AMS) records showed both transmitters had sent alerts for two days before the event. “We didn’t see the alerts, because we weren’t monitoring frequently enough,” he said. “It was a learning experience—a step on the journey.”

On the positive side, Krueger cited several LAO successes. One was associated with the first example above,

where AMS captured all the information needed to understand the incident. Since the temperature (RTD) was not part of the process information on those pressure transmitters, they were able to reconfigure the temperature values in the transmitters. “Two days later, that prevented a second shutdown worth \$953,000,” Krueger said.

A little bit about smart instruments

Rosemount 3051S pressure transmitters provide information about their condition and the condition of the loop by tracking pressure, differential pressure and temperature (using external RTDs). They monitor loop integrity by measuring the voltage needed to provide the milliamp signal: if the loop wiring is damaged or connections are corroded, the voltage will rise out of range for the current.



“We didn’t see the alerts, because we weren’t monitoring frequently enough. It was a learning experience—a step on the journey.” LyondellBasell’s Ben Krueger discussed the enormous loss avoidance opportunities the company has since credited to the proper use of smart instrumentation and AMS.

If the loop resistance falls due to a short or the power supply fails, voltage will be detected as too low.

The 3051S can detect plugged lines through statistical process monitoring (SPM). The transmitter takes readings 22 times per second; they report the mean to the DCS, but watch the standard deviation—if it falls, it indicates damping that may be caused by plugged lines.

The 3144 temperature transmitters use the readings from dual RTDs to track sensor drift, and detect thermocouple failures by measuring the resistance across the thermocouple. “The default resistance setting is 5,000 Ohms,” added Emerson’s John Scott. “If resistance rises due to loose connections, vibration, corrosion or a failing thermocouple, it sets an AMS alarm.”

Transmitters can be configured for appropriate voltage, temperature and current limits for the individual application, and for what they’ll do when a deviation occurs, for example, to signal instead of drive high on RTD failure. “That’s what we did on the furnaces to prevent the second incident, to save that \$953,000,” Scott said. “By the way, those were not Emerson RTDs.”

Decrease LPOs, increase LAOs

“These potential savings cannot be ignored,” Krueger said. “Emerson has developed powerful tools to save mil-

lions of dollars, but it’s up to us to use them.”

Grasping that advantage is a three-part process, Krueger says. The first is to adjust job duties. “Instrument techs are now required to configure alerts on AMS Monitor. Alert configuration sheets for each device are printed out and put in binders at each station.”

As an engineer, “I am now the AMS champion,” Krueger said. “I regularly report the number of smart devices, which are monitored and which are not, and report the LPOs and LAOs.”

The second part is to redefine organizational roles “to monitor AMS alerts and generate timely and effective response,” Krueger said. This role is distributed among the instrument technicians at this plant, but may be assigned part- or full-time to an “AMS technician,” or even automated through AMS and a CMMS.

The third part is to work with local experts and Emerson to make an effective implementation, Krueger said. “We’re now changing a unit from RS3 to DeltaV, and we’re adding online monitoring before we start up.

“I can’t emphasize this enough. Just spending millions of dollars on smart instruments will not do it alone. You must make some form of these changes to gain the benefits.”

EMERSON EXCHANGE BEST-IN-CONFERENCE AWARD WINNERS NAMED

Five track winners selected from among 300 sessions given at the 2016 Emerson Global Users Exchange.

Jim Montague

One of the unfailing highlights of Emerson Global Users Exchange are the Best in Conference Awards for its very finest conference sessions, and the winning presentations for 2016 were no exception. Five teams won awards in the conference’s main categories, and accepted their crystal plaques at lunch on the event’s fourth day this in Austin, Texas.

The record-breaking 800 session proposals received earlier this year by the Emerson Exchange Board of Directors were narrowed down by the board and its conference subcommittee into the 320 sessions presented this week, and just five were chosen as best in conference.

“We look for presentations that tell a good story, define a significant problem, and detail its solution,”

Thomas Cole, UND Power Plant, Bill Farmer, Novaspect, and Todd Stauffer (not pictured), exida, won in the Solve & Support track for “Fighting Irish Tackle Alarm Management—Implementing an Alarm Management Program @ UND Power Plant.”



said Robert Sentz, vice chairman of the 2016 Emerson Global Users Exchange, and instrumentation and controls engineers, 3M Materials Resource Division. He will serve as chairman next year. “We also want to know the how the solution benefited its users.”

Solve & Support

“Fighting Irish Tackle Alarm Management—Implementing an Alarm Management Program @ UND Power Plant” by Thomas Cole, UND Power Plant, Bill Farmer, Novaspect, and Todd Stauffer, exida

UND Power Plant, Novaspect and exida improved the plant’s DeltaV alarm system by creating an alarm philosophy document (APD) that could drive consistency and create a common understanding. The alarm configuration was loaded into SILAlarm software, and alarm rationalization was performed. After rationalization, the alarm configuration was imported back into DeltaV to update settings and to populate Alarm Help software.

Measure & Analyze

“A Wireless Odyssey—from Resistance to Enthusiasm” by Alan Weldon, Hunt Refining, and Donna McClung and Steve Moore, both of Emerson

After some initial resistance about wireless, Hunt Refining Co. accepted it for maintenance, added it to other monitoring

applications, and has been a leading user of Emerson’s wireless technology for close to a decade, though there were some bumps along the way. In 2007, there was a need to monitor temperature in a hot asphalt tank, so Hunt and Emerson navigated challenges and collaborated to implement wireless safety relief valve monitoring that saved Hunt \$170,000. This increased confidence, and since then, Hunt’s network has grown to include many pervasive sensing applications that address safety, environmental, reliability and process needs across the refinery. Implementation of Emerson’s AMS and Wireless Snap-On settled any concerns of network reliability and system integration.

Operate & Manage

“Intelligent Solvent Tank Farm Management” by Matt Rauschke of 3M and Kyle Nystrom and Colin Singer, both of Novaspect

3M and Emerson collaborated to improve 3M’s existing solvent delivery system. The system was migrated

Alan Weldon, Hunt Refining, and Donna McClung and Steve Moore, both of Emerson, won in the Measure & Analyze track for “A Wireless Odyssey—from Resistance to Enthusiasm.”



Matt Rauschke, 3M, and Kyle Nystrom and Colin Singer, both of Novaspect, won in the Operate & Manage track for “Intelligent Solvent Tank Farm Management.”



from an energy-intensive, pressure-based system to an on-demand system with intelligent monitoring and bookkeeping. The solution was developed through the use of an inventory management system/DeltaV interface, better flow measurement, smart VFD flow calculations, and wireless limit switches. The new system reduced accounting discrepancies, eliminated rail car unloading errors, and provided real-time verification of the piping network integrity using a software-based leak detection system. No transfer errors have occurred since the system was installed, and the solution reduced cost for repurchasing new solvent and disposition of mixed solvents.

Final Control & Regulate

“Natural Gas Pipeline System Integrity Improvements—Reducing Operational and Financial Risks through Pressure Control Station Reinforcement” by Niko Boskovic and Andrew Loge, both of FortisBC, and Reese Dawes, Spartan Controls

Natural gas distributor FortisBC runs a distribution pipeline serving more than 600,000 customers, which is supplied by its large Huntingdon pressure-control station using six parallel 16-in. Fisher V250 control valves. However, its single-station design was identified as being a reliability concern as a single point of failure, so FortisBC and Spartan Controls used Fisher 24-in. V260 control valves, Bettis Gas Hydraulic actuators and ControlWave telemetry to provide complete redundancy, including over-pressure protection, true fail-safe, low bleed, remote and local operation, and control performance requirements. The solution met all of the unique project requirements and was tested, installed and commission on-time and on budget. The result is a massive risk reduction for FortisBC.

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Business Management & Career Development

“Better Listening, Better Life—Learn to Listen Like a Pro” by Nikki Bishop and Bruce Smith, both of Emerson

This workshop taught attendees simple techniques to learn to listen like pros by focusing on listening and better understanding spoken words. Participants had the opportunity try out new techniques during the session.

Niko Boskovic and Andrew Loge, both of FortisBC, and Reese Dawes, Spartan Controls, won in the Final Control & Regulate track for “Natural Gas Pipeline System Integrity Improvements—Reducing Operational and Financial Risks through Pressure Control Station Reinforcement.”



TANK FARM UPGRADE AFFECTS MULTIPLE ORGANIZATIONS AT 3M

New systems improved operations as well as EH&S and accounting.

Mike Bacidore

At the 3M plant in Cottage Grove, Minnesota, recurring problems had prompted the materials resource division to plan a distributed control system (DCS) migration. “We had a daunting challenge,” explained Matt Rauschke, senior resident engineer at 3M, who led a presentation at this week’s Emerson Global Users Exchange. “How do you connect the tank farm’s three different control systems?”

The first six months of the project were spent migrating two of the systems from PROVOX to DeltaV, while the third system remained a Modicon programmable logic controller (PLC-based) system. But the longer-range impact of the upgrade was destined to affect three main areas—environmental, health, safety & regulatory (EHSR); operations; and accounting/bookkeeping.

“We needed to migrate the DCS for operational improvements,” explained Rauschke. “But there were specific issues to address. Spills were a problem, so we needed to improve our EHS&R risks and consequences. We had two accounting systems, and they weren’t reconciled.”

