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HIGHLIGHTS OF AUTOMATION FAIR 2022

Perspectives • Industry Forums • Process Solutions User Group

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A Special Report
by the editors of *Control*

Rockwell Automation

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SIMPLIFICATION AND INGENUITY LEAD INDUSTRY FORWARD

By Mike Bacidore

Emerging from a haze and walking into a new dawn requires a guiding light and the ability to see a clear and simple path forward. Rockwell Automation has mounted simplification and ingenuity as headlights to guide industry out of the darkness and into the post-pandemic economy.

"We've learned to take our products and our software and our services and combine them together for industry needs," explained Blake Moret, chairman and CEO, Rockwell Automation, who kicked off the Perspectives program, held this week in the run up to Automation Fair 2022 in Chicago. "We've added more consulting capabilities and more landing spots for data. We can offer simplification. That is what will sort out the winners and losers—the simplification of technology and simplification of business models. It's about managing risk. We're touching the insights that will fuel success, customer by customer and industry by industry."

Rockwell is solely focused on industrial automation and digital transformation, said Moret. "Why are we doing this?" he asked. "To simplify complexity, so we can meet customers where they are. All of us have existing infrastructure. It's that industry-focused ingenuity."

Industrial systems are highly complex, but, by layering tools on top of them, individuals can work with them. "The technology under the hood has to be brought back a step from the workers, so they can fix something on third shift when there's no one else around," said Moret.

"We're connecting the imaginations of people with the potential of technology, to expand human possibility and keep it focused on real business results, and that's the why that drives me and drives our company," explained Moret.

"The last time we were here was 2019," said Moret, recalling a previous Automation Fair in Chicago. "It was the biggest show Rockwell had ever had. It was a new highwater mark. We were starting to invest more, and then the world changed—and not just from a professional standpoint. It changed from a personal standpoint, as well. We are all changed forever in the way we live and the way we work."

Moret remembered how it changed one Rockwell customer, a large food company, that was focused on adding line extensions to drive productivity and looked to increase its cybersecurity to protect its data. "With the pandemic, everything changed overnight," said Moret. "This company was selling in bulk to the hospitality industry." Instantly, its business model changed because no one was going out to eat in a restaurant, so the company had to shift its focus to other distribution channels.

The line extensions increased because the company was increasing the number of SKUs. "People were buying

"We saw 20 years of evolution happen in just two because we had to." Rockwell Automation's Blake Moret recalled the complications of COVID-19 when he kicked off Perspectives during the run up to Automation Fair in Chicago.

from the grocery store," explained Moret. There was still a focus on cybersecurity. In fact, it was even more of an issue because people were working at home, creating more opportunities for cyber-attacks directed at remotely connected users.

Rockwell was there for critical industries that were making masks, packing food, providing transportation and generating energy, said Moret. "We were right in the middle of it," he announced. "I was happy with our ability to adapt and solve these problems quickly when we needed to. We saw 20 years of evolution happen in just two because we had to. It came with costs, but it's making us more resilient, more agile and more sustainable."

Moret noted customers such as Barrett Steel and Kraft Heinz that worked with Fiix and Plex, respectively, two relatively recent Rockwell acquisitions, to democratize technology and scale operations—including elements of enterprise resource planning functionality once outside its province. "That's a new set of muscles for us, but one that's working very well," said Moret, who also mentioned how Rockwell's ingenuity brought a win to a Hyundai greenfield EV plant in Georgia.

He highlighted five components of industry-focused ingenuity:

1. "We're optimizing productivity," said Moret. "That's the heart of what Rockwell has provided. You can't make a competitive automobile without robots."
2. "It's empowering workers," he added. "It's basic training and providing the tools. It's giving these workers superpowers and providing the capabilities to enhance workers and expand human possibility."
3. "Managing risk means cybersecurity and safety," Moret explained. "Cybersecurity was expanded to a workforce that was mostly at home. We've had to find the money and resources to mitigate these sorts of risks."
4. "We're driving sustainability by helping manufacturing companies to use less water and energy," he said. "We're enabling the ability to shed loads and manage energy. We're working with the energy suppliers and helping fossil-fuel companies with their energy transitions."
5. "IT is the key lever to accelerate growth through the digital transformation," said Moret. "We're building that connectivity in the digital architecture from the ground up, to be able to connect devices. We're adding the ability to exchange data between software applications as IT comes down to the plant floor."

HARNESS THE POWER OF INNOVATION TO DELIVER VALUE

by Jim Montague

Just like invention, innovation is also 1% inspiration and 99% perspiration. However, nothing useful happens without that 1% spark, so it requires a fertile and nurturing environment where it can grow and thrive, despite the stresses and scarcity imposed by today's tumultuous times.

"New technologies have been emerging for 100 years, but what's changed are the levels of speed and complexity," said Cyril Perducat, senior vice president and CTO at Rockwell Automation. "The difference now is users asking, "Why can't I get the same complicated data and intelligence in my plant that I get from my consumer technologies?" Users have to realize there are diverse scenarios, but this speed and complexity are impacting the ways we innovate. They're driving the need for open, interoperable and flexible systems that let users make manufacturing flexible and optimized."

Perducat presented one of the keynote addresses at the Perspectives thought leadership event before the opening of Rockwell Automation Fair 2002 this week at McCormick Place in Chicago.

Hunt stability, gather efficiency

Given the continued upheaval caused by COVID-19 and its remote work and supply chain aftershocks, Perducat reported it's hard for engineers and managers to maintain the relative equilibrium they need to innovate and improve operations performance.

"It's harder and harder for manufacturers to get on a lean trajectory and stay there," said Perducat. "Lately, they have to rethink and revise everything they do. Plus, they're facing demands that returns on investment (ROI) happen sooner, too."

In addition, large manufacturers are facing equally large-scale production challenges, including corporate directives intended to solve them, which can cause friction between formerly isolated departments.

"For instance, IT previously focused on computing infrastructure and what software was put into plants, but now they're dealing with users who want to add software containers, artificial intelligence (AI) and models, and are worried they'll lose control of their processes," explained Perducat. "This is why we can't just add new technology. We have to help customers focus on improving performance and production by using new technology, and maximizing the value they can achieve, even though their resources are more and more limited."

Meanwhile, Rockwell Automation provides similar aid to smaller manufacturers, such as makers of electric vehicle (EV) batteries and life sciences systems. "For example, we're partnering with the Advanced Regenerative Manufacturing

"We work with all different types of companies and industries, but our focus is solving real customer problems, and not just waving new technologies in front of people." Cyril Perducat of Rockwell Automation discussed how the company is helping its customers become more agile and resilient through the application of relevant technologies.

Institute (ARMI), which is a consortium of companies we helped co-found that brings technical startups together," he said. "One of its startup labs is working on growing skin, tendons and other tissue, and we're participating to help them conduct experiments that will enable them to move from the lab to industrial-scale operations and productization. We work with all different types of companies and industries, but our focus is solving real customer problems, and not just waving new technologies in front of people."

Collaborate to optimize

Beyond applying helpful technologies, innovation must also be nurtured with human cooperation.

"Maximizing production means finding optimization scenarios. However, they can't happen in silos, so everyone must be empowered to work together," added Perducat. "For example, we have an exhibit on the show floor at Automation Fair this week that features a production line balancing application that identifies flows and issue by combining production data with AI algorithms and identifies more quickly when blocks and stops are likely to happen. This lets users free up people, optimize production, and identify more complex problems. These can include reducing energy consumption and emissions and broadening the scope of their environmental sustainability goals (ESG) by combining hardware, software and ecosystems."

Building systems that let individuals and devices work together can make a big difference in optimization, according to Perducat. These systems are characterized by open architectures and ecosystems that follow open standards and extend their capabilities into optional architectures. "These include every industry segment and vertical we target," said Perducat. "Customers are looking at increasingly sophisticated scenarios and asking us where to start their digital transformations. We have a range of capabilities in this area, such as working with Kalypso, which is Rockwell Automation's digital consulting company."

Secret sauce of analytics? Humans

Because Rockwell Automation and its personnel are long-time experts in digital transformation, they know that it takes more than simply implementing technologies. "We've seen the ups and downs of the Industrial Internet of Things (IIoT) for 15 years, so we know it's frustrating to collect data that doesn't always deliver business value," added Perducat. "Information needs to be used in the right way, so it can take manufacturing to new levels, and enable us to co-innovate and invent the future with our customers."

This is the root of Rockwell Automation's obsession for solving real-world problems to create value. "We're customer-centric, and this puts us in a unique position to reinvent industry and have a significant impact on the performance of our customers," added Perducat. "This is especially important as we move from automation that programs devices to perform tasks to autonomous systems that learns tasks and start to adapt on their own. We need to combine data science with plant-floor expertise. These systems need to integrate the personas of their users, and we're developing these abilities with our customers. However, human-centric innovation also means working with the people who are available today and helping them gain the skills they need to use these new technologies."

For instance, Rockwell Automation's FactoryTalk Design Hub software provides the simplicity and reusability that users can take advantage of to optimize their operations, according to Perducat. "This is our focus—expanding human possibilities—so technology doesn't add complexity and block performance, and instead provides a good production environment that makes it easier and less risky to innovate."

FINDING SUCCESS IN A POST-PANDEMIC WORLD

By Len Vermillion

The COVID-19 pandemic has impacted the way we live and work. Now, nearly three years on, industrial operations are facing challenges both new and enhanced as the world makes major shifts in the way people are working and expectations of consumers and stakeholders change rapidly.

"The challenges all of us were experiencing prior to the pandemic, particularly the lack of access to skilled workers, has only become more pronounced over the past two years," said Tessa Myers, senior vice president of intelligent devices at Rockwell Automation. Myers was one of the featured speakers during the Perspectives thought-leadership session held this week at Chicago's McCormick Place in the run up to Automation Fair.

"When I started a lot of what we focused on was lean manufacturing. It was a wonderfully simple time for manufacturers," Myers told the audience. "All of us had the playbook for what it took to drive improvements in our operations, but that's not the case today."

Indeed, today's industrial sector not only faces a lack of human resources for its operations, but also new expectations from stakeholders who have different thoughts on what it means to be a responsible industrial company. "There's been a rapid evolution in customer-buying preferences. Customers want what they want, when they want it, and how they want it," Myers said. "It feels like consumer preferences are moving at hyper speed."

While the pandemic may have accelerated expectations it also opened up opportunities and set examples of what can be accomplished by manufacturers.

Myers pointed to successes such as the rapid production of vaccines and the acceleration in construction of new facilities in response to needs for things such as masks during the pandemic as shining examples of new ways of addressing the industrial environment post-pandemic.

"We are all living in what is a rapid changing workplace," she said. "Here's the good news: We've never been more well equipped and more enabled to succeed by the technology we have to leverage. The companies that come out on top and realize their full potential are those focused on building agility, resiliency and sustainability in their operations. Not only can we work differently, but time gives us the opportunity to work better."

To get there, Myers said she sees three trends being adopted in industry to "power growth for what's next." Those trends include the transformation of production logistics to adapt quickly to changes in production needs,

"We've never been more well equipped and more enabled to succeed by the technology we have to leverage." Rockwell Automation's Tessa Myers discussed how manufacturers' ability to satisfy rapidly changing expectations hinges on transforming production logistics, producing more locally and diving into the data.

producing locally for rapid order fulfillment and embracing data-driven sustainability efforts.

Transforming production logistics

In the past, the way industry dealt with spikes in production needs was to throw people at the problem, according to Myers. With the workforce woes trending in the sector, as it is with many industries, that's not an option anymore.

As several other speakers noted throughout the week at the event, Myers said, "We need to reconsider how goods move through the plant to be able to handle a wide variety of product with the least amount of work."

Cue the technology. Rockwell Automation boasts products enabling "hundreds of thousands of configurations with thousands of flavors," Myers continued. In short, automation technology is ready to fill the void left by the lack of a qualified human workforce.

Among the solutions available is independent cart technology, which is designed to change the way products move through plants. Myers said the technology has proved to boost customer efficiency and increase throughput by up to 50%.

Myers also pointed out that the barriers for integrating robotics into the plant floor have been lifted. She showed that unified robotics allows for one control platform for motion and robotics.

"Historically, integrating robotics and other mechatronics into systems was pretty arduous and time-consuming. You needed very specialized skill sets, multiple hardware platforms," she said. "We've been focused on building kinematic control in our logics controllers, and I'm excited about the unified approach to systems design."

Myers discussed Rockwell Automation's partnership with robotics company KMel Robotics. The two companies launched a unified robotics solution at Automation Fair this week.

Producing locally

Construction of new manufacturing facilities in the U.S. alone has grown 116% over the past year, Myers said. She considers that great news, especially considering the growing need for rapid deployment of product by manufacturers in the post-pandemic world.

"In order to stay competitive, companies are moving to be more local," Myers said. "They are gaining proximity to their customers and building resiliency in their supply chain."

She added that it is vital to maintain resiliency and simplification in rapid asset deployment. "We've been driving technology developments over the last few years that are really enabling companies to rapidly deploy automation and process systems in their facilities around the world," Myers said.

She highlighted the new FLEXHA 5000 I/O, a fully configurable input/output platform—any point can be discrete, analog or HART—built for the requirements of process applications. She said it cuts programming time by 50%. Myers also highlighted the company's Armor PowerFlex drives, which requires fewer manual connections and speeds installation.

She also touted Rockwell's investment in its digital engineering tools, which she said enable customers to test, design, refine and improve every aspect of an automation design before moving into production. The result, she said, has been a reduction in system engineering of 30% for electric vehicle battery manufacturer Hirata.

Data-driven sustainability

For all the talk around net-zero goals, less than 25% of all companies are on track to meet their sustainability goals, according to OMNIA Partners.

Considering the requirements of stakeholders around sustainability, there's a lot of work yet to be done. Myers said help lies in the data.

"I think what's really important is that sustainability efforts have to be data driven," she said. "We've been investing in our intelligence device portfolio, we're not just enabling agility, rapid deployment and new ways to automate equipment. We're really investing in an infrastructure that's going to provide the data that's needed to drive resiliency and sustainability through the improvement of operations and processes."

She added that the connectivity capability of devices across the entire portfolio is the core of digital transformation. Data starts at the devices, and it's critical to connect those data sources together to provide insights to all customers.

"I think what's critical is an integrated system, hardware and software working together, to drive true value," Myers added.

Myers said the oil and gas industry is "probably under the most pressure" when it comes to sustainability. Rockwell Automation recently worked with an oil producer in the Permian Basin of West Texas to reduce its greenhouse gas emissions by 50% by leveraging a connected device platform, according to Myers.

She said it was a classic example of industry not only working differently, but working better.

MYRIAD SOLUTIONS FOR NET-ZERO GOALS

By Chris McNamara

As it is in the larger industrial world, sustainability is a hot topic at Automation Fair in Chicago, with multiple presentations spotlighting sustainable approaches for manufacturers eager to work toward net-zero goals.

Rockwell Vice President of Sustainability Tom O'Reilly chronicled how, in July 2021, Rockwell's Customer Sustainability Team was launched with his fronting the group. During a press briefing, the VP then mapped out his group's three-part strategy.

Sustainable company—creating innovative sustainable products and solutions while fostering a culture that empowers employees to operate safely, sustainably and responsibly. This commitment is considered a competitive advantage and a way for Rockwell to differentiate itself from its peers. O'Reilly stressed that he closely monitors sustainability-rating agencies that chart his team's progress. He was clearly proud when detailing recent recognition from business-rating network EcoVadis.

Sustainable communities—supporting the communities in which stakeholders live and work, leaving a legacy that extends beyond the Rockwell organization. The mission is to provide to community partners access to resources that enhance their productivity and sustainability—initiatives like STEM and workforce-development programs, explained O'Reilly, who detailed Rockwell's internal sustainability commitment to be carbon-neutral for Scope 1 (direct) and Scope 2 (indirect) emissions by 2030.

