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ROK LIVE

A Rockwell Automation and Plex Systems Event

HIGHLIGHTS OF ROKLIVE 2022

June 13-16 * Orlando USA

A Special Report
by the editors of *Control*

Rockwell Automation

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CUSTOMERS AT THE CENTER OF ROKLIVE UNIVERSE

By Jim Montague

It's always good to have friends, but in times of uncertainty and upheaval, it's crucial to have someone who has your back. Fortunately, Rockwell Automation and its partners spend most of their waking hours developing, investing in and perfecting ways to help their customers survive and thrive no matter what challenges they face.

This steadfast, longstanding commitment—backed up by comprehensive capabilities—is on full display this week at ROKLive 2022 in Orlando. Fla. The software-centric event highlighted Rockwell Automation's latest Plex cloud-based enterprise resource planning (ERP) and manufacturing execution system (MES) portfolio, as well as its Fiix cloud-based computerized maintenance management system (CMMS) solutions.

"We're continuing to bring the Connected Enterprise to life, and helping users respond to all the continuing volatility, snarled supply chains and other issues we've all been dealing with lately," said Blake Moret, chairman and CEO of Rockwell Automation, in a video message that kicked off ROKLive's opening keynote session. "We're using analytics to help customers optimize production and products, eliminating single points of failure in operations, and providing deeper insights that allow them to pivot faster to better outcomes. No one is in a better position than Rockwell Automation to help users achieve and maintain these gains."

Moret reported that Rockwell Automation accomplishes this mission in three primary areas:

- Innovations in its core technologies, including its traditional devices and software, which are consistent, maintain high usability and are simplified for system integrators, operators and maintenance. They're also cyber-secure to enable safe communications between field devices, edge computing and cloud services.
- Advancing its software and information solutions with high-value services, such as those from Plex Systems and Fiix, to give customers more and better insights for minimizing inefficiencies and enabling their businesses. To further boost these services, Rockwell Automation also recently opened a security operations center (SOC) to make them cyber-secure, and acquired Maverick Technologies and Kalypso to consult with customers on their digitalization journeys.
- Refocusing on customers' individual manufacturing challenges with Rockwell Automation's industry-leading software and services, and combining people and

"Data is at the center of all we do. With our Operations Management vision, strategy and products, we and our customers can bring together data from anywhere, put it in context, and let users employ it everywhere." Rockwell Automation's Brian Shephard welcomed some 2,000 users of the company's automation solutions, including those of its recent Plex Systems and Fiix acquisitions, to ROKLive 2022 this week in Orlando, Fla.

technologies to also make their operations, organizations and the larger world more sustainable.

Pathway to data power

To achieve these epic goals for customer success, Rockwell Automation and its customers begin by synthesizing the raw data that forms the basis for all their analytics and other optimization efforts, continued Brian Shepherd, senior vice president of software and control, Rockwell Automation, as he took the keynote stage.

"We believe in the power of data, technology and expertise to transform manufacturing. We make all the devices users employ in their factories, but they aren't just individual components. They're part of systems that are powered by software and services that make them easier, safer and more productive to use," Shepherd said. "We're a pure play in manufacturing that's 100% focused on operations. We help our customers to achieve business outcomes in five main areas: optimizing production, empowering workforces, managing risk, driving sustainability and accelerating transformation."

For instance, Shepherd reported that:

- Copper producer Codelco has increased ore processing and production by 80,000 tons per day by investing $4 billion to transform a 100-year-old mine with formerly disconnected equipment into a fully connected and integrated operation with smart devices and software from Rockwell Automation that make it more agile and productive.
- Life sciences provider Cytiva built its modular and integrated Flex Factory system on Rockwell Automation's solutions, so its users can quickly ramp up therapeutics production, develop and produce new medicines, and optimize production for both. In fact, Cytiva recently achieved a 10% increase in throughput and employee efficiency thanks to integrating Rockwell Automation's digital technologies and scalable automation.
- New Zealand-based Fonterra is continuing to integrate tools from Rockwell Automation, PTC and Microsoft into its dairy operations, including a recent focus on enterprise data, coordinated operations technology (OT) and information technology (IT), allowing it to reach new performance levels by getting the right data to the rights users at the right time.

Map for design and smart devices

For users seeking similar gains, Rockwell Automation has developed a multi-part vision and strategy for operations and enterprises, which embraces and coordinates its numerous solutions and services. These parts include:

- Analytics, Apps and Access;
- Machine, Cell, Line, Plant Design;
- Intelligent Devices;
- Control, Communications and Compute;
- Operations Management;
- Production Data Platform; and,
- People and Services.

"We mapped the whole enterprise production system, and invested in all of its sections, so we can deliver results for our customers," said Shepherd, who introduced a panel of Rockwell Automation experts on each major area of the strategy. "For example, the Machine, Cell, Line, Plant Design area covers where to put things correctly in equipment and application designs before committing to building them. This can be done by using Emulate3D software to build digital twins quickly and easily and Logix Echo software to verify solutions, and adding multi-physics simulations to digital twins to emulate real processes exactly. Our FactoryTalk Hub offerings also use digital twins for designs that are closely tied to the physical world of the factory and its real-time operations."

Bob Buttermore, vp of the power control business at Rockwell Automation, reported that the Intelligent Devices area of the map covers optimization and maintenance, and forms the foundation for most other digitalization, productivity and sustainability projects, regardless of whether they're seeking to improve outcomes in discrete, process or hybrid applications. Similar to the dashboard on a smart automobile, Intelligent Devices include predictive AI functions that Rockwell Automation has added to its PowerFlex drives to maximize their uptime and productivity, as well as links to Fiix for better device maintenance.

"Data visualization, preventive maintenance, optimization, autonomy and digital threads are all made possible by Intelligent Devices, and smart sensing, industrial control, safety, power control and motor control they can provide," said Buttermore. "Rockwell Automation achieves them by embedding intelligent data models with AI into our devices, and this lets data flow seamlessly and continuously from devices to the edge to the cloud."

Control, operations and people areas

Meanwhile, the Control, Communicate and Compute area adds value by providing a conduit for visualization, according to Dan DeYoung, director of production automation control and networks at Rockwell Automation. "We've invested heavily in reducing friction and minimizing risk in solutions, such as our Flex High-Availability (HA) 5000 open, connected and scalable control module, which works with our PlantPAx DCS, and is our first with analog and digital inputs and outputs in one unit," explained DeYoung. "It's also going to be integrated with acquisition Asem's modern computing module for ControlLogix."

In addition, Nathan Pieri, vp of product strategy and management, Plex Systems, detailed the Operations Management section of the map, and showed how it integrates machines, shop floors and top floors, and employs the latest high-fidelity inputs to connect them for more productive, agile and sustainable applications.

"These are industry-focused, on-premises operations that are built on a platform, and allow our customers to produce vaccines in compliance with regulations by using products, such as our PharmaSuite software, InnovationSuite powered by PTC, and FactoryTalk ProductionCentre for optimizing operations," said Pieri. "Rockwell Automation also leads in cloud-based solutions, which include our FactoryTalk Operation Hub with Plex for simplified, cloud-native applications, and FactoryTalk Maintenance Hub with Fiix, which can deploy access to global applications, maintain digital threads, keep processes tightly integrated, and apply AI and machine learning (ML) to drive agility and resilience."

Finally, the map's People and Services section includes consulting, professional, connected, field and workforce services, which can all contribute to accelerating the digitalization capabilities of its customers, according to Rachael Conrad, vp of services at Rockwell Automation. "For example, analytics and applied AI can also be used to improve training programs, just as data science can provide learnings to operations," explained Conrad. "However, as this data moves through and across OT and IT, it also comes with cybersecurity risks that must be addressed. The time is now for IT and OT experts to double down on cybersecurity, which is why we invested in building the best SOC in the market, and implemented ODVA's CIP Security standard to help our customers mitigate the impact of potential intrusions and attacks."

Shepherd added that all these sections of the Operations Management maps are centered around the production data platform. "Data is at the center of all we do," he said. "It's the lifeblood of manufacturing, but it's often been siloed and trapped. Now, with our Operations Management vision, strategy and products, we and our customers can bring together data from anywhere, put it in context, and let users employ it everywhere. No one is better prepared that Rockwell Automation to make use of data and unlock its value for our customers."

PLEX SYSTEMS BLOSSOMS IN FIRST YEAR WITH ROCKWELL

By Mike Bacidore

As Plex Systems enters the homestretch of its first year as part of Rockwell Automation, the two manufacturing tech companies combined forces to host ROKLive this week in Orlando, Fla. "It's the first time we've had Plex customers and Rockwell customers together at an event," explained Brian Shepherd, senior vice president, software and control, Rockwell Automation.

"Plex is a cloud pioneer and an industry leader with proven success and loyal customers," said Shepherd. "We saw a perfect puzzle-piece fit of Plex inside of Rockwell. More than 700 customers are running their businesses off the Plex platform."