The DCS migration needed to happen because parts were becoming difficult to find for the PROVOX system. “System reliability was extremely poor,” admitted Rauschke. “The pump time altered frequently, and a building supervisor would have to come over and reset the pump. Plus, we didn’t have a standardized solvent charging program.”

The biggest problem with the leak detection system was it wasn’t a leak detection system at all. “It

relied on a set maximum pump run time,” explained Rauschke. “We had the potential for a spill the entire length of the pipe.”

Accounting was inaccurate. “We had 6% of our solvent that wasn’t accounted for properly,” said Rauschke. “We use a lot of solvent, so that was a big problem. We had no way to reconcile true usage with run cards.”

Multiple issues

The tank farm had a lot of problems to address. “Early on in the migration project, we decided to move away



“Because of the performance of those meters, we went from 7,000-lb spill potential to 25 lb.” 3M’s Matt Rauschke on the effectiveness of an upgraded tank-farm pump system and DCS migration.

from the pressure-based system and move to an on-demand system,” explained Rauschke. “The new system would require an on signal from each user. The biggest challenge was to make it easy for the operators. We tried to tailor the system to make it invisible and intuitive to the operators. The operator would open a valve on the manifold, and the system would turn on the pump and then close the automated valve. We also installed a pushbutton system with limit switches to select which solvent they wanted. And we improved our wireless coverage in the tank farm. This was critical later in the project.”

For the leak detection system, a new software-based system was designed to reduce the potential of a 7,000-lb spill. “The new system would use a flow rate, and it allowed us to get down to 250 lb in a spill event,” said Rauschke.

And, for tanker unloading, the old system only made sure the tanks wouldn’t overfill. “In the new system, the operator would open a limit switch, and the HMI would require they look at tank,” explained Rauschke. “Rail cars would be weighed as they came in and then weighed as they left. That would tell us how much we actually used in our plant.”

As the project progressed, the two databases needed to be compared. “As you get information out of DeltaV, you have to go through the historian,” explained Kyle Nystrom, operational intelligence engineer for Novaspect, an Emerson local business partner in the Midwestern U.S. “We decided to put everything into the event journal. We ran into a few issues, in terms of syntax, so we had to create a relational database and use a third-party software called BridgeWorX.”

At 3M Cottage Grove, there are three divisions, explained Colin Singer, project manager, also with Novaspect. “Specialty chemical is the largest solvent user,” he said. The chemical pilot plant was the least technically involved implementation. And the adhesives pilot plant is the Modicon system.”

While the Modicon system wasn’t migrated, the other two were upgraded to the DeltaV solution, which included a three-level architecture—solvent distribu-

tion locations, coordination modules and solvent supply. “Each location or requester would communicate with the coordination module,” explained Singer. “If it were a new request, it would contact the solvent pump to start. There was a coordination module for every solvent that was used. Before our upgrade, there was no level of automation at the drum filling station. We put limit switches on all of the valves.”

Lessons learned the hard way

With any project startup there are issues with commissioning. “We discovered some shortcomings,” said Rauschke. “At first, the pumps were tripping constantly, and recycle lines didn’t work as intended. We were also struggling to get feedback from operators for what was tripping the pump.”

There was also a fundamental problem in how the system was designed with a pump and variable frequency drive for flow control. Leaks were to be detected by comparing the flow rate predicted by the VFD and pump curve against a Micro Motion Coriolis meter on the other end of the solvent movement system. “But the VFD could not match the performance of the Micro Motion flow meter,” said Rauschke. “Startup dynamics and drift were the two major issues.”

Seasonal variations were especially troublesome for leak detection. “We had to abandon the leak detection system for a while because of the temperature variation in Minnesota,” explained Rauschke. “The solution was to install wireless conditioned differential-pressure (DP) flow transmitters and temperature transmitters. There were cost savings of more than \$150,000 over hardwired transmitters.

The tank farm control system migration and on-demand pump system costs totaled about \$600,000. “It’s a much more reliable safety system now,” assured Rauschke. “The solvent reporting discrepancies decreased from 6% to 1.3%, and we reduced maintenance costs by reducing pump cycling. But we can’t know it’s working until it doesn’t work, and we hope we never see that.”

NEW SENSORS BOLSTER DIGITAL ECOSYSTEM FOUNDATION

Instruments for monitoring corrosion and electrical equipment join the Rosemount wireless family.

Paul Studebaker

With the increasing availability of low-cost sensors and wireless technology, today's plants have the opportunity to improve operational performance by enhancing and leveraging sensing capabilities. Indeed, sensing and measurement technology form the foundation of the new Emerson Plantweb digital ecosystem (see accompanying graphic, p3), unveiled at this week's Emerson Global Users Exchange in Austin, Texas.

"The whole idea is to look at the problem holistically—to see, decide and act," said Bob Karschnia, vice president and general manager, Wireless, Emerson Automation Solutions, to attendees of a Tuesday morning press conference. "The key to operational benefits is to act, but the first step is to see. To see what's happening in your processes and equipment, we offer Pervasive Sensing."

As part of Emerson's Plantweb digital ecosystem, Pervasive Sensing expands the use of sensor and analytics technology into new operational performance areas through a new generation of low-cost sensors that are easy to install and maintain, take advantage of wireless communications as part of a secure, integrated industrial network, and use new analytic algorithms to create insights into the performance of a plant's assets.

"We launched Pervasive Sensing a few years ago, and it's now in use in networks around the world, in many kinds of plants and any application you can think of, from BP's Quad 204 oilfield project to a set

of six pumps in the back of a plant," Karschnia said. "The key is sensing technologies—Emerson is different, with a broad portfolio. We now have 40 existing wireless products, and today we're highlighting six new ones that can be used to drive safety, reliability, production, energy efficiency and compliance."

Wireless corrosion monitoring: Permasense Wireless Corrosion Monitoring is a permanently-installed technology that uses unique sensor technology, wireless data delivery and advanced analytics to continuously monitor for metal loss from corrosion or erosion in pipes, pipe-



"From BP's Quad 204 oilfield project to a set of six pumps in the back of a plant, the key is sensing technologies." Emerson's Bob Karschnia on the foundational importance of sensor technology for optimal process performance.

lines or vessels. Corrosion and erosion trends are delivered in real-time and directly to the engineer. The sensors are battery-powered and can be deployed in hazardous and remote areas, the analytic software accurately forecasts corrosion and erosion issues/ locations in pipelines or vessels, and the system can be integrated with virtually any existing IT architecture.

Wireless medium voltage equipment monitoring: IntelliSAW wireless medium-voltage equipment monitoring systems monitor electric power switchgear temperatures to identify and prevent failures that can result in significant damage, power outages and potentially fatal accidents. The noninvasive, wireless temperature sensors require no external power and are capable of simultaneously measuring all relevant hot-spots such as bus bars, breaker inputs, breaker outputs and cables. They provide surface acoustic wave (SAW-based) measurement of temperatures, RF-based partial discharge detection, and humidity monitoring along with an advanced human-machine interface.

Wireless gas monitoring: The Rosemount 928 Wireless Gas Monitor is the world's first integrated WirelessHART toxic gas detection solution. Maintaining wellheads and natural gas metering stations is difficult and dangerous because workers may be exposed to unplanned releases of toxic gas. Operators typically have had to rely on portable gas detection devices (or no gas detection at all). Remote sites and previously unmonitored portions of existing facilities can now continuously monitor for the presence of toxic hydrogen sulfide gas to protect facilities and more importantly, help keep personnel safe.

Wireless non-intrusive surface-sensing temperature measurement: Rosemount X-well Technology is a surface-sensing temperature measurement solution that eliminates the need for thermowell process pen-

etration for measuring process temperatures in pipe applications, and removes leak points to reduce compliance costs and increase safety. Eliminating the need to drill to get process temperatures also avoids the risk of corrosion. It provides an accurate and repeatable internal process temperature measurement with quick, easy installation and simplified long-term maintenance. And temperature measurements can be added without shutting down a process.

Wireless power metering: The SensEnable 56WM wireless power meter is designed to monitor voltage, current, power, energy and other electrical parameters on single- and three-phase electrical systems with revenue-grade accuracy. It allows early detection of machine problems through continuous measurement of power consumption and power quality. With other submeters monitoring gas, water, steam, and other utilities, it can help provide a "complete holistic view of energy consumption," Karschnia said. Its granular data can enable better operations management decisions, and support optimized predictive maintenance of facility assets based on energy consumption and power quality.

Pressure gauge measurement: Rosemount Wireless Pressure Gauges deliver safe and reliable readings as frequently as once per minute to keep operators updated on changing field conditions, reducing manual operator rounds and improving safety by keeping personnel out of hazardous areas. They use WirelessHART, offer a 10-year life and feature field-proven pressure sensor technology, including up to 150 times the overpressure protection of traditional gauges and two layers of process isolation for a safer field environment. They reduce maintenance costs and time by eliminating common weak points found in mechanical gauges.

HOW TO CHANGE YOUR SAFETY CULTURE

Interpersonal dynamics can be as important as training when it comes to preventing industrial accidents.

