

CONTROL

PROMOTING EXCELLENCE IN PROCESS AUTOMATION CONTROLGLOBAL.COM

2021

Oil + Gas Automation

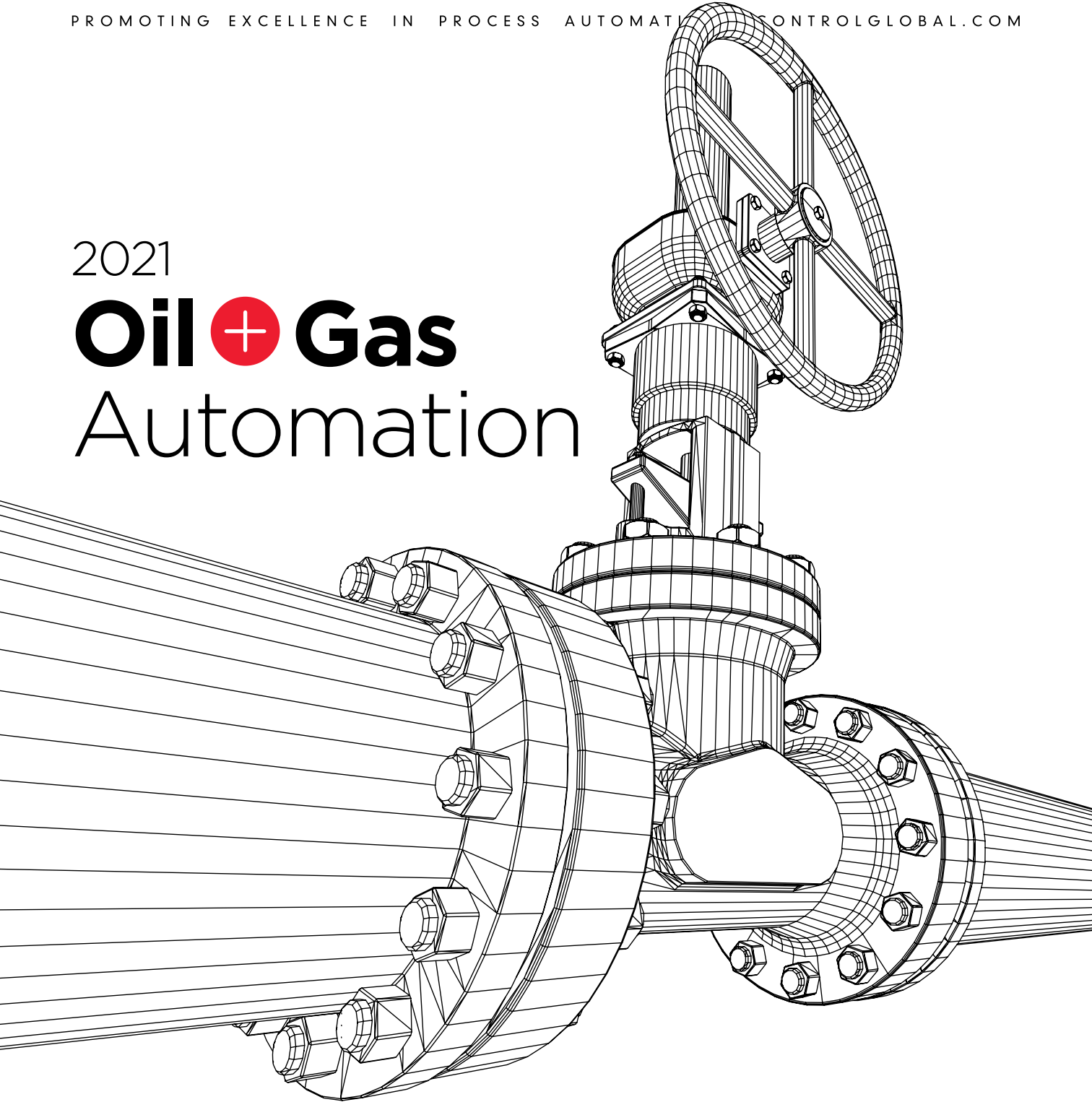


TABLE OF CONTENTS

Oil & gas panel tackles energy transition, digital challenges	4
Plantwide I/O approach streamlines plant start-up	9
Sour gas plant shaves three months from schedule despite onrush of late design changes	
OPAF/O-PAS world tour	14
Open Process Automaton Standard (O-PAS) test labs are multiplying worldwide	
Transforming Terminal Automation operations on a grand scale	24

AD INDEX

Acromag • www.acromag.com	3
Krohne • us.krohne.com	8
Moore Industries • www.miinet.com/HES	27
Rittal • info.rittal.us/modular-enclosures	13
Sierra Instruments • info.sierrainstruments.com	23



Dependable Value

Expandable Remote I/O Modules for Ethernet



New Expandable Ethernet Remote I/O Modules Offer Great Flexibility

Acromag's new BusWorks® NT Series remote I/O modules provide an Ethernet interface for analog, discrete, and temperature signals. These modules provide value with I/O expansion of up to 64 channels with a mix of signal types on a single IP address.

- Configurable over Ethernet with a web browser
- i2o® peer-to-peer or multicast communications
- Dual RJ45 ports enable daisy chain topology
- Modbus/TCP, Ethernet/IP, and Profinet protocols
- Conditional logic for rule-based I/O operation
- Thin 25mm housing with pluggable terminals
- Wide temperature operation (-40 to 70°C)

You Get Personalized Support-Guaranteed

You can trust Acromag for all your signal conditioning and remote I/O solutions. You can be confident that with our more than 60 years I/O experience that you will get professional personalized support – guaranteed.

ISO9001
AS9100



877-295-7066

Acromag [®]
THE LEADER IN INDUSTRIAL I/O



 Visit Acromag.com/NT
TO LEARN MORE

Remote I/O Solutions You Can Depend On.

Oil & gas panel tackles energy transition, digital challenges

By Jim Montague

Digital transformation may be one of the few saving graces that can help oil and gas producers cope with their roller-coaster, rapidly transitioning and COVID-19-impacted markets. However, as with any big shift, it's easier said than done.

The Oil & Gas Industry Forum, part of this week's Automation Fair at Home event, played virtual host to five industry experts to explore these issues and consider possible solutions.

"The pace of transition in the energy industries is accelerating, but there's also a lot of demand destruction now, which has a long-term feel that makes it different than previous events," said Fred Wasden, Shell veteran and managing member at Optilytix, a consultancy focused on accelerating

asset value realization through data analytics and technology implementation for the energy industry. "The second trend is an overwhelming surge of digital technologies by process-industry users, which are being adopted after being risk-tested in other industries. We're also facing a big challenge in recruiting and retaining staff. It's an exciting time, but it's a lot of change all at once."