Sustainable customers—enabling Rockwell customers to achieve their own sustainability goals while making a positive impact on the world. "Everything we do for our customers is about increasing efficiency, reducing energy usage, improving worker safety and ensuring regulatory compliance," noted O'Reilly.

Sustainable customers hold the greatest promise for real progress, he explained. While Rockwell's internal goals are aggressive and encouraging, empowering tens of thousands of Rockwell customers to work more sustainably at their own facilities has exponentially positive results, akin to teaching ahumankind to fish.

"We are looking internally and at the whole ecosystem of industry," said O'Reilly's colleague and co-presenter Pete Morell, Rockwell Automation global OEM industry director. "Achieving sustainability in this timeframe requires a partner ecosystem that can help develop new technologies needed to scale these programs. We can help with that."

The pair then highlighted a number of case studies that exemplify that type of help. One is with hydrogen fuel-cell company Plug Power, which relies on Rockwell's

"Front-end consultations about sustainability and energy management are very important." Rockwell Automation's Pete Morrell addressed the press, along with colleague Tom O'Reilly, about helping clients work toward their sustainability and net-zero goals at Automation Fair in Chicago.

PlantPAx software to align its partnerships and manage its assets during fuel-production processes.

Another example is the carbon-capture initiative at ArcelorMittal, which is turning carbon emissions into ethanol. Rockwell is helping them coordinate disparate OEM programs connected with this project to align with their wider sustainability strategy.

The presenters touched on emerging technology for the physical and chemical processes involved with recycling plastics and technology, or "e-waste." They stressed the importance of supporting customers after they've announced their net-zero goals but before feasible strategies are put into place, oftentimes a period of great confusion. "These front-end consultations about sustainability and energy management are very important," said Morell.

They noted how large, multi-national corporations are spearheading sustainability programs, more commonly in Europe than stateside. They hinted at a new Rockwell energy-as-a-service offering in development. And they explained how the best sustainability programs are developed with the intent to be applied to installed bases—brownfield assets. "This isn't just for new stuff," O'Reilly explained. "These enhancements must be able to be used on all of our automation assets."

The exhibit floor at Automation Fair, which showcases all sorts of automation assets, demonstrates countless other sustainability use cases, enabling event attendees to connect with Rockwell subject-matter experts along with customers to discuss how they can emulate these successful programs.

"We're getting much more serious about getting the message out about sustainability now and in the future," summarized O'Reilly, who then addressed a common misconception about this hot topic. "Sustainability and productivity can be aligned. They have to be connected."

CLOUD-BASED SOLUTIONS OFFER SPEED AND AGILITY

By Anna Townshend

"You want to be a cheetah, a business cheetah," said Brian Shepherd, senior vice president of software and control at Rockwell Automation, who spoke during Perspectives this week at Automation Fair 2022. In the current global climate, a business cheetah, Shepherd said, needs to be able to pivot with speed and agility. Customers can find that speed and agility in cloud-based, software-as-a-service (SaaS) solutions.

"We see an almost unending list of challenges that manufacturing companies are faced with and have to address," Shepherd said. "The good news is we're all still here. Manufacturers have been adapting."

Despite the success stories, Shepherd said, they also hear from customers that things still aren't moving fast enough. "Those old highway signs used to say that speed kills. It seems today that speed is the only way to survive." And agility is just as important.

"The cloud is tried and tested. It's proven," Shepherd said. SaaS in the cloud provides the speed and agility that customers are looking for to meet their key business outcomes. "The cloud enables those business outcomes by changing the way you work," he said.

The cloud can also accelerate time-to-value and reduce the need for expensive on-site experts and teams for deployments, patching and upgrades. "That's good because you can't find those people anyway," Shepherd said. Adopting the cloud also eliminates large upfront purchases for hardware and software licenses. "You can start small and scale up fast," Shepherd said. "That's real agility. You can scale back down as business conditions change."

Shepherd said the cloud also boosts collaboration, with the ability to work from anywhere. "Honestly, your employees are going to accept nothing less than that ability to work from anywhere at any time," Shepherd said.

Where processes, machine performance, quality records and maintenance plans are often siloed in certain applications and devices, the cloud can make that data accessible across geographies and time zones. "Manufacturing data is a tremendous asset for your company," Shepherd said. Putting all the data from different sources in context is also important and creates real value in the datasets and ensures trustworthy data. Ultimately, it allows customers to make decisions from that data. "That's the way you change your business, and that's the way that you create value," he said.

Rockwell aims to be the best choice for customers as they pursue agility and speed goals, and it invested in that mission with FactoryTalk Hub, a set of SaaS and cloud native offerings. "It covers the entire lifecycle of manufacturing,

"Manufacturing data has historically been gridlocked, trapped in the devices or the applications where it was created." Rockwell Automation's Brian Shepherd announced new FactoryTalk features designed to unlock data's potential during Perspectives at Automation Fair in Chicago.

from the design of new production systems to the operation of those production systems and the maintenance of those production systems," Shepherd said.

For design, Rockwell announced a new cloud offering, FactoryTalk Design Studio. "It's a completely new generation of pure cloud software for programming our automation systems," Shepherd said. It offers flexible programming approaches and languages, and it is multi-user to flexibly scale as a team. "And it's multi-controller. It takes a system view, not a single controller view of the automation project," he said.

Rockwell's investment in SaaS-native applications was bolstered by its acquisitions of Plex and Fiix. "These are big bets that Rockwell was placing on the future of the cloud and manufacturing," Shepherd said. "These applications connect people, plans, activities and results."

Rockwell customer Motus Integrated Technologies, which provides automotive interiors to transportation companies around the world, had a reliance on paper-based processes. "They were flying blind in a world that requires agility," Shepherd said. With Plex and a cloud-based smart-manufacturing platform, Motus implemented the system across three continents in seven different plants. The real-time visibility into production data helped the company identify errors and opportunities in production and helped it to take immediate action during the product manufacturing process. This, in turn, drove significant improvements in scrap and in overall quality for Motus. "This is the kind of performance that companies are achieving today, through the agility and speed provided by the cloud," Shepherd said.

Perth County Ingredients (PCI), a supplier of ingredients for food, beverage and sports-nutrition companies, was mostly doing reactive maintenance on its assets but wanted to move to a more proactive approach. With Fiix, PCI is using data to plan and then optimize the maintenance activities of its important assets. "It's the first step of the journey that PCI is taking on its digital transformation. It's kind of an easy and high-impact way to start that transformation journey," Shepherd said.

With FactoryTalk Hub, Rockwell is focused on the Connected Enterprise and a unified experience to seamlessly flow data between all applications. "Manufacturing data has historically been gridlocked, trapped in the devices or the applications where it was created," Shepherd said. "You need the right data in the right place at the right time and in the right context to make decisions," Shepherd said. Machine sensors generate tremendous amounts of data about the health of the production processes and the health of assets. "Those data sets are really the vital signs of your factory," Shepherd said.

Edge technology is also integral to cloud-based solutions. "There is no pure cloud manufacturing. It's always a hybrid story," Shepherd said. To manage what is happening on-prem close to the production process, at the next layer up at the edge and at the cloud, Rockwell launched FactoryTalk Edge Gateway, a brand-new SaaS solution that lives in the cloud and allows customers to manage edge devices across a fleet of factories, as well as the devices and workloads running on the edge. "This is bringing an IT mindset about managing a fleet of devices across the company, to the OT world where you're doing that remotely. You're doing it via the cloud and doing it securely," Shepherd said.

The value of data comes from the insights it provides, but the real challenge lies in scaling those tools. "That challenge is to grow so that it survives and thrives over time. And, at scale, you really need an industrial approach to data wrangling," Shepherd said. "Otherwise, it's chaos."

The need for an industrial data hub is what drove the need for Rockwell's partnership with Cognite. "We're working with Cognite to build its leading industrial data hub into our new solution that we'll call FactoryTalk Data Mosaics," Shepherd said. The offering will be available mid-2023. "It's the key to unlocking value at scale from this tremendous set of data that you have in the factory," Shepherd said. Creating value from data requires a dataset from a single trusted source of truth. "That's the target for our FactoryTalk Data Mosaics offering. I think it's going to be pretty important for the way that it brings that whole FactoryTalk, SaaS-based set of technologies to life for customers," Shepherd said.

"We're investing in the cloud; we're making those big bets," Shepherd said. "We're meeting customers where they are in their journey and helping them align to achieve those business outcomes that they're looking for around speed and agility, and with a vision, with investment, with technology and with all of you, we're taking manufacturing to a whole new level."

PLANTPAX ADVANCES DIGITALIZATION, STAFFING AND SUSTAINABILITY

by Jim Montague

When multiple, earth-shaking difficulties are bearing down simultaneously, it's good to have a friend with the solutions and expertise that can provide some shelter. Operators, engineers and managers in all industries are facing a multi-pronged, perfect storm of workforce shortages due to the Great Resignation after the COVID-19 pandemic at the same time they're trying to digitally transform from hardware to software, networking and cloud-computing, as well as deal with increasing demands for more sustainable manufacturing practices.

"Sustainability is a challenge for everyone with new pressures and rules that touch all industries, but Rockwell Automation has process controls and data analytics that can help," said Jim Winter, global process business director at Rockwell Automation. "We were also making progress on prior labor shortages, but then COVID-19 and the great resignation hit, so we're trying to address it with more network links, intuitive systems, remote connections and autonomous capabilities."

Winter and Dave Rapini, global business manager for PlantPAx at Rockwell Automation, delivered the keynote address, kicking off Process Solutions User Group (PSUG), just before the opening of Automation Fair 2022 in Chicago. More than 750 visitors from 15 countries and 20 process industries attended 14 customer sessions, 30 technical sessions and eight hands-on labs at PSUG.

Handling headwinds

Winter pointed out that the COVID-19, digitalization and sustainability trends spun off a host of other challenges for end users and their partners, such as supply-chain bottlenecks and resulting productivity issues, or increased network connections that produce more cybersecurity vulnerabilities.

"Supply-chain delays mean users have to make substitutions and change tuning, optimization and plant systems, so they need more plug-and-play devices to handle them," explained Winter. "Backlogs mean users have much less tolerance for off-spec products and downtime, and they must be even more productive and as fast as possible. More network connections make it even more crucial to follow IEC 62443 and other cybersecurity standards. Changing workforces need standards that can improve connectability and emulation for training. And standards like the Open Process Automation Standard (O-PAS) and NAMUR's

"Low-code/no-code extends HART features that couldn't be easily deployed before and lets users extract messages, migrate them to controls and even create graphics." Rockwell Automation's Dave Rapini explained how open technologies have reduced coding to simple configuration during the PSUG keynote.

Module Type Package (MTP) are entering more of the specifications required by users."

Technical and system treatments

One of the main remedies that Rockwell Automation prescribes for many of these challenges has been its PlantPAx distributed control system (DCS), which made several big strides over the past two years. It gained a peak controller as part of its recent PlantPAx 5.0 release, while PlantPAx 5.1 was launched this past summer, and featured FactoryTalk emulation software for the peak controller. However, the big news is the unveiling of PlantPAx 5.2, which will be highlighted by the fully redundant FLEXHA 5000 I/O platform. It has all discrete and digital inputs and outputs on one card, which will let users terminate wires and program them electronically, saving huge amounts of time on configuration, startups and spares management.

In addition, Winter reported that Rockwell is working on combining hardware, software and services for better outcomes in industries and applications, such as energy management, mining, brewing, batch analytics, burner management and single-use technologies. "These solutions help users get to market faster and work together better," added Winter.

Open standards for open solutions

To help end users achieve more high-value goals without having to work as hard, Rapini stated that Rockwell Automation's technologies can handle many of their traditionally manual tasks—freeing them to concentrate on what's most important to them. Programmable logical controllers (PLCs), such as ControlLogix and CompactLogix, accomplished many of these efficiencies over the years, but now they're gaining new software and capabilities that are allowing them and their users to make even greater gains. These features include embedded software objects, integrated HART communications, ownership and arbitration functions, graphic frameworks, regulated industry compliance, automatic hardware diagnostics, alarms in object, smaller server footprints, enabled analytics and cybersecurity.

"Our R&D focuses on open technologies based on open standards, which allow easier integration and collaboration; low-code/no-code software with reusable software blocks, so users don't have to spend so much time on programming; and digital transformation that enables connections and lets users add value," said Rapini. "For instance, low-code/no-code extends HART features that couldn't be easily deployed before and lets users extract messages, migrate them to controls and even create graphics. These tasks are now just a check box. This is just configuration, not coding."

Rapini stated that low-code/no code also enables:

- automatic diagnostics that can be pushed directly to databases
- embedded software objects for simpler architectures in Rockwell Automation's controllers
- ownership and arbitration functions, which run behind the scenes, so software updates can be rolled out easily to groups of devices.

Rapini reported that Rockwell is also working with other open standards, such as OPC UA for communications, ODVA and NAMUR's joint process special interest group (P-SIG), and MTP and MQTT publish-subscribe protocol for skid integration.

"With this November's release of PlantPAx, we'll have remote alarming. And, in next year's release, ODVA and NAMUR's P-SIG initiative will cover basic instrumentation, which will let users quickly create the reusable code they need," said Rapini. "Meanwhile, MTP for skid integration will allow OEMs to configure files that can ride on their skids, until a DCS discovers them. This will make integration much easier."

In addition, PlantPAx has also gained a scalable batch solution that's based on the ISA88 batch standard. It features:

- An instruction-based ISA-88 Sequencer that bring essential batch execution to the controller
- SequenceManager software that provides independent operation of a single unit on skid controllers
- FactoryTalk Batch software with a comprehensive batch-management platform that solves issues about traceability and compliance.

Many of these functions can be handled by FLEXHA 5000 because it's fully redundant, has built-in diagnostics, is available with smart junction boxes, has individual channel isolation, offers individual channel universal I/O, enables ease of wiring and is configured for simplex or duplex operating.

"PlantPAx and FLEXHA 5000 also enable digitalization and IT and OT convergence because they provide users with the advantages of their diagnostics and reporting," concluded Rapini. "Ten years ago, we talked about Cisco and Stratix switches, and using Ethernet to reach the enterprise. Now, we're able to talk about how they can

add value further up the organizational stack; provide data structures and models for all the software in an application; let users pick their top 12 parameters and put them in a database; and help data managers do what they want and get the reports they need. We can now think of the DCS as doing more than just basic control. With PlantPAx, it can securely do data analytics and multidisciplinary control, and make multiple deployments easier to use."

THE TRENDS SHAPING TOMORROW'S INDUSTRIAL FACILITIES

By Len Vermillion

Identifying the current drivers of the world's process industries can be boiled down to three mega trends: Sustainability, digital transformation and flexible manufacturing. That was the consensus of an eight-person panel discussion during the opening session at Rockwell Automation's Process Solutions User Group at Chicago's McCormick Place on Monday.

"A keyword to all of this is that it is a journey," said Jim Winter, Rockwell Automation's director of global process business, emphasizing that change won't be easy for many companies, and it will take a concerted effort to address all three trends.

Another panelist, Kumar Sokka, global business director for digital at Rockwell Automation, said his business often describes the process of industrial digitalization as "difficult digital" due to the commitment necessary.

Craig Resnick, vice president of ARC Advisory Group, picked up on that theme and added that the common denominator in all three mega trends is that they all revolve around industrial workforce issues. Even as automation technology is used more and more to offset a lack of experienced workers, producers are seeking to increase productivity and control costs in the face of a fast-paced and ever-changing world where consumer demands shift often.

"You can almost look at the workforce and categorize it as to how each of these trends affects it," Resnick said. "When we talk about sustainability at the C-level, we spend a lot of time looking at things like net-zero, circular economy, energy saving. When we're in the plant, it's an operational resilience story.

"How do we compensate if there is another pandemic, or we're cut off from our supply chain? Is there a plan and tools in place that we can go to, so we truly do have a sustainable plan?" he continued by asking hypothetically: "Do we have the right tools and technology in place knowing we might not have a workforce that's able to support them?"