Jim Montague

Installing process safety equipment and software? Easy. Getting people, groups and organizations to change their attitudes and habits? Close to impossible. So what can be done? Deliberate, persistent and targeted training, retraining, simulation and encouraging safety team members to speak up and intervene when needed.

“Seventy-five percent of accidents in industry are traceable to organizational and human factors,” said Travis Hesketh, marketing vice president for Europe, Emerson Automation Solutions. “In 2014, there were more than 3.7 million recordable injuries and 4,679 deaths in U.S. industries, costing \$212 billion. So, have you really thought about the impact and relevance of human factors in handovers, maintenance and documentation, environment, managing ambiguity, ignoring warning signals, and the team leader role?”

Annison and Hesketh investigated the human factors in business culture that can cause or prevent a disaster at Emerson Global Users Exchange.

“About 60% of all accidents or serious incidents occur within 30 minutes of a shift change, so we have to ask what key handovers are happening in our environments,” explained Julian Annison, principal industry consultant, Emerson Automation Solutions. “Are they recognized? Do we have a formal process in place? And how are we recording them?”

“We also need to know what’s the quality of our permit to work (PTW) handback, and is shift handover

structured, given proper time and location? Finally, we also need to address how we’re using modern tools to facilitate or automate handovers.”

And because it’s often feast or famine when it comes to process safety information, Annison recommended that users examine how they secure the right data and get it to the right people in the way that’s best for them to understand.

One of the biggest factors contributing to process safety incidents is the staff’s working environment,



“Team members must learn to intervene when necessary, even against the will of a powerful leader.” Julian Annison (right), along with Travis Hesketh, Emerson Automation Solutions, on culture change.

which includes time crunches, conflicting personalities and the agitation and stress they generate. However, many of these work-setting issues remain stubbornly hard to tackle because they're some one of the least discussed and understood problems.

And because no process application or facility runs perfectly all the time, operators and engineers always have to manage their plants with something that isn't working properly. As a result, they must be aware of the conflicts and consequences this improper situation could cause and resolve them.

Though everyone in the process industries understands the surface aspects and issues of alarm overload and prioritization, Annison reported that many procedures for handling them remain unresolved, even basic policies such as how to report key alarms to operators, managers and maintenance.

"The main question is: Can the teams recognize those top-level, infrequent alarms? And will they know what to do?" asked Annison. "More recently, many alarms have become like a social-media deluge in recent years, and this is a big problem because a control room during a major incident is the true definition of data overload, as operators try to decide what to do. This is very difficult to overcome."

Despite some gains in social equality and organizational politeness in recent years, Annison reported that process safety teams still need leaders and experienced followers, which means pecking orders still inevitably develop.

"Working culture and perceived hierarchies still occur in all teams," added Annison. "On static teams, individual personalities become dominant, and positive and negative consequences happen."

Call to action

To address these safety issues and improve these factors, Annison added it's vital for leaders to challenge their teams in three primary areas:

Authority gradient: Ask if anyone is on a pedestal and why. Who's driving decisions through on dubious ground? Who always gets their way? Update responsibilities, and remind team members about expectations for them to intervene.

Empowerment: Do all team members understand their responsibilities and obligations to speak and act? Team members must consider training others and themselves, where needed, and do it in a language that gives power to intervene in any situation. They must also support intervention by others. "Team members must learn to intervene when necessary, even against the will of a powerful leader," said Annison.

Training: To maintain genuine safety competency, Annison advises teams to reexamine how well they actually train their members. This means getting beyond multiple-choice tests and stamping certificates; determining the best learning methods for each member; investigating if the training really increased competency; and especially including training in abnormal situations.

Annison concluded, "So, is it possible to change the culture of process safety team members? The answer is 'yes' because there are a lot of positives. Pilots need to learn more than flying in a straight line; they need to learn takeoffs, landings and abnormal situations; and the same goes for process safety teams. We're fortunate that now we can set up virtual plants and processes to demonstrate and evaluate competence."

PREVENT DOWNTIME AND ENSURE SAFETY WITH ISOLATED INSTRUMENT GROUNDS

Air Liquide's Terry Colleran shares the best practices that keeping people safe and equipment running.

Paul Studebaker

From the days of Westinghouse and Edison, when “power distribution” was by a single, naked copper wire strung through trees and around glass knobs, to today’s civilization, which would not be possible without computers and tablets, people have struggled and died to provide adequate grounding systems. “The electrical intersection of man and machine has resulted in injuries and deaths,” said Terry Colleran, international expert, DCS, instrumentation and process control, Air Liquide. Improper grounding also leads to early demise of many control system components.

Together with Jesse Godwin, service specialist, Control Southern, Colleran presented the session, “Grounding vs Grounding: What’s the Difference?” at the Emerson Global Users Exchange 2016, this week in Austin, Texas.

Today’s automation systems use transistors and integrated circuits, components whose lives can be reduced or ended by capacitive discharge, overvoltage and power supply AC ripple. A capacitive or static electricity discharge that jumps a ¼-in gap at less than 60% relative humidity is 10,000 volts. “Wires store electrons. The amount depends mainly on the length of the wire, just like a capacitor,” Colleran said. When the capacitance is exceeded, the voltage discharges. Surges and arcs are caused by motor starts and stops, RF transmitters, proximity to wires carrying more than 50 VAC, and of course, lightning. “Unless constantly drained away to ground, electrons gather in wires until the capacitance is exceeded,” he said.

Beware AC ripple on DC power—“sour power, we call it,” Colleran said. You’ll have more or less, depending on the rectification and power quality. “Capacitor filters prevent problems, but they deteriorate. Replace them every five to seven years.” Three volts of ripple means the 24 VDC electronics will see only 21 VDC, and will draw higher current. “Higher current means more heat, more resistance, and more current draw—a vicious cycle,” he said.



“You think electricity takes the path of least resistance, but it doesn’t. It takes all the paths.” Terry Colleran of Air Liquide on the importance of providing adequate and separate protective and instrument grounds.

Protective vs Instrument Grounds

A proper plan requires two separate grounds, a protective earth (PE) ground for power, and an isolated ground for instrumentation. “Both must be at the same potential to protect man—a technician might touch both ground bars in a cabinet—so the National Electrical Code requires ‘at least one connection,’ but they are not the same thing,” Colleran said.

Provide PE grounds in the form of a triad—a set of three rods spaced so the Hall-effect areas intersect to maximize current capacity. Use a separate, star point ground, and connect all the instrument grounds to it. “Then provide only one connection between the star point and the triad. Do not connect the power and instrument grounds in the cabinets. If you do, you don’t have a separate instrument ground.”

“You think electricity takes the path of least resistance, but it doesn’t. It takes all the paths. So in a lighting strike, it burns through everything. Wires, steel structure, the voltage in everything goes high, then over time, it dis-

sipates,” Colleran said. “You want the lighting to go to ground first and mainly through the triad, so keep instruments isolated.”

The effectiveness of ground depends on the quality of the substrate—the soil beneath and around the facility in contact with ground rods. The conductivity of many substrates is bad and varies with time, seasons and weather. “When the plant is built, they take one sample at one time, 30 inches down,” Colleran said. “Sandy soils resist taking a charge.” Plants built on sandy soil, chert (flint) and loam, like many in the southeast and southern U.S., experience increased instrument failures during dry seasons and droughts when soil water content is low.

Electrical events can cause sealed controls—contacts don’t open, safety systems actuate, equipment operates “in an uncontrolled manner, causing destruction of machinery and property, and sometimes loss of life,” Colleran said. “What’s the cost of a tripped process? The estimated cost of a life is more than \$10 million, a good triad and star point cost about \$3,000.”

ACTIONABLE INFORMATION DELIVERED IN RELEVANT TIME

**‘Always Mobile’ approach tailors information delivery
to each individual decision maker.**

Mike Bacidore

A manufacturing organization has a lot of different players, and all of them need different information—some urgently, some less so. “All of the information that’s incoming needs to be distributed in a secure and timely manner,” said Duncan Schleiss, Emerson vice president of business development, Process Systems and Solutions. Schleiss delivered the news of his company’s “Always Mobile” solution at this week’s Emerson Global Users Ex-

change in Austin, Texas.

“We need to deliver the right information to the right people at the right time,” he said. “Not everyone is working at the same speed. Relevance and speed are different for everyone, depending on their roles. Who needs to know about what and at what speed?”

Emerson’s See–Decide–Act model leverages data collected from the customer site, gets it in the hands of Emerson experts for analysis, and then delivers

“Not everyone is working at the same speed. Relevance and speed are different for everyone, depending on their roles. Who needs to know about what and at what speed?” Emerson’s Duncan Schleiss explains the benefits of Always Mobile at Emerson Global Users Exchange.

actionable information to customers. All toward reducing unplanned downtime, optimizing preventive maintenance tasks, lowering maintenance costs and improving outage planning for maintenance and spare parts. “Always Mobile is the Act department,” said Schleiss.

Always Mobile gives professionals access to role-based tools, analytics and dashboards anywhere, anytime. By adding mobility to the AMS and DeltaV process automation platforms, Emerson has extended the reach of its Plantweb offering. Plant personnel can access information needed to perform their jobs, regardless of where they are.