DIPS INSPIRE REFOCUSING

Pal Roach, industry consultant, Oil & Gas, Rockwell Automation, added, "The present situation with COVID-19 is similar to past downturns. Much of the initial 30% dip in demand has been recovered, but we're still down 5-7%, and most estimates are that it will be slow to come back because so many more people are working at home. At the same time, even though demand

for aviation fuel has collapsed, diesel fuel is up because there are so many Amazon and other trucks driving through neighborhoods. Some estimates are that demand will remain down 5-6% for 20 years, and some refineries will have to close. Others indicate the refining industry may grow 20% by 2040, but this will still be only a 1% increase per year.

“This is all impacted by the fact that refining is a unique business, which has little or no influence over the cost of its materials or the products it produces, and also has to deal with many regulations and safety requirements. The challenge is to optimize feedstocks and operations, and seek better performance and maintenance. The service side of refining took a big hit in 2014 due to pricing pressures on operators, causing some providers to exit the industry and refocus.”

Chetan Desai, vice president of digital technologies at oilfield equipment and services supplier Schlumberger, explained that these challenges are causing the company’s upstream and midstream clients to sharpen their focus on portfolio management. “Especially in the past six weeks, we’re seeing supply and demand imbalances, and efficiency and cost concerns, which are leading to an increased focus on total value creation, closer integration with service providers to scale up quality, and delivering greater value to asset operators.



“Users can get some quick wins with digitalization, and use them as a foundation for transitioning to a new world.” ExxonMobil’s Dave Hedge argues that the oil and gas industry must adopt digital tools to attract the new generation of technical professionals that will bring the industry forward.

They’re also focusing more sharply on existing operations, instead of exploring for new ones on the frontier.”

NEED TO LEAD IN NEW DIRECTIONS

To address these epic challenges, the panelists reported that new levels of leadership will be required across the oil and gas sector. “This really begins with a vision for success that addresses profit and safety, of course, but also acknowledges that greenhouse gas intensity has become a front-and-center metric, too,” said Wasden. “This means many leaders will have to adopt broader visions than they have in the past, and bring their priorities into balance.

“Previously, leaders might talk about ‘people, planet and profit,’ but the focus

was still mostly profit,” he continued. “Now, they’re going to have to deliver on all fronts. Fortunately, there are ways for oil and gas leaders and their organizations to do it. For example, just as we use the Waze app to navigate our commutes, we’ve tried equivalent software that can help with operating oil and gas fields, and they can deliver some significant benefits. For many leaders, the focus has been less on inventing new applications, and more on adapting existing software to their processes.”

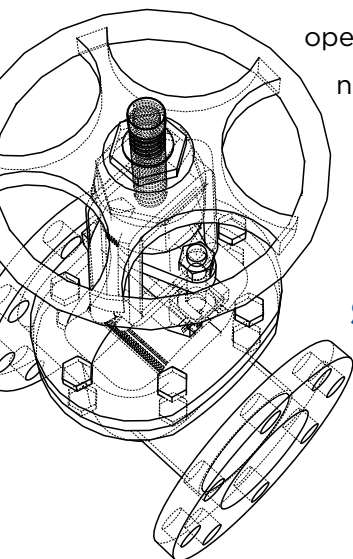
ALIGNING WITH DIGITALIZATION

Because so many potentially useful technologies are emerging so quickly, Andy Weatherhead, chief technology officer at Sensia, reported that many of these technologies and their architectures are converging. “For example, cybersecurity capabilities are getting baked into many products, which is making them pervasive,” he said. “Many applications are becoming increasingly virtualized at the same time that they’re participating in open-source software communities like the Open Process

Automation Forum (OPAF), or beginning to use fit-for-purpose sensors or self-organizing wireless components.”

Desai added that one way to organize today’s ever-shifting technology deluge is to ask “to what end?” and concentrate only on those that can solve specific problems. “The real problems are change management and adoption, and how to package and deliver solutions to users,” explained Desai. “Digitalization can affect all the pieces in the full, cradle-to-grave lifecycle of many hydrocarbon assets, so we have to focus on the ones that can uplift performance across those lifecycles.”

Roach cautioned these shifts aren’t easy for process applications because they’re so firmly based in physical settings. “Many process assets cost \$100 million to \$250 million or more, and are so complex that it’s hard to develop digital representations, or build models of them that can indicate when they need support or maintenance,” said Roach. “Digital twins of physical equipment are also costly up front, but once users have



One way to organize today’s ever-shifting technology deluge is to ask “to what end?” and concentrate only on those that can solve specific problem.

them, they can start to follow their physical counterparts for better performance of engineering, maintenance and support tasks. This is likely where most of the benefits will occur.”

Dave Hedge, solution architect at Exxon-Mobil Information Technology, reported there are three main phases of digital transformation—initial data collection, taking and learning, and applying it back in the field—and that COVID-19 has accelerated all of these initiatives. “It’s amazing what digital transformation can do, but the question suddenly became ‘how can we get everyone onboard?’ So, we need to get back to deciding on a common vision about what we need digitalization to do based on extracting value from our processes.”

CULTURE LUBRICATES, INVESTS IN TRANSFORMATION

The panelists unanimously agreed that a critical ingredient of digital transformation is encouraging cultural acceptance by operators, technicians, engineers, managers and other end users.

“The process operations landscape is still all about people,” added Desai. “These staffers are demanding access to digitalized tools and retraining for machine learning (ML) and artificial intelligence (AI), and their companies will need digital dexterity to make it happen. Leaders will have to ask if their organization are agile enough and open to

these changes. We all need to get proficient at using them. It’s no longer enough to just be good: digital technology is needed to attract talent. Users running \$20-50 million assets have FitBits on their wrists checking their heart rates, and they want the same technologies for their operations.”

Hedge reported that recent graduates coming into the process industries have skills like Python programming, and want to use them to improve process industry applications, but they still need acceptance from veterans and managers to help the field move forward. “Upstream, midstream and downstream users are looking more closely at the data moving across their companies,” added Hedge. “They want to ‘see the molecules’ moving from production to customers. All that data, from their premises and platforms, is coming in waves, and digitalization can help organize it.

“This also is why it’s time to invest in digitalization. Fast return in investment is always needed, but users can get some quick wins with digitalization, and use them as a foundation for transitioning to a new world. We just need to make a few initial steps to get started. These are businesses that still need to make money, and digitalization can add to those bottom lines.” ∞

About the author

Jim Montague is executive editor of *Control*. He can be contacted at jmontague@putman.net.



Pushing the limits for your measurement applications

Products, solutions and services for the oil and gas industry

- Process instrumentation for flow, level, pressure and temperature
- Metering and monitoring solutions from design concept to on-site commissioning
- Consultancy, engineering, start-up, periodical validation, training, Service Level Agreements and metrological accreditations
- krohne.com/oilandgas



us.krohne.com

► products ► solutions ► services

KROHNE
Oil & Gas

Plantwide I/O approach streamlines plant start-up

Sour gas plant shaves three months from schedule despite onrush of late design changes

By Keith Larson

Companies have long complained about automation budget over-runs and schedule delays, often due to late changes in project design. Traditional, hard-wired input/output (I/O) systems were a primary culprit because hardware procurement and software development necessarily proceeded sequentially. Design changes requiring more or a different mix of I/O resulted in expensive and time-consuming re-engineering that affected both budgets and schedules. These impacts, of course, got progressively worse as the project neared completion.