Resnick told the audience that digitally transforming a facility can help a workforce to reach heights it might not be prepared to reach. While the youngest generations of workers are also the most technically savvy, the right technology is still needed to help those workers be more productive.

"They might be great at Fortnite but when you say something like 'cat cracker' they're completely lost," he said.

When it comes to flexible manufacturing, Resnick added, manufacturers these days are required to look at their supply chains from a real-time perspective and be prepared to shift gears at a moment's notice.

Sustainability front and center

Pete Morell, global OEM industry director, sustainability and process, at Rockwell Automation, picked up the discussion on sustainability by saying many new OEMs coming into the process industries, whether in energy or food processing, really understand their processes but don't necessarily understand the automation

Sustainability, digital transformation and flexible manufacturing will shape the process industries' investments for many years to come, agreed a panel of industry experts who convened to kick off the Process Solutions Users Group in this week's run up to Automation Fair 2022 in Chicago.

involved. He said Rockwell's work with such customers is centered around driving consistency, which he said can ease the burden.

He also said many can't seem to hire enough workers to develop such consistency. "That's where we advocate a concept around 'connected workers,'" he said, describing a plant where there is a central control room and workers are able to communicate and work in tandem.

John Steckler, director, North American Process Automation at Archer Daniels Midland (ADM), a Chicago-based food processing corporation, said consumers around the world have made it clear that they expect the products they purchase to come from sustainable sources, produced by companies that share their values. "With our role in the food chain, we really have a responsibility to scale up our sustainability efforts to the ever-expanding needs of the global population," he said of his company.

To accomplish its sustainability goals, Steckler said the company focuses on its supply chain, which are farmers. "We're helping to enroll over two million acres in regenerative agriculture for low-carbon intensity products," he said of his company's efforts. He outlined several other key initiatives such as the company's "Strive 35" commitment, which aims to decrease its greenhouse gas emissions 25% by 2035.

"That commitment also includes targets for reduction in energy, water intensity and diverting waste from landfills," he added. "So, we are looking at scope 1, 2 and 3 emissions."

He also said the company is involved in projects and joint ventures for the production of bioplastics and sustainable aviation fuel. In addition, he highlighted its "Project Subway," which is a project to produce feedstock for renewable diesel fuel.

For the project, Steckler said ADM needs a highly automated" plant in North Dakota, which it hopes to have in operation by next year's harvest, although Steckler admitted the timeline is aggressive. Steckler said the process of automating the plant, while sustainable in scope, was "really digital transformation in the form of a brand-new plant."

He also said that ongoing workforce challenges needed to be considered, and that the plan for the new plant redefines roles, something he said is becoming increasingly necessary in today's world. "The operator of yesterday is probably not the operator of tomorrow," he said. "All roles in a plant might be different than what we would call traditional roles in plant production."

He pointed to the need for building much more automated unit controls. He added that things such as full plant production adjustments need to be based on demand or key performance indicators.

"With less human interaction, normal process changes," he said.

Digital transformation

Getting started on the digital transformation journey is no easy feat. Sokka said, "If you look at the market, you can see how everyone wants to figure out how to get into digital transformation and figure out what the problems are to solve.

"Where we sit, right in the middle is trying to bring all of the hardware, software, domain expertise, services, and partner software technology together to solve value," he continued as he discussed Rockwell's approach to digital transformation. "Our biggest focus is 'fast value.'"

He said their approach is to work with customers to figure out what they can digitalize over six to eight weeks and thenhow to scale the solution. This approach drives larger scale transformation, he said.

One industry that has an urgent need for digital transformation but has struggled to master finding the right value is oil and gas. Andrea Monte, vice president, digital automation solutions and services at Sensia, an oil and gas technology company that brings together real-time control and IoT technology from Rockwell Automation and pairs

it with software and analytics from oilfield services giant SLB (formerly Schlumberger), said the oil and gas industry face three main obstacles to digital transformation.

First, he said the global nature of the oil and gas business means there are very different operating conditions in different countries that companies face. "That makes standardizing difficult," he said.

He added that the lifecycle of an oilfield is measured in decades, so architecture gets outdated even though it is still in use. That means it might not be capable of being transformed easily.

Finally, he reiterated the theme of the panel and pointed to the industry's "Great Crew Change." Ironically, this is a reason for digital transformation to step up in pace, he said. "There's an opportunity for digital technology to replace domain knowledge," he said.

Flexible manufacturing

The driver behind flexible manufacturing is quite simply consumers. Consumers aren't just seeking sustainable products they want increased functionality, said Mark Massey, global electrical and controls manager at Primient, a manufacturer of food and industrial products from plant-based and renewable sources. "All the while still purchasing products from their established brand," he added. "This puts a lot of pressure on the manufacturing space to change production more frequently and get to quality standards more quickly."

This evolving demand requires products to move quickly from plant floor to end consumer without increasing warehousing or tank space, and while reducing working capital, he added.

"It has to be about everyone working together up and down the supply chain and requires stakeholders to think holistically about their businesses," Massey said.

He added the trend toward flexible manufacturing offers the opportunity to revolutionize how companies manage their production. More importantly, it offers the opportunity to build smarter facilities.

Tim Shope, vice president, digital transformation at Endress+Hauser, agreed, saying new plants will be built "very differently." Shope added that flexible manufacturing needs to be accounted for when building plants because the possible lack of workforce in the future will require more automation and less direct human interaction. He cited new green hydrogen plants as examples of facilities coming online that will be more about the technology and less about how many people are needed to run it.

Both men agreed with the rest of the panelists that flexible manufacturing has already arrived and is here to stay.

"Flexible manufacturing is no longer a far-off wave but a tsunami that has already hit," Massey said.

And, it goes hand-in-hand with the trends toward sustainability and digitalization in defining the future of the process industries.

E TECH GROUP DELIVERS BATCH CONTROLS FOR MEAT CULTIVATION

By Anna Townshend

Taking cells from livestock to grow meat in a lab might seem like science fiction, but E Tech Group is making the ethical and sustainable processes a reality. Cassy Gardner, director of operations, and Anees Chamarty, lead automation engineer at E Tech Group, Life Sciences West, discussed their work to develop a scalable and sustainable solution for cultivated meat. The first-of-its-kind pilot plant is essentially growing meat in a lab, with the help of automation.

"This is something that's not been done before, so our clients are in a very innovative space," Gardner said. This made early involvement with the client imperative to reducing design changes throughout the course of the project. "We really had to stay, from an automation perspective, in lockstep with the clients as they evolved what they were looking to accomplish from a process perspective," Gardner said.

To design, program and test the distributed control system (DCS) in about six months, E Tech Group needed a platform with an out-of-the-box solution but one that was also flexible. E Tech Group turned to Rockwell Automation's PlantPAx platform.

In addition to a tight deadline and the need for flexibility, the project included some 1,100 individual I/O points. The PlantPAx process library helped with relatively easy and quick programming, and using module programming where the state machines were embedded also helped speed things along. "So at a high level, we deliver a code that's reusable and scalable," Chamarty said.

The batch model is based on ISA 88, which enables modular style programming and remote unit operations. The solution also includes centralized data monitoring, process data storage and trending, and remote alarm notification to targeted personnel.

The plant equipment includes multiple large bioreactors, as well as small-scale bioreactors, portable tanks, media prep vessels and transfer lines. Individual control devices included block and control valves, pumps, variable frequency drives, and analog and digital devices.

"Our inputs and outputs are individual devices; those turn into control modules, so PlantPAx offers a bunch of features to be able to pull those out of the box with just some simple configuration," Gardner said. "And then, building upon the control modules, we put those together like Legos." Equipment modules are next, and phases and operations are on top of the equipment models. "All

"All the different building blocks come together in a standard hierarchy." Anees Chamarty, together with Cassy Gardner of E Tech Group, detailed the company's use of PlantPAx to automate all the various phases of a new pilot plant for meat cultivation.

of them execute a sequence that ultimately executes the process that delivers the product in mind," Gardner said.

"All the different building blocks come together in a standard hierarchy," Chamarty said. The process hierarchy at the lowest level includes control modules. "And then the next higher level you have a module, which could use one or more control modules to carry out a unique activity, such as cooling or activating heating," Chamarty explained. One more level up is the equipment unit that encompasses the modules to carry out major process activities. This is where FactoryTalk Batch allows the operator to interact with the process.

"On top of that you have operations unit procedures. That's the recipe, and it could be a combination of two different procedures," Chamarty said. "The parameters are downloaded to the program, to the recipe, and then the operator can just enter the set points with a click of a button on the HMI [human machine interface]," Chamarty said.

To help develop the complex project with multiple developers, E Tech Group used a pin chart, a 2-D representation of the design. The design document shows the sequences and processes as they happen on the plant floor. "We use this very heavily in collaboration with the process team to make sure the programs that were coming together match what they're looking for," Gardner said.

To translate the design into software for the ControlLogix platform, the team used Studio 5000 to import and export I/O in bulk. "That really helped us when it came to managing design changes and iterations," Chamarty said. They also used a mix of PlantPAx 4.x and embedded 5.0 process objects, and function blocks and ladder logic to program the control and equipment modules. "We wanted to leverage our existing prior experience," Chamarty said.

For equipment module programming and putting multiple individual devices together to control a certain state, a scheme propagation can program those to all work together. "We use a state model to help with that process, and each of the equipment modules have to pull permissive and interlocks," Gardner said.

Complexity is also derived from the phase-driven control strategies, and a cascade methodology for shared equipment, or modules using the same equipment. One particularly complex piece of equipment to program was a mix-proof valve, or aseptic double-seat valve, which allows users to process media in parallel with the cleaning operation. It's a four-part valve with a middle chamber including a steam and drain outlet. The mix-proof valve includes seven automation elements: four valve actuators (main valve, steam inlet valve, chamber drain valve and trap divert valve); two seat lifters (upper and lower); and one temperature input. "All these elements come together to be able to design a safety matrix that shows you the relationships between all the difference sequences of operations," Chamarty said.

For graphics, Gardner said, they needed to comply with industry best practice standards, and ultimately, wanted to communicate the most important information to operators at the right times. The HMI does not use a lot of color, mostly grayscale. "The colors are really meant to emphasize when there really is a problem," Gardner said.

Because this was a pilot project, the client is still iterating on their process and in order to do that well, they need data. "They need to understand what's happening on the plant floor and how the processes are running," Gardner said. "So we help them do that and get that information they need through FactoryTalk Historian."

FactoryTalk AssetCentre helped the team to help meet the aggressive timeline with multiple developers. "We can manage the various versions of the code that we were using and developing to make sure we're not stomping on each other," Gardner said.

In terms of testing and simulation, the team had close to 90 phases, which all needed the sequences that were programmed to match exactly what the client wanted. To do that, the team took the graphics they developed and put them side-by-side with the code programmed in the controller. Sometimes they used a physical controller and other times an emulator to be able to run the sequences for each phase and compare to the pin chart step by step. The emulator was an important part in making sure the team minimized the time spent testing on equipment and the resources required for testing those phases and making sure they match the process design, Gardner said.

Once the client begins full production, the plants will be all over the world. "At the end of the day, the product has to look, feel and taste the same," Chamarty said. E Tech Group needed to deliver a solution that was robust, repeatable and flexible, she said. "So for that, we need automation."

TRIANGLE PACKAGING INNOVATES TO DIFFERENTIATE

By Mike Bacidore

Celebrating its 100th year in business, Triangle Package Machinery still operates with the freedom and innovation of a family-held machine-building company. It's what allows Triangle to design and manufacture premium machinery for the packaging industry and reinvest annual profits into research and development as it identifies customer needs and market opportunities.

"We're at the premium end of the market," said N'gai Merrill, chief operating officer at Triangle. "Customers are willing to pay for quality machines that last for 30 years." Merrill and a group of executives hosted a group tour at the company's 120,000-sq-ft manufacturing plant in Chicago during Automation Fair 2022. Now in its third generation of being family-owned, Triangle employs almost 200 people and offers sanitary food packaging equipment, including tray loaders, horizontal cartoners, combination weighers, rotary pouch equipment and vertical-form-fill-seal (VFFS) machines, which account for more than 70% of its business.

Being in business that long doesn't come without hurdles. When Triangle migrated from Rockwell Automation's Kinetix 6000 drives with MPL motors to Kinetix 5500 drives with V-series single cable motors, benefits abounded. Improved flexibility and maintainability, increased sustainability, smaller panel footprint and simplified installation were mere appetizers to the main course of cost savings from the reduced energy-input requirement needed by the single-cable design of the servo.

"When implementation began on Triangle's X series VFFS series bagger, it noticed an issue with the sealing jaws," noted Niki Lococo, OEM account manager, Rockwell Automation. Rockwell had changed the thermal model behavior between the Kinetix 5500 and the Kinetix 6000. "Current would build up, and the jaws would close on themselves," she explained.

"We established a plan to improve the 5500 design to operate as well as the 6000 system did," said Lococo. "We developed, tested and implemented the jaw-torque-control add-on instruction (AOI)." During development and testing, the Rockwell Automation Global OEM Technical Consultant (GOTC) team worked with Triangle engineers to test a new AOI to remove the thermal difference between the two classes of Kinetix drives. "The implementation of the AOI was successful," said Lococo.

While Triangle still supports legacy machines with control architecture from another manufacturer, Rockwell Automation has been a Triangle partner for more than 20 years, helping the machine builder to differentiate itself from competitors through Triangle's use of ControlLogix

"They want everything to be as simple as possible. Let the logic in the machines do the changeover, so the operator just has to press a few buttons." Triangle Package's N'gai Merrill explained why Post wanted a simplified version of machine changeover for its multiple cereal brands during a facility tour in conjunction with Automation Fair 2022.

and CompactLogix and its focus on sanitation, customization and service. "Our machines are built to be kept clean," explained Merrill. "We are highly customized, too. We have a product line with lots of options. And we have service techs all around North America. We can provide service throughout the life of the machine."

All machines are built to do changeovers as quickly as possible—an attractive feature. "Most machines will take hours for a changeover, but changeovers of our machines can be done within minutes, and all changeovers can be done without tools," explained Luis Torres, director of product line management at Triangle.

Post, manufacturer of multiple breakfast cereals, wanted a machine that was going to be auto-changeover. "We have that on our cartoners," said Merrill. "They've got issues with labor or people with the same backgrounds to be able to operate machines like in the past. They want everything to be as simple as possible. Let the logic in the machines do the changeover, so the operator just has to press a few buttons. Our strategy is trying to be more focused around what we do with R&D. I want us to focus on things we can sell broadly across the portfolio."

Another area where Triangle is focused is the human-machine interface (HMI). "We have an HMI project in our pipeline," said Merrill. "Everyone is trying to simplify their HMI to be able to have new people come in and know what to do. People are used to an iPhone. They want things more visual."

Before the pandemic, it was getting more difficult to find operators. "Post-COVID, that just fell off the cliff," said John Cooke, Triangle's sales director. "The turn toward autonomous machines is gaining momentum."

The use of IO-Link has also allowed Triangle to pull devices out of the cabinet to minimize cabinet space, noted Russ Sharpe, control system application engineering manager. Some additional technologies are gaining ground industry-wide, but Triangle is waiting for customers to adopt them.

"Ultrasonic sealing only uses energy when it's in operation, but it hasn't caught on in the United States because companies are reluctant to change from heat sealing, even if it means longer term that it's better," explained Cooke.

"The focus is on adding new machines that focus on particular applications," said Merrill. "The compact sanitary bagger is for fresh produce. We just launched our zipper tape machine. There's a big focus on fresh poultry. There's a lot of zipper tape applications for fresh poultry."

SMART MILKING: MODERN DAIRY REDEFINES EFFICIENCY WITH PLANTPAX

By Chris McNamara

The cows don't mind the automated processes.

In fact, once they get used to how the milking carousels work—a slow-but-efficient eight-minute spin for 106 animals at a time around a giant, autonomously operated hub that extracts and collects their liquid output into a central pipe—the cows eagerly climb into the stalls, as they are relieved to unload their udders three times each day.