The DeltaV Mobile application allows users to monitor processes remotely and receive notifications on user-selected process alarms. The AMS Trex Device Communicator provides maintenance technicians with a modern user experience packaged in a tool built to withstand harsh industrial environments, isolating repair problems without interrupting production. AMS Asset View’s persona-based alert system ensures reliability personnel receive relevant alerts needed to ensure asset health.

Facilities’ biggest challenge is managing expertise. Knowledge is leaving the organization. With Connected Services for DeltaV, data from steam traps, machinery and control valves can be collected and pushed to Emerson subject matter experts, who can fill that knowledge void remotely, said Schleiss.

“In terms of monitoring on our customers’ behalf, we need to avoid rearview-looking numbers,” said Schleiss. “We should be looking at the health of equipment in the plant. It should be displayed as a forward-looking number that customers can act upon.



This is a completely different driver than historical information.”

Emerson’s Always Mobile solutions provide process insight to mobile tools and devices. The AMS 2140 Machinery Health Analyzer, for example, enhances vibration analysis and maintenance by automatically collecting data and reducing data man-hours in the field, and is ergonomically designed for single-hand operation.

The AMS ATG View mobile application, in turn, provides protection status, health data and alarm status of critical assets to mobile devices anywhere on the plant’s Wi-Fi network. ATG View also distributes data from the AMS 6500 ATG protection system. And Emerson’s 475 Field Communicator is a built-for-purpose handheld communicator that enables advanced diagnostics for valves and devices in the field.

“We started with the maintenance tech,” explained Schleiss. “AMS Device Works delivers instrument information. It’s an extension of the AMS Device Manager. It provides device health and performance to electrical and instrumentation maintenance personnel in relevant time. Everywhere. Securely.”

'SECURE FIRST MILE' DELIVERS DATA SAFELY

Emerson provides a range of secure connectivity options for the Industrial Internet of Things.

Jim Montague

The best information isn't worth anything of you can't get it where it needs to go. But how are you supposed to deliver process data from sensors, instruments and applications in the field without making them and their networks vulnerable to outside probes, intrusions and potential cyber attacks?

So, to help ensure the secure and reliable transmission of data from Emerson's Pervasive Sensing technologies, the company launched this week its Secure First Mile offering. Emerson experts provided in-depth details about Secure First Mile and its role in the larger Plantweb digital ecosystem at the Emerson Global Users Exchange this week in Austin, Texas.

"The main challenge is: How can users let that data out without opening the door to attacks, and control who gets what data?" said Claudio Fayad, Emerson's technology vice president, Process Systems and Solutions. "We think Secure First Mile is the solution."

Fayad reported that Secure First Mile is a set of architectural approaches and designs, enabled by a family of security services and robust, secure and flexible servers, gateways and data diodes, which work together to make certain that data in existing operational technology (OT) systems can be easily and securely connected to Internet-based applications. "Secure First Mile is located close to where process data is generated, and converts sensor and other production-level information into secure data for the Internet and cloud level," he said.

While efforts to move process data securely aren't new,

they're typically organized using the traditional, seven-layer Purdue model, which relies on segmenting networks, dividing them with managed Ethernet switches, and requiring data to pass through multiple layers. Data from critical OT systems must traverse a number of firewall-separated networks, many times passing data through 'data-aggregation' applications such as historians to provide added security and access points until it finally reaches a network level that provides controlled Internet access. These architectures are used at larger facilities, and are effective as long as IT personnel are available to support them. However, they



A data diode provides extra security because it creates a physically unidirectional network that lets data out, but has no physical connection for letting data in." With data diode in hand for show-and-tell, Emerson's Claudio Fayad explains the simple yet effective security technology.

need effort to configure and support correctly, and can require significant labor to add new sensors and make data available through those multiple layers.

“The secure OT environment include levels 0, 1, 2 and 3 in the Purdue model, while the secure IT environment includes levels 4 and 5. Secure First Mile is at Level 3.5, to protect and connect OT systems with IT,” explained Fayad. “We also use OPC-UA communications to link smart devices and our AMS software with OSIsoft on the secure OT level, and then communicate via Secure First Mile to OSIsoft and PI Cloud Connect software on the secure IT level. This approach, however, requires multiple levels of software and stakeholders; it makes network penetration difficult but not impossible. It’s effective but hard to maintain.”

To provide more concrete security, Fayad explained that Secure First Mile also offers a data diode approach to simplify protection against inbound communication. “The data diode model provides extra security because it creates a physically unidirectional network that only lets data out, but has no physical connection for letting data back in,” said Fayad.

“This enables production data to go the edge gateway for conversion to IoT cloud protocols, but physically disables the inbound path.”

To apply data diodes for valve monitoring, for example, Fayad added that Emerson’s 1410 Gateway supplies WirelessHART valve information to a field gateway, while the data diode prevents outside access to the OT environment. Further, a Microsoft Windows 10 IoT edge gateway converts the data to an IoT protocol like AMQP and sends it to Emerson Connected Services powered by Microsoft Azure cloud service. This method is also encrypted from end to end.

In addition, Fayad reported that Emerson has already added OPC-UA communications to its DeltaV DCS, but now it’s also adding OPC-UA inside its controllers. This means users will no longer need to have DeltaV on top to achieve Purdue-model security, which will make their security models simpler and leaner.

“DeltaV connects today via the Purdue model and Secure First Mile, but DeltaV, Version 14, will also provide multiple paths to the cloud and IIoT applications,” he said. “Emerson has the expertise to securely connect your OT systems to new Operational Certainty applications in whatever way you choose, either with architectures with existing plant systems such as historians, or via new ‘direct connect’ architectures.”

POLYMER PRODUCTION IN A DIGITAL ENVIRONMENT

Polymer manufacturer Covestro seeks to leverage digital technology to optimize supply chains and reinvent business models.

Mike Bacidore

With annual sales of more than 12 billion euros and almost 16,000 employees, polymer maker Covestro has 30 sites across Europe, Asia and America, eight of them production facilities. “We’ve been making polymers since the 1930s,” said Rich Guhl, director of global process automation.

“We develop state-of-the-art polymer materials that can do more. We help to push boundaries by supplying innovative and sustainable products, technologies and solutions

for key industries and modern life. We think we can make the world a better place by doing what we do best.”

Guhl shared his company’s journey into data leverage and the Industrial Internet of Things (IIoT) during a press conference this week at the Emerson Global Users Exchange. Covestro is organized in three divisions. The polyurethanes division makes the raw materials for rigid and flexible foams. Polycarbonates sells granules and sheets for a wide variety of applications. The coat-

“We needed to make business models digitally enabled. How would Google run our business?” Covestro’s Rich Guhl envisions a digitally enabled process that is ready to leverage disruption and thrive.

ings, adhesives and specialties division manufactures more than 2,600 different materials. Plus, Covestro supplies basic chemicals for its own operations, producing enough chlorine to make it one of the world’s leading chlorine producers, explained Guhl.

Covestro faces five big challenges along the value chain as a result of its European location.

1. First is the feedstock disadvantage. “If you go to the Gulf Coast or the Middle East, you see an abundance of feedstock,” said Guhl, “but not in the EU.”
2. Because of the feedstock locations, the chemical industry clusters outside of the European Union, where feedstock is more readily available.
3. EU regulations for the chemical industry have increased by 56% since 2008, driving up costs in Europe and creating an uneven international playing field, especially compared to China and the Middle East, explained Guhl.
4. The EU’s manufacturing base is shrinking. “Our products go to other manufacturers,” explained Guhl. “When they’re disappearing, that’s a disadvantage to us.”
5. There’s also been a shift in demand. “Our products are expected to be more sustainable and environmentally friendly,” he said.

Covestro’s approach to digital manufacturing started with three horizons of implementation.

1. Optimize supply. “We wanted to innovate how we do daily business, from predictive maintenance and end-to-end supply chain,” said Guhl.
2. Leverage growth. “Then we had to innovate how customers do business with us,” explained Guhl. “For the customer experience and channels, it meant getting more in tune with customers.”
3. Start a new game. “We needed to make business models digitally enabled,” said Guhl. “How would Google run our business?”



To optimize supply, Covestro needed to put data into context and make it actionable, with an initial focus on three categories of data-driven improvement aimed at reducing costs, ensuring safety and increasing uptime/improving quality. “If we can accomplish this, it will enable end-to-end supply chain and improve our own operation. Standardization and strong partnerships are the foundation.” Emerson is one of the key partners for Covestro’s process automation, he explained.

Covestro has created partnership models with varying levels of value delivery. Lower-level partnerships typically are asset-focused, while higher-level partnerships encompass plant or system performance. Further, Level 1 partnerships might rely on break-fix maintenance, while Level 2 represents on-premise maintenance services. Level 3 includes connected services via IIoT, and Level 4 outcome-based services.

“At some plants, we’re not ready to move up, so we have a joint program with Emerson to migrate to Delta V, and then we can upgrade to more system-based performance increases,” explained Guhl. “Our long-standing wish list includes plug-and-play for devices and package units; seamless data integration; auto-updated plant documentation; built-in IT security; sharing data and services beyond own enterprise; and leveraging joint expertise of Emerson and Covestro.”

CORROSION SENSORS JOIN ROSEMOUNT WIRELESS INSTRUMENT ARSENAL

Technology allows process piping to be continuously monitored for integrity.