Rockwell also has given Plex a forever home; it's no longer owned by private equity. "We're increasing investment in R&D," explained Shepherd. "The global reach of Rockwell is another advantage. We have more than 25,000 people at Rockwell, all focused on manufacturing."

The acquisition has made a difference already. For the first time, Plex was named as a leader in the 2022 Gartner Magic Quadrant for manufacturing execution systems.

Some notable Plex customer achievements of late include:

- Euro Tranciatura Mexico's improved on-time delivery to nearly 100%.
- FloraCraft achieved a 60% increase in revenue with no additional labor hours.
- Hausbeck improved its inventory accuracy from 70% in 2015 to 99.6% now.
- G&W Products achieved 98% on-time delivery.
- Accuride slashed its hardware-requisition time from days to less than a half hour.

Shepherd also noted that Plex has quickly become an integral part of Rockwell Automation's Connected Enterprise production system, which is built on five core competencies:

- Leading cloud-based business systems;
- Fully contextualized machine and operational data;
- Visualization and analytics with applied artificial intelligence/machine learning (AI/ML);
- Modern production system design; and,
- World-leading automation and control.

Nathan Pieri, Plex's chief product officer and vice president, applications, identified three areas of acceleration that the organization is pursing, including manufacturing execution; machine integration; and analytics and applied AI/ML. Further, six key areas are targeted for investment. They include the digital thread; inbound

"We've worked to further productize our OEE solution. The packaged solution can help you get up and running on Day 1." Plex Solutions' Nathan Pieri outlined steps the cloud-based solutions provider is taking to streamline implementation for its manufacturing customers.

supply chains; agility; edge to cloud; user centricity; and premier cloud services.

"The digital thread connects your workers to your business systems," explained Pieri. It blurs the lines of what a traditional manufacturing execution system (MES) is. "We can solve problems that go beyond those traditional boundaries," he added, noting the inclusion of tools such as Mach2 low-code IIoT (Industrial Internet of Things) development environment and SmartEDI with new OEM (original equipment manufacturer) support, which Plex added by acquiring Kors Engineering in early 2021.

Inbound supply chains, or "supply-chain in," is important because performance is only as good as how well the supply chain is managed. "ML-based forecasts will be available in Q3 2022," said Pieri. "Over the past year, we've been looking to improve scenario planning and add more content to make better forecasts. Applying ML improves forecast accuracy by 5%."

"We'll be able to collect the data, run it through the models and make decisions for you to minimize work-in-process (WIP) inventory, maximize capacity utilization and maximize adherence to promised delivery," explained Pieri.

Agility is at the heart of the MES, he added. "We want to be the MES of choice for food-and-beverage and discrete industries," proclaimed Pieri. "We want to build a full stack of capabilities," which include condition-based maintenance, Ford FMEA (failure mode and effects analysis) compliance for quality management, multi-site kitting, VIN tracking and flexible assembly.

Edge-to-cloud aids with the ability to integrate machines by utilizing low-code tools. "It all starts at the edge," said Pieri. "We've worked to further productize our OEE solution. The packaged solution can help you get up and running on Day 1." Overall-equipment-effectiveness (OEE) templates are divided into five groups: automation; OEM and industry compliance; error proofing and validation; visual intelligence; and connected worker. One manufacturer realized a 20% throughput improvement and unlocked 30% downtime reduction, Pieri explained.

User centricity includes modular solutions to simplify the Industry 4.0 transformation. "The journey includes visibility, control and automation," said Pieri.

Finally, Plex's premier cloud services offer a constant stream of continuous innovation without upgrades, so users can focus on making and not maintaining. "More than 380 updates were made over the past 12 months without upgrades, while maintaining a 98 security score," Pieri explained.

Plex Chief Technology Officer Jerry Foster also announced the winners of the annual Customer Impact Awards during ROKLive.

The Transformer Impact Award was given to Kendrick Plastics, which reduced its scrap rate.

Accuride won the Innovator Impact Award by achieving ISO-17025 accreditation.

The Leadership Impact Award went to Old World Spices & Seasonings, thanks largely to its ability to maximize information availability with zero disruptions.

Control+M Solutions earned the Partner Impact Award, after achieving the highest all-time post-boot-camp results.

And Partner of the Year was awarded to Plante Moran for its expansion of Plex services in the Asia-Pacific (APAC) region.

CERTAIN GROWTH, TEMPERED WITH UNCERTAINTY

By Chris McNamara

The good news: Plex Systems' latest State of Smart Manufacturing Report reveals a 50% growth in the adoption of smart manufacturing technologies in the past year. That continues a trend—snowballs it, really—that this annual report has chronicled for the past seven years. It's a huge jump in adoption, one that validates the efforts of solution providers such as Plex and Rockwell Automation, and echoes the messaging that many of us have been shouting from the rooftops. "This stuff works!"

The bad news: all of these new tools, while enabling unprecedented gains, are creating "technology paralysis—an inability to choose the right technology to fit the business needs." That was reported as a top ten growth obstacle by the 321 global manufacturers who completed the recent survey that informed this report.

"This is the first time we asked about technology paralysis in the survey," said Gerry Abbey, product marketing manager, Plex Systems, who fronted a 60-person team in the creation of this report and shared key findings from it during a presentation at this week's ROKLive event in Orlando, Fla. While there used to be just a few software and hardware providers, he added, now there are myriad. "When someone is moving toward digital transformation and the technology they need to adopt, there are so many that they might have trouble making a decision."

One solution Abbey suggested is empowering teams of leaders from throughout the manufacturing enterprise to make collectively informed decisions about digital-transformation strategies. Formal processes are required, of course, but he also stressed the value of watercooler discussions (even "virtual watercooler discussions" in this remote age) where stakeholders within enterprises can hash out needs and concerns and opportunities before commitment to digitalization courses of action.

Naturally, even the best-laid plans are subject to the rigors of the modern industrial arena. Abbey referenced different segments of the report to call out ongoing challenges that survey respondents—all of us, actually—just can't seem to shake:

- The difficulty in—and value of—connecting disparate Industry 4.0 technologies such as cloud computing, automation efforts and wireless capabilities.
- Labor shortages caused by retiring skilled labor and a reluctance to enter the manufacturing field among young workers. "It is here. It may be here to stay. It may increase," said the presenter.
- How malware attackers are increasingly focusing on manufacturing, having found those business owners to be quick to pay ransoms because they are so reli-

"When someone is moving toward digital transformation and the technology they need to adopt, there are so many that they might have trouble making a decision." Plex Systems' Gerry Abbey reviewed the results of the company's seventh annual report on the state of smart manufacturing.

ant on business continuity. 52% of respondents are not managing cybersecurity and 61% do not have a risk-mitigation plan in place. "These numbers are very concerning," said Abbey. "To not have a plan in place, considering all we have seen in recent years?"

- Supply chain disruptions. While many have completed supply chain planning solutions, all processes are often not connected, limiting the ability to respond to issues in real time. "Supply chain disruptions are nuanced and changing. This is an ever-present challenge."

On the flipside, the State of Smart Manufacturing Report spotlights encouraging developments among respondents:

- Increasingly modular smart-manufacturing software systems are enabling more enterprises to start small and launch production-monitoring programs in a matter of days. "You can then build payback, get ROI and scale quickly," explained Abbey.
- Another first for this report was the inclusion of ESG topics. Survey-takers were asked about their commitment to environmental, social and governance initiatives, as these topics are rapidly evolving from obligations to desirable value drivers. As manufacturers struggle to attract talent, for example, a public commitment to sustainability, equitable practices and compliance is a proven method to pique interest in youngsters who now expect this of their employers. The proof—97% of survey respondents noted that they have a formal or informal ESG policy in place. "There are many reasons companies push ESG—business reasons and human reasons," explained the product marketing manager. "ESG can be a true competitive differentiator."
- Among six technologies that can most help with modern digitalization campaigns in the report, Abbey focused on evolving artificial-intelligence and machine-learning solutions. "The business cases that are being built with AI and machine learning can fill in gaps in operations," he said. "These are key tools to this conversation."
- The emergence of connected supply chains—customers, suppliers, plants and distribution centers working together. "Once you have in place that closed loop, you have more inputs that provide you greater forecasting accuracy. You can better communicate with your suppliers. You achieve more effective growth."
- The ample methods to mitigate cyber-risk—key among them is a multi-tenant cloud software-as-a-service approach that enables users to rely on software, hardware and security support teams. "This frees up your IT department so they can add business value elsewhere; they become more than data-analysts. We offer a whole company devoted to this; teams of software and security professionals and CSOs looking out for your best interests."

In the last seven years of creating these reports, the Plex team had witnessed incremental commitment to digital transformation among manufacturers. In the last year, incremental growth became monumental. And Abbey and the dozens of peers with whom he created this report foresee this trend continuing. "The barriers to adoption are falling, and that is enabling change. Think about your own situations," he said before informally polling the room about their own commitment to smart initiatives.

Most hands in the room shot skyward…more technology enthusiasm evident than any paralysis.