But gas processor SemCAMS Midstream (now part of Energy Transfer Canada) bucked that trend, beginning production at its greenfield Wapiti sour gas processing plant in northern Alberta in

late January 2019—under budget and three months ahead of original schedule—despite late changes and additions to project scope.

How, you might ask? Project principals credit in part the plant's pioneering use of ABB Select I/O, the Ethernet-based single-channel I/O system for the ABB Ability System 800xA control system. Importantly, Select I/O relies on industry-standard Profinet as the backbone of its plantwide I/O network. Use of this standard protocol dramatically streamlined the integration of even third-party I/O on skids that came late to the party. Indeed, changes during the engineering process had increased the I/O count from 1,200 to 2,400 as more gas streams and equipment were added.



Gas processor SemCAMS Midstream (now part of Energy Transfer Canada) began production at its greenfield Wapiti sour gas processing plant under budget and three months ahead of original schedule— despite late changes and additions to project scope.

The Wapiti plant also marked a successful effort by system integrator Blackrock Automation, which has earned a reputation for tackling tough automation assignments with skill and precision. The fact that project startup came when temperatures were dropping to -42 °C was another of the challenges for the project team to overcome.

ELIMINATING DEPENDENCIES

ABB's Select I/O was designed to eliminate the traditional, controller-centric methodology that made late changes so difficult to accommodate. Called xStream Engineering (now part of the ABB Adaptive Execution methodology), the approach provides multiple workstreams and late binding principles to promote engineering efficiency. At Wapiti, this enabled remote I/O cabinets to be installed and wired in the field while the Blackrock team configured the system

at their Calgary office. Decoupling project tasks reduced the impact of late changes, and activities such as functional wiring and loop checks could be done much earlier.

“We designed, built and installed 27 identical remote I/O cabinets each with 96 I/O per cabinet,” says Galen Wilton, senior programmer at Blackrock Automation. “As a result, we were able to field-test all the cabinets in just two or three hours. Select I/O also saved a lot on cable by allowing us to use more flexible switching devices between panels and reassign them as needed. That meant most changes were no longer about asking for money, but were about new ways to save money.”

Each of the Class 1, Div. 2 remote cabinets was assigned a device address on the Profinet network as it was added, enabling last-minute changes throughout the process. The project also featured motor-control-center (MCC) communications with more than 40 Multilin relays and 76 variable frequency drives over Profinet.

“Select I/O is perfect for remote I/O applications as it moves the I/O from the motor control center and electrical rooms into the field,” explains Brad McDonald, product marketing manager for ABB. “Extra I/O can simply be ordered and installed as needed since field wiring doesn’t have to be brought back to the central control room. This eliminates marshaling, junction boxes, cabling and cable tray, ultimately reducing project costs by 30-40%.”

The control and network architecture at Wapiti includes two virtual servers, two servers working as historians, four operator stations, three engineering stations, PLC interfaces and two AC 800M controllers connected to the remote I/O cabinets.

In addition, there were two local S800 I/O cabinets connected via Profibus for remote MCCs.

REDUNDANCY REQUIREMENTS

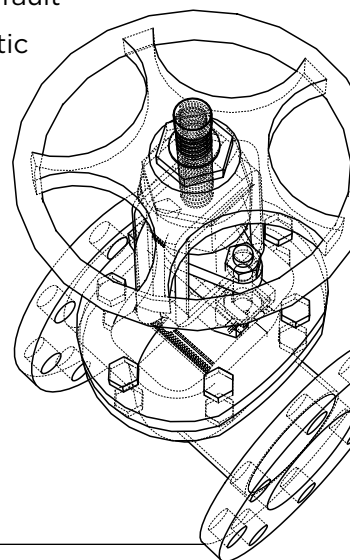
“In addition to the virtual servers hosting redundant server functions, the system also included software-based controllers, which meant we could set up, simulate and test the entire project at our office in Calgary and even use them for training,” says Wilton.

Plant availability, and hence redundancy, was a top priority for control and communications. The plant processes about 200 million cubic feet of sour gas every day, so it’s critical that plant personnel are able to keep tabs on the process at all times to assure that hydrogen sulfide, propane, butane and other impurities are being properly removed from the final product.

For maximum uptime and visibility, the System 800xA’s redundant controllers were connected to the Select I/O cabinets and drives via Profinet utilizing a fault tolerant, redundant, fiber-optic

“Select I/O is perfect for remote I/O applications as it moves the I/O from the motor control center and electrical rooms into the field.”

— Brad McDonald, product marketing manager for ABB



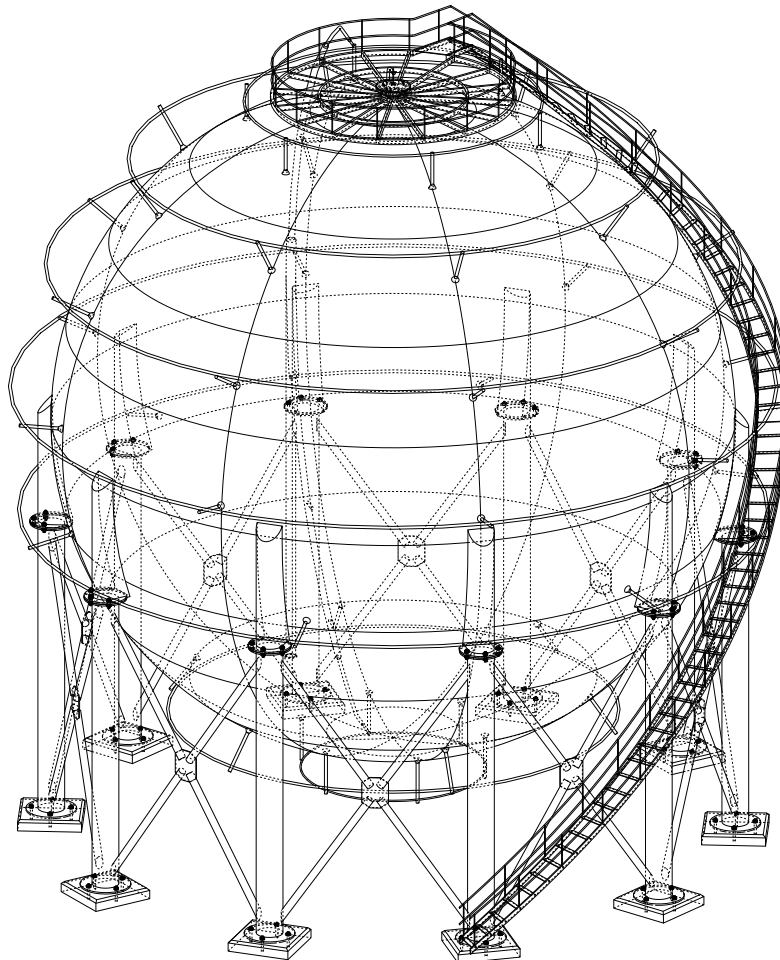
ring of stars architecture. Profinet network designs are relatively straightforward, since standard, off-the-shelf Ethernet switches can be used. An optimized ISO model enables Profinet to connect with more than 1,000 remote I/O drops for communication over one network, along with millisecond performance and seamless failover on both ring and redundant architectures.