Dave Perkon

Emerson has added non-intrusive wireless corrosion monitoring to its Pervasive Sensing strategies portfolio, continuing its strategy to invest in its core business platforms and expand in markets that hold significant long-term growth opportunity.

On Oct. 3, 2016, Emerson announced it had agreed to acquire U.K.-based Permasense Ltd., a leading provider of non-intrusive corrosion monitoring technologies for the offshore and onshore oil production, refining, chemical, power, pipelines, metals and mining and other industries. Permasense monitoring systems use non-intrusive ultrasonic wall thickness measurement sensor technology, wireless data delivery and advanced analytics to continuously monitor for metal loss from corrosion or erosion in pipes, pipelines or vessels.

“Corrosion and erosion can significantly impact the safe and reliable operation of our industrial customers’ infrastructure, which can have dire consequences,” said Mike Train, president, Emerson Automation Solutions. “Wireless non-intrusive corrosion monitoring is a transformational shift that helps customers immediately understand the health and integrity of their infrastructure in real-time and enable them to fully optimize their operations while maximizing safety.” For example, with the increasing variability in types of crude oil coming into many refineries today, unpredicted corrosion is becoming a significant issue that affects both uptime and profitability. “Now, refinery

infrastructure can be monitored and controlled using this non-intrusive technology,” Train said.

The Permasense product line will become part of Emerson’s Rosemount portfolio of measurement and analytical technologies. Permasense technologies complement Emerson’s Roxar intrusive corrosion monitoring and non-intrusive sand management systems, and strengthen the company’s Pervasive Sensing applications. With Permasense and Roxar tech-



Permasense integrity monitoring systems use permanently mounted ultrasonic sensors to deliver continuous wall thickness measurements.

nologies in its portfolio, Emerson will be the largest provider of integrity and corrosion management solutions in the marketplace.

Central to Permasense corrosion monitoring systems are sensors that employ proven ultrasonic wall thickness measurement principles. The sensors are battery powered and communicate wirelessly, eliminating the cable, minimizing the cost of installation, and enabling use in remote areas and on a large scale with thousands

of sensors. The sensors' low-power consumption enables deployment in Zone 0-rated, intrinsically safe areas of the plant.

A browser-based data analysis and visualization software, DataManager, enables the wall thickness data to be accessed anywhere in the world via an Internet connection, facilitating automated collection and management of integrity data from the most remote, even unmanned, facilities.

VALVE SELECTION FOR SAFETY INSTRUMENTED SYSTEMS

Emergency shutdown systems demand more than a SIL rating from their valves.

Jim Montague

One technical area that can help safety instrumented systems (SIS) fulfill their missions is selecting the right SIS valves, and implementing their diagnostic functions and support software. "Why do we need SISs? To keep plants out of the news," says Tommy Elkins, product manager, ControlWorx services division, John H. Carter Co.

Janine McCormick, refining industry manager, Emerson Automation Solutions, reported that the two main process sector standards for SISs are IEC 61508, the umbrella safety standard passed in 2010 for manufacturers and devices suppliers, and IEC 61511, the process industry standard for SIS designers, integrators and end users. For valves, it's most important to define the appropriate safety integrity level (SIL). "It's also important to reach out to a certified process safety professional," added McCormick.

McCormick and Elkins presented "How Valve Selection Can Impact SIS in Refining Applications" on the third day of Emerson Global Users Exchange 2016 in Austin, Texas.

"The first task in SIS valves is selecting the right valve

for the application," said McCormick. "You must consider valve type, materials, fluid challenges such as particulate, corrosion, erosion, cavitation, noise, etc., and determine if the valve is SIL-capable to the level you need. In addition, just because you picked the right valve and all related components are certified SIL-capable, that doesn't mean they'll all work well together. Often, there's a different supplier for each component—valve, actuator or positioner—plus an integrator to put it all together, and this could introduce the possibility for error. The ultimate bottom line is: Is my valve going to move when I need it to?"

Partial stroke testing

Because SIL capability begins to slowly deteriorate as soon as a valve is installed, and users can't just pull and fully test large valves as often as they'd like, Elkins reported that suppliers such as Emerson have developed proof-testing and partial stroke test (PST) methods to bring valves close to their originally verified capabilities. These methods can detect: seized or tight valve packing, crimped or blocked actu-

“The ultimate bottom line is: Is my valve going to move when I need it to?” Janine McCormick, Emerson Automation Solutions, co-present the fine points of safety system valves with Tommy Elkins, ControlWorx services division, John H. Carter Co



ator air line, valve stem sticks, valve seat scars, debris in seat and plugged seat. Other failures include increased friction indicated by a travel deviation alert; broken shaft connection indicated by a visible change in valve signature from decreased friction band; increased breakout force required; and air line clogging indicated by supply droop detection.

To handle unusual problems—such as an outboard shaft moving but having no effect because their plug/shaft connection is broken—McCormick added that Emerson can deploy FIELDVUE SIS DVC diagnostics for shaft integrity. “If a low torque alert comes up during a PST, the user knows to question the shaft integrity,” she added.

To improve valve selection for SIS applications, McCormick recommended, “Be sure to review application needs, such as temperature, pressure, fluid, erosive and corrosive,

when selecting the final control element, not just SIL capability requirements. Evaluate whether to consolidate to one vendor for SIS valve solutions, or if that’s not the right path, do you feel that your vendors have good communication to get the solution right the first time? Do you need to add some buffer time in case something doesn’t mount quite right? Finally, review how you’re testing your valves. If it’s a visual exam, is that telling you everything you need to know, or would it be helpful to add a positioner to capture diagnostics? Also, are you leveraging the diagnostic capabilities of your DVC?”

SEVERE SERVICE ISOLATION VALVE SOLVES LEAK-THROUGH PROBLEM

New Emerson solution replaces ‘bad actor’ valve at Duke Energy’s Buck Combined Cycle Plant.

Paul Studebaker

Duke Energy’s Buck Combined Cycle Plant in Rowan County, North Carolina, is a 630-MW facility that burns gas in two combustion turbines and uses their exhaust to generate steam for additional turbine generators. Ever since its startup in 2011, the safety isolation valve on the spray attem-

perator has been a bad actor. “We replaced it three times between 2011 and 2014, each time at a cost of \$10,000,” said Jim Webb, account manager, R.E. Mason, which assisted Duke with the problem.

Together with Mark Nymeyer, global marketing communications manager for Fisher flow controls,

"A pressed-in primary seat was chosen despite its potential for a leak path because the specifiers wanted it to be able to expand and shrink without fretting the other internal parts." Mark Nymeyer, Emerson Automation Solutions, on selecting the right valve.

Emerson Automation Solutions. Webb presented the session, "Emerson Isolation Solution at Buck Combined Cycle," at Emerson Global Users Exchange in Austin, Texas. "The valve cost \$6,000, and installation cost \$4,000," Webb said. Worse, "when leaking, the valves were costing \$2,000 per month in thermal performance degradation."

The spray attemperator adds water to high-pressure (HP) steam to cool it to the right temperature to feed it to the turbines. The problem valve is on the line that supplies boiler feedwater to the attemperator, which operates at 350 °F and 3,500 psi. The isolation valve cycles several times each day when the unit is going in or out of load and was failing by destruction of its internal trim parts.

Together with Duke Energy, Buck Combined Cycle and Emerson specified and supplied a replacement valve that appears to be solving the problem. The replacement is based on the Fisher Z500 two-piece floating ball valve, which meets leak test criteria of standard AP 598 under both high and low pressure and is available in ½- to 36-in sizes with full or reduced bores in classes 150-4500 (also limited classes). Forged materials are standard.

The specified Z500 Severe Service replacement valve includes Inconel 718 internal components, spray-and-fused overlay coating and a double-d shaft. "A pressed-in primary seat was chosen, despite its potential for a leak path because the specifiers wanted it to be able to expand and shrink with temperature without fretting the other internal parts," said Nymeyer. With a blowout-proof shaft and graphoil packing rings, it is capable of API 598 shutoff in the pri-



mary flow direction, and Class 5 under reverse flow.

The valve is fitted with a Bettis G Series actuator with two sealed single-pole, double-throw (SPDT) GO proximity switches. The actuator is rated to 176 °F. "It's heavy and requires some extra support," Webb said.

The new valve was installed on Nov. 1, 2014. As of Jan. 13, it showed a count of 3,166 cycles and no sign of leak-through. "At an ambient temperature of 28 °F, I measured the pipe temperature as 30 °F. That's complete shutoff," Webb said. The cumulative cycle count indicates an average of seven cycles per day. "I was shocked that it was still working when it cycles so much."

Along with saving \$24,000 per year in thermal performance, the new valve promises to save the plant \$10,000 per year in replacement costs. "We have reliable, tight, metal-sealed shutoff," Webb added. "Emerson provided a quality solution with improved thermal performance that saved a lot of money for the plant."

LOW-BARRIER ENTRY TO IIOT ANALYTICS

New application helps users interpret data quickly and easily.

Dave Perkon

Emerson's Plantweb Insight applications build on the company's Pervasive Sensing and Secure First Mile offerings, and help users instantly make sense of plant data to drive overall enterprise profitability. "It's a single, lightweight, easy-to-install web-based platform that automatically and strategically interprets plant data through a scalable suite of applications," said Melissa Stiegler, director, wireless product management, Emerson Automation Solutions, in a Tuesday morning press release at the Emerson Global Users Exchange in Austin, Texas.