THE NEW SHAPE OF LIGHTS-OUT MANUFACTURING

By Anna Townshend

"Automation looks very different in every industrial environment. There's not one specific way to do it," said Bernard Cohen, product marketing manager at Plex Systems, and moderator of the panel discussion highlighting those many differences at this week's ROKLive event in Orlando, Fla. The "Path to Lights-Out Manufacturing" discussion included panelists Tony Kaczmarek, vice president of product management at Plex; Luke Abrams, IT manager at Newman Technology; and Greg Heath, director of business strategy at Shape Corp. They discussed current automation efforts, combating the skilled worker shortage and the future of plant floor automation.

Accessibility to technology is the biggest change in automation over the last few decades, Kaczmarek said, led by the decreasing cost of entry for these products and the rise of the Internet. "I think we've always had the ability to move tons of information and reflect it. But now, to provide context around it, to be able to deliver it to the people that can affect change, those are the things that we're really seeing make a huge impact," Kaczmarek said.

The latest automation efforts at Shape Corp., Heath said, are about trying to simplify operations and remove menial tasks from operators. Oftentimes for companies new to automation, taking that first step is the hardest. It can require internal passion and interest to drive change. At Shape Corp., one team member in the electrical controls group drove the process. "If we didn't start, we wouldn't have evolved to begin with," Heath said.

"Automation is a key part of any new lines that we put out there at this point," said Abrams. Standardization is also a key part of that process. "We have standards that we put in place now for all our lines depending on the type of line that is," Abrams said.

Customers are also impacting how businesses approach their automation efforts. For example, a customer has pushed Newman Technology regarding process requirements for labeling. Rather than having operators manually generate labels, customers want them to be generated consistently by a machine. Customers have also pushed the company on serialization, which was originally created for internal use at Newman. Now, customers also scan those same barcodes to validate parts on arrival.

In general, Newman uses automation for error-proofing. "You use it to be that second checker, that verification," Abrams said. The integrated system will prevent the company from sending an incorrect part to the customer, and follow up conversations with customers also help further develop processes to ensure errors aren't made, Abrams added.

Greg Heath, director of business strategy at Shape Corp. (left) and Luke Abrams, IT manager at Newman Technology (right) participated in a lively panel discussion on the many ways in which organizations can fulfill aspects of the "lights-out" manufacturing paradigm.

Can new technology solve workforce issues?

According to the latest Plex Systems State of Smart Manufacturing Report, 75% of organizations say technology is highly helpful in addressing workforce challenges, and 34% of respondents have invested in process automation, which they think has helped to address workforce challenges. Cohen asked the panelists about their newest technology applications.

"As our business evolves, we're getting into more and more products that have stricter tolerance requirements," Heath said. This has led to discussions about investing in artificial intelligence (AI) and machine learning tools that can help in that process.

Many companies do not have IT staff to handle security and all the server and database infrastructure. "It's shocking to me to watch the number of customers that we have that don't have a single programmable logic controller (PLC) programmer," Kaczmarek said. It often takes an operator on the plant floor that already has experience in maintaining the machines and the product process, or people with an IT background to expand further into operational technology. Turn those with IT responsibilities, who are trying to keep databases alive with old solutions, into analysts that are implementing new solutions, Kaczmarek recommended.

"We're not looking at the automation side as a pure, raw dollar return on investment," Heath said. It's also important for the team to understand its data, he added. "As data comes streaming in you can potentially lose some of that connection to what the data represents," Heath said.

The engineering group at Shape Corp., when buying new equipment, began to modify the build manual for suppliers, so when they receive specifications, suppliers fully understand what's expected. "We wanted machines to come in already configured to our standard, so that every new machine got the same exact set up," Heath said.

At Newman, they're beginning to look at new technology for capturing data for check feeds and adding sensors that detect the location of a part or measurement, Abrams said. "Some newer cameras actually have machine learning or AI built into them, so you essentially teach them over a series of parts, what is a good part and what are the bad parts," Abrams said.

Is industry ready for lights-out manufacturing?

A lights-out operation for an entire facility is a lofty goal, and for now, more companies are interested in fully automating specific production lines. Newman is close to lights-out but not all the way; it has one production line with two workers, one at the beginning loading parts and another at the end, loading parts into the container.

"Continue to build toward that process," Abrams said. "It's little by little getting that confidence that what we have in place will send a good part every single time, and if it doesn't, the proper notification is sent out."

Every effort bringing a facility closer to 100% lights-out is also bringing increased complexity of materials management, handling rejects or material flow between systems, Kaczmarek said. "We forget how agile a human person is to be able to handle all these little nuances," he added. They're seeing more smaller cells, rather than the full operation, going lights-out.

Internal citizen developers or the use of low-code/no-code software has also given the smaller to mid-sized market more opportunity in this area. Newer vision systems and robotics also provide many more opportunities to validate everything. "Unless you're making the same part for probably two or three years, the need for agility may keep you from going fully lights-out," Kaczmarek said. "There's a journey to making sure that you get to a point of perfection."

A PREVIEW OF NEW FACTORYTALK VISUALIZATION PLATFORM

By Mike Bacidore

The FactoryTalk Hub suite will look different by the end of the year. FactoryTalk Optix, a new, scalable, cloud-enabled visualization platform with options, is expected to launch in November. ROKLive attendees got a sneak preview and demonstration of the upcoming addition to the FactoryTalk Hub suite in Orlando, Florida.

FactoryTalk Optix Studio is the integrated design environment for creating Optix projects. In it, users can design and test human-machine interface (HMI) projects directly from a web browser or desktop editor. The result of that design, a FactoryTalk Optix Application can be deployed to Rockwell Automation devices, third-party devices and PCs.

"We're planning to launch this at Automation Fair," said Steve Briant, visualization platform manager at Rockwell Automation, who explained the progress that's been made so far on FactoryTalk Optix and predicted what path further development might take.

Users can design and test HMI projects directly from a web browser, explained Briant. Collaborative workflows allow modifications from anywhere. Version management tracks changes and identifies who made the changes. In addition, projects can be built dynamically by scripting or even at runtime.

Deployment options include flexible host hardware, open or closed deployment and a pay-for-what-you-use structure.

Responsive graphics are built in. "You can push to a widescreen format or narrow format," explained Briant. "Built into the product is a reporting engine. You can create or change applications with a style sheet, and it includes multi-language support."

Extensible options include a library tool that will allow for integration. "We have a suite of the most popular third-party automation drivers," said Briant. "It has IoT native connectivity and full support of OPC/UA companion specs."

Demonstrated Optix

Simone Mori, business development manager, Rockwell Automation, provided a demonstration of FactoryTalk Optix that showed key features in three phases—designing an application, collaborating with others and deployment to target devices.

Using the web-based FactoryTalk Optix Studio, Mori showed how to configure HMI graphics, data sources, including OPC/UA, and HMI alarming, trending and recipes.

Application design is broken down into using templates, linking them and then connecting automation. Templates are a collection of graphical objects combined with linkages for animations and user interactions. They can be assembled in any project or can be pulled from an existing library. Graphical containers can provide interfaces for opening, updating, logging and security. These interactions are enabled by linking the templates to the main page. Finally, connecting to automation can be done through tags or function calls using OPC/UA methods.

Multiple users can collaborate on the same FactoryTalk Optix application or using a GitHub repository. Mori demonstrated how changes are logged and versioned, as well as how conflicts are managed.

In the third phase, Mori showed how to deploy applications to different HMI devices, as well as make modifications to a running application after it's already been deployed.

"You can create or change applications with a style sheet, and it includes multi-language support." Rockwell Automation's Steve Briant gave ROKLive attendees a sneak preview of FactoryTalk Optix.

MANUFACTURERS REALIZE QUANTIFIABLE GAINS

By Mike Bacidore

We've all spent the past two years in the metaverse. We had no choice. But it's been eye-opening to see what can be done, from attending online meetings, webinars and conferences to collaborating digitally with colleagues in faraway locations and even commissioning machinery remotely. The possibilities are virtually endless.

We've discovered just how much we can get done, and we continue to test the limits of what can be achieved with connectivity to digital environments and data.

It's no small wonder the virtual manufacturing world is becoming not just a playground, but a viable business endeavor for the gaming industry, explained Jerry Foster, CTO and founder of Plex Systems, who spearheaded the opening session at ROKLive's second day this week in Orlando, Fla.

Foster cited the many advantages of an industrial metaverse and then welcomed other guests onstage to share quantifiable results of digital implementations.

"With Emulate3D, you can design the machine, configure the floor and train employees before building the physical line," said Foster. An industrial metaverse allows the user to not only preview production, but to rewind and replay what happened in the factory yesterday and slow it down and observe it. "What if I rewind yesterday's operation and change something, like a temperature, to find out the downstream effect of that?" he asked.

Rockwell Automation's Emulate3D is built on the Unity game engine, which is coincidentally used to build video games. Foster said he recently visited an exhibit booth by Epic Games, maker of the Unreal Engine, a 3D gaming engine, at Automation Alley's Integr8 conference in Detroit.