OPERATIONAL TRANSPARENCY

Having various field equipment connected via Profinet—all tied back to one common platform—provides for effective facility-wide monitoring and maintenance on an ongoing basis.

“The diagnostic capabilities of Profinet make it a very good tool for information and analysis,” adds Rob Remeika, lead automation manager and safety system expert at Blackrock. “You can get more information faster, and you can plug in anywhere.”

Wilton says operators at the plant also like Profinet’s trending and alarming system. “It is quite simple and yet effective. We hardly had to do any training. They were able to run tasks and reorder them while the software was using the analysis tool, which enabled instant changes with quick results.” ∞





SIMPLIFIED. FLEXIBLE. DONE.

MODULAR ENCLOSURE SYSTEMS FROM RITTAL

- Available in both stainless and carbon steel
- Designed for use in harsh environmental conditions
- Can hold up to 3,000 pounds
- Up to NEMA 4X and IP 66

Plus, our robust 16-fold tubular frame system provides buying options on all sides for endless configuration and ultimate scalability.

LEARN MORE AT [INFO.RITTAL.US/MODULAR-ENCLOSURES](https://info.rittal.us/modular-enclosures)

WE ARE RITTAL.



OPAF/O-PAS world tour

Open Process Automation Standard (O-PAS)
test labs are multiplying worldwide

by Jim Montague

What do you when you get good at a skill or craft? You perform for friends and relatives, of course—and then you go on tour. That's just what several far-flung members of the Open Process Automation Forum (www.opengroup.org/opaf) are doing to drive development, testing and adoption of the and the Open Process Automation

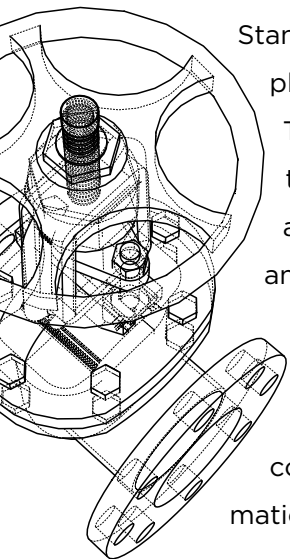
Standard (O-PAS) for interoperable, plug-and-play process controls.

They presented a series of virtual tours of their worldwide test labs and testbeds during the 25th annual ARC Industry Forum Online (<https://arc-industry-forum.arcweb.com>) in mid-February. This virtual journey was conducted by Harry Forbes, automation research director at ARC.

FIRST STOP: SAUDI ARAMCO AND SCHNEIDER ELECTRIC

The kickoff tour was at the Middle East OPA Testbed, which is a collaboration between Saudi Aramco (www.aramco.com) and Schneider Electric (www.se.com) that hosts the test lab at its Innovation and Research Center in Daharan.

“We’ve partnered with OPAF since 2019, worked with system integrators to deliver its technical advances locally, and found common ground with Schneider Electric on bringing the open infrastructure of O-PAS to interested regional end users,” says Abdullah Khalifa, senior engineering consultant in the process and control systems department at Saudi Aramco. “We’re also developing experiments and tests for our testbed, which will help implement O-PAS

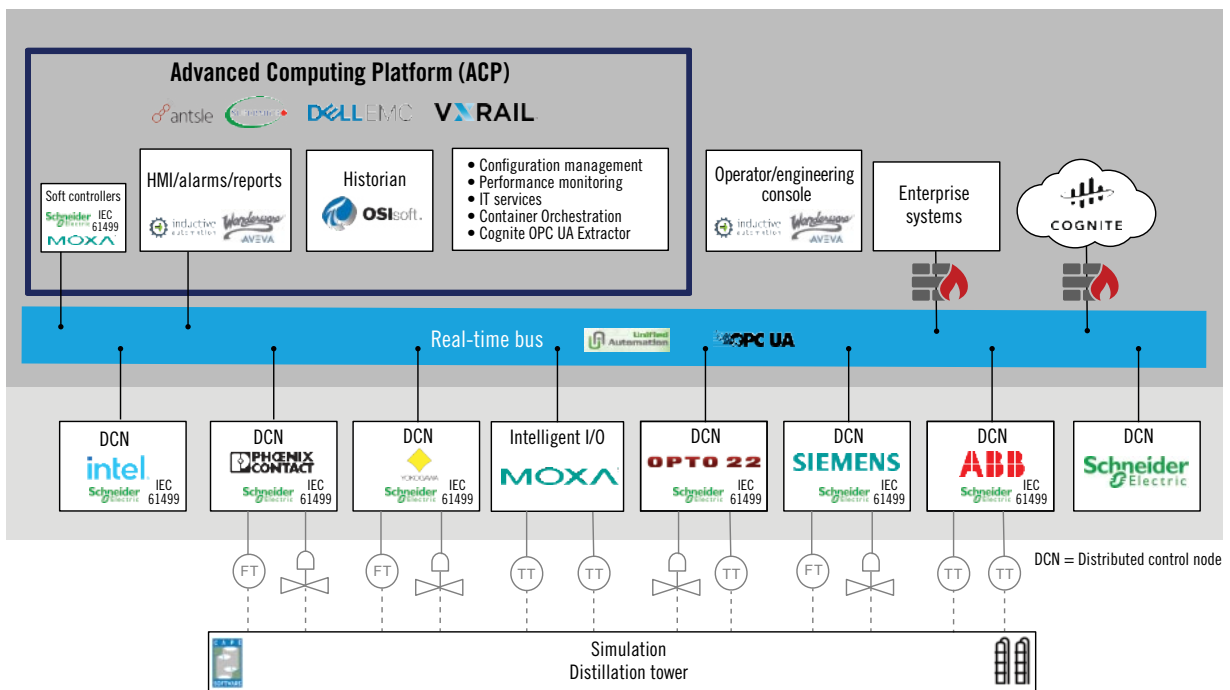


solutions, including leveraging its OPC UA networking and IEC 61499 for distributed systems. The goal of our lab is to develop field-proven, O-PAS compatible systems. The main areas we’re working on include system management, security and secure remote access, and future partners.”