"About 18 months ago I spent time talking with customers about what wireless product they wanted Emerson to develop next," said Stiegler. "What I heard repeatedly was not that they wanted a new product, but that they wanted help with their data. They had tons and tons of it, but didn't know what to do with it, no one to look at it."

From this need sprang Plantweb Insight applications, which are designed to support customers' operational excellence programs in key performance areas such as reliability, safety, production, and energy and emissions management.

Using Plantweb Insight, users can improve asset reliability and energy usage by identifying abnormal situations and inefficiencies, recognizing optimum maintenance times, and tracking asset health to identify and prevent failures before they occur. They also can avoid potential safety incidents and ensure regulatory compliance, reducing fines and environmental impact through the real-time identification of leaks and other hazards.

The power of Plantweb Insight resides in its collection of easy-to-deploy applications, each containing the

embedded domain expertise and analytics that enable existing resources to immediately identify and resolve asset issues that historically were addressed by periodic, manual rounds or unexpected failures. These applications are designed to help users realize the most from Pervasive Sensing strategies at their sites.

More than a dozen total applications are scheduled for release, with each dedicated to a single, specific asset class. The first three applications are available now and future applications will be released at a rate of two per quarter.

Steam Trap Insight instantly identifies steam trap failures using wireless acoustic transmitters to re-



"They had tons and tons of it, but didn't know what to do with it, no one to look at it." Emerson's Melissa Stiegler on customer demands for help interpreting sensor data.

motely monitor steam traps, even in hard-to-reach locations. Up-to-the minute visibility of all steam traps allows manual rounds to be eliminated and dramatically reduces energy waste.

Pump Insight provides predictive health monitoring aimed at identifying and diagnosing the underlying problems that lead to pump deterioration and failure. Through monitoring and analyzation of temperature, vibration, efficiency, pressure and deviation data, wireless, real-time insight into cavitation and pump health is

generated and visually provided to plant personnel.

Pressure Gauge Insight works in tandem with Emerson's Rosemount Wireless Pressure Gauge, this application visually delivers safer and more reliable readings, enabling remote collection of field data as frequently as once per minute. Accurate, wireless readings keep operators updated on changing field conditions remotely – reducing manual operator rounds and improving safety by keeping personnel out of hazardous areas and safeguarding against catastrophic events.

HUNT REFINING WARMS TO WIRELESS

Early adoption trouble has given way to growing confidence in a broad range of applications.

Jim Montague

Some of the best relationships grow slowly and get warmer over time, even if they experience some bumps along the way. Such is the case with Hunt Refining Co., which cautiously adopted wireless for maintenance about six years ago, and came to appreciate it in a variety of monitoring, reliability, optimization and safety applications.

"It's been a long journey since 2007, but from early adoption of a pre-standard wireless solution to aiding development of future Emerson products, Hunt Refining truly blazed a wireless trail," says Alan Weldon, technical services and safety director, Hunt Refining. "I initially said I didn't want to do wireless, but our maintenance manager decided to try it, and generated savings. So, we began to try wireless in other areas, and now I'm a big wireless advocate."

Weldon and Donna McClung, executive field engineer, Emerson, and Steve Moore, wireless specialist,

Emerson, presented "From Resistance to Enthusiasm: A Wireless Odyssey" on the second day of Emerson Global Users Exchange 2016 in Austin, Texas.

"Our initial resistance was due to concerns of network reliability, security and integration into the existing DCS," adds Weldon. "However, acceptance grew as the wireless network was expanded to include many pervasive sensing applications that address safety, environmental, reliability and process needs across the refinery."

Wireless growing pains

Hunt began using wireless shortly after Emerson introduced its version in 2007 to monitor tank temperatures in a remote location. "Potential savings overcame initial resistance, and we installed three Rosemount 648 wireless temperature transmitters along with a 900-MHz 1420 Gateway and four additional 648s as repeaters," Weldon explained. "However, we also had some bumps in the road."

"The takeaway is when we look at an application now, we immediately ask if we can do it with wireless." Alan Weldon, Hunt Refining Co.

Wireless temperature monitors were added to more tanks the following year, but some power modules had to be replaced after less than a year of service. Weldon's staff and their colleagues from Emerson determined that the existing, 900-MHz wireless network was experiencing "choke points" with too much data trying to pass through one device. Also, battery life issues caused a delay in installing more wireless temperature monitoring.

Standards and solutions

These wireless hiccups began to be resolved in 2009 when Emerson's Rosemount division adopted the WirelessHART protocol, and Hunt upgraded to a newer, 2.4-GHz WirelessHART gateway. AMS and Wireless Snap-On were also added to address network stability and reliability concerns. "This made the upgrade easy and successful," said Weldon. "So when overflow protection was needed on a remote ethanol tank, we installed a Rosemount 702 Discrete Wireless Transmitter to a two-point float switch."

Then, to improve equipment reliability in 2010, Hunt implemented Rosemount 648 temperature transmitters on critical heat exchangers. And, to address environmental compliance, it added Rosemount 3051CD DP and 648 temperature transmitters to monitor water flow and temperature going to the nearby Black Warrior River.

In 2011, Hunt added a THUM wireless adapter on a 3051 SMV transmitter to meet 40 CFR 98 reporting requirements for greenhouse gases. Following its success, THUM was added to a Micro Motion Coriolis meter measuring asphalt to a coker for density and mass flow data. However, intermittent communication issues delayed installation of additional THUMs. "That added some angst," said Weldon. "But the difficulty was finally identified as a wiring issue, and it was repaired."

More recently, Hunt installed six Rosemount 708



acoustic transmitters on its Butane Bullet relief valves in 2013. These notify operators if a relief valve is beginning to relieve or leak. In 2014, the refinery added three Rosemount 848 high-density temperature transmitters on diesel hydrotreater and combined feed exchangers.

In 2015, Hunt upgraded its wireless gateways to Version 4.0, which was required to install a Permasense corrosion monitor and 20 sensors in coker and crude unit. Also, a THUM was added to a Micro Motion meter on a crude feed tank to monitor flow, temperature and API gravity, and a CSI wireless vibration monitor 9420 was added to coker jet pumps. "Finally, this year we added Micro Motion's high-capacity ELITE Coriolis Meter with THUM to our oil movements area for custody transfer of asphalt," said Weldon.

"Our initial resistance to wireless was overcome by its demonstrated network and transmitter reliability, as well as the improved diagnostics from AMS and Wireless Snap-on. Our acceptance resulted in non-traditional monitoring applications in environmental, reliability and safety. So far, we have a total of 77 Emerson wireless devices and 20 third-party devices installed. The takeaway is when we look at an application now, we immediately ask if we can do it with wireless."

REMOTE SERVICES TIE END USERS TO EMERSON EXPERTS

Pay-by-the-drink for help with downtime, energy usage and preventive maintenance challenges.

Jim Montague

Like any good help, capable process control and automation experts can be hard to find. To compensate for the double whammy of accelerating retirements and galloping technical advances, Emerson Automation Solutions introduced its new Connected Services program this week in a press conference at the Emerson Global Users Exchange.

Connected Services is an essential element of the company's Plantweb digital ecosystem which securely delivers plant-floor, operations technology (OT) data up to enterprise and cloud-level software applications.

"Connected Services represents a model for collecting equipment data, and getting it to Emerson's experts," said Mike Boudreaux, director of Connected Services, Emerson Automation Solutions, who described Connected Services, its capabilities and how it fits into the Plantweb digital ecosystem.

"The big challenge is how to manage available expertise," Boudreaux explained. "We've all been saying that more retirements are coming to our field, but they're happening now. Many of our customers are having to go wide and thin on their experts, and those who need expertise in many specific areas can't maintain it. There's also a lack of skills coming in, so the knowledge gap is widening even more."

To spread Emerson's process control expertise as efficiently as possible, the company's Connected Services, aided by the Microsoft Azure platform, makes possible real-time monitoring of equipment and device health, energy use and other process variables.

These enable Emerson experts to constantly monitor and develop reports on device and production performance, prioritize repairs, and perform asset trending. The services are scalable, leverage existing equipment, and employ Emerson and Microsoft cybersecurity solutions.

"We have experts on staff with years of experience in getting real value from process data, and delivering it to customers so they can make better decisions," explained Boudreaux. "They can help users with any of the performance, uptime, reliability or other chal-



"Connected Services represents a model for collecting equipment data, and getting it to Emerson's experts." Emerson's Mike Boudreaux on the company's new range of remote monitoring and support capabilities.

lenges they may have,” added Boudreaux. “Typically, we don’t need to sell customers on the value of this expertise because they already know the KPIs they’re looking for Emerson to help improve. These usually fit into their existing reliability programs.”

As a result, Boudreaux reported that Connected Services are expected to reduce or eliminate unplanned downtime; minimize and optimize preventive maintenance tasks; reduce overall maintenance spend by increasing predictive work orders; and improve outage planning for maintenance and spare parts.