What was Epic Games, which makes the popular game, Fortnite, doing at a manufacturing conference? "Epic has its sights set to build virtual worlds, even in manufacturing," explained Foster. "They've set up a lab in Detroit to work with automotive manufacturers."

Things just got real.

Game-changing technology

Plex originated in a forging plant in Michigan more than 20 years ago. "Just-in-time and lean manufacturing were coming in," explained Foster. "Manufacturers were forcing unprecedented cost-cutting measures on their suppliers. That forging plant survived because we had leadership that was not concerned with the status quo. They went out in the plant and applied new ways of doing business. Plex was built to solve these problems. Plex made manufacturing data available all the way from the shop floor to the top floor."

"Most of the Industry 4.0 technologies are a way to look at a physical device in a digital environment." Plex Systems' Jerry Foster pointed out results achieved through digitalization.

Fast forward to the 2020s, and many major obstacles, including supply-chain issues, the labor shortage, cybersecurity and decreasing profit margins, are in manufacturing's path.

"How do you survive?" asked Foster. "Strong leadership and new technology. But as we implement new technologies, we're often not looking at an overarching strategy of how they fit together. We're creating siloes," he warned.

"Data and feedback loops are critical. When you extend that data thread outside your walls to the customer and back, that is a game-changer. You can even sell your product as a service," said Foster, who cited his own subscription to Hewlett-Packard (HP) for his home printer.

"I no longer have to pay for ink on my color printer at home," he explained. "My printer tells them how much I use, and HP sends me ink. I don't have to find an open store in the middle of the night. I'm seeing other things, from home washing machines to jet engines, being paid for on a usage basis." All it takes is connecting feedback loops and building digital threads, said Foster.

"Industry 4.0 is connected manufacturing," explained Foster. "The digital thread is the act of creating a sequence of digital twins. Most of the Industry 4.0 technologies are a way to look at a physical device in a digital environment."

Real-world results

Emulate3D's Tyler Phillips, global business development manager, and Andrew Deeble, catalog engineering lead, shared new product features, as well as results from ECM, an Italian customer in the structural-metals industry, which was able to shave five months off of a 10-month project using Emulate3D.

"We've been busy connecting with our digital partner ecosystem to increase functionality. We can now connect to Ansys digital-twin models and bring them into a larger simulation testing system," noted Phillips.

"We can connect to Fanuc Roboguide," said Deeble. "We start with 3D CAD and we bring that to life. We've added more than 500 new robots and automated storage and retrieval systems to our library. In many cases, it's low-code or no-code to assemble and configure these system simulations. You can generate the control code automatically. We have rich and deep APIs. ECM had a secret weapon. They took controls testing and worked earlier. All of what we described is available today, plus we've been working with ePlan on an upcoming eCAD release."

Kendrick Plastics, a Plex Systems user, was formed two years ago as a spinoff, manufacturing for Tier 1 and automotive OEMs. "We track everything in our process from torque to screw pressure," explained David Chupp, IT manager at Kendrick, which consolidated 27 systems into one, decreased scrap rate from 1.8% to 1%, streamlined the PO process from days to minutes and eliminated 40 hours/week of data entry.

"We were able to start gathering insights quickly for every single one of our presses and start driving root-cause validation with the operations team," said Chupp. "Data by itself has no intrinsic value. Having data is expensive if you don't use it. We rolled out a program similar to what Uber Eats is. Our users are able to request anything they need to be successful. A single process sends that to our materials team electronically and automatically, and that has driven a lot of our efficiencies."

Maintenance is a specific area where manufacturers are realizing benefits with digitalization. "Sensors for temperature or vibration are installed in the machines," explained Luda Domakhina, product strategy for applied artificial intelligence (AI) at Fiix, Rockwell's cloud-based computerized maintenance management system (CMMS) offering. "Work orders are validated by supervisors. Once work orders are completed, AI is used to help prevent future failures. Digitalization happens in multiple areas in maintenance. Data needs to be entered into the system first."

Fiix customers report 10-15% maintenance cost savings, 78% reduced time to fill out work orders and a 27% reduction in downtime, said Domakhina.

Another example of real-world results was achieved by a mining operation that realized more than $200 million in cost savings. "When a problem occurs upstream at the mining operation, it can turn into a big problem," explained Rachael Conrad, vice president, services, Rockwell Automation. "They used decision automation as their pivot and took the variability out. Transformational change really matters."

Labor assistance

"Everyone in the room is feeling the impact of the great resignation," said Rockwell's Conrad. "If we look at the U.S. Bureau of Labor Statistics data, in the United States alone, 47 million people quit their jobs. Over the past 10 years, there's been a steadily increasing number of people leaving the workforce."

Conrad identified five reasons for the exodus—retirement, relocation, reconsideration, reshuffling and reluctance to return to physical workplaces.

"People are less likely to relocate," said Conrad. "Companies have had to adopt work-from-anywhere strategies.

People are finding different work-life balances and moving or changing jobs."

The solution involves retention, recruitment and workforce planning. "Retention is keeping your skilled talent," explained Conrad. "Develop them and understand how and where they want to work. Recruitment is about branding companies differently. And with workforce planning, how are you going to develop those skills with persona-based strategies? You can't just hope. Hope is not a good strategy."

New employees want to learn and be ready to go. Expert capture for video viewing is a new way of working, said Conrad. "You can improve plant-floor and maintenance-team efficiencies with video support. We implemented Vuforia Chalk to provide a virtual expert by your side," she said.

EDGE TECH IN INFANCY, BUT GROWING UP QUICKLY

By Chris McNamara, Smart Industry

Local computing is where many operational technology (OT) professionals are most comfortable. Doing it all right there on the plant floor with PCs and laptops and servers. That approach works, of course, but it has limitations as we advance to connecting systems and sending data to the cloud. Also, the local approach makes it almost impossible to share data with vendors.

Cloud computing overcomes those hurdles and makes transporting data easier, but connecting to the cloud can be tricky in some OT environments. Cloud computing with massive data sets can grow costly, too.

Enter edge computing, which in the parlance of Oliver Haya straddles the line between local and cloud computing. With edge computing you are working closer to your equipment, which reduces latency. There is built-in security with (smart) edge-computing approaches. And edge enables easier transport of data and applications to OT.

"The edge is really the best of both worlds, reducing the downsides of each," summed the Rockwell Automation commercial product manager during his ROKLive presentation, "Growing, Scaling and Managing the Industrial Edge," in which he announced the fall 2022 launch of Rockwell's new FactoryTalk Edge Gateway, a software-as-a-service package designed to scale industrial edge uses to make it easier for industrial professionals to quicken their digital transformations while capitalizing on new software capabilities.

The capacity crowd in the room was intrigued. Haya explained how FactoryTalk Edge is an intelligent, centralized edge-management infrastructure solution that is accessible as a single sign-on with other Rockwell Automation software-as-a-service (SaaS) products. It addresses edge-computing use cases from the top floor to the shop floor across the cloud, plant and line levels. Users can reduce their total cost of ownership with faster time to value, enhanced productivity, and reduced maintenance needs all while future-proofing their business with this managed edge solution.

The audience peppered the presenter with questions about specific uses of this new tool. Haya provided big-picture context for its creation and industry-specific examples of its capabilities.

Applications proliferating

The presenter noted a sea change over the past few years regarding edge use. "People see the potential for IT/OT convergence with the edge," he said, focusing on OT operations managed by IT teams. "There are real challenges for OT with cloud latency and the cost of connectivity. Moving to the cloud has been slower for OT, but that will accelerate because of the edge."

"The edge is really the best of both worlds, reducing the downsides of each." Rockwell Automation's Oliver Haya discussed the importance of edge computing in bridging local and cloud platforms, and previewed the company's new FactoryTalk Edge Gateway.

And while there is growing recognition among industrial professionals about how the edge can benefit their operations, Haya stressed the need to consider the what. "If you are going to build an edge strategy, you have to consider what you are going to do with it," he said as heads in the audience nodded. Are more granular analytics the goal? Do you want to run your MES better? Are you seeking greater visualization of your platforms? Is your answer yes and yes and yes and more?

"There are a lot of good reasons for an edge approach, but you have to determine the specific value for you and your business," noted Haya. "That will inform your roadmap of applications and your edge strategy. And then you have to lean in."

Lean in?

What the presenter means is that successful edge strategies exploit their distributed and modular nature. He explained how users should launch this approach with "an edge per machine or per line." The more users commit to the edge—they more they lean in—the more rewards they will reap.

And users need a network that can support that full commitment, particularly as the number of edge devices and the number of affiliated apps expands. "Here we can add a ton of value with the solution we're bringing," Haya crowed, touting FactoryTalk Edge's ability to provide managed services to more easily roll out edge efforts. He explained the solution's ability to future-proof campaigns to determine what users don't know about their operations, and the ability to study modular systems within an industrial architecture and add appropriate elements over time.