Camera-guided autonomous robots spray the udders before the milking, then rinse them down afterward. In colder months, this post-spray includes an anti-freeze component. The only step that has yet to be automated, in fact, is the act of attaching the nozzles to the udders.

"All of this was made possible with PlantPAx." Automation Werx' Nick Reichelt explained how the company helped Millenkamp Cattle dramatically streamline milking processes at the organization's Jerome, Idaho, facility.

"We call that step the race to the moon," explained Nick Reichelt, who as owner of Automation Werx oversees this digitalization program that relies on Rockwell Automation's PlantPAx systems to keep milk (and profits) flowing smoothly.

The owners and staff at Millenkamp Cattle in Jerome, Idaho are thrilled with the recently adopted automation processes, which require less human intervention while optimizing the entire process, from feeding to milking to prepping and then shipping the million+ pounds of milk produced each day just within Barn #2 at the massive farming complex.

After their ride on the milking carousel, the cows return to newly cleaned stalls stocked with fresh supplies of feed and even air mattresses. "Cow paradise" is how it's described at this Automation Fair case-study presentation by Reichelt, who explained the motivations, challenges and wins with this ongoing project.

"We sat down with Rockwell and decided PlantPAx was the right solution," he said about the initiative's launch in 2018. "It has the tools and support for properly sizing a system like this, along with the network-design capabilities. We wanted to be sure we could trust this system."

The operators trust the system as much as the cows do the carousel. Consider these gains achieved over the past four years with smart, digital approaches to the ancient art of milk-collection:

- The Millenkamp staff members were attracted to virtualized templates within PlantPAx, which speeded implementation and adoption, and rely on standardized processes that are easy to communicate to stakeholders.
- Operators wanted greater insight into breaks. With a PowerFlex 755 operating the milking carousels over Ethernet/IP, operators can now quickly diagnose safety or drive issues and easily swap out hardware as needed.
- Team members credit PlantPAx for eliminating network glitches and reducing downtime.
- Intuitive displays on high-performance HMIs keep farmers on the milking floor and in the C-suite fully informed of production rates with real-time updates.
- The PlantPAx System Estimator tool took the guesswork out of determining how many servers and hard drives were required to complete the initiative.

"For the 400 employees at this facility, we are redefining what farming looks like," said Reichelt, who detailed an example of how new, smart cleaning-in-place procedures at Barn #2 slashed wash times and reduced costs by $12,000 a day. Case-in-point: what previously required manual testing of fluids running through pipes (you can't have any of the acidic cleaner mixing with the dairy, lest you wind up with cheese) is now performed with conductivity sensors that autonomously detect aberrations. "All of this was made possible with PlantPAx."

In a testament to the success of these programs, Millenkamp Cattle is scaling its efforts and building new facilities following these models to enable even greater volumes of production at additional barns. And, in keeping with their mission of extreme efficiency courtesy of smart, digital tools, Reichelt explained how the cattle farm is working on a project to convert the methane produced within their facilities into natural gas to be use by consumers to, say, prepare themselves a nice glass of warm milk.

FEEDWATER PLANT UPGRADE RELIES ON PLANTPAX

by Jim Montague

While it's not in the movies, J.R.R. Tolkien famously wrote that, "Water hot is a noble thing," and the same goes for boilers in refineries. Oil, gas, chemicals and most other modern blessings wouldn't be possible without old-fashioned hot water and steam, which both require clean water. To keep this crucial resource flowing cleanly and safely at a large refinery in Ontario, Canada, Teng Inc. in Mississauga upgraded its boiler feedwater treatment plant (BFWTP) this past June from an older, programmable logic controller (PLC) system to Rockwell Automation's PlantPAx distributed control system (DCS).

Glen Rycroft, senior process control engineer at Teng, presented "Upgrade of obsolete boiler feedwater treatment plant PLC/HMI to PlantPAx 5.0" at the Rockwell Automation Process Solutions User Group conference during Automation Fair 2022 week at Chicago's McCormick Place.

Teng is a 26-year-old, mid-sized engineering, procurement, construction and management (EPCM) firm with more than 145 staffers, who provide project lifecycle services from project development to commissioning/start-up, maintenance services and support such as inspections, optimization and turnaround services, and automation and controls including system integration from concept to commissioning.

Overcoming obsolescence

The BFWTP pretreats water before it goes to the refinery's boilers to make steam. The plant also produces potable water used throughout the facility. The process is critical to overall refinery operations because losing boiler feed water and steam production would cause a plantwide shutdown.

This refinery also runs 24/7, so there was no feasible way to schedule a full plant shutdown to replace its PLC. Because only a short migration window was available and the plant had to remain online throughout, the new control system would have to be robust and flexible enough to handle it.

The existing BFWTP was controlled by a 30-year-old, obsolete Honeywell IPC-620 PLC with an obsolete version of Intellution iFix human-machine interface (HMI) software. The PLC managed more than 500 I/O points, running about 30 pumps and 100 valves, while its programming was heavily sequenced for operations, such as regenerations and backwashes. The PLC was also connected to a legacy Honeywell DCS for supervisory monitoring.

"The obsolete PLC was no longer supported by the vendor, so it was hard to obtain spares. Meanwhile, PLC component failures were rapidly increasing over the past two or three years. A catastrophic PLC failure would cause

"The boiler feedwater upgrade reduced the time that operations and maintenance spent on troubleshooting by 60%." Teng's Glen Rycroft discussed the substantial benefits realized by the company's recent system upgrade of an older system to PlantPAx.

a costly plant outage of more than 12 weeks," said Rycroft. "Likewise, the HMI wasn't communicating with the PLC because a custom driver on the HMI workstation wasn't supported, and native files weren't available. As a result, operator interaction was only available through the Honeywell DCS communications link to the Honeywell PLC. In addition, troubleshooting in the old PLC wasn't intuitive, onsite staff weren't very familiar with the software, and Teng's support was required for detailed troubleshooting or modifications. Also, the old PLC's programming terminal was well beyond end of life with multiple component failures, and a replacement would be difficult to obtain and set up. Finally, the PLC's documentation was out of date or non-existent PLC documentation, including control narratives and I/O wiring diagrams."

Evaluating new controls

To evaluate and implement a new PLC, the BFWTP would need a replacement that was also sequence-based, though this wasn't ideal for the legacy DCS. The refinery eventually settled on Rockwell Automation's PLCs because they were already the site standard outside the feedwater plant's DCS as part of an earlier upgrade. Based on a review by stakeholders, it also adopted PlantPAx due to its ease of operations, enhanced troubleshooting for maintenance, ability to easily complete future modifications, and similar look and feel to a planned, plantwide DCS upgrade.

The refinery and Teng considered converting the IPC-620's program to Studio5000 software via a third party. However, Rycroft reported they rejected this option because this type of conversion wouldn't benefit the site because troubleshooting would still require manual scanning using ladder logic, and it wouldn't provide PlantPAx's enhanced HMI faceplates for operations and maintenance. Plus, the cost difference was negligible compared with migrating to PlantPAx. In addition, converting IPC-630 to Studio5000 would still require:

- Comparable testing to confirm conversion was completed correctly.
- Using an output conversion tool to maintain the old PLC's tag naming syntax, and keeping legacy tags and logic, which would make troubleshooting messy.
- Converting tools from ladder logic to function block because the BFWTP's site standard is function block where possible, and ladder where function block isn't possible.
- Still having to change process/control loops manually.
- Performing system diagnostics manually.

Likewise, the refinery and Teng also rejected upgrading the feedwater plant's iFix HMI software to its latest version because the supplier reported that migrating would have still been mostly manual due to its age. "With negligible cost difference to reprogram HMI in PlantPAx, along with multiple benefits of PlantPAx interface, upgrading the old iFix HMI did not make sense for this application," explained Rycroft. "It also would've required about 10-20% more testing without pre-built object libraries."

Picking out the pieces

Based on the BFWTP's 500 I/O and required availability, Teng and the refinery selected redundant 1756-L83EP process controllers and racks, each with a redundant power supply. They estimated CPU utilization at 50% and memory utilization at 44%, though actual performance after commissioning was only 30-40%. Other components and software included:

- I/O modules upgraded in-kind with 25% spare I/O points for expansion;
- Modbus RTU communications to the DCS via Prosoft MVI56E-MCM to replace proprietary Honeywell communications link between the DCS and the old PLC;
- Device Level Ring (DLR) EtherNet/IP communications among racks;
- Stratix 5700 switch for communicating with the HMI workstation and engineering workstation; and
- PlantPAx 5.0 DCS with Studio5000, V.33, and FactoryTalkView SE, V.12.

"Before shipping hardware and software, we took advantage of distributor Gerrie Electric's value-added service of staging all the hardware at their facility in Burlington, Ontario, as per network architecture drawings to reduce onsite installation and testing time," said Rycroft. "All firmware was loaded, software and patches were installed on the HMI and engineering workstations, and preliminary switch and network configurations were completed. Processor rack redundancy was also configured and tested. Meanwhile, the factory acceptance test (FAT) was completed at Teng's office, which includes a well-stocked automation lab for testing and training."

Programming the plant

Before migrating the BFWTP's new controls, Rycroft reported that Teng also performed several standard PLC and HMI upgrades. These consisted of developing the

I/O database, developing and reviewing the new control narrative, developing and reviewing static graphics, and conducting more thorough redundancy testing, DLR testing, switch configuration and IP address assignments during the PLC panels and hardware FAT to speed up onsite testing.

"The original IPC-620 PLC program, which had been one of the onsite standards, was difficult to read, and with one rung per page, it was difficult to search through," explained Rycroft. "Other PLC functions were located in separate programs, such as I/O conditioning, DCS communications, diagnostics etc. To program the new PLC, each program was divided by device containing individual PlantPAx objects. Sequences were programmed using ladder to interface with PlantPAx objects. Finally, objects were built first, which was done in bulk by using the Process Library Online Configuration Tool."

Likewise, typical function block layouts were developed with a consistent look and feel, which was programmed for each function block diagram (FBD) for maintenance troubleshooting. All commands to actuate devices were located directly in FBD and commented according, instead of using the old program's method of searching and cross-referencing.

"Wherever possible, all previous program functions were moved into PlantPAx objects to remove as much custom programming as we could," said Rycroft. "Complexity of sequences drove them to be programmed separately, interfacing with PlantPAx objects where required. Each sequence was complex on its own, and generally each sequence interacted with at least one other sequence. We used the Process Library Online Configuration Tool thoroughly during bulk development for quick modifications to parameters given the number of I/O points in the system."

In addition, interlocks and permissives were reprogrammed into PlantPAx objects for enhanced operator and maintenance troubleshooting. Also, local Honeywell PID controllers were migrated by Teng into the new PLC program as PlantPAx blocks. All loops were also retuned by Teng to further improve control. Similarly, storing the alarm database within the PLC and automatically generating it with PlantPAx objects provided many benefits, such as speeding up development by about 5%, and eliminating the need to synchronize and double check the PLC versus the HMI alarm database.

"Integrating local, loop controllers into the PLC gives the operators full control capability from the HMI, and loops are now automatically controlled via sequences, reducing dedicated operator time in the field. This was a big advance," added Rycroft. "Two of the loops were also previously bad actors that tended to overshoot, requiring additional operator intervention. Now that they're tied into seeing the rest of the process through the PLC, control is much smoother for these loops, which reduces or eliminates sequence faults due to these controllers."

Once all this programming was done, the pre-commissioning software FAT was held during two days at Teng, while operations and maintenance training was completed over multiple shifts before and after commissioning at the refinery. "Between the BFWTP's DCS and PLC, we also completed a significant amount of testing because more than 600 tags had to be transferred via the Modbus RTU link for monitoring and control," added Rycroft. "This testing was accelerated by using virtual/simulation modes of PlantPAx objects rather than manually creating simulation logic/force bits."

Commissioning and benefits

During the six-day migration, approximately 25% of the plant remained online, which required installing temporary facilities required for working seamlessly with the new PLC throughout the migration. "I/O wiring migrations from IPC-620 to the ControlLogix PLC required I/O power to be segregated from power for the new PLC chassis. This allowed the PLC to stay online, and let us complete any requested last-minute changes and review items with operations," said Rycroft. "We also completed I/O loop checks, which were again sped up by using PlantPAx compared to a typical system. Everything was now well organized, easily visible and manipulated from the HMI with no time wasted on searching for I/O in the old PLC program."

Benefits gained by migrating the feedwater plant to PlantPAx and ControlLogix included fully supported hardware and software from Rockwell Automation with local distributor Gerrie Electric directly involved in system setup and support.

"We're no longer required to obtain third-party parts for an obsolete PLC," said Rycroft. "The feedwater plant reduced the time that operations and maintenance spent on plant troubleshooting by 60% thanks to up-to-date equipment, improved controls, HMIs, alarms and diagnostics.

"We also accelerated the development and programming schedule by 20% by using PlantPAx 5.0 and associated tools, which also reduced expenses to the customer. In short, PlantPAx 5.0 played a major role in ensuring the migration stayed on schedule. Finally, this project's implementation costs were estimated to be very similar to alternatives, while providing a solution with much greater added value."

CENOVUS ENERGY UNIFIES OPERATIONS WITH INTEGRATED CONTROL CENTER

By Len Vermillion

Cenovus Energy is Canada's third-largest oil and natural gas producer and its second-largest refiner. With 12 heavy oil thermal facilities and more than 100,000 barrels per day of production, the company has a lot to manage. Add to that the vast distances its staff needs to traverse to maintain operations among facilities, and it all makes for needed change and opportunities for operational improvements.

"Operators hate two things. They hate change, and they hate when things don't change fast enough," quipped Don Sherwick, superintendent of operation for Cenovus Energy, who along with several other company leaders was on hand to tell Cenovus' story of how it addressed its need for an integrated control center during Rockwell Automation's Process Solutions User Group conference and Automation Fair 2022 meeting in Chicago.

The Integrated Control Center (ICC) is at the heart of the company's improvements, and it is designed to make its vast operations across a wide swath of western Canada function more seamlessly and productively. The ICC sits approximately 150 km from each site. Although representing a change in operations, Sherwick said the ICC was very much welcomed by operators at Cenovus oil and gas assets.

Cenovus' Riley Pashniak, senior automation specialist, pointed out several reasons why the ICC needed to be built. For starters, they wanted to turn good operations into great operations. The ICC is designed to give operations managers better tools to work with, and to improve processes. The ICC divvies up responsibility among operators, with each managing about 7,500 I/O. The ICC project also improved human-machine interface (HMI) and radio communications among its facilities. In addition, Pashniak said, the ICC gives the company much-needed agility, a recurring theme throughout the PSUG and Automation Fair sessions. Agility in processes was often cited as a main need in today's fast-changing world of stakeholder expectations.

The ICC is designed for centralized process data, including historian and visualization functions. It also sets Cenovus energy up for Industry 4.0 opportunities.

One of the biggest benefits the ICC brings is unified operations. That means all its facilities can participate in data-based decision-making and apply best practices from one facility to another.

Given that the company largely operates in Saskatchewan, Alberta and the Northwest Territory in western Canada, travel from facility to facility among its staff can

"Looking back, the trial was extremely beneficial," Cenovus Energy's Riley Pashniak explained how the company unified operations across four of its sites in an Integrated Control Center before bringing in the other eight.

be unproductive. The ICC creates opportunities for remote maintenance and reduced operational inefficiencies. "It also closes a divide between urban and rural workers," Pashniak said.

Located in Lloydminster, Alberta, The ICC serves 12 thermal facilities in places such as Sandall, Bolney and Edam in Saskatchewan. It also serves a raw water network stretching from the far west back into Saskatchewan. The company worked with Apex Automation, a systems integrator with operations across western Canada.

"I would say 15 years ago we were more experienced on proprietary and serial networks," said Levi Hastman, system integrator, Apex Automation. "As control systems evolved and everything started going EtherNet/IP, system integrators started learning more about various technologies."