As part of the Plantweb digital ecosystem, Connected Services are on offer in several major areas, including:

- **DeltaV Connected Services** will drive reliability and performance improvement by sending continuous health monitoring from customer sites via email to the Emerson Global Services Center, which will send back local response and resolutions recommendations.
- **Steam Trap Connected Services** seek energy, reliability and quality improvements by sending acoustic data from WirelessHART gateways, delivering it to the Center via VLAN or cellular connections, and emailing back steam trap condition reports that make maintenance or device replacement more targeted and efficient.
- **Machinery Connected Services** gather continuous vibration monitoring data, sends it to the Center via HTTPS protocol, and emails back advice that lets the customer collaborate with its local Emerson representative.
- **Control Valve Connected Services** that leverage online ValveLink software to gather DeltaV, HART, MUX and WirelessHART data and communicates via HTTPS with the Center, which emails back advice on how the customer and local representative can collaborate.

“A gateway sits on the user’s network, monitors for changes, and collects and sends them to the services center,” said Boudreaux. “Next, the center finds items the user might not see otherwise, filters out noise and chatter, and sends back actionable information. In this case, the innovation is that Emerson now owns the monitoring sensors and wireless gateways, and hosts the software; customers sign up for long-term service contracts, and pay a monthly fee; and we add network monitoring to improve their reliability as part of their subscription service.”

Beyond its present Connected Services for DeltaV, steam traps, control valves and machines, Boudreaux added that Connected Services also will be coming soon for gas chromatographs, ultrasonic flowmeters, radar tank gauges, metering skids, heat exchangers, compressors, turbines, boilers, heat recovery steam generators and other process equipment.

“The next phase of Connected Services will have more secure connectivity, and use data diodes for cybersecurity. We’ll also take their onsite connectivity and available software, apply that infrastructure across Emerson Automation Solutions, and coordinate it with Secure First Mile networking and Microsoft Azure to add more services,” explained Boudreaux. “Using our version of the analytics maturity model, based on API-691 for Advanced Condition Monitoring, we’ll go from simply aggregating data visualization to anomaly detection, diagnostics, prognostics, decision support and intelligent products.

“In this case, the last mile is using the Microsoft Azure cloud environment, partnering with OSIsoft and Dell, and using Azure for machine learning, big data storage and Microsoft IT support,” Boudreaux said. “Connected Services represents a model for collecting equipment data, and getting it to Emerson’s experts.”

SOFTWARE SUITE DRIVES OPERATIONAL CERTAINTY

New applications help drive overall improvements in equipment health, process performance and energy consumption.

Paul Studebaker

Leveraging the Industrial Internet of Things (IIoT) begins with generating continuous, in-depth, quality data on a plant's assets. However, transforming that vast amount of data into actionable information requires powerful analytics that provide plant personnel with the specific information they need to ensure reliability and efficiency.

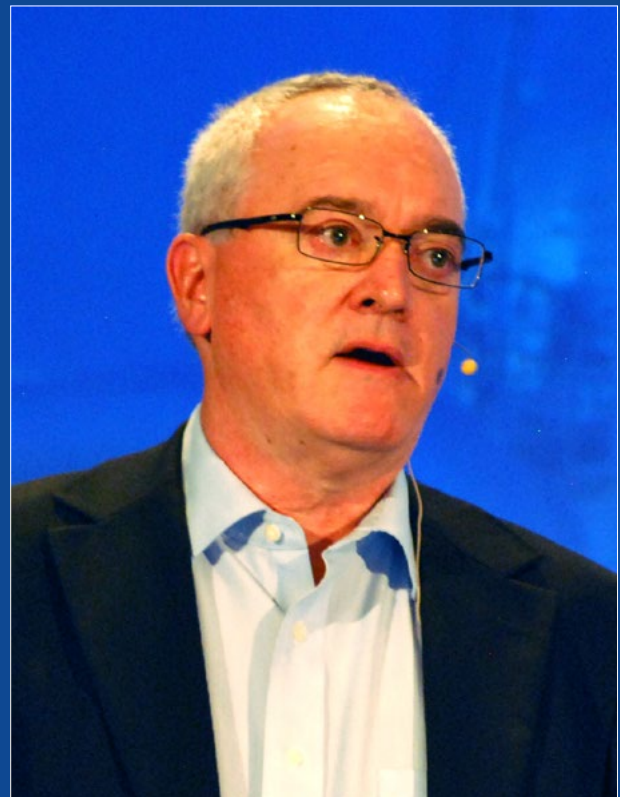
"In a typical organization, data flows are very complex due to complex work environments, silos and fragmented technologies," said Phil Niccolls, vice president, industry marketing and applications, Emerson Automation Solutions, to press conference attendees Tuesday morning at Emerson Global Users Exchange this week in Austin, Texas. "It comes down to a lack of IT and OT convergence. Plantweb Advisor is our solution to help customers bring information and decision-makers together."

Plantweb Advisor Suite is a key component of Emerson's Plantweb digital ecosystem. Niccolls announced the addition of two new applications, Health Advisor and Performance Advisor, to the previously released Energy Advisor. All leverage the industry-standard OSIsoft Pi System's highly scalable, open data infrastructure that captures and shapes data generated by equipment.

Empowering a plant's reliability, process and energy experts with critical information can improve or restore a plant's profitability to industry-leading levels. (Top Quartile performers can recover two weeks of available production per year as compared to their average industry peers). Estimates show that 47 percent of unplanned outages are

due to equipment failure, and the cost of repairing a failed asset is 50 percent higher than addressing the problem prior to failure. Further compounding the issue, the petrochemical industries are experiencing up to a 40 percent loss in energy due to various inefficiencies.

Plantweb Advisor Suite is designed to help plants achieve significant improvement across these areas. For example, a 250,000 barrel-per-day refinery using the suite can recover as much as \$15 million a year in maintenance savings and new revenue, specifically resulting from 1.2 percent capacity recovery, 14 percent maintenance



"In a typical organization, data flows are very complex due to complex work environments, silos and fragmented technologies. It comes down to a lack of IT and OT convergence." Emerson's Phil Niccolls explained how the company's new Plantweb Advisor Suite can help advance Operational Certainty for end users.

nance reduction, and 10 percent energy recovery.

Health Advisor improves asset reliability, increases process availability and helps reduce safety and environmental risks by providing continuous diagnostics and equipment alerts prior to the occurrence of unplanned shutdowns or slowdowns. This information enables plant personnel to take corrective action and avoid production losses, reactive maintenance and environment or safety incidents.

Performance Advisor is a real-time application that cal-

culates equipment performance, enabling plant operators to run processes more efficiently, track operating performance against targets, schedule maintenance activities and determine the root cause of production asset inefficiencies.

Energy Advisor is a real-time Energy Management Information System (EMIS) that automates the process of mapping and managing energy consumption as it is being consumed. Real-time alerts, dashboards and emails signal when energy consumption is higher than expected so that actions may be taken to reduce energy costs.

PEMEX RESURRECTS OIL PLATFORM WITH INCREASED PRODUCTION

Mexican oil producer turns to Emerson for fast-track recovery.

Mike Bacidore

When the Abkatun-A permanent platform exploded and collapsed in April 2015, the operator, Mexican state energy company Pemex, couldn't get it back into production quickly enough.

"Abkatun-A platform was built in the Gulf of Mexico in the early 1980s," explained Ana Matute Portillo, Emerson marketing communications manager in the region. "The oil complex of six integrated platforms is 80 km off the coast of Carmen in Campeche. The production capacity is 380,000 bbl/day of light oil and 250,000 bbl/day of heavy oil, along with 630 million standard cubic feet/day of sour gas."

Mexico is the world's tenth largest oil producer, and when the Abkatun-A platform went dark, Pemex deferred 220,000 bbl/day of oil. "Stopped production has a cost of \$8 million/day, or \$240 million/month," explained Portillo at the Emerson Global Users Exchange this week in Austin, Texas.

"Around this complex, there are many field productions," explained Fernando Mirafuentes, solutions manager, Emerson. "A lot of pipelines converge to the complex. The production is collected at the linking platform and sent to the temporary platform and then to the permanent platform

where there's a separation of oil and gas. This platform is capable of pumping 750,000 bbl/day of oil. The challenge to rebuild the platform was incredible."

Pemex needed to get the platform back in production and targeted December 2015 as the date, but it also wanted to increase production with the rebuild. "Pemex had two different concerns—to restart production and to increase production. And July 2015 was when the bidding process started."

The operator wanted to restart the entire platform at the same time and not receive single parts of the solution at different times. "The scope included supply, installation and startup," explained Mirafuentes. "They preferred one company to supply the whole solution for automation, system and safety in one package. The challenge was not easy."

Two competitors had an installed base in the complex. "They had three companies participating in the bidding—Invensys, Emerson Automation Solutions and Rockwell Automation," said Portillo. "Pemex was looking not only for product, but for a supplier that could work with them in a super-short period of time. They

“They preferred one company to supply the whole solution for automation, system and safety in one package. The challenge was not easy.” Emerson’s Fernando Mirafuentes on bringing a Pemex oil platform back to life in the Gulf of Mexico.

were looking for a company with experience.”

Emerson was assigned the automation and given just three months to execute. “We provided and executed the entire project,” explained Portillo. “When restarting the platform, we also established the basis for increasing production.”

In the first phase of the project, the instrumentation was integrated in the factory. “The scope was to supply systems, supply DCS instrumentation, supply fire & gas instrumentation, supply emergency shutdown (ESD) instrumentation and install, commission and start up,” explained Mirafuentes. “The second phase was an extension of project. The real challenge was the installation in the field.”