Khalifa reports the Middle East OPA Test-bed finalized its architecture, picked hardware and software, and completed procurement and system integration in 2020; plans to develop and test its controls in accordance with O-PAS V.2.1 in

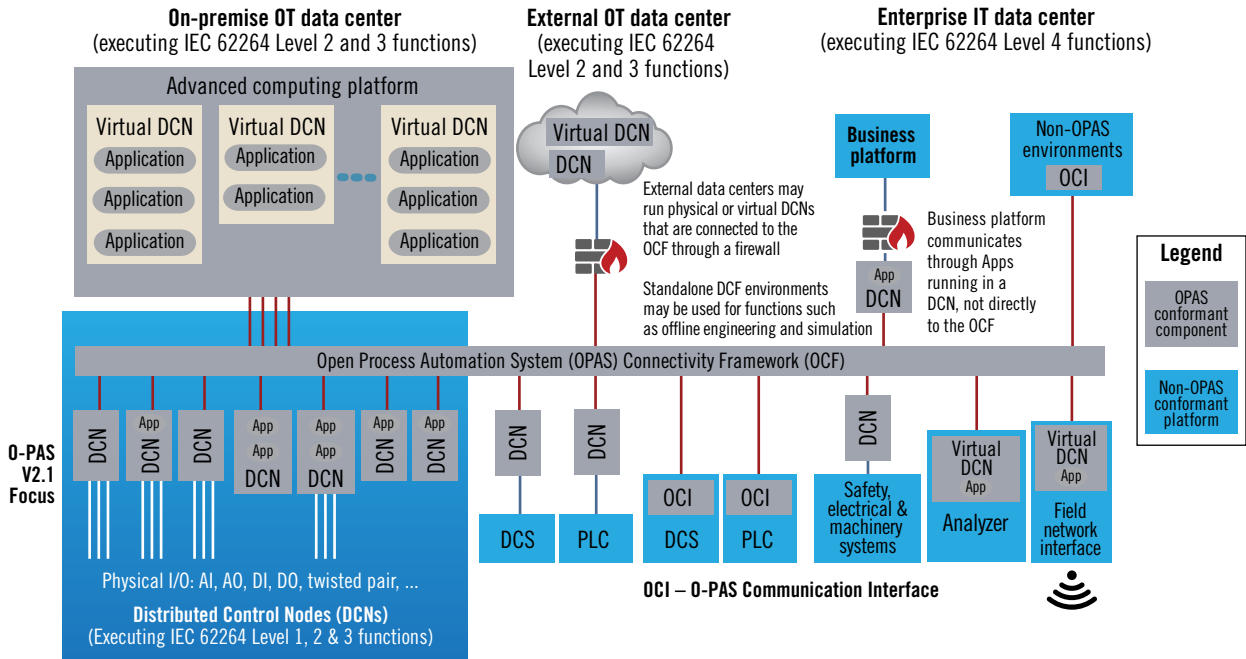
2021; complete systems specifications and component readiness in 2022; and develop specifications and designs for field trials in 2023.

“We may not finalize the test bed in the next two years, but we’ll have built the basic infrastructure. This will let us test field devices for interoperability and security, and show we can work with O-PAS,” saus Khalifa. “The results from the testbed will provide us with a basis of readiness, key O-PAS features and strategies for replacing legacy systems, which we can use in



EXXONMOBIL OPA TESTBED ARCHITECTURE

Figure 1: The open process automation (OPA) testbed at ExxonMobil’s OPA Test Lab realizes its vision for an open-process system architecture with distributed control nodes (DCNs) from many suppliers communicating via an O-PAS connectivity framework (OCF) network and protocols with advanced computing platform (ACP) devices and software. Using this design, the lab presently runs four environments that are responsible for development, testing and validation, acceptance testing of user applications, and production with continuous operation and demonstration functions. Source: ExxonMobil



COMMENT ON THE NODES

Figure 2: Open Process Automation Standard (O-PAS), Version 2.1 Preliminary (V2.1), is being released in March 2021, so it can generate public comments and input that the Open Process Automation Forum's (OPAF) developers stress are crucial to making the standard stronger before further publication in 4Q21. V2.1 covers many of the distributed control nodes (DCNs) that connect to the open connectivity framework (OCF) in the overall O-PAS technical architecture. Source: OPAF

our initial field target applications and in key concepts we want to demonstrate. The test results will also let us move from large systems to distributed control nodes (DCN) defined by O-PAS, which we can use to expand our existing facilities incrementally without disrupting or modifying existing operations, and enable us to work in a more heterogeneous way.”

SECOND STOP: PERTH, AUSTRALIA, AND ERDI

The second leg was a two-part tour of the ERDi i4.0 TestLab at the University of

Western Australia and in Perth, Western Australia, where it's aided by consultant Enterprise Transformation Partners (www.etpartners.com.au). ETP serves clients in the mining and oil and gas industries. John Kirkman, managing director at ETP, reports the city-based lab is adding O-PAS equipment, and plans to initiate testing projects soon.

“The lab acts as a catalyst for Industry 4.0 technology, mostly in Australia's energy industries,” says Kirkman. “Process control is getting to be more about the overall value chain, so we'll also be working with

“Certification will give everyone rules, so we can plug-and-play like we do with RJ-45 connectors, HDMI cables, USB ports and HTML on websites. This will eliminate many of the integration nightmares of the past.”

other manufacturers that can take advantage of O-PAS operations and performance benefits. We expect users to employ interoperability in process operations, resources management and materials tracking.”

Kirkman adds the ERDi lab is staffed by a blended team, so its process control engineers and IT-based staffers both appreciate that O-PAS can help orchestrate and automate maintenance of software and hardware devices. “The interoperability that O-PAS enables can also help users with their digital transformation efforts, such as using digital twins to monitor and reduce frozen materials in pipelines, so they don’t have to shut down and get defrosted,” adds Kirkman. “Of course, we also agree that O-PAS isn’t about getting into the intellectual property (IP) in products. We just want to help suppliers develop the software that will allow users to work in larger applications.”

THIRD STOP: TEXAS, EXXONMOBIL AND YOKOGAWA

The third tour revisited the oldest and most extensive of the O-PAS test labs, which is operated by ExxonMobil Research and Engineering (<http://corporate.exxonmobil.com>) in the Woodlands, Texas, near Houston. Based on its earlier proof-of-concept and prototype deployments, the 13,000-square-foot OPA Test Lab has been up and running for about one year. It receives system integration and administration support from Yokogawa (www.yokogawa.com), and incorporates a growing list of technologies, suppliers and other partners (Figure 1).

The lab’s testbed consists of a simulated refinery separation tower, and carries out OPAF’s basic vision of connecting DCNs via an open process automation system (OPAS) connectivity framework (OCF) network to advanced computing platforms (ACPs) in onsite operations technology

(OT) data centers, and to external OT data centers, information technology (IT) and enterprise data centers, and other business platforms. Participating DCNs include Phoenix Contact's PLCNext, Yokogawa's Network-I/O (N-IO), Siemens' 1515SP PC2 processor and Kunbus' Revolution Pi industrial PC (IPC). The Kunbus IPC is based on the same Broadcom processor as the Raspberry Pi, while Schneider Electric uses its M251d, ABB uses its xDC and Opto 22 uses its groov EPIC controller. Meanwhile, the advanced computing platforms (ACPs) include Wind River's Titanium controller plus Antsle, Supermicro and Dell VxRail systems. The testbed also recently added Cognite software that contextualizes data that wasn't linked before to provide better insights, and is looking at CPlane.ai orchestration software to aid in automating software maintenance tasks.