Perhaps most critically, the Rockwell solution enables these gains to be made securely. During this presentation Haya referenced a Gartner stat that, by 2025, 25% of edge networks will be breached as enterprises continue to converge IT and OT. "If you don't have new security with your new edge solution you are creating a new hole, a new attack vector," he warned, noting how FactoryTalk Edge was designed from the beginning with security in mind. "Any time you can enhance your security posture, that is worthwhile."

Users are invited to build their own applications to work alongside a rich ecosystem of applications native to FactoryTalk Edge. They are encouraged to test the full capabilities of the flexibility and modularity of the solution. And they were reminded during this session to consider the historical status of all of this work.

"We are still at infancy with edge as a technology," said Haya.

And that may be true. But as powerful solutions like this prove, it is growing up quickly.

FACTORYTALK DESIGN HUB LETS TEAMS BE TEAMS

By Jim Montague

The benefits of getting everyone on the same page were unappreciated and vastly underrated for a long time. However, its huge potential benefits gradually gained recognition, and unified views of projects and processes are quickly gaining momentum and speed—especially in digitalized and software-based industrial applications. One of the best examples of these common platforms is Rockwell Automation's FactoryTalk Design Hub software.

"A lot of things are moving to cloud-computing services because they allow access from everywhere, collaboration by remote users in a central location, on-demand scaling of computing power, cost savings and improved performance, all wrapped in a cybersecurity layer," said Chris Como, principal platform leader for FactoryTalk Design Hub at Rockwell Automation.

Como presented "Bringing Teams Together in the New FT Design Hub" on the second day of ROKLive 2022 this week in Orlando, Fla.

Build up and out

To understand FactoryTalk Design Hub, it's important to know that it's one of three primary outgrowths of FactoryTalk Hub, which is Rockwell Automation's software-as-a-service (SaaS) offering enabled by Microsoft Azure. After several years in development by a small team at Rockwell Automation, FactoryTalk Hub launched a unified experience with common login context and data. More recently, it built outward from this foundation by adding FactoryTalk Design Hub for streamlined automation system design, FactoryTalk Operations Hub for simplified, cloud-native operations management, and FactoryTalk Maintenance Hub for asset management and predictive maintenance.

"The main question users have is how to bring their team members together, such as their human machine interface (HMI) expert and their motion control expert, and enable the group to benefit from their strengths," said Como. "FactoryTalk Design Hub gives them the central location they need, enables multiple personas, allows access to design software, provides version control, and enables system testing, experimentation and analytics."

Three spaces for sharing

To establish this central collaboration space, FactoryTalk Design Hub creates a common, on-demand location for all of a user's automation design needs and projects. Como reported that the overall, cloud-based ecosystem for FactoryTalk Design Hub includes three primary sections.

"The main question users have is how to bring their team members together, such as their human machine interface (HMI) expert and their motion control expert, and enable the group to benefit from their strengths." Rockwell Automation's Chris Como discussed the features and functionality of the company's new FactoryTalk Design Hub.

First, FactoryTalk Vault consists of role-based sharing of files by participants and organizations; organized solutions to maintain file histories and changes, and group project files together; and a version control system to further record changes to files, keep them safe, and recover files as needed. FactoryTalk Vault also enables in-depth analysis of controller projects; project upgrades using Logix Designer, V.16-34, software, and file-type conversions that provide the right file types without requiring installation of their software versions. Como reported that FactoryTalk Vault can presently be used by single users, and will be available in 3Q22 in an organizational version.

"FactoryTalk Vault lets users open all their design artifacts, and display and position them however they desire," said Como. "They can create and store different functions, such as which programmable logic controller (PLC) or drive they want their HMI to interact with, which drawings they want to go with which project, or which simulation model goes with which artifacts."

Second, the Design Tool section of FactoryTalk Design Hub covers file-conversion project upgrades, project analysis and future issues. Two of its main benefits are that it lets users upgrade all their projects at once, and also allows file-type conversions without installing associated software versions.

Third, the Design Engineering section of FactoryTalk Design Hub is layered above its two counterpart sections, and uses four main tools to perform system testing, experimentation, analysis and virtual commissioning. Como added these functions will be available to users later this year, likely in 4Q22. They include:

- Controller programming with Studio 5000 Logix Designer software as part of FactoryTalk Design Studio;
- HMI programming and development with upcoming FactoryTalk Optics software;
- Emulation and simulation with Emulate 3D software as part of FactoryTalk Logix Echo; and
- Enhanced capabilities by Rockwell Automation and its many partner organizations.

"We support what Logix Designer supports, and if a project is saved in FactoryTalk Vault, then users can go back and access it," explained Como. "Function tiles available via the Design Engineering section include controller overview, hardware overview, controller task model, program composition, motion, tags, alarms, objects and inter-processor communications. Program composition lets users make sure functional specs are being followed without opening a project, while inter-processor communications show which devices like PLCs are talking to which other devices, and helps identify problems faster. For example, when we look at the P Alarm block, we can see all the upstream and downstream composition about what objects it's interacting with."

MANUFACTURERS GET SAAS-Y

By Jim Montague

Cloud computing and software as a service (SaaS) can land industrial users on the shore of a new world of performance benefits. They just need to steer toward solutions to bring that promised land into sharp focus.

This was the essential assessment of five experts in Rockwell Automation's Software and Control division who discussed cloud-based industrial automation Software on the second day of ROKLive 2022.

"Digital transformation is a big trend, but COVID-19 had an even bigger impact on it," said Leo Kilroy, director of digital design, SaaS and FactoryTalk Hub at Rockwell Automation. "The pandemic accelerated digital transformation by users seeking to gain efficiencies, develop services and address other business changes. Now, they're scaling digital transformation with cybersecurity, cloud-computing, artificial intelligence (AI), data analytics and automation, which is right where we can help."

Adam Gregory, commercial software leader for next-generation design software at Rockwell Automation, added that digital transformation is paralleling a shift to a more modern way of thinking and bringing additional software-based practices to manufacturing. "Rockwell Automation's programmers are using and getting increasingly excited about IT tools and how industrial processes can adapt to use them," said Gregory. "These include FactoryTalk Vault and FactoryTalk Hub with cloud services like Microsoft Azure and Amazon Web Services on the backend, which let users employ design tools and object-oriented programming to build applications more easily."

Saving grace of SaaS

Several panelists stressed that the primary advantages of SaaS are that its software and security functions are always up to date because they remain the responsibility of their providers, which frees users from former and often arduous patch management, software version control and security update tasks.

"It recently took us two hours to download some new video-processing software, and this was precisely the kind of job that SaaS would allow us to avoid. With SaaS, we'd have immediate access to the new version," explained Oliver Haya, marketing manager for edge-to-cloud at Rockwell Automation.

Steve Briant, platform lead for next-generation visualization and FactoryTalk Optix at Rockwell Automation, added that SaaS lets users log in to a web browser for ubiquitous access from anywhere to its assigned software applications and services. "Many of us enjoyed these new features, such as using Microsoft Teams, during the pandemic without having to download the software," said Briant. "This zero-overhead model is something we all appreciate."

Beyond access to computing functions and files, SaaS also enables users to develop and deliver new content and

Five expert panelists in Rockwell Automation's Software and Control division emphasize that cloud computing and software as a service (SaaS) can streamline every type of industrial application.

value to colleagues and clients, said Chris Como, principal platform leader for FactoryTalk Design Hub at Rockwell Automation. "This week, our customers are seeing that we have new capabilities they can try out, especially in FactoryTalk Design Hub," said Como. "This really changes the whole cadence of how we develop and release solutions because we can deliver them much faster."

Scaling up, savings and sharing

The panelists also reported that, not only can SaaS in the cloud allow new capabilities, it can also multiply those solutions as needed, dramatically increase its computing power to meet the needs of data-intensive tasks and make formerly difficult jobs simpler to handle.

"The cloud makes it easier to increase and apply CPU power more quickly. We can also scale horizontally, and run five or more applications at the same time," added Kilroy. "I used Emulate3D software on the cloud yesterday to simulate a canning line on my laptop, and it ran as smooth as silk. It can run large applications for performance scaling and bring together teams for projects. If you need to do virtual commissioning, you can do what you need to do and drop out when you're done."

Briant added that Rockwell Automation's upcoming FactoryTalk Optix software uses the same cloud-service model, so users only need to purchase as much capacity as they're actually going to use. "No one wants pay for something they won't use, so we're also building subscription and consumption models, which can both be classified as operating expenses (OpEx), and produce added cost savings."

In addition to immediate financial benefits, SaaS in the cloud can also generate savings indirectly by allowing users to share files and save valuable time, as well as see who made what changes to which file. "FactoryTalk Design Hub brings together multiple personas, who can ask each other about items like the AutoCAD program they're using, wiring on a project, an HMI or PLC they're developing or anything they're doing to build a global solution," added Como. "This is very similar to the in-person collaboration they've always done."

However, one of the unshakable infrastructure requirements for SaaS in the cloud is maintaining a good Internet connection, said Haya. "This can be an issue because some plants have poor Internet links, but connectivity and performance are much more closely tied these days. SaaS needs good connections at the edge, so it can build out from there. SaaS and the cloud are just another tool in the box, but we're not replacing the box," he explained.