This solution was only for the permanent platform. But in Phase III Pemex wanted to replicate the system on all platforms in the Abkatun Complex.



“We were able to restart operations in 70 days, even though the schedule was for 90,” said Portillo. “The investment was paid off in a few hours. As a result of the rehabilitation, they implemented a new separator and Pemex was able to increase production to 30,000 bbl/day.”

SPAM BE GONE: MONSANTO TAMES NUISANCE ALERTS

Device alerts can assist in timely decision-making—as long as there aren’t too many of them.

Dave Perkon

“Sometimes, taking advantage of status and diagnostics in intelligent devices can inundate you,” began Joel Holmes, site electrical reliability engineer at Monsanto’s manufacturing facility in Muscatine, Iowa. “A single instrument failure can result in six or more alerts. So, instead of sorting through a mountain of nuisance alerts, use AMS

Device Manager to rid your system of spam information so you can focus your attention on more important decisions.”

Holmes, employed by Monsanto for more than 23 years, also supports the enterprise globally with respect to Emerson’s AMS solution. In the context of a workshop focused on taming nuisance alerts this week at

“We actually realized an 82% reduction in device nuisance alerts.” Monsanto’s Joel Holmes on a successful pilot deployment of the latest AMS Device Manager release to filter out redundant, unactionable alerts.

the Emerson Global Users Exchange in Austin, Texas, he discussed the use of Alert Monitor, which he described as the predictive component within Emerson’s AMS Device Manager software application. He also discussed solutions provided in AMS Device Manager v13.1.1 upgrade and gave actual results of a pilot program underway at the Monsanto plant. He also discussed optimization and enhancements discovered along the way.

Monsanto Muscatine, located in southeast Iowa along the Mississippi river, primarily manufactures and packages Roundup herbicide at its 150-acre, 450-employee facility. This 24/7/365 operation produces 70% of North America’s Roundup herbicide.

The AMS Device Manager at the Monsanto plant is a distributed application that encompasses multiple DeltaV domains and a legacy PROVOX system. AMS is integrated with its distributed control systems and includes more than 1,700 HART protocol tags and more than 125 FOUNDATION fieldbus tags.

There are multiple device family clusters spread throughout the facility. “Imagine the amount of information that is coming in to our Alert Monitor, including status and diagnostic information,” said Holmes. “The data is flooding our system. It’s not just one area, it’s the entire plant.”

What Is a Device Nuisance Alert?

“Manufacturers provide a multitude of information from intelligent devices right out of the box which is great,” said Holmes. “Unfortunately, much of the information does not add value, often is redundant to the root cause, or it’s cryptic,” Holmes said. “We had a mountain of information coming in to our system—well over 100 device alerts a day.”

Monsanto needed to be able to make reasonable use of the data coming into its systems. To highlight a nu-



sance alert, Holmes provided an example of a dual element, hot backup temperature sensor. “An alert was simulated by lifting a wire,” explained Holmes. “As a result, with v12 and v13 of Device Manager, a total of six device alerts occurred due to this single instance. After the upgrade, with the new v13.1.1 of Device Manager, you get just the information that adds value: sensor open and hot backup active. This results in an 83% reduction in actual generated alerts for this one incident.”

Optimization and Enhancements

By optimizing the device toolkit installations, more usable information is available to act on. “There is less noise in your system that you will need to deal with, enabling you to get to the core issues your plant is experiencing,” said Holmes. “It’s all about usable information instead of too much information—which is often ignored.”

Optimization of the device install toolkits is a major portion of the upgrade. It eliminates the noise and spam in the data that the manufacturers originally provided with their intelligent devices.

“A quick snapshot of our pilot system showed a small number of devices were generating a large amount of

spam in the system,” said Holmes. “A dozen device types were generating over 90% of our alerts. Additionally, we had only 10 individual devices that were causing more than 40% of those alerts. The top 20 accounted for 80% of all the alerts we saw. We were able to eliminate more than 50% of those instances because they were redundant or did not add information of value.”

One key objective of the AMS Device Manager V13.1.1 upgrade was to make it as efficient and simple as possible to get up and running at users’ sites. Over 120 device descriptor files were upgraded. Other additions include an auto-

sorting feature to help set up the Alert Monitor configuration, and a default capability to simplify configuration.

The results of the Monsanto pilot project are impressive. “Through our initial testing, we predicted we could achieve a 60% reduction of device alerts within Alert Monitor,” said Holmes. “The actual results were well beyond that. We actually realized an 82% reduction in device nuisance alerts and a 71% reduction of device tags that were part of those issues. It made me more efficient at my job, and more improvements are planned for the future.”

GO FIRST AND LEAD THE WAY

Former NFL quarterback Tom Flick shared his perspectives on effective leadership, management and innovation with Emerson Exchange attendees.

Mike Bacidore

The only thing better than winning is leading others to victory. “Winning is great,” said Tom Flick, a former NFL quarterback who delivered the guest keynote address Monday. “It’s an amazing thing. But there’s something better than that—helping other people to win.”

Leading change has more to do with the heart than it does with the head, said Flick, who’d been knocked out five times during his football career. He offered three golden threads in his presentation on leadership in a world of complacency.

1. Leadership is the name of the game. “Our world is overmanaged, but leading is different,” Flick assured.
2. The speed of the leader determines the rate of the pack. “Bringing people together lets you jump through opportunities collectively,” he said.
3. Leading change is a process of engaging the head and the heart. “We are fast to use the brain but slow to use the heart,” warned Flick. “Feelings are more influential than thought when it comes to bringing about change,” he suggested.

Quarterbacks are taught to look over the defense and locate danger, explained Flick. The quarterback is the leader of the offensive squad on the field. He holds 65-70 meetings a day, and those meetings last just a few seconds, but it’s the quarterback’s job to lead the other 10 players. “Great leaders and great competitors hate to lose,” said Flick. “Great teams stack one good play on top of another good play on top of another good play.”

Flick recounted a game in which he replaced injured quarterback Joe Theismann and found himself under center and staring across the line of scrimmage at the Pittsburgh Steeler defense. Middle linebacker Jack Lambert pointed a finger straight at him and asked, “Who are you?”

While Lambert’s intent was to intimidate, Flick found it ultimately inspirational. It spurred the questions a great leader should ask: “Who am I? Where am I going? Where am I going to end up? What is life really all about? Great leaders can answer these questions. The people you’re trying to lead want to know if you can lead,” he said.

"If everything is important, then nothing is important."
Former NFL quarterback Tom Flick on how a great leader finds what's more satisfying than winning.

What motivates you and enables you to lead at a higher level is based on your picture of your future, how you focus your energy and your team's energy. What is it that you do?

The distinction between leadership and management is increasingly important. "We've educated people to become managers," explained Flick. "Management's job is taking complexity and making something simple. Management does not move us forward. Its job is keeping things the same."

Leadership is wholly different, said Flick. "It's communicating motives and strategy," he explained. "It isn't mysterious. It's not better than management. Nor is it a substitute for it. If management is playing defense, then leadership is playing offense. If management is transactional, then leadership is transformational. Management is keeping things the same. Leadership is about change."

The two great challenges we face in growing business are complacency and false urgency. "Complacency is contentment with the status quo," explained Flick. "This is not laziness. It's not intentional. It isn't malicious. It creates a 'stop' attitude. What's the point of change? Complacency is based on past success."

False urgency, on the other hand, is a ramped-up, hair-on-fire, fear-based stop attitude. "When you're exhausted at the end of the week and realize you accomplished nothing, that's due to focusing on false urgency," said Flick.

Comfort zones also cause a stop attitude, but true urgency is a true asset. "People come to work to duck real hazards and seize real opportunities to win that one day," explained Flick. "This gives us a 'go' attitude. If you are truly urgent, there's a chemical change in your brain to get you on the go side. True urgency looks like focusing on the head and the heart."

Like winning a football game is based on stacking one winning play on top of another, business success is winning one day at a time, suggested Flick. "Start your morning with no access to anyone else," he said. "Turn off electronic devices. Create a list of one to three opportunities that



you'll focus on that will ensure you win the day. Then determine a list of one to three dangers or hazards that would prevent you from winning the day."

A leader's voice speaks out like a megaphone with hope, optimism and courage. "Words create pictures," he explained. "When you speak to yourself internally or are trying to communicate something, the words create pictures, which create emotions. Emotions create attitudes, which permit behaviors that create habits. Habits create reality for you and me. Great leaders are very intentional about how they speak."

If you want to really push frontiers, you need to seize the big opportunities. You can't make a list of priorities that's three pages long. Focus on the few big priorities. "If everything is important, then nothing is important," explained Flick. "We need to be truly urgent. Leading change is the process of connecting the head and the heart. Technology is coming at you with lightning speed. Seize the big opportunities, and use the leader's voice."

See yourself as a leader who serves, offered Flick. "Establish strong relationships," he said. "Consistently take action to help others. The more you help others to get what they want, the more you get what you want. How do we make it easier to lead courageously and seize opportunity? Go first and lead the way."



SAVE THE DATE!

Emerson Exchange 2017 comes to Minneapolis, Minnesota, USA, October 2-6