The ICC is loaded with technology. Cenovus and Apex worked with various technologies and technology partners including ThinManager and VersaView from Rockwell Automation, and offerings from TRBOnet, Voicemeeter, Stratus, Dell, Logitech and Motorola, to name a few. At the center of its technology is its radios, networks, audio and peripherals.

"High performance standards and radio communications was a big part," Pashniak said of their selection of technology. "Operator experience in our case was very critical."

He pointed to the Logitech Easy-Switch software and multiple monitor functionality as key technologies in the layout of the ICC. The software allows multiple computing devices to be controlled by a single mouse and keyboard. The operator simply selects a preconfigured button to toggle among devices.

During an initial trial across four facilities, the company had a chance to find out what challenges it would face before rolling out the capabilities across the full fleet of assets. "Looking back, the trial was extremely beneficial," Pashniak said. From there, the ICC created smoother operations across all its facilities—and a smoother ride into the future.

UNIFIED OPERATIONS

PLANTPAX TEAMED WITH iPADS ELIMINATES CONTROL ROOM FOR FOOD PROCESSOR ICL

By Mike Bacidore

Based in Israel, ICL is an essential part of the global food supply chain. Its plant site in the Carondelet neighborhood of St. Louis operates continuously, with yearly production of about 100 million pounds. "We're mainly a phosphate salts facility. Quality assurance plays a big part," explained David Kaltwasser, engineering manager at ICL.

The site originated in 1876, when the first product was monocalcium phosphate made from bone black, sulfuric acid and lime. It's had quite a few owners over the years, notably Monsanto for a few decades beginning in the 1930s.

"We do some batch. We do continuous," explained Kaltwasser. "We use drum dryers, rotary dryers, crystallization. A lot of what we do is acid-based chemistry. You eat what we make several times a day. We had this opportunity to get into an alternate-protein process. When we got the project approved in 2020, it needed to be started in 12 months."

The 10,000-sq-ft facility was constructed on ICL's 19-acre production campus in St. Louis. At full capacity, the plant is expected to produce more than 15 million pounds of product annually. The facility currently operates two shifts as it ramps up.

"It's not an overly complicated process," explained Kaltwasser. "We bring in materials and cut them into an emulsion. This emulsion is very thick, like a pancake batter. We pump that up and form the fiber, and then we cure it

"No department wanted to be the reason why the project was delayed." ICL's David Kaltwasser shared details of his operation's deadline-driven implementation during Rockwell Automation's Process Solutions User Group (PSUG) in the run up to Automation Fair 2022 in Chicago.

and then rinse it. It goes down some conveyors, and then we pack it. Then it's sold to other manufacturers who use it to make nuggets or other products."

Design requirements focused around one core need. "We wanted ease of integration," said Kaltwasser. "We knew we were going to buy a lot of package systems, so we wanted to be able to dictate what we wanted. We were time- and schedule-driven, so we had to figure out how we were going to make this work, and we wanted to keep the number of operators down." Possibly the most important requirement was that Kaltwasser wanted no control room. "We wanted the operators on the plant floor with iPads to control the process," he explained.

"For the architecture, we used PlantPAx 5.0," explained Andrew Romine, automation engineer, Gray Solutions, the integrator that steered the design and implementation, dropping in a ControlLogix add-on profile (AOP), defining assemblies for programming and enabling a quick and easy integration. One of the issues with using the iPad was its 1680x1180 resolution, which could create a hurdle going forward, converting to a control-room display. There are also some minor adjustments, such as changing batteries and licenses when switching iPads.

"The architecture was sound," said Brad Downen, senior project manager, Gray Solutions. "The iPad was pretty challenging, but we reaped the benefits of not having a control room." PlantPAx also ensured standards similar to other departments. "We put that in 2012," explained Downen. "That was 2.0, but it has been updated to 3.5 and 3.6. We accelerated development with PlantPAx, so we were able to go as things came in."

Delays, as expected, became a part of the process. "Things were delayed left and right," admitted Kaltwasser. "But no department wanted to be the reason why the project was delayed. When that last piece came in, we wanted to start up, and that's basically what we did. It takes six to eight months to get final certification."

Visibility and mobility then took center stage. "We were able to debug things remotely," said Downen. "And ControlLogix does help with expanded I/O trees, and we were able to do that quickly. We were able to keep the automation deadline; we didn't miss a beat."

Thus far, the operators are very engaged, explained Kaltwasser, who noted a 25% reduction in labor by eliminating the control room, as well. "The iPads are going well, except we don't have an audible alarm. That's something to watch out for if you go with iPads. We built it so we could ramp up. We're working two shifts four days a week now."

The strong Wi-Fi in the building made the iPad implementation easy. "But taking it outside was challenging to troubleshoot a valve or a pump," said Kaltwasser. "Fortunately, 90% of the I/O is inside the building."

DIGITALIZATION DRIVES SUSTAINABILITY SUCCESS

By Len Vermillion

When it comes to sustainability there's little doubt that technology is leading the way to meaningful progress toward net-zero goals. Digitalization, in particular, is a catalyst for corporations around the globe to answer many of the challenges that often hinder even the most well-meaning companies. That's why many of the most successful companies on sustainability efforts have partnered with automation and other digital technology providers to create the kind of operational infrastructure needed to truly focus attention on decreasing emissions, increasing recycling capabilities and powering a different kind of industrial sector.

"In some ways it's like we are creating a digital twin of planet earth," said Andrea Ruotolo, global head of customer sustainability at Rockwell Automation.

Ruotolo is one of Rockwell Automation's growing team of sustainability leaders focused on the acceleration and launch of new and enhanced customer sustainability offerings. This week at Automation Fair she moderated an Industry Forum panel featuring some of those customers, and they spoke to how they have found success in maneuvering the often confusing and difficult path to net-zero targets.

Before the session even began, Ruotolo polled the audience and discovered many are dealing with challenges such as costs for instituting sustainable operations, difficulties establishing environmental, social and governance (ESG) goals, and finding and utilizing the right technology capabilities to help them find their way to sustainability. One of the panelists, Piet De Vriendt of Kezzler, a provider of cloud-based enterprise platforms for product digitalization and traceability, said digital transformation gives companies "the technology to substantiate how sustainable you are."

Given that ESG reporting is one of the main ways to show your sustainability bona fides to investors, customers and even potential workforce talent, having a solid data plan is essential to success. That's where traceability, De Vriendt said, becomes an essential tool for sustainability.

"Traceability is the ability to follow a product through its entire value chain, not only internally inside a factory, but especially when a product leaves a factory," he said. "The data can be aggregated on that product through its journey all the way to the end consumer and actually beyond that."

He added that weaving a thread of structured and organized data around a digital identity serves many purposes, including better transparency, which can be the centerpiece for reporting on ESG goals. Data also serves a growing need consumer have for better transparency before they will be willing to pay for products. Therefore, solid

"We want to displace diesel." Sanjay Shrestha of green hydrogen producer Plug Power was among the Sustainability Industry Forum speakers who pointed to automation and digital transformation as key to scaling society's sustainability efforts.

data collection leads to premium brand identity, according to De Vriendt.

He also pointed to growing regulations where traceability can achieve more circularity and hold manufacturers accountable for their carbon footprint. Among those regulations are the EV Battery Passport, the EU's Digital Product Passport and the Food Safety Modernization Act.

Renata Cardoso, vice president, sustainability and low carbon, Electra Battery Materials, agreed. Electra is building one of the first EV battery materials refineries outside of China, in Ontario. She said to be part of the EV industry, "You really have to position yourself in a way to avoid any sort of ESG complaints."

She added that the company continues through its construction phase of its refinery, it's used digital technology to enable it to build low-carbon operations from the start.

When polled about trends they were interested in to reduce their carbon footprint, the audience listed carbon capture, geothermal energy, wind power and hydrogen as their top choices. Green hydrogen has received a lot of momentum recently, especially following the Inflation Reduction Act of 2022 which allots investment dollars for U.S. development of the technology.

Green hydrogen is defined by hydrogen fuel that is produced from renewable sources such as wind turbines. In differs from blue hydrogen, which is derived from the extraction of natural gas. In either case, the primary use for hydrogen is as a transportation fuel.

"We want to displace diesel," Sanjay Shrestha, chief strategy officer at Plug Power, told the audience. Plug is a U.S.-based company involved in the development of hydrogen fuel cells that can be used in buses and cars.

Plug has about 60,000 fuel subsystems operating in the field. Producing those large amounts of product means the need for automated operations. "I think automation is so important to what we're doing because it allows for scalability," he said.

That also helps keep costs in check. One of the biggest challenges cited by the audience in becoming more sustainable is the cost of products.

Likewise, automation helped HDG overcome it production challenges on its HFFS packaging machines for sustainability. The goal of German-based company is to use natural packaging material and shift away from plastics. Its operational objectives are to reduce machine electricity consumption and implement energy monitoring.

"We thought to ourselves, what can we do to reduce energy," said Marcus Behrens, managing director for HDG.

He discussed the companies journey to a more transparent and automated process, which he credited to Rockwell Automation's advice. "It's not only for transparency of the process but also for predictive maintenance."

For all of the panelists on the stage, digitalization and working in partnerships with automation suppliers proved to be the driving force behind their sustainable futures.

PHARMACEUTICALS SWALLOW THE DIGITAL-TRANSFORMATION PILL

By Anna Townshend

The Life Sciences Industry Forum at Automation Fair focused on digital-transformation imperatives in the industry. Moderator Daniel Matlis, president and founder of Axendia, was joined by panelists Sachin Mirsa, global pharmaceutical and biotech industry practice lead at Kalypso; Mark Auger, senior principal engineer of automation engineering at Cytiva; Carlos Martinez, associate director of MS&T at Sarepta Therapeutics; and Matthew Laing, senior director of digital manufacturing engineering at Eli Lilly.

Matlis began by presenting some research done by Axendia, an analyst firm that provides advice to life-science executives on business, technology and regulatory issues. He also provided an overview of FDA regulations and guidance, as his company has a strong relationship with the agency and has been involved in several digital-transformation initiatives with the FDA.

Axendia's research identified the top drivers for digital transformation as the ability to make data-driven, intelligence-based decisions, enhancing manufacturing efficiency, throughput and yield, and improved product quality.

"Compliance is the baseline in our industry," Matlis said. "What's interesting is when we asked, 'What are the primary barriers to digital transformation?' Only 1% told us that the barrier is technology. Technology is mature; the technology exists today. It's been proven; we just need to implement it."

The barriers to adopting digital-transformation initiatives include the need to make a business case (27%), regulatory compliance (32%) and, at the top of the list, company culture (40%).

The pharmaceutical industry is quick to blame regulators as a barrier, Matlis said, but, starting in 2009, FDA began several transformations focused on digital initiatives. FDA implemented the Technology Modernization Action Plan in 2019 and the Data Modernization Action Plan in 2021 and, this year, implemented the Enterprise Modernization Action Plan. Last year, FDA also started the Office of Digital Transformation, focused on cloud strategy and the continued adoption of as-a-service models. "The agency is moving all of its systems to the cloud," Matlis said. "So, the next time your quality department says the FDA isn't going to allow us to use cloud solutions, you can point them to the Office of Digital Transformation."

In September 2022, the FDA launched new draft guidance for computer-software assurance for production and quality system software. The final guidance should be released the first quarter of 2023. Matlis said the focus is

"We built containerized modules that can connect to all of these different instruments no matter what the vendor." Matthew Laing of Eli Lilly joined a panel that shared lessons learned from their digital journeys at Automation Fair in Chicago.

on critical thinking and flipping the process, where records and documentation are of value to the organization first, and then also meet regulatory requirements.

From there, Matlis opened the discussion with the forum's panelists, and he started by asking the group about the most important considerations for building a digital-transformation strategy.

"I think the first thing, from a fundamental perspective, that you have to have is a business case," Laing said. He works at Lilly, where he focuses on data for the company's automation system and accelerating the organization's use of digital manufacturing technologies. Once an organization has established the business case, consider the foundational infrastructure needed to support that digital success, Laing added.

Mirsa, who leads Kalypso's global pharmaceuticals and biotech industry practice, agreed that the business case is where to start, but also points to culture as a part of that process. "You have to take into account whether the organization is ready to adopt and embrace that change," Mirsa said. "Culture eats strategy for breakfast," he added. Mirsa also recommended implementing digital strategies in small phases that build momentum to drive larger adoption.

It is not a lack of data that inhibits digital transformation, he added. "We're data rich but information poor," Mirsa said. "A lot of our approach is to assess what data exists and how we can contextualize it."

Even with all the data in one place, that doesn't mean it is properly contextualized. "We have a data lake where we pull in all the data," Laing said. "But just because you've landed in one spot doesn't mean you actually got rid of your digital silo." He also makes a distinction between being digital and being electronic. True digital understanding requires fully integrating that data with the systems in context.

Many barriers exist for digital transformation in the pharmaceutical industry, including changing practices to focus on solving an organization's problems first, then applying the right technology for that problem. For large organizations like Eli Lilly, Laing said it can be hard to initially move the needle. "You can't move it all at once," Laing said. "But here's where technology can really help us solve that true problem."

"Our industry is risk averse," said Martinez, who oversees the implementation of large automation projects at Sarepta Therapeutics. "People are always very unwilling to change, but once you provide value to them and visibility, I think it changes the culture." It's most important to ask, he said, "What value are you providing, and how does it make you more agile and more effective?" And the answer is not any one technology to meet all the challenges but the right technology for the company's specific application. The process is also dependent on a common information model, which can evolve over time, Mirsa said. "There needs to be that initiative for excellence," he added. "You have to take into consideration the cultural aspects. I keep coming back to culture because it is a very risk-averse industry."

Matlis introduced price control as a big concern for the industry. The Inflation Reduction Act of 2022 includes some language that would allow the government to negotiate drug prices, which will create significant price pressure within the industry, he said. "The only way to make that up is to shorten time to market," Matlis said, and he asked the panelists how organizations are using technology to support accelerated product launches.

Mirsa said there are multiple strategies, but his main point focused on not disrupting organizations in terms of their focus on science. They may still want to produce PDF documents that hold little data value, but natural language processing technologies can extract the data and restructure it in a format that can be leveraged. The other area to expedite time to market, Mirsa said, is with virtual commissioning. "What you can do with today's technologies is design that entire facility, design the lines with the assets and simulate the behavior of the assets. You can even optimize the PLC logic," he said.

Laing said Eli Lilly is looking at digital tech transfer tools, but, in terms of culture change, those tools represent a big hurdle for the industry.

Martinez also pointed toward simulation. "We leverage simulation in order to do testing, and I think that reduces the amount of time required to do commissioning," he added.

Mirsa also recommended looking at how other industries have accelerated production, moving from predictive to prescriptive maintenance practices. In the pharmaceutical industry, tying those predictions directly into the control layer may be problematic for the industry. He suggested keeping humans in the loop, an operator to review that decision and physically make the control adjustment.

Laing delivered a strong message around standardization. "Just to streamline equipment delivery, one of the biggest things that we've done is standardize the processes and the equipment," he said. Eli Lilly has undertaken a standardization project to connect legacy standalone

instruments that were never connected before. "We did a large global project that put in the foundation for us of our IoT messaging," Laing said. "Then, we built containerized modules that can connect to all of these different instruments no matter what the vendor." Down the line, this can enable plug-and-play concepts, which can help accelerate time to market.

For updating legacy equipment, Laing also said defining standard interfaces is paramount. "It's all about finding those standard interfaces between systems," Laing said. It doesn't matter what the underlying technology is. "If the interfaces are standardized, it becomes plug-and-play." Standard interfaces also help ensure consistency and drive quality, he added.