"We'll always maintain an on-site version of software if users need it, and it can run in conjunction with the cloud," said Gregory. "However, even though not everyone is ready for it yet, cloud and SaaS are the next wave."

MES ENABLES THE CONNECTED WORKER TO SOAR

By Chris McNamara, Smart Industry

While presenting to an audience that had, for the most part, flown here to Orlando for ROKLive, John Clemons used a fitting analogy during his presentation entitled "MES: The Cornerstone for the Connected Factory Worker."

He asked us to picture the trust we put in airline pilots. We hand them the keys to the aircraft assuming that they are trained, skilled, smart and motivated to fly the multi-million-dollar planes properly.

"It's the same thing as entrusting your multi-million-dollar manufacturing facility to your workers," said the manufacturing execution systems (MES) solution consultant for Rockwell Automation. "You're asking them to 'fly' your plant and you want them highly skilled, properly trained and motivated to do what you need them to do—make products, make money, get results."

As manufacturing environments grow more complex and connected, and as workers within those facilities grow more demanding of smart approaches to doing their work, the tools, training and motivation at play are evolving. The humans are digitally transforming along with the hardware and software (but only if approached properly).

And central to success in this change are the manufacturing execution systems that connect people to every facet of manufacturing operations, optimizing processes and creating truly connected factory workers.

Clemons explained that he's "been doing MES way longer than it's been called MES." Over the past few decades he's witnessed the expansion of elements that fall under that MES banner, now encompassing the entire manufacturing process, from the receiving dock to the shipping dock, involving all of the people, all of the processes, the maintenance, the materials and more. "The difference is that, today, MES is all about having to track everything, to be able to reconstruct what is happening with your manufacturing. If you get a call from a customer with a problem, you can go back to the database and see everything about the product."

It's heady stuff, this MES. Multi-faceted and constantly changing. But for this presentation, the consultant narrowed his focus on that people component—the workers interacting with the integrated suite of applications that comprise an MES in modern, fully connected capacities. While the technology within MES may be cool, he stressed, it requires people to make it work. Smart, trained, motivated people. (Think airplane pilots.)

"When people on the shop floor don't have access to the information they need, they don't make good decisions," said Clemons. "They are uninformed. They are

"When people on the shop floor don't have access to the information they need, they don't make good decisions." Rockwell Automation's John Clemons discussed the important role that manufacturing execution systems play in keeping connected workers at the top of their game.

not driven by data. They get frustrated, and then safety becomes a concern. Having an inefficient, ineffective workforce costs you more than just wasted hours. It can limit your business potential."

So how does MES remedy that?

In short, by providing modern workers with their modern needs. These include universal dashboards with aligned key performance indicators (KPIs). Worker-mobility technology that enables team members to stay connected as they move throughout facilities performing tasks. Augmented and virtual-reality tools that, among other benefits, speed training for new hires and multiply the capabilities of every worker via pooled knowledge.

Collectively, these tools build a modern work environment that attracts new workers with a safe and technologically advanced workspace, which is particularly important during the ongoing (never-ending?) manufacturing labor shortage. These tools improve the employment value proposition by offering team members devices they demand to work with (think smartphones and tablets). This, of course, necessitates a robust high-speed digital infrastructure that can support and secure these smart devices.

And those connected workers, simply put, work better. They rely on predictive information to inform their decisions. They easily access remote support from peers in the factory next door or the sister facility on the other side of the globe. Connected workers pull up on-demand instructions and location-based information, which prevents mistakes. They access real-time process information, which boosts first-pass yield rates and overall equipment effectiveness. Digital record-keeping replaces inefficient paper processes. Satisfied workers show up for work and perform.

"The connected worker has an improved ability to get things done safer, faster, more efficiently," summed Clemons, adding this peculiar aspect—ultimately these workforces don't care about the larger manufacturing execution system organizing all of these optimizations. Nor do they care about the details of, say, any enterprise resource planning setups.

"That should all be in the background," said Clemons. "They just want solutions geared for them that allow them to do their jobs."

Put another way, solutions that enable these manufacturing pilots to soar.

CREATE AND COLLABORATE IN THE CLOUD

By Jim Montague

Because all digitalization roads lead to the cloud—and everyone is buying tickets to get there—designers want to accompany their monitoring, automation, control and manufacturing counterparts, so they can all collaborate happily together.

Rockwell Automation's investment and vehicle for riding this big digitalization wave is FactoryTalk Design Studio, which is a cloud-native, software-defined, industrial-automation design suite and ecosystem. Its three primary characteristics are modern development functions to build and deploy solutions faster, multi-user collaboration tools to support scalable teams and varying skillsets, as well as multi-controller support for all devices to provide context across a user's entire system. This means all controllers in the same system can be viewed and handled as one project, and the whole system can be seen at once.

FactoryTalk Design Studio, which is scheduled to be launched and available to users by the end of 2022, is a virtual machine that runs in the cloud and uses containerized microservices, so it can scale quickly and easily, said Adam Gregory, commercial software leader for next-generation design software at Rockwell Automation. "This is similar to the way that FactoryTalk Smart Object uses contextualized data. Its software is also modular, so users can do object-oriented programming," he explained in his presentation, "Next Generation System Design Sneak Preview of New FactoryTalk Design Studio" at ROKLive 2022 in Orlando, Fla.

SaaS ecosystem

As a member of Rockwell Automation's overall, cloud-based FactoryTalk Hub software-as-a-service (SaaS) built on Microsoft Azure, FactoryTalk Design Studio consists of an ecosystem of software solutions that can all talk to each other. They can also share data across their services, such as emulation and simulation with Emulate3D software as part of FactoryTalk Logix Echo.

"FactoryTalk Design Studio's cloud-hosted solutions provide the value of SaaS, foundational features and the benefits of frequent iterations," added Gregory. "However, our on-premise Studio 5000 Logix Designer isn't going anywhere because it's an established product with a full feature set, and it will also get new features because we're continuing to invest in it."

The 3 Ms

Gregory reported that the modern aspects of FactoryTalk Design Studio include:

"The shared library can control and scale individual objects, such as adding new versions or required standards." Rockwell's Adam Gregory assured ROKLive attendees that the road to design in the cloud is modern and collaborative.

- enhanced modular development for developing and maintaining projects more easily with object-oriented programming concepts
- integrated library management that increases code standardization and reduces repetitive steps with integrated library tools
- browser-based, anytime/anywhere functions that ensure always-available access to the most up-to-date software and hardware resources.

"Modern really means smart software objects, groups of objects and routines that are reusable and scalable and can be defined and instanced out from a library," explained Gregory. "Plus, any changes can be added to all the objects, and the shared library can control and scale individual objects, such as adding new versions or required standards."

Meanwhile, the multi-user side of FactoryTalk Design Studio includes:

- native, multi-user collaboration that maximizes productivity across teams of all sizes with integrated, multi-user collaboration tools
- integrated version control that increases project development efficiency with Git software and other available functions; Git tracks changes in file sets; programmers typically use it for coordinating work on collaborative projects, such as developing source code
- text-to-graphical language flexibility, which enables power-user development with an entirely text-based project structure that automatically renders graphically.

"Multi-user supports multiple members on scalable teams and lets them share version control and repository functions," said Gregory. "Users get their own projects, but they're also alerted to changes made by other members, so they can keep one's or another's changes or both. Its background is open-text files, so users can update text in real time and push changes to their shared depository. They can also share commits, which are similar to safe rollback points, and compare them."

Finally, the multi-controller side of FactoryTalk Design Hub consists of:

- multiple controllers in a single project, which streamlines development by configuring and managing all system controllers and devices in one development space
- flexible firmware compatibility, which reduces frustration by supporting multiple versions of controller firmware in a single environment
- logical hardware abstracted design, which delivers intuitive projects by building systems based on what they're doing, rather than where they're executing.

"This lets users view all their controllers as a system in the same project and be able to see all their logic in the same way, as well as move around and quickly adjust as needed," added Gregory.

SEVER PLANNING FROM THE SPREADSHEET

By Anna Townshend

Manufacturing execution systems from Plex Systems, a Rockwell Automation company, will have more emphasis on the development of supply-chain solutions, said Ara Surenian, vice president of product management at Plex, who spoke at ROKLive in Orlando, Fla. Current and long-time supply-chain issues are influencing the roadmap for future supply-chain-planning products, he explained.

Plex's 7th Annual State of Smart Manufacturing Report was important in helping the company further understand the importance of supply-chain planning, Surenian said. "Modularity is definitely something customers and companies are looking for," he said. "They're looking for solutions that address the need when the need arises." Plex has begun breaking out more modular components for quality management (QM) solutions, application performance management (APM) and supply-chain planning. "The study reinforced that the strategy and approach we've taken makes a lot of sense," Surenian said. Modularity is leading to a higher level of adoption, he added.