"Many vendors such as ABB are offering devices that are half PLC to talk to I/O via OPC UA or another protocol and half Linux OS that can run a user's software and connect to the control network, Internet and cloud," says Dave DeBari, process control engineer in ExxonMobil Research and Engineering's Measurement & Automation Projects section, lead prototype engineer of its OPA program, and co-leader of the Application Portability subcommittee in OPAF's Technical Working Group (TWG). "To allow them to interoperate, these devices have to remove their proprietary

barriers. However, unlike all the controllers we bought in the past, we're asking for the root passwords, and the vendors are beginning to share them."

The lab presently runs four environments which are responsible for development, testing and validation, acceptance testing of user applications, and production with continuous operation and demonstration functions. The acceptance and production areas each use a process simulator that works with many of their DCNs in their drive towards interoperability. "The test lab has two main purposes," says DeBari. "The first is to answer questions, understand designs, and build interoperable systems from heterogeneous parts, such as we did with the earlier pilot project in our research unit. The second purpose is to get to field trials on a production unit, so we can show that O-PAS can work efficiently, and deliver real benefits, reliability and revenue."

DeBari reports the separation tower application is supported by two teams. ExxonMobil maintains its basic systems, instruments, process applications, advanced control and IT-based functions, while Yokogawa handles its control logic programming, cybersecurity and other systems, including a hyper-converged system with Linux applications it wants to make more secure. "The teams work as a group and consult with others. There are usually five to eight people there. However,

“We’re hoping to start the engineering phase for the field trials later in 2021, after getting management approval, and start running a process with an OPA-based system in late 2022.”

— Dave DeBari, ExxonMobil

just like everyone else in 2020, we’re also working and collaborating remotely due to COVID-19, so our schedule and ability to get people together has slowed down,” says DeBari. “The lab also supports two groups, ExxonMobil and OPAF, and the efforts of each to follow O-PAS. We tell OPAF what we’ve learned, so we can make the standard stronger for everyone.”

COMING SOON: FIELD TRIALS

In the near future, the OPA Test Lab’s testing and acceptance results will let it develop the basis for field trials on a production unit. DeBari reports that more answers are needed before the teams can decide what process to run in their trials, though it’s likely to be some kind of chemical or refining process. Independent field trials will be performed by ExxonMobil and its collaboration partners, including Aramco Services Co., BASF, ConocoPhillips, Dow, Georgia-Pacific, Linde and Reliance Industries Ltd. They’ve already agreed on the need for

OPA systems, and they hope to speed up development by conducting several, parallel field trials. But they’ll also choose their own system integrators, employ O-PAS as available, share non-competitive findings with each other, and design further test-bed experiments.

“We’re hoping to start the engineering phase for the field trials later in 2021, after getting management approval, and start running a process with an OPA-based system in late 2022,” says DeBari. “This will round out the science experiment in interoperability that we started eight years ago. But first we have to focus on what we still need to know, so we can select the right process application for the field trials. Standards are documents—it’s said they’re ‘nets, not buckets’—so their principles must be tested because they’re not the same as turning software and machinery into a working system. This is how the testbed will help us transition from scientific principles

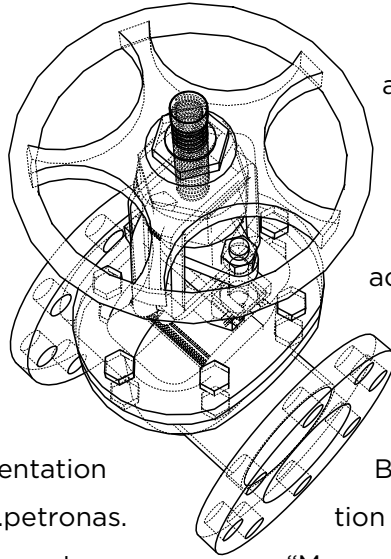
to the parts needed for field trials and operating process automation systems.”

NEXT STOP: MALAYSIA AND PETRONAS

Following the three tours at the ARC event, Sharul Rasid, custodian engineer for instrumentation and control at Petronas’ (www.petronas.com) east coast refinery and aromatics plant in Kertih, Terengganu, Malaysia, announced his company will establish an O-PAS testbed at its training plant in Batu Rakit, test devices including DCSs and flow-computing platforms from multiple suppliers, and conduct field trials with help from Yokogawa.

Though they aren’t on the tour itinerary yet, several other sites and organizations are actively pursuing O-PAS solutions. For example, BASF (www.basf.com) debuted its Open Process Automation demonstrator for the chemicals industry with four water tanks and managed control loops at the 2019 NAMUR conference in Germany. Based on the NAMUR Open Architecture (NOA) that’s similar to O-PAS, BASF reports it’s “an agile proof of concept with real components and an uncritical process, which makes the success of OPAF’s initiative more and more likely.”

Similarly, Georgia-Pacific (www.gp.com) got involved with OPAF a couple of years



ago to learn about and participate in developing O-PAS, and investigate how it could improve data access and achieve savings at its 150 manufacturing sites. “We’re also developing an O-PAS demonstration board,” says Bruce Ainsworth, VP of automation innovation at Georgia-Pacific.

“Many engineers are retiring, which means we have to develop more streamlined controls, and O-PAS can help us do it. Likewise, we can still buy some parts on eBay for old equipment, but when we can’t get them, we won’t be able to delay these migrations, and O-PAS can assist us with those, too.”

Still hungry for input, OPAF reports even non-members can contribute stories about their needs for open process automation by participating in a survey at www.cognitiforms.com/OPAS1/UserStories. It asks for a “narrative that expresses one specific need that a user has, normally expressed in a few sentences.”

OPAF DRIVES TO CONTROL FUNCTIONS

Back at OPAF headquarters, O-PAS efforts are concentrated on several fronts. “The first is that we expect to release O-PAS Version 2.1 Preliminary (V2.1) in March 2021, so the public can comment on it before publication, and say what they want

the standard to do,” says Don Bartusiak, co-chair of OPAF and president of Collaborative Systems Integration (CSI-automation.com). “V2.1 represents thousands of man-hours of work on defining its specifications and contains lots of details. There’s enough for suppliers to begin making products and they’re doing it.”

V2.1 covers many of the DCNs that connect to the OCF in the overall O-PAS technical architecture (Figure 2). It updates:

- Part 1 on technical architecture based on IEC 62264 (ISA-95) reference standard;
- Part 2 on security based on IEC 62443 (ISA-99);
- Part 4 on connectivity based on IEC 62541 (OPC UA);
- Part 5 on system management based on DMTF (Redfish); and,
- Part 7 on physical platform with a reference standard to be determined.

V2.1 also updates Part 6.1 on information and exchange models, Part 6.2 on basic configuration for OPC UA, and Part 6.4 on function blocks. It also introduces Part 6.3 on alarms complying with ISA/IEC 18.2/62682, and Part 6.6 on IEC 61131. Part 6 is based on several reference standards, including IEC 62541 (OPC UA), IEC 62714 (AutomationML), IEC 62682 (ISA-18.2), IEC 61131-3 and IEC 61499. Later this year, V2.1 will update Part 3 on profiles and introduce Part 6.5 covering IEC 61499.