Matlis also focused the conversation on the cloud and whether that can drive speed to market and production efficiency. Mirsa said he's seen a rapid uptick of cloud solutions, but those will likely remain a hybrid solution for the foreseeable future. He did caution pharmaceutical companies that want to adopt the cloud to consider how that will impact their validation organizations. "If you adopt cloud, you have to make sure your validation resources can keep up with the cadence of the updates," Mirsa said.

Laing said Eli Lilly has a cloud-first strategy but supports the hybrid infrastructure, where critical operations remain on-prem.

WATER INDUSTRY TAKES THE PLUNGE ON MODERNIZATION

by Jim Montague

Just like most supportive industries, water/wastewater is usually invisible until something goes wrong. However, with so many new challenges like digitalization, cybersecurity and sustainability crowding in, the industry is having to stand up and be counted on how it's addressing these issues.

To provide some much-needed experiences and insight, the Water/Wastewater Industry Forum and its panelists took a comprehensive look at all sides of these topics on the opening day of Automation Fair in Chicago.

Leading off, moderator Eric Bindler, senior research director at Bluefield Research, framed the discussion with several salient findings about the state of water/wastewater and related disciplines:

- The global digital water market is expected to grow by more than 8% during 2021-30.
- Eight in 10 water utilities saw their digital comfort levels increase during the COVID-19 pandemic.
- Only 1.5% of global water utilities serve more than 100,000, which means most are much smaller.
- Distributed denial of service (DDoS) on global utilities increased by more than 223% during 2019-20.
- The average cost of an operations technology (OT) cybersecurity incident is $3 million.
- Sixty-six percent of U.S. water utilities allot less than 5% of their budgets for OT cybersecurity.
- Twenty-one separate billion-dollar natural disasters occurred per year in the United States so far in the 2020s, compared to just three per year in the 1980s.

"It's crucial to get IT and OT together and secure management buy-in. After these relationships are established, everything gets easier." Jason Wirtz, City of Sioux Falls, and a group of water/wastewater panelists discussed digitalization and the responsibilities it brings.

- The water industry has a 2% share of global greenhouse gas (GHG) emissions.
- Electricity prices in the United States increased 25.4% per year from July 2021 to July 2022.

Growing pains = vulnerabilities

To handle the particular combinations of these challenges, the forum's panelists shared details of their current projects and operations.

"We're presently doing a $215 million plant expansion to expand our capacity from 21 million gallons per day (mgd) to 30.1 mgd because the city has grown so much, so we need to do more digital data capture to find more leaks and act on other issues," said Jason Wirtz, controls technician in the public works department in Sioux Falls, South Dakota. "We spent $136,000 per year on SCADA [supervisory control and data acquisition] system software licensing and hardware over the last three years, and we expect that budget to increase by $20,000 per year over the next three years."

On a similar expansion path, Mark McKinney, director of cyber and physical security at engineering consultant Tetra Tech, reported it's developing a cybersecurity program for the drinking and wastewater systems relied on by one of the top 10 metropolitan municipalities. "We started by assessing their controls environment that has about 300 HMI screens and sought to stabilize their processes by adopting standard procedures and technologies, which could also help with their skills shortage due to retirements," said McKinney. "Next, we'll further standardize with a technical refresh of their master plant and modernize by refraining from using end-of-life equipment."

Though most water/wastewater utilities haven't standardized on a particular cybersecurity standard yet, McKinney reported that many will likely implement a version of the well-known North American Electric Reliability Corporation Critical Infrastructure Protection (NERC CIP) procedures and recommendations soon. "The U.S. Environmental Protection Agency (EPA) has also published some steps for cybersecurity, so we'll probably use some of them as well," added McKinney.

Desalination and system integration

Even from a global perspective, Fritz van Rooij, operational technology manager at IDE Technologies, reported it's facing similar difficulties and opportunities at the desalination plants it installs for clients in China, Israel and elsewhere worldwide.

"We're constantly innovating to optimize system integration, introduce autopilot functions and increase the flexibility and efficiency at our plants," says van Rooij. "We've been incorporating digital-twin models of centrifugal pumps into our SCADA systems for two decades. They compare physical performance against virtual to analyze performance degradation, virtualize pump flows at various speeds that aren't feasible for physical flowmeters and let users optimize efficiency."

Van Rooij added that IDE also employs digital twins to manage restoration of all-important reverse osmosis (RO) membranes and expects to save $0.5 million to $1.5 million at the Carlsbad Desalination Plant for the next five years by extending the life of its RO membranes. "These digital twins test the long-term effectiveness of various maintenance policies before physical implementation," explained Van Rooij.

Back in the United States, Jeff Krawczyk, vice president of sales and business development at system integrator Commerce Controls (CCI), reported that it completed an upgrade, digital transformation and sustainability project that included 144 motor control centers (MCCs) that are networked to their starters, soft starters and variable

frequency drives (VFDs). "We're responsible for putting the systems together and connecting the OEMs," said Krawczyk. "For a water treatment plant in southwest Florida, we have cybersecurity in place, such as firewalls and DMZs, and they do internal network traffic monitoring."

Secure transformation to-do list

To overcome the obstacles of achieving digital transformation, Wirtz reported that public utilities must also convince the budgetary authorities in their municipalities of the value of digitalizing to collect more and better data to improve future decision-making. "We spent 15 years on SCADA and collecting data from every well and lift station, but the question is: How much has to be spent before benefits are seen?" asked Wirtz. "Once we get the data in, we make better decisions, and it gives people the seed of an idea that they want more. Once this process gets started, it's fun to see it grow. It's also crucial to get IT and OT together and secure management buy-in. After these relationships are established, everything gets easier."

Krawczyk reported that digitalization, cybersecurity and sustainability efforts are even altering how projects are conducted by end users, systems integrators, contractors and suppliers. "In the midwestern United States over the past three to five years, we're moving from the usual design/build process to a progressive design/build process, in which all parties including OT are involved much earlier, and we all work more alongside each other," said Krawczyk. "In this way, end users learn they may want the Cadillac technology, but they understand they can settle for the Chevy."

McKinney added these tasks can be performed more securely and the accuracy of their data can be confirmed by running two devices and matching their readings. "This is also how digital twins let users model the behavior of their systems," said McKinney. "We're seeing more effort on pulling accurate data because it enables better models."

McKinney reported that the U.S. Department of Homeland Security previous listed water/wastewater as 12th on its list of the 16 critical infrastructure industries, but recently moved it up to third place. "Water/wastewater never used to get proper guidance from the government on cybersecurity. We only got safety and quality guidance," added McKinney. "Now, water utilities are seen as having government-funded deep pockets, and that's what threat actors go after. Consequently, governments are looking more closely at reliability and resilience, and there's more to protect water/wastewater systems from end to end."

McKinney added that a small water utility north of Tampa, Florida, recently had a cyber threat get through its SCADA system and dialed its sodium-hydroxide level up past what was safe. Luckily, the utility's operators saw the change and dialed it back to a safe level. "This incident was reported to the government and police, but it was clear evidence of an intrusion and showed many utilities that they need look more closely at building in protections," said McKinney. "The EPA's guidelines leverage the U.S. Department of Homeland Security's Cybersecurity & Infrastructure Security Agency (CISA), but we're also likely to see more requirements at the state level."

Successful sustainability

Just like achieving cybersecurity, the panelists reported that sustainability can also be accomplished if a practical approach is used.

"We're fortunate in that we started working on sustainability years ago," said Wirtz. "We spent on instrumentation, fiber-optic networking and live data collection, but not all at once, and found we could really increase our maintenance predictability. It was a hurdle, but it was doable. This allowed us to stop running electrical equipment during high-demand periods and run when costs are lowest."

Krawczyk concluded that sustainability consists of the three Cs—contractors, consultants and community. "Many communities are getting better educated and engaged about sustainability, which is pushing contractors to be better problem solvers and reach out to system integrators, so we can all work as a team."

LABOR LOOKS DIFFERENT IN THE FOOD & BEVERAGE INDUSTRY

By Mike Bacidore

Labor issues topped the list of concerns faced by participants of the Food & Beverage Industry Forum at Automation Fair this week in Chicago. "Workforce is one of our biggest challenges," said Brian Marsh, senior director, digital manufacturing, at Nestle, who was part of a panel of industry veterans from diverse companies leading the discussion. "There's just not a large labor pool out there to fill our needs. It's important to be able to create a new environment. Manufacturing isn't sexy, so how do you create an environment that attracts them and keeps them? Nobody wants to sit around in training and read from binders. We want to get them on the floor and let them start doing something valuable for the company. It's all about the people and the technology going at the right speed."

Most organizations aren't sure where to start, warned Joe Francel, director, business programs, manufacturing service line at Microsoft. "Start with the business problem," he advised. "A lot of us are engineers and are comfortable going to the solution first. Don't look at the technology. Use cross-functional teams and get input from a lot of different areas. Once you start, where do you go from there? What's impacting overall equipment effectiveness (OEE)? Give me information that's actionable. A lot of customers say they have a data lake, but they've not gone through and used the input of the people to determine which data matters. Don't just collect data because you can."

The more things change, the more they stay the same. "Ten years ago, when I started working with customers," recalled Andrea (AZ) Zaman, chief operating officer at Pearson Packaging Systems, "The number one thing we heard was the workforce. There was turnover. We needed to design equipment that was easy for operators to use. The issue is still workforce, but it's different. Now the equipment needs to be easier to use so your employees go home every day feeling accomplished. That's where technology can take us. As we look forward, we look through the eyes of our customers."

Employees want to contribute something valuable, assured Mike Chaney, a former executive at P&G, who moderated the panel. "They want to know they're making a difference," he emphasized. "Let them know they're cared for and they're valuable parts of the organization. Make sure everyone knows they're valued."

Workers need to know they're part of a team, agreed Marsh. "The work cell is just part of the whole entity," he said. "What's going on upstream and downstream?"

And once those workers are indoctrinated, trained and aware of their roles in the overall business outcome, retaining them can be difficult. But retaining what they know

"We want the information to come up safely into the cloud and ping us. Those things are going to evolve." Pearson Packaging's Andrea Zaman explained how digitalization will empower workers during the Food & Beverage Industry Forum at Automation Fair in Chicago.

is within closer reach than it's ever been. "How do you capture the tribal knowledge?" asked Francel. "How do you force more interaction with the workforce and give them more tasks of value vs. mindless labor? Let automation do the mindless tasks, so employees can do more meaningful tasks."

Zaman cited an example of a customer that didn't even know it needed new programming to improve productivity, but Pearson Packaging was able to push it through using remote connectivity without interrupting the customer's workforce.

Digitalizing for good

The ability to connect remotely and to analyze data creates as many new challenges as it does opportunities. "My focus is trying to do things in real time," said Francel. "Years ago, when I worked for a coffee company, we had both historical models and real-time demand metrics. That winter, we ran out of Christmas blend coffee. We had that information from the stores, and it told us the demand was higher, but nobody looked at it. It's important to use real-time information and not just historical analyses."

Nestle is looking to streamline processes, which is challenging in a regulated industry. "We use lots of metal detectors in our factories," explained Marsh. "When they're good, no one cares. We need to pay attention to any variations in our metal-detector checks. Sometimes we get cartoner stock that causes problems with our packaging equipment. It's easy to take vision equipment and identify when something abnormal is going on in the factory."

Zaman looked back at when Pearson's service technicians had to be in front of a machine to troubleshoot it. "Days and hours matter for production," she said. "We've moved into Vuforia and Emulate3D. We're able to remote into machines with cameras when the machine calls in. Where are we going next? Everything will be in the cloud. We want the information to come up safely into the cloud and ping us. Those things are going to evolve. We get pinged. We reach in, and we solve it."

Operational complexity

With consumer markets demanding more personalization, the number of stock-keeping units (SKUs) continues to rise, which means machines must be flexible to accommodate changeovers. "A while ago, P&G called it, 'Set it, and forget it.' That is no longer where we are," explained Zaman. "Baby Wipes, for example, come in so many different SKUs. Marketing departments change things, so machinery needs to be flexible. We look at our design differently. We look at production needs over the life of the equipment. It's not just different SKUs. Different production lines have different operations. Production variables are different from machine to machine. Artificial intelligence (AI) will help us to identify these better than humans can."

Francel looks at the issue from a different angle: "How do you minimize changeover?" he asks. "The product is the same, but how do you minimize and consolidate the changeovers? One customer minimized the changeovers by looking at the data. Can I stage everything to minimize the impact of the changeovers? If I have one plant that does a changeover in 30 minutes and another takes an hour, what is the 30-minute changeover facility doing differently?"

Changeovers are an excellent application for the digital twin, explained Marsh. "How many times have we had situations when we want to make changes on our line?" he asked. "There's a lot to that. You have to be sure that works. You can use the digital-twin model. Being able to build these virtual environments decreases the risk. That's something that's never been available before."

Chaney agreed on the digital twin's potential. "The beauty is: the more you learn, the more you can feed back, and the better the digital twin gets," he said. "We put it in a 3D model so I can see a plant running. We're moving toward smart manufacturing. A lot of us in food and beverage are dealing with natural ingredients. Every bit of corn or flour is not the same."

The cybersecurity conundrum

The ability to remotely optimize production, troubleshoot problems, leverage data and enable the digital twin hinges precipitously on secure connectivity, and it's a team sport. "Cybersecurity is not just an ideal," cautioned Francel. "There's an operations element to it. You need remote support. You need to have operations, IT and engineering all involved. It's about universal governance that all three parties influence. The biggest advantage of the cloud is focusing on who has what access. Give them what they need instead of what they want. Risk tolerance is part of the equation."

Adding an IoT device in a factory requires a process that does that quickly, said Marsh. "It's happening more and more," he stressed. "How do we get all of this stuff connected quickly and safely? At our factory levels, it's trying to get employees educated as they're picking new devices.

Every company we deal with is different. Some of them do cybersecurity great, and some not so well."

The silver lining of the pandemic was that it finally enabled remote access into equipment. "It made everybody pucker," explained Zaman, "but the alternative was not available. It's hard to be safe if you don't know. Now we need to be careful to find those ways to be safe. The thing that stops us is fear. If you can play in a digital world, you're advancing yourself."

Remote monitoring of data is OK with Marsh at Nestle but making adjustments to machine controls from a remote location can be problematic, if there's no one at the site to oversee what happens. "We'd want a person there if someone is making adjustments to the controls remotely, in case something goes wrong," he said. "We don't want to put someone in danger."

DEFINING THE OIL & GAS INDUSTRY DIGITAL JOURNEY

By Len Vermillion

Digitalization in the oil and gas industry has come a long way, but make no mistake, it still has a long way to go. In an industry that experiences the dual pressures of creating operational efficiency and meeting environmental, social, and governance (ESG) requirements, digital transformation is no longer a question of if, when or how, but one of, "What's the best way to accomplish our specific needs?"

During a panel of oil and gas industry leaders at Rockwell Automation's Automation Fair, representatives of some of the largest producers and service suppliers in the industry pondered the question in more practical terms, asking how digitalization has evolved and what it means for the industry today.

"As a supplier, the definition [of digitalization] is elusive because it means different things to different customers," said Allan Rentcome, CEO of Sensia, a joint venture between Rockwell Automation and SLB (formerly Schlumberger). "Defining digitalization as data and science, we've been doing that for a long time. I think it's more about helping customers get to their end goals.

"The technology isn't the impediment anymore," he continued. "The thing that needs to be in the mind of the customer is how do I apply these technologies."

Rentcome referenced the technology on the show floor at Automation Fair as an example of just how much technology already exists to enable digital operations. He also added that there isn't one single supplier that can offer all the technology needed for any company's digital journey.

Among the panelists, which also included Mahyar (Matt) Mohajer, digital platform manager at SLB; Barry Elliott, vice president of process industries at Rockwell Automation; and Alan Bryant, engineering consultant for automation at one of the top independent oil and gas producers in the U.S., Oxy, several themes broke through the difficulty in defining today's industry digital transformation. Those themes include: operational optimization and standardization, the need to shore up environmental, societal and governance (ESG) and decarbonization data and an ability to satisfy multiple constituencies.