According to the report, the three most critical challenges facing manufacturers are the shortage of skilled workers (41%); risk mitigation/cybersecurity (39%); and supply-chain disruption (35%). The issues with supply chain are also compounded, he said. In addition to the pandemic, issues such as the war in Ukraine, as well as port and canal traffic jams, are further influencing supply-chain problems.

The need for a supply-chain solution to help address these issues becomes critical for breaking out of spreadsheet management, Surenian said. "Spreadsheets are the classic way of planning, but it only takes you so far," he said.

The survey also looked at the current use of supply-chain-planning software solutions. Seventy-eight percent of respondents stated they are using a supply-chain-planning software solution; 70% said that their supply-chain-planning systems still rely on spreadsheets and manual processes; and 38% are actively shopping for improved solutions.

Typically, companies are doing a portion of supply-chain management, such as forecasting, in a software solution, but they then pull that data out and drop it into spreadsheets to do the scheduling, Surenian explained.

"The need for a holistic solution that brings all these pieces together is critically important," Surenian said. "It's really about building something that connects end to end from demand to supply and execution." Plex has started introducing some supply-chain products this year and will continue with additional offerings over the next two years.

To use a holistic solution, Surenian said, demand planning should start with a forecast. "The more accurate the forecast, the better," he added. That forecast then

"Spreadsheets are the classic way of planning, but it only takes you so far." Plex Systems' Ara Surenian identified the changes needed to fix supply-chain issues moving forward.

translates into a master production schedule (MPS). "From there, that plan can be optimized, can be leveled, to utilize paths to more effectively understand that there are constraints that can undermine the ability to meet the sales plan as defined, and then, once that's reconciled, explore those requirements through the materials to see where there's potential shortages and then iterate from there," Surenian said.

With this digital thread, the new Plex supply-chain solution can incorporate input from sales, planning, marketing and finance to identify the working capital objective. "Then that plan flows through and it takes you all the way down to the finite schedule and connects right to the machines. That's our vision," Surenian said.

Without accurate demand predictions, inventory and capacity issues will arise. If the supply plan is disconnected from the demand plan, this can lead to material shortages and other constraints. "Connecting all these pieces together is critically important," Surenian said.

Proper supply-chain planning connects an organization to its customers and suppliers to define the who, what, when, where and how of inventory to best meet the organization sales and service objectives, he explained.

Plex will introduce a number of supply-chain products this year and next year to address many of these issues. In the first quarter of 2022, it released the Constrained Capacity Production Leveling application to provide a closed-loop process from planning to production. Later in the year, Plex will introduce a machine-learning capability to assist customers with expanding their forecasting abilities.

In 2023, Plex plans to release a standalone Finite Scheduling solution, which will expand constrained view plans to a future state. "Finite scheduling looks at multiple optimizations, but it's more looking at that finished goods level, the point of where you're producing the goods and understanding whether you have the capacity to meet the demand that your sales team has projected," he said. "The ability to now get that machine data against those jobs that are earning and look at the actual rates, the actual setup times, completely changes how you look at scheduling. It's no longer an estimate, but it becomes real."

Typically, when more uncertainty or disruptions exist, especially with labor shortages, manually scheduling all that is difficult, Surenian said. "Folks are looking for a tool that they can add to whatever enterprise resource planning (ERP) or manufacturing execution system (MES) they have," he said. "We're able to drive higher forecast accuracy, which will help establish a much more stable material planning system. We can optimize that schedule based on a constrained schedule, and, in doing so, especially as you bring in finite, have higher levels of much more predictable execution."

The supply-chain planning application will run two parallel processes—the sales and operation planning (S&OP) or integrated business plan, as well as executing the current planning cycle. Machine learning will greatly improve this process, Surenian said.

The first release of the machine-learning component will collect the sales history of an item by customer and by location. "So, we take that entity and have time-series historical data set off weekly buckets. That data set will then go into the machine learning," Surenian said. "It's establishing and trying to understand, based on the sum and aggregation of all this granular item location and customer data, which of those attributes are significant," he said. For example, in retail, apparel production has many components—color, size, style and seasonal attributes. Machine learning can understand which of these tags are most significant in the modeling. Next, the solution will introduce a call for related data, such as price changes or events, such as the pandemic, sales promotion or any event that might influence demand.

Overall, a 1% improvement in forecast accuracy will lead to a 0.17% increase in revenue and 1 to 2% reduction in inventory. Technology and automation are driving the next generation of manufacturing, Surenian said. "Inventory requires an understanding of who you're selling to, what you're selling, how much you're selling and where you're going to ship it from," he added.

SIX WAYS TO SUPERCHARGE CLOUD COMPUTING

By Chris McNamara, Smart Industry

There are as many ways the modern manufacturer can benefit from cloud computing empowered by software-as-a-service (SaaS) as there are clouds on a rainy day.

In their ROKLive 2022 presentation, "Cloud-based Software as a Service: The Future of Industrial Automation is Here," presenters Leo Kilfoy, director SaaS & digital design, Rockwell Automation, and Oliver Haya, commercial product manager, Rockwell Automation, spotlighted just six of those ways.

But first, they explained how SaaS compares to existing, more traditional software solutions. While embedded software runs on specific automation hardware, local computing is performed on laptops or workstations, and the on-prem approach happens within servers located in the building, the SaaS applications run in regional data centers, purchased on a subscription model that covers maintenance costs, and shifts responsibilities for software upkeep from the user to the provider.

Without a hint of hyperbole, the presenters claimed that SaaS is, quite simply, transforming how we all work. It is accelerating time to value. Boosting collaboration among teams. And unlocking unprecedented data value. "We see this as an enabling factor to help operational technology (OT) catch up to IT," said Haya. "This is OT operated and IT managed, both working together, to allow us to deliver software, as a service, to the edge."

To orient the audience about the SaaS approach in the industrial space, the presenters prompted them to consider how frequently they rely on SaaS solutions in their personal lives—when playing videogames or making dinner reservations or booking an Airbnb. "This is part of our daily lives," surmised Haya. "And it is already part of our work lives. Think about your CRM or your financial reporting. This is another tool in our toolchests."

Let's get back to the benefits. Kilfoy walked through those half-dozen ways that SaaS is enabling modern industrial teams to optimize processes. These include:

Access everywhere—SaaS enables users to do what they do from any device anywhere with an internet connection. Web-delivered content is suited for different device types and operating systems. Software is available on-the-go, without the need for heavy-duty workstations.

"Installing and updating software is not value-add time," explained Kilfoy. "You want your employees focused on creating value. SaaS provides ways to have your software always up to date. And if COVID taught us anything, it is the tremendous value in the ability for remote teams to work together."

"Installing and updating software is not value-add time." Together with colleague Oliver Haya, Rockwell Automation's Leo Kilfoy discussed the many advantages of using cloud-based SaaS software in operational technology (OT) environments.

Collaboration—SaaS relies on single-source-of-truth documents, breaks down data silos, and enables partnering across locations and partnerships. "This extends beyond your local office," said Kilfoy, noting how contractors, suppliers and customers can also collaborate with this approach.

Added Haya, "You can do a lot of this stuff without SaaS—with thumb-drives or emails of whatever—but it is so much easier with it."

On-demand scaling: As you grow, SaaS enables your software and infrastructure to grow, too. Enterprises can start small and add users over time. Capital expenditures and maintenance costs are minimized. There are greater capabilities with data analytics.

Cost: The SaaS approach offers users predictive, steady costs that are clearly visible. In a nutshell, you pay for what you use, rather than the greater commitments required with traditional software. Customers are not responsible for infrastructure or software-maintenance costs.

Performance: SaaS promises the right amount of the best hardware to meet customer needs, said Kilfoy. This includes best-in-class data centers, massive computing scale for model-training and simulation, and the ability to store design and production data. "And you can easily change plans," he added.

The sixth benefit offered by a SaaS approach was woven throughout the other five; it informed the entire presentation. "This is all wrapped in the blanket of security," said Haya. That includes ensuring that only those authorized to access certain data can actually access it. It includes the ability to set permissions within systems, and the promise that identities of users are common across all environments.

The presenters highlighted the particular needs for safe processes when using SaaS and the focus Rockwell Automation puts into security with its offerings, including contracting with third parties to audit the security of their SaaS products and that they meet compliance requirements. "We invest very heavily in this," said Kilfoy.

"Put it this way," added Haya. "There is good SaaS and bad SaaS. Bad SaaS software is going to have holes in it and is not going to be secure. That's why it matters who you choose as your vendor."

HOW TO GET STARTED ON OT CYBERSECURITY

by Jim Montague

Cybersecurity is a huge, evolving issue that can seem overwhelming. Cyber-intrusions and attacks like ransomware are lucrative for criminals, and accelerating in critical infrastructure applications. Plus, unpatched, legacy devices are everywhere, so there are many holes in many networks. However, none of this has to cause panic, and no one's hair is required to be on fire.