“Overall, Part 6 is the heart of O-PAS’ control functions that allow portability and transfers of data,” says Dave Emerson, vice president of the US Technology Center at Yokogawa (<https://www.yokogawa.com/us>) and co-chair of OPAF’s Enterprise Architecture Working Group (EAWG). “Part 6.1 lets users move engineering data and control strategies from one tool to another. Part 6.4 defines the inputs and outputs of function blocks to provide a set of reference functionality. This includes how to take data from devices and get it to the function blocks, but it isn’t meant to replace other blocks or controls. It’s just a reference model that allows interoperability between different systems. Part 6.5 allows different control strategies between processors.”

Emerson adds that Yokogawa views the overall migration to O-PAS as inevitable. “Existing, proprietary DCSs have been running for decades, and in this time, we’ve seen the growth of commercial, off-the-shelf (COTS) products used in DCSs, HMIs and networks,” adds Emerson. “O-PAS continues this evolution by making software and hardware interoperable, and decoupling them in a natural progression that adds capabilities in software. We’re seeing the global acceptance of the O-PAS concept in the seriousness and desire of end users and suppliers to make the standard and its interoperability happen and get widely adopted.”

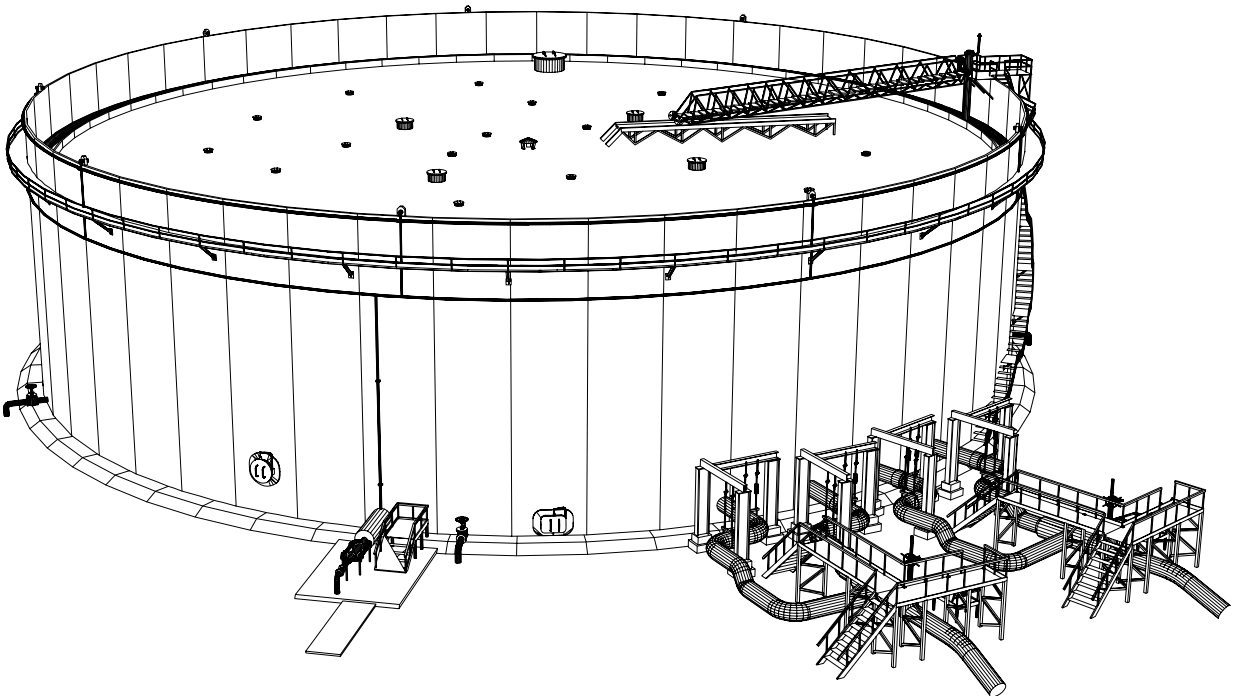
CERTIFICATION = CREDIBILITY

Trevor Cusworth, co-chair of OPAF and Schneider Electric's global account manager for ExxonMobil, reports the forum's second big effort lately is its Conformance Working Group (CWG) revving up its Conformance Certification program, which will enable suppliers to bring in products for certification testing, and secure approvals that their products conform to the standard. OPAF states a strong certification program is critical because it: assures users that certified products meet the O-PAS standard; lets system Integrators be certain that certified products will work together; and enables suppliers to gain acceptance in market, and have a springboard for differentiation and innovation.

"Certification is vital to making sure O-PAS is credible for its industries and users, so it's

developing test suites that will give users confidence that the products they deploy will meet minimum interoperability requirements," says Cusworth. "For example, the first wave of certification tests will include Part 4 on connectivity framework with IEC 62541 (OPC UA) as its reference architecture, so testing will be done by the OPC Foundation's certification labs. Meanwhile, Part 5 on system management is based on DMTF (Redfish) and will be tested at ERDi.

"Certification means users won't have deal with the supplier self-declarations they've had to face because IEC, ISA and others don't have certification processes. This will eliminate many of the integration nightmares of the past. Certification will give everyone rules, so we can plug-and-play like we do with RJ45 connectors, HDMI cables, USB ports and HTML on websites." ∞



No one makes you smarter.

One thermal flow meter delivers everything you need.



QuadraTherm 640i[®] with qMix[™]

- World's Highest Accuracy: +/- 0.5% of reading (inline);
+/- 0.75% of reading (insertion)
- Maintains accuracy when flare gas composition changes—
No factory recalibration needed
- Meet EPA Refinery Sector Rule 40 CFR 63 regulation
with breakthrough technology
- Handles upset conditions at ultra-high flows
- Measures very low pressure with no pressure lost



[LEARN HOW](#)

sierrainstruments.com / 800.373.0200

Transforming Terminal Automation operations on a grand scale

By Chris McNamara

As one of the largest independent liquid petroleum pipeline operators in the world, with 6,000 miles of pipeline, 115 terminals and 118-million-barrel tank capacity, Buckeye Partners knew their digital transformation was going to be complicated. And they knew it was necessary to stay competitive.

“We were struggling with the technology used to support terminal automation,” explained Angel Matos, Buckeye Partners’ senior manager of terminal automation applications, during his Automation Fair At Home case-study presentation. Matos, who oversees Terminal Automation project planning and execution across all of his company’s oil-and-gas distribution terminals, explained how his team was reliant on systems that, quite frankly,

were not intended for the modern scope of automation.

So they set goals. The senior manager and his team wanted to quicken IT/OT convergence across their facilities. They wanted to ensure longevity of the tools and systems they implemented (always a challenge in harsh environments). They wanted fewer moving parts and more-functional industrial computers at their disposal.