"It's very much driven by our stakeholders," Bryant said. "If we take digitalization in context to mean using digital technology to optimize production, then it is very much driven by groups like operations or artificial lift."

He added that figuring out the direction takes a lot of thought and planning since the last thing any oil and gas producer wants in its operations is a bunch of one-off solutions. He said the bigger goal is standardization that can be used across the value chain.

"As the stakeholders come up with needs, we're figuring out what technologies are available for those needs." Oxy's Alan Bryant described the oil and gas industry's need to optimize operations against additional parameters, such as those required by ESG constraints.

All four panelists agreed that digitalization strategy is a value proposition more than a reactive fix. As an example, Bryant pointed to Oxy's strategy in regard to its supervisory control and data acquisition (SCADA) systems.

"We're sorting these things out. Like what belongs in our traditional SCADA system," he said. "As the stakeholders come up with needs, we're figuring out what technologies are available for those needs.

Mohajer agreed that choosing your digital path must be focused on the value added to the organization over the long term. "The lines are getting quite blurry," he said concerning pinpointing digital transformation priorities. "Looking at optimization, a good portion of my job is to look into tech and make sure we adopt them, and also defining what we need in terms of the entire life cycle [of the operation]."

ESG enters the fray

The needs of operations aren't the only stakeholders of significance these days. "Now with ESG there's another stakeholder that we didn't have before," Bryant said. "In order to get your tax credit there is a lot of data that needs to be gathered."

While the ESG acronym is now top of the mind for executives in the oil and gas industry, the industry has actually been attacking its decarbonization issues for quite some time.

"Oil and gas has been doing ESG for a long time," Mohajer said.

Technology can help the industry meet its decarbonization challenges, but to do so, ESG needs to be part of standard processes.

"You cannot separate it from your operations," Mohajer said. He added that the choices you make now when adding digital technology to your operations impact your long-term ability to minimize your carbon footprint. He said autonomous operations can minimize footprints because they minimize field operations by personnel.

Bryant said data vital for operations in carbon capture and to reduce emissions. He said the industry is in need of good and reliable predictive technology to alert operators when leaks are possible so they can be proactively fixed.

Industry's automation future

When asked to look ahead 10 years and opine on the role of automation technologies and their role in oil and gas operations, the panelist offered several areas of growth potential.

Bryant pointed to technology's role in creating flexible operations. "Flexibility is needed to support multiple stakeholders' needs," he said. "Another is making good use of industry standards that are out there so we're able to take advantage of the technologies, and especially as we bring new people into the industry."

Mohajer added that the Internet of Things (IoT) is another big advancement. "IIoT opens a lot of doors for innovative workflows and component safety," he said.

Rentcome brought up cybersecurity. He said he expects standards to be developed to help make operations more inherently secure.

THE CHEMICAL INDUSTRY'S PATH FROM MODERNIZATION TO DIGITALIZATION

By Chris McNamara

Modernization campaigns within chemical-industry companies can be met with some common criticisms. Too costly! Too time-consuming! Too complicated!

But when you reach a point where you're shopping for replacement parts for your faltering industrial assets on eBay, as Helen Dotson explained she's had to do, it's pretty clear that modernizing your machines and processes is long overdue.

That anecdote elicited chuckles from the audience at this Automation Fair Chemical Industry Forum that gathered Dotson, director of global process automation and technology with Archer-Daniels-Midland, Kalypso Global Commercial Leader Lance Rodenfels, Society of Chemical Manufacturers & Affiliates President Jennifer Abril, Rockwell Automation Global Industry Technical Consultant Ramon Farach, and Gabriel Rivera, who is the migration automation leader with Corteva. Michael O'Sullivan took a break from hosting OGGN's Oil & Gas Tech Podcast to serve as moderator for this session.

The larger focus of the forum was to discuss the urgency with which chemical manufacturers need to update aging technology while also meeting environmental, social and governance (ESG) goals and adopting new digital technologies to thwart cyber-threats. A tall order of topics; this panel was eager to engage.

"So how are we doing with modernization in these environments?" asked O'Sullivan. Farach replied that, while many in the chemical space are embracing programs to modernize and digitalize their operations, there are still those who don't even want to consider artificial intelligence or advanced data analytics or any of this IIoT stuff. "They think it's hocus pocus," he said, blaming these laggards for the chemical industry trailing oil & gas and pharma in pursuing digital transformation. "And some of these systems in chemical factories are from the 1960s. There are elements of these plants that are not talking to each other. And since digitalization requires having access to data, we've got to start with modernizing these systems first. We've got to have a modern control system in place."

A company can be very interested in evolving to Industry 4.0, Dotson added, but if they are trying to perform data analytics on systems that are 40 years old and don't have the required horsepower, it ain't gonna happen. "The underlying infrastructure is essential to modernization," she concurred.

"The underlying infrastructure is essential to modernization." Helen Dotson of Archer-Daniels-Midland during the Chemical Industry Forum at Automation Fair 2022.

Heads on the dais nodded in agreement. Abril added that the chemical industry is booming, particularly in North America, and leaders are having a hard time accepting the idea of taking their plants (no matter how antiquated) offline for a few weeks to make modernization upgrades. "Lack of labor is also really hitting these decision-makers," she added. "They just don't have the bandwidth to consider these changes."

But they should, the panelists agreed. At some point, dated control systems, dusty machines and running lean with just-in-time/just-in-case approaches will prove untenable for many in the chemical space. Dotson warned that modernization programs can take many years to develop. Digitalization campaigns don't provide immediate returns. And current challenges will only worsen over time. "We're now at the point with the workforce-shortage problem that we have to get more efficient," stressed Farach. "We don't have the people to run the plants. We need to automate."

With the motivations clearly established, the panelists explored solutions. Rivera advised creating teams of what he calls "bilingual" workers within chemical facilities, who can communicate with seasoned workers about existing processes but also spearhead adoption efforts with modern, digital tools and systems. Rodenfels added that highlighting the value components with these enterprise-wide updates is critical for buy-in. For example—connecting different digitalization efforts while improving, say, the cybersecurity or ESG postures. "If planned properly," he said, "modernization can be a means to drive additional value. It can be profitable."

The moderator inquired how to prove that profitability to doubtful purse-string holders. Panelists suggested using existing customer-success stories as proof or referencing consulting-firm studies that prove the benefits of digitalization—think increased throughput, reduced downtime, less maintenance. "Those stories are out there," Farach insisted.

Abril dove deeper on this front, listing three hot-button areas that will prompt chemical-company CEOs to sit up, listen and truly consider modernization programs. The first is any safety concerns related to dated workplaces. The second is if quality is being compromised by current systems. And, lastly, batch integrity. "If batches are spoiled, that costs money. CEOs will be eager to find ways to get ahead of that."

The good news? The biggest wins are among the most simple. Installing variable-speed drives on pumps, for example, or monitoring the electricity demands of each asset (rather than the entire facility) to pinpoint areas for optimization. "As you modernize, it's like you can put some of your processes on autopilot," explained Rodenfels. "Your operators are still there, but they can be doing other, more important things."

Or they can be doing other, less important things, like browsing eBay for Christmas presents rather than industrial assets.

PULP & PAPER INDUSTRY WRITES A DIGITALIZED FUTURE

by Jim Montague

The pulp and paper industry and its many manufacturers have experienced more ups and downs than a roller coaster in recent decades due to fluctuating demands for different types of paper and the evolving technologies for producing them.

"I've had five different owners over 30 years, but somehow kept the same phone number. Early in my career, life was good and we built new equipment. Then came the downturn, and we had to focus even more on reliability to minimize costs," said Greg Drewiske, PE, manager of engineering and capital at Billerud Americas Corp., which produces coated papers in central Wisconsin. "Now, the mills that are still open have a lot of obsolete, proprietary equipment, and the need to incorporate more automation is even greater."

Tom Shope, VP of digital transformation solutions at Endress+Hauser, added, "There's fewer staff, so it helps to have more intelligence in devices. However, the question now is how to use all the data they're generating? For example, how we can turn it into maintenance workorders and get them to skid builders or suppliers."

Drewiske, Shope and other co-panelists explored how the pulp and paper industry can optimize and transform with an assist from automation and digitalization at Automation Fair 2022 this week in Chicago.

Right data, right hands

The panelists reported that more detailed, targeted and distributed data can greatly enable pulp and paper processes if it quickly reaches decision-makers who can make the best use of it.

"At the 8 a.m. meeting, operators and managers want to know why their process was lost last night, and this usually means pulling up Excel spreadsheets and cross-correlating them," said Dan Timmers, solutions consultant for machine design, information and analytics at Rockwell Automation. "Now, more information is getting processed at the edge—such as signatures of flows on a day-to-day basis—and getting it to the cloud, which has the potential of giving us the equivalent of Google Maps for process control. This is especially important because the old guys that could walk by equipment and tell that something was wrong from the vibrations are retiring. Because this tribal knowledge is vanishing, we need controls that can tell us what the 4-20 mA signals can't, and that transition is coming."

Timmers cautioned that, even if information can be shown on a dashboard, it can't be just blind data points, and requires components and software that are smart enough to immediately put it in useful context. "This capability is

"I think integrating our data sources is going to get easier in the future, once we get over the hump of bringing them all together." Greg Drewiske of papermaker Billerud Americas Corp. represented the end-user perspective during the Pulp & Paper Industry Forum at Automation Fair 2022.

immensely useful. Some applications can predict motor failures two or three months ahead of time," he said. "We need devices to fill in for experts that have retired, but those devices need to first establish performance baselines before they can look for anomalies."

Education softens reality's punch

To gain the benefits of added automation and more digitalized data, some wrinkles must inevitably be smoothed out. Drewiske reported that Billerud's mill installed a single-loop distributed control system (DCS) about 10 years ago, which included HART-enabled devices that pointed out new details when they were connected.

"It turned out that 30% of our instruments had issues we didn't know about before, such as valves sticking," said Drewiske. "We also implemented control-loop, performance-monitoring software to identify tuning issues. In our drying section, we took current feedback, and relayed them to FactoryTalk Historian software."

Shope added, "IT is taking over some of these areas, but the question remains: how do we get 30 years of plant-floor experience into just three years of staff training?" Because IT is getting more closely involved with production issues, Timmers advised users to designate a leader and cross-functional team to handle IT's presence in the process space, such as deciding on a policy for configuring switches.

"We have to educate our IT guys," said Drewiske. "Previously, if we couldn't get email for 3-5 seconds, not many people would notice. However, if we lose control of our paper process for 3-5 seconds, a lot of people would notice."

Tooting automation's horn

Drewiske reported that increasing automation, digitalization and data analytics in papermaking is also important for meeting enterprise requirements and achieving corporate goals. "It's pretty simple to meet basic production and product priorities," he said. "However, it's harder to also stay ahead of technical obsolescence, as well as address what a company wants to do as it goes from being family-owned to hedge fund-owned to internationally owned."

Drewskie explained that plant-floor personnel tend to fix equipment and systems and not make a big deal about it, but this can result in other parts of the organization not being aware of OT's importance or what it requires. "Equipment becomes obsolete, and parts can't even be found on eBay, and then we have to negotiate. I always say the best time to negotiate is at 2 a.m. after 10 hours of downtime," said Drewiske. "In any case, we have to make clear what our processes and equipment need to maintain availability and uptime, and hopefully invest in a phased approach."

Unfortunately, another hurdle to securing investment in pulp and paper is that fact that operations issues and the cost of fixing them typically overshadow maintenance concerns and advocating for them, according to Drewiske. "We measure overall efficiency and target speed and quality, but when we're looking at lost time, dealing with operating problems outweighs maintenance, and makes it hard to justify investing in it," he explained. "If a company is looking at a multi-million-dollar project, they usually want a 30% return on investment, and it would take maintenance far too long to reach that ROI and justify that investment."

Drewiske added that automation and digitalization take operations, maintenance and other data sources out of their formerly separate silos, making them easier to pull together. "We don't look at these reports as much as we should, but we have a corporate reliability initiative to focus on developing systems that can integrate our data sources. I think integrating them is going to get easier in the future, once we get over the hump of bringing them all together."

MINING INDUSTRY LEVERAGES TECHNOLOGY TO OPTIMIZE PRODUCTION

By Anna Townshend

The benefits of modernization were front and center at this week's Mining & Metals Industry Forum at Automation Fair 2022. First, attendees learned how Chicago Heights Steel benefitted by modernizing its aging control systems. Then, how mining companies around the world can become more sustainable by taking a second look at traditional grinding technologies.

Moderator Mauricio Alfonso, industry process director at Rockwell Automation, first welcomed panelists Antonio Ambra, managing director, North America at AIC; David Zapata, general supervisor of engineering at Chicago Heights Steel; and Gillian Holcroft, president of ReThink Milling and innovation manager at the Canada Mining Innovation Council.

Ambra and Zapata took the stage first to outline a production system upgrade at Chicago Heights Steel, with the help of AIC, a power control supplier and system integrator.

Chicago Heights Steel was established in 1893, and today is the largest special market mill the U.S. The mill recycles rail steel into many products for farms, ranches, municipalities and job sites, including fence tee posts, U-channel posts for signs or other custom products. The plant takes the rail steel and splits it at high heat into three sections (the head, the web and the flange/foot). Each part is rolled to a predetermined shape and size by a series of rolls. "We roll a different product out of each one of those sections," Zapata said.

The plant had many issues with reliability. Equipment was constantly failing without warning, and diagnosing issues was nearly impossible, all causing significant losses in production. In addition to improving automation reliability and diagnostics, the project also needed to accommodate a new open system that would allow for modifications down the line; reduce maintenance costs for spare parts and downtime; sustain consistent production and mill capacity; and install an integrated and comprehensive control network infrastructure.

"The distributed control system (DCS) that we had in the plant was very antiquated with very little feedback," Zapata said. Most of the equipment had reached the end of its life, and spares were no longer available. "When I took over the electrical department three years ago, I was tasked with the job of finding a solution," Zapata said, and he started working with AIC. "At Chicago

"If we pool our resources together, share risk and share reward, maybe we can accomplish something great." Gillian Holcroft of ReThink Milling leads a consortium of mining companies and other interested parties in the development of new grinding technology that promises to cut energy consumption by 65% relative to traditional methods.

Heights Steel we're very hands on," he said. "I go with my guys. I put my hands on the equipment with them. And we picked AIC because they had the same mentality. They were able to basically get in there with us and find the solution."

The solution included a ControlLogix control system and other Allen-Bradley components from Rockwell Automation. The AIC rolling mill automation and control system (RACS) solution has been installed in more than 50 plants around the world. The solution also uses the Rockwell Automation FactoryTalk View SE HMI, another product very familiar to AIC. The plant's two production lines were kept separate. "So that one day the mill would be able to roll on a single line," Ambra said. "It's also a system that allows expansion."

The previous configuration was dangerous for operators, and the new panel design included many safety features, such as safety door options and arc flash detectors. Also, with a lock box on the main floor, operators can request access to a machine, and the mill will automatically stop rolling. Then, the operator can access the needed key. "When the key is out, we are making sure that everything is off inside the cabinet," Ambra said.

With only 10 days to commission the project on-site, scheduled during an annual shutdown, AIC relied on Rockwell not only during design to help properly configure the network, but also at the panel manufacturing facility in Italy to test the products before they were shipped on-site.

With the new system after only three months of rolling, performance increased by 15%. "This gives an idea of how much time the mill was losing before with the old system," Ambra said. The mill also produces much less scrap steel from its new production process.

Disruptive technology for grinding equipment

In the second Industry Forum presentation, Holcroft outlined a pilot project to develop conjugated anvil hammer mill (CAHM) platform technology, which has the potential to reduce energy consumption by 65% compared to high-pressure grinding rolls (HPGRs).

Holcroft detailed the work being done to develop CAHM and how the Canada Mining Innovation Council consortium is supporting the project. Her work with CMIC helps to encourage mining companies to work together to solve common problems in the industry and is focused on disruptive technologies. "If we pool our resources together, share risk and share reward, maybe we can accomplish something great," Holcroft said. She began managing the project four years ago.

Mining consumes between 3 and 6% of the world's energy. "Grinding equipment really hasn't advanced at all in the last 20 years with the last major advancement being a high-pressure grinding roll," Holcroft said.

The consortium in charge of advancing new grinding technology includes CTTI, the inventor and product developers, Anmar as the fabrication partner, Corem as the testing experts, and Rockwell Automation as the automation partner. The consortium also includes a number of mining company partners, who are investing resources and funding to advance the project. It has the potential to greatly reduce operating and capital costs for grinding operations. "And of course, with all these things together, we can have a big impact on environmental, social and governance (ESG) and decarbonization targets," Holcroft said.

The project has $11.9 million of investments to date. "When you're going after government grants, if they see that you have major mining companies putting money behind this, it must be good," Holcroft said.

The key innovation is unconfined thin particle breakage, which is a more energy efficient way to break rock and works for every hard rock and most soft rock mines. The energy benefits come from eliminating small rock crushing and compression and shear fractures, maximizing voids allowing crushed rock to expand, and minimizing wear with synchronized crushing surfaces. There is very little hold up of material in the machine. "The hammer pushes the material from the slot as soon as it's fine enough," Holcroft said. It eliminates repressions and significant fines and maximizes voids in the material. "The novelty is in maintaining a thin particle bed," Holcroft said.

Once material leaves the CAHM, it enters the MonoRoll, which is designed to replace the ball mill. "The combination circuit of the future would not have recirculated pebble crushers or hydrocyclones. All the screening is happening within the machine," Holcroft said. "Less equipment means less operating costs."

The design was optimized by CTTI based on discrete element method (DEM) modeling. "They did over 200 simulations optimizations to figure out what should be the angle of the tooth and the hammer and the anvil," Holcroft said. "They optimized that slot geometry to maximize energy efficiency and minimize wear, so before we ever engineered or built anything, they had simulated everything."

This was necessary in part because the machine is massive. It weighs 27 tons. It measures 8.5 meters long, four meters wide and six meters high, and processes 50 tons of

rock per hour. Hot commissioning of the prototype was underway in August 2022. They are running experiments on the protype to determine the limits for capacity, energy reduction, reduction ratios and product size distribution. They anticipate that further updates to the machine can reach a 72% energy reduction compared to HPGR, as well as superior product and higher reduction ratio in a single pass.

"Because of the way this machine is designed, and the hydraulics that are pushing forces to crush the rock and force the hammer and the anvil together, if we have a situation where we get trapped metal inside the machine, we need the hydraulics to react to that event in less than 10 milliseconds to not damage the liners in the machine," Holcroft said.

The technical team wants to track 150 analog, digital and vibration inputs at 200-Hz and react to events within milliseconds. "At 5 milliseconds, we are really at the sensor and hardware limits," Holcroft said. Rockwell's FactoryTalk Edge Gateway and variable speed drives helped make it possible, she added.

ReThink Milling wants to be a licenser of the CAHM platform technology for one or multiple original equipment manufacturers (OEMs). Holcroft said the project still needs additional strategic mining partners and funding, and hopes a commercial rollout can happen with one of the consortium's mining company partners.

ROCKWELL RELEASES HIGH-AVAILABILITY, SOFTWARE-CONFIGURABLE I/O

By Mike Bacidore

Rockwell Automation began taking orders for its new I/O platform, the FLEXHA 5000, at Automation Fair 2022 this week in Chicago. Demonstration of the new product was arguably the most popular booth in the exhibition hall, where Armand Prezioso, product manager at Rockwell Automation, introduced and explained the family of high-availability I/O—the HA literally stands for high-availability, or five-nines-availability, meaning 99.999%. FLEXHA 5000 will begin shipping in 2023.

Customers in the process industries will see more flexibility and reliability, enabling integrated control for their Connected Enterprise production systems, while decreasing total cost of ownership and enhancing productivity through reduced downtime and time to engineer with access to additional process diagnostics via HART Premier Integration in Studio 5000 Logix Designer software. "We've leveraged input from the Process Customer Advisory Board," explained Dan DeYoung, vice president, product management, Rockwell Automation.

The I/O platform is designed to reduce hardware complexity and cost by using a more conveniently integrated design, and the modules enhance communication with 1 Gb EtherNet/IP network connectivity, offering higher speed and increased bandwidth. Reducing downtime and engineering time while limiting costs, this platform is designed to be a smarter, more efficient I/O solution.

"Process customers are looking for a modern, reliable and flexible I/O solution to satisfy their basic and process safety control needs, while reducing downtime, minimizing engineering and simplifying configuration and maintenance," said DeYoung. "With the range of options this platform offers, customers can see more consistent operations, reduction in downtime and optimized footprints that maximize the return on their assets."

Ready for process applications, the FLEXHA 5000 I/O platform helps customers achieve more efficient engineering time through tight integration with an instruction set in the PlantPAx system. Customers can gain support for ControlLogix 5580 controller redundancy in high-availability applications from Studio 5000 Logix Designer software, version 35 or later, and deliver more consistent operations with increased reliability.

The flexibility in design and maintenance of the FLEXHA 5000 I/O platform helps customers to optimize their footprint by enabling them to mount up to 24 I/O modules on a single node, vertically or horizontally,

"The system can contain up to three banks and have 24 modules in a bank, giving 192 I/O points for simplex or 96 I/O points for duplex." Rockwell Automation's Armand Prezioso demonstrated the new FLEXHA 5000 configurable I/O platform at Automation Fair in Chicago.

and in any module sequence. A reduction in downtime can also be achieved with simplified removal and insertion under power (RIUP) and easy online changes.

"The system can contain up to three banks and have 24 modules in a bank, giving 192 I/O points for simplex or 96 I/O points for duplex," said Prezioso. "The PlantPAx System Estimator can be used to generate a bill of materials."

The I/O modules operate at -40 to 70 °C (-40 to 158 °F) temperatures and in extreme environments up to GX rating with conformal coating. They can be used in hazardous areas under Class I, Div. 2, Zone 2, and groups A, B, C and D.

The FLEXHA 5000 I/O module is fully redundant, has built-in diagnostics, is available with smart junction boxes, has individual channel isolation, offers individual channel universal I/O, enables ease of wiring and is configurable for simplex or duplex operations. The FLEXHA 5000 I/O modules contain a universal-card option that allows for flexibility in I/O choice. Universal I/O simplifies field wiring, reduces spare module requirements and reduces maintenance time. This I/O choice is configurable per channel during runtime as HART-capable analog or discrete input or output. Modules can also be configured in simplex or duplex.

"The FLEXHA 5000 allows us to push into the process industries. It is fault-tolerant," explained DeYoung. "Everything is duplicated. That stretch from the I/O module to the controller represents the last mile of data transport. We've enhanced our network, and FLEXHA 5000 is integrated into PlantPAx 5.2, extending its proposition as a modern DCS."

In the future, the FLEXHA 5000 I/O platform will allow for integrated safety I/O and base process control I/O to be conveniently mounted in the same rack, which reduces hardware complexity and cost of the PlantPAx system.

THE TOOLS, TACTICS AND TALENT TRANSFORMING MANUFACTURING

By Chris McNamara

The challenges are familiar to all of us. Supply chain disruptions are limiting our capability to procure parts needed for manufacturing, while simultaneously customers are demanding full customization capabilities, and they expect to receive their custom products ASAP. Within our facilities we struggle with aging workforces, dwindling workforces, and workforces that are being challenged to adopt newer, smarter ways of working in the digital era.

Yet—weirdly—there is tremendous optimism, particularly among solution providers here at Automation Fair 2022 who promise they are developing the right tools to right the industrial ship.

During their presentation titled "How Innovative Technologies Are Improving Productivity," David Vasko, senior director of advanced technology, Rockwell Automation, and Jerry Foster, chief technology officer at Plex Systems, noted how there are currently 800,000 unfilled domestic manufacturing jobs. That scarcity is limiting productivity and inhibiting manufacturers from achieving true digital transformation. By 2030 that gap will balloon to more than 2 million unfilled jobs, which just might cripple the U.S. industry.

So, what tools can be employed to solve these problems? Take your pick!

Automation, in the broadest sense, has the power to do more with less. Vasko referenced a bio-tech company that replaced its small team of overworked, overqualified scientists with tabletop production units that performed the repetitive cartilage-building tasks.

"This is not your father's manufacturing facility," said Plex Systems' Jerry Foster during his presentation on how innovative technologies are boosting productivity.

Robots, of course, are filling many of the ranks vacated by human workers. Among the most appealing aspects of modern versions is the ease of training—a factory worker can instruct a robot to perform a task about as quickly as he can learn it himself.

The presenting pair described the benefits of artificial intelligence (AI) in the modern manufacturing space this way: AI can give your newest operator all of the powers of your best operator. "Superpowers," Vasko said of AI, when used properly.

And, lastly, the duo celebrated the value of the digital twin in stressed industrial workplaces, which enable every member of teams to access, test, tinker and optimize processes for their real-world asset counterparts.

These are more than just cool new toys. Modern digital technologies are recruitment levers, workforce enablers, staff-training and retention devices. The challenges we see in the global industrial arena are spotlighting the value of them—pressure makes diamonds. And hard times are prioritizing new skills.

The ideal modern worker, according to Vasko, is flexible, as she must adapt to constantly evolving tech. She is a natural problem-solver, a strong communicator, and an eager collaborator, as the Industry 4.0 approach depends on sharing data across functions. The ideal modern worker is digitally inclined, capable and eager to learn and quickly put to use new tactics. This duo described the value in "leveling up" operators, technicians and engineers as they adopt additional skills, roles and responsibilities. This helps keep them around.

"The solution is really simple," said Foster. "We need to leverage these advanced tools by making sure the people in the factories know how to use them. It all has to be about productivity—making us more efficient, more productive. These things like cloud and AI and robots give us a fighting chance over the next 10 to 15 years."

Foster referenced fallout from the pandemic in recent years—those using cloud-based manufacturing execution systems (MES) were able to operate much more smoothly (oftentimes remotely) than those shackled by on-prem systems. "Factories using local software really struggled during that period," he said, before asking the audience to imagine the industrial worker of the not-too-distant-future. She is operating a complex asset, but she's doing so miles away from the factory, sitting on the couch in her living room, equipped with virtual-reality goggles that enable her to interact, digitally, with machines and to connect with a global network of fellow expert operators in the metaverse. "This is a real possibility," he said. "It's still a few years away, but it's coming quickly."

Presently, cloud computing and remote technologies are shifting strategies. The presenters detailed three ways smart approaches are affecting the modern industrial workplace:

Business impact: These approaches can help industrial enterprises weather unexpected disruptions (think pandemics, bad weather and war). "Decision-makers can still make decisions," said Foster. "They can still get real-time updates on operations via cloud computing, rather than the on-premise approach, where information was trapped in a black box within facilities."

Employee impact: When the workplace adopts these smart approaches, the workers can more often keep working. Shutdowns are reduced. Remote access enables personnel to, as Vasko described one employee, work from his RV while traveling the country. "Happy employees are more productive employees," he said.

Additionally, cloud computing widens the talent pool, enabling employers to find the skills they need from a global selection of workers.

Technology impact: Simply put, cloud technologies boost productivity. The presenters used as an example augmented-reality glasses, which can enable one field

engineer to access the intelligence of his full team back at headquarters. "You can pull others into your environment to help with challenges. The technology impact of the cloud is huge," said Foster. "And in combination with the IoT and 5G capabilities, there are massive benefits."

The wins in adopting this mindset and embracing these tools are plentiful for employers and the teams that help them realize their plans. But this transformation of tactics and upskilling of workers can prompt a surprising, challenging side effect, the presenters explained. As they become more technically skilled, workers become more attractive to hi-tech employers eager to hire them away.

The solution?

Making their current jobs as rewarding as possible. "We want to elevate the perception of manufacturing," said Foster. "We want young people to think this is a really cool job that they want to pursue. This is not your father's manufacturing facility."

THREE KEYS TO THE FUTURE OF AUTOMATION

By Anna Townshend

Matheus Bulho, vice president and general manager of production automation, and Dan DeYoung, vice president of product management, Rockwell Automation, discussed the future of automation at a press conference at Automation Fair 2022. "This is a difficult question because we could easily spend the whole day here talking about all the different areas in how we see technology evolving," Bulho said. To narrow the field, they focused on three key areas: simplified production environments, removing boundaries to accelerate outcomes, and mitigating risk for people and equipment.

"We see the technology evolving well beyond functional safety into areas like cybersecurity, and also things like what the automation system can do to support environmental, social and governance (ESG) goals that many of these customers have when they're deploying the technology," Bulho said.

Eighty-eight percent of executives think their customers are changing faster than their businesses can keep up, and 64% of consumers wish companies would respond faster to their changing needs. And part of the problem is automation systems that aren't as agile as they could be. "I think over the course of the last two and a half years, that's never been more evident," DeYoung said. "As we look into the future, manufacturers, machine builders, equipment builders, etc., need more nimble, scalable control platforms to simplify the design."

Keep it simple

Companies must find better ways to bolster efficiency, empower workers and enable more flexibility. "Keeping it simple is something that is really the DNA of Rockwell Automation," DeYoung said. "We've been focusing on enabling automation systems to be simple."

Unified machine design will collapse multiple processes into a single integrated design environment. "Increasingly, those environments are going to be deployed in the cloud, so they're more collaborative than in the past," DeYoung said.

IoT technologies like augmented and virtual reality simulation and emulation will be able to model the behavior of a machine, a controller, a drive or the whole system in a virtual setting. "For the user that has these systems deployed, you're able to model the behavior of an optimization that you want to apply to that particular machine to make sure that it's going to work before you take the machine and apply that change," DeYoung said.

Leveraging the control system and significant computing power together will help develop industry specific applications that allow remote deployment. "We're seeing a significant amount of additional computing resources available that can be deployed down on the platform next to the control system," DeYoung said. "The nature of how automation systems have been managed is still fairly old school. There's a tremendous opportunity to bring modern

"We believe that a more powerful tomorrow is within sight." Rockwell Automation's Matheus Bulho (left) and Dan DeYoung discussed how simpler, integrated automation development environments could help users react more quickly to changing customer demands and reduce overall risk to workers and production.

IT technologies to the deployment process involved in managing those assets."

Many customers also have dated machines and equipment, which is an opportunity to modernize systems in a logical, natural way, DeYoung said.

"Overcoming today's heavy reliance on multiple, disparate systems and fusing them together in a more expeditious way will drive speed, better innovation and more productivity," DeYoung said.

Removing boundaries

"Modern software development with the cloud and convergence of information and operational technology systems is really a major pivotal moment that we can bring to the forefront of automation systems," DeYoung said. With simulation and emulation, digital twins can solve technology challenges in the virtual world more efficiently, and cloud-based solutions help make that possible.

In the past, one individual often designed the controller program or the visualization environment, but now those projects are often collaborative. "You have a variety of people that are working in a collaborative fashion in order to design a system," DeYoung said. The cloud environment and new design tools help make collaboration more effective, he added.

Smarter ways to mitigate risk

"Automation systems really bring together people, technology and the automation system itself," DeYoung said. As an example, he points to integrated safety systems. "We've been integrating safety together in a more intentional way for many years," DeYoung said. Having control and safety in one system helps production recover more quickly than it could in the past.

Industrial cybersecurity must focus on internal cybersecurity assessments and also compliance standards. The standards actually vary significantly across the globe. "We expect that will continue," DeYoung said. Technology could help meet different cybersecurity global standards more efficiently, he added.

The elevated expectations of ESG goals are also very critical, DeYoung said. "Data is really critical to do this well," he said. Ensuring efficiency and visibility across the entire spectrum of the manufacturing process and then focusing on minimizing precious resources are also critical.

"We believe that a more powerful tomorrow is within sight," DeYoung said.

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