Central to the project was a shift to predictive maintenance—collecting data at the edge, integrating with hybrid cloud operations, and using real-time analytics and machine-learning models. The efficiency goals they envisioned would hinge on strategic platform monitoring/protection. Some of the IT and OT workloads would

be automated, freeing up personnel to tackle more important tasks. The system would have to be scalable for additional applications down the road, and be able to fully integrate with the larger terminal operations.

No sweat, right?

To accomplish these goals the Buckeye team envisioned a pilot program at their South Texas Gateway Terminal. They sought out hardware and software solutions that would optimize disaster-recovery efforts, and make OT more manageable. They needed a way to corral the 36 different applications they manage. They wanted a better system to roll out upgrades. (“We had a lot of flavors of PCs,” joked Matos.) And they demanded systems that offered 24/7 service and support programs.

Then Matos and his colleagues went shopping. They met with vendors. They attended conferences to collect insights from peers and competitors and solution providers.

The solutions they ultimately selected and implemented matched the complexity of the project. Matos explained how control systems and software from Rockwell Automation, together with fault-tolerant computing platforms from Stratus Technologies, proved central to the campaign. These included PlantPAx DCS (with virtualization) and ControlLogix systems, together

with FactoryTalk VantagePoint EMI and ThinManager software from Rockwell Automation complemented by ftServer and ztC Edge fault-tolerant computers from Stratus.

“This was all about the end-user experience,” he said. “We wanted to make sure they were receptive and comfortable with these decisions.”

The project was not without its challenges, of course. First, there was a reservation to change among many stakeholders. “It can be difficult for the human mind to adapt



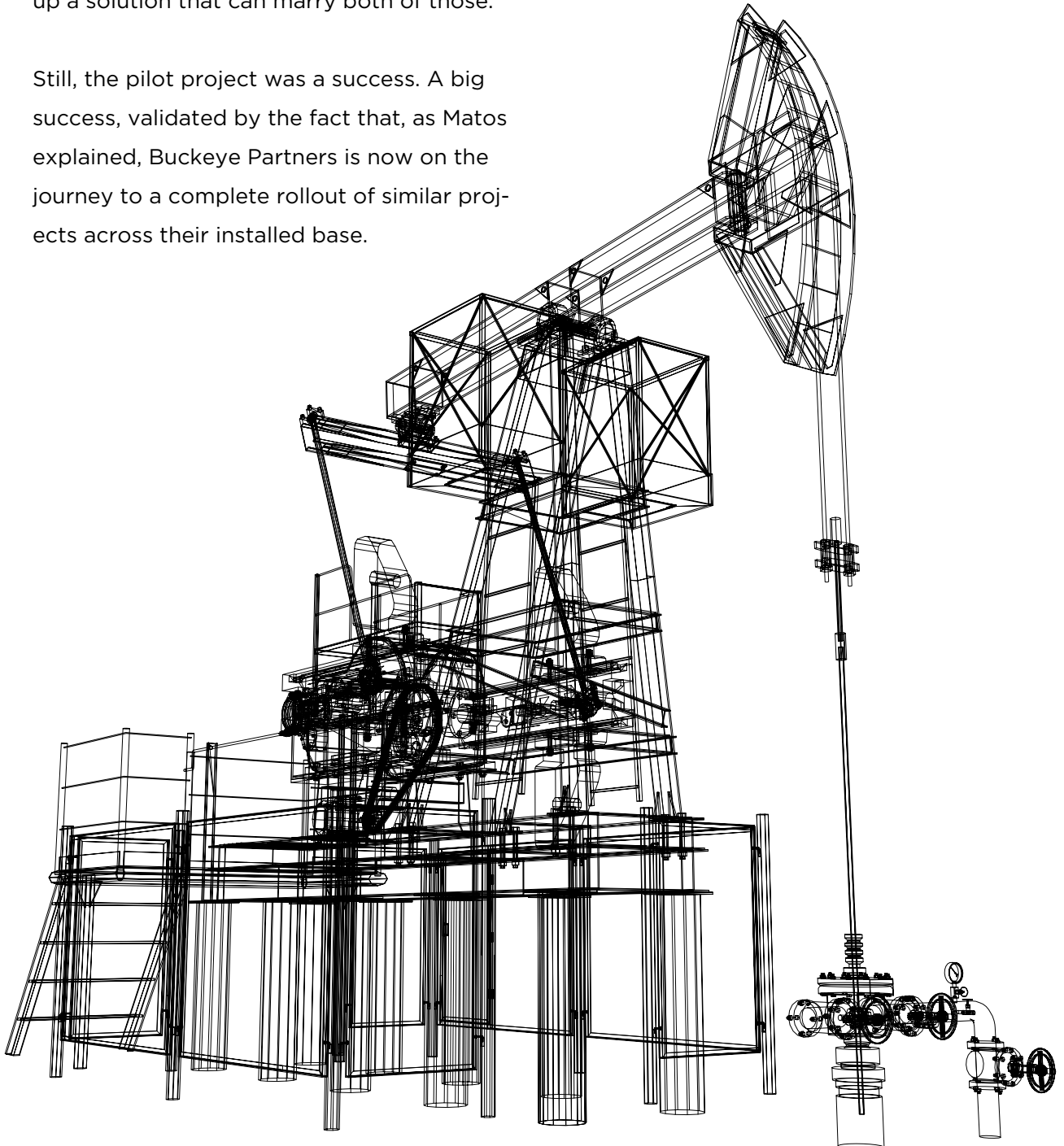
“This is the only way to achieve significant increases in efficiencies.” Buckeye Partners’ Angel Matos detailed the complex system of solutions implemented as part of the pipeline operator’s digital transformation.

as quickly as the technology,” admitted Matos with a tone that indicated how challenging this was to overcome. There were stumbles with maintaining synergy among project-management teams and the IT/

OT crews, likewise with the systems integrators and end users. Complexity with the network-design process required regular, lengthy meetings. And, frankly, the IT and OT sides came to the project with different goals. “Each discipline has to understand the other’s desires. And we have to serve up a solution that can marry both of those.”

“This is the only way to achieve a significant increase in efficiencies,” he stressed. “Our response times are quicker. In the event of a failure we know what to do. We have good integration across our systems. We are planning for more digital-transformation efforts.” ∞

Still, the pilot project was a success. A big success, validated by the fact that, as Matos explained, Buckeye Partners is now on the journey to a complete rollout of similar projects across their installed base.



Accelerate Your HART Data at the Speed of Ethernet



Get the process detail you need from your Smart HART devices to MODBUS/TCP and HART-IP based monitoring and control systems at the speed of Ethernet with the **HES HART to Ethernet Gateway System**.

Connect up to 64 Smart HART devices and collect the Dynamic and Device Variables, along with diagnostics, from each device that delivers critical information needed to address process and device problems before they turn into unplanned downtime. Plus, the built-in web server lets you easily monitor all HART device data via any web browser.



Call 800-999-2900
or visit
www.miinet.com/HES