"It can seem like there are no best practices because what's best for one user may not be best for others. Plus, everyone's attack surface is too big, so what can we do, and how can we measure it?" asked Brian Deken, North American commercial manager for networks and security services, Rockwell Automation. "But you have to do something. It doesn't matter where you start, and a little effort here and a little there can really add up. "

Deken presented "Best Cybersecurity Practices for OT" at this week's ROKLive 2022 conference in Orlando, Fla.

Pragmatic steps

Several widely accepted standards and guides, such as IEC 62443 and the NIST Cybersecurity Framework, can provide valuable advice on initial cybersecurity efforts, along with online self-assessments and other government resources from the U.S. Dept. of Homeland Security's Cybersecurity and Infrastructure Security Agency (CISA). However, it's also crucial for users to secure support from their managers and participation by coworkers, especially those on both sides of the operational technology (OT) and IT divide.

"Once your organization begins to understand some of these issues, you can begin to use OT and IT convergence as a catalyst for cybersecurity," said Deken. "It's an engineering- and enterprise-wide issue that also involves the supply chain, so everyone has to get involved. You can address cybersecurity by building bridges between OT and IT, growing a joint team, creating a cybersecurity strategy and vision, drafting a response and recovery plan, and executing it. Cybersecurity is a team sport."

Just as the staff at many industrial plants and facilities hold "safety minutes" at the begin of meetings and other events, Deken reported that users and companies can begin to do the same for cybersecurity. "Much of developing cybersecurity in OT is about changing organizational structures and eventually culture as well," explained Deken. "However, everyone also has to recognize that none of these issues will go away, and so any successful cybersecurity effort will take years."

"The main thing is to just do something about cybersecurity. Get some people together, write an initial plan—maybe with a policy for changing passwords—and take some action." Rockwell Automation's Brian Deken discussed how manufacturers can take their first steps toward more cybersecure operations.

Proactive approaches

Deken explained that a cybersecurity plan should cover three primary periods:

- Before, when the job is to identify and protect, using asset inventory services, qualified patch management, vulnerability and risk assessments, and industrial control system (ICS) security zone and countermeasure deployment.
- During, when detection is the goal, using real-time threat detection services, remote monitoring and administration services, incident handling and response, and incident response and disaster recovery planning services.
- After, when respond and recover is the task, and backup and recovery solutions are employed, along with remote monitoring and administration, incident handling and response, and incident response and disaster recovery.

Diving deeper

Once a team and the organization get some education and cybersecurity, and during or after they implement their initial cybersecurity strategy, Deken reported they can begin to explore a more risk-informed cyber-strategy, which begins with gauging the visibility of their assets, but goes on to evaluate their cybersecurity posture with a cyber-risk assessment, penetration testing of OT systems and equipment, and establishing a cybersecurity framework and standards. These and other potential items go into developing a basic cybersecurity hygiene program, which can include anti-malware strategies, moving legacy/physical servers to virtual servers, deploying antivirus management, implementing operating system (OS) infrastructure patching, and assessing and addressing OT networks.

"Just as patch management means different things to different people, each team has to assess and determine the aggregate risk posture, cybersecurity hygiene, and network readiness needed for their operations and organization," said Deken.

Going forward, Deken added that in-depth repeatable and multi-year adaptive cyber-strategies can be deployed. These typically involve:

- Even more detailed assessments and modernization of the installed base,
- Network segmentation with firewalls and industrial demilitarized zones (IDMZ) between OT and IT environments,
- Secure OT endpoints on device- and machine-level networks,
- Continuous threat detection services and tuning,
- 24/7/365 monitoring and managing of OT environment's applications, data centers, firewalls, IDMZs, network and threat detection platforms,
- Augmenting the cybersecurity workforce with a dedicated security operations center (SOC), and
- Revising and readjusting one's disaster recovery plan in response to subsequent assessments and related events.

"Of course, repeatable or adaptive cyber-strategies require more people and time," added Deken. "Less than 10% of organizations report doing adaptive cyber-strategies at this point, and even they're not the be all and end all. The main thing is to just do something about cybersecurity. It doesn't matter what or where because you can always add to it and adjust later. Just get some people together, write an initial plan—maybe with a policy for changing passwords—and take some action."

A ROADMAP TO THE CLOUD FOR FACTORYTALK DESIGN HUB

By Mike Bacidore

FactoryTalk Design Hub will soon have cloud-native features available remotely for collaboration. Rockwell Automation's Leo Kilfoy, director, SaaS and digital design; Chris Como, principal platform leader, FactoryTalk Design Hub; Steve Briant, visualization platform leader; and Adam Gregory, software commercial leader, FactoryTalk Design Studio, explained the dynamic changes that are coming to the suite during this week's ROKLive conference in Orlando, Fla.

FactoryTalk Remote Access with Stratix Runtime is available in Q2, offering secure remote access for industrial equipment via hardware and software communities. FactoryTalk Vault & Design Tools will be launched in the third quarter, giving users cloud-based data management, version control and analytic tools.

Just in time for November's Automation Fair and an official launch before year's end will be FactoryTalk Design Hub's Project Digital Engineering with cloud-accessible Logix Designer application, Emulate3D and FactoryTalk Logix Echo; FactoryTalk Design Studio for cloud-native, multi-user, scalable, system-level control authoring; and FactoryTalk Optix for hybrid multi-user, multi-protocol visualization authoring in the cloud or on desktop.

"There are five ways the cloud can help you transform your business," explained Kilfoy. "You'll securely access production systems from anywhere in the world. You'll be able to maximize collaboration across stakeholders to increase speed of innovation. On-demand scaling—not only hardware, but scaling your team as well as your capabilities—will let you easily add or remove compute power and users to reduce time to value."

Software as a service (SaaS) has unique business models, and you can pay for what you use, which reduces hardware, software and IT costs, said Kilfoy. "And you can get higher throughput with access to the latest computing hardware, which improves performance. All of this is wrapped in security by providing unpatched software, using centralized management and end-to-end encryption."

Enabled by the cloud, FactoryTalk Design Hub provides a good, common user experience, explained Kilfoy. "It has an on-demand platform that provides you and your customers with design automation that reduces risk, accelerates schedules and enables better agility," he said. "FactoryTalk Design Hub is built on Microsoft Azure and uses the cloud to increase scalability, reduce capital and maintenance expense and deliver new tools that increase productivity."

The cloud-accessible Logix Designer application will allow access and edit capabilities to new or existing Studio 5000 files from anywhere. FactoryTalk Logix Echo will enable collaborative testing and troubleshooting

"You can use your laptop, wherever you may be, to connect to your desktop on-premise." At this week's ROKLive conference, Rockwell Automation's Steve Briant previewed FactoryTalk Remote Access Runtime, which enables the benefit of a VPN tunnel.

of emulated code without target hardware in real time. And Emulate3D will build models that interact with controls from your browser that will scale to more complex equipment.

It's in the vault

FactoryTalk Vault is where you can create a storage location for your team with modern version and access control, explained Como. "It's your application," he said. "Everything is rolled up into a solution. It's important to understand who did what, why and when."

The cloud-based industrial file storage, available in Q3, will include role-based sharing within organizations, organized solutions to maintain file history of changes and version control to keep work safe and recover files whenever and wherever needed.

"It's about learning and viewing your project in a way you haven't seen before," said Como.

Controller programming and emulation will also see some innovations by the end of 2022, with the ability to test and design Logix-controller applications with Studio 5000 Logix Design and FactoryTalk Logix Echo. And projects can be accessed directly from FactoryTalk Vault.

Where's the remote?

FactoryTalk Remote Access is already available with the Stratix router. "We're introducing FactoryTalk Remote Access Runtime, which enables the benefit of a VPN (virtual private network) tunnel," explained Briant. "And you can get a remote desktop view. It also integrates with our human-machine interface (HMI) panel, but that will be coming out in the future. The benefit is you can use your laptop, wherever you may be, to connect to your desktop on-premise."

Other new features will be available in the cloud, added Kilfoy.

FactoryTalk Design Studio will have no downloads or installs required because it's connected to the cloud. "All you need is a web browser for access to the system anywhere, and groups can work together simultaneously," explained Kilfoy.

"We've been building things up through FactoryTalk Hub," said Gregory. "We've got version control in the Vault. We're deploying things in the Hub, so you can do everything all in one place."

The next step is designing something totally new with cloud-native, software-defined industrial-automation design, Gregory added. "Instead of running locally in a virtual machine, these are running in Azure."

FactoryTalk Design Studio's Q4 update will be modern, multi-user and multi-controller, proclaimed Gregory.

These enhancements will include integrated library management and browser-based access. "Enhanced modularity means the FactoryTalk smart-object concept brings contextualized data into your system," said Gregory.

Native multi-user collaboration accommodates people who prefer different workflows. "We support both at the same time with text-to-graphical language flexibility," he added.

The system includes multi-controllers in the same project with flexible firmware compatibility and logical, hardware-abstracted design. "It gives you the ability to see a system view. You can look at what your system is doing, rather than what it's executing," said Gregory. "We'll be able to manage multiple firmware versions. We're doing that for you through the power of SaaS."

The FactoryTalk Optix HMI visualization platform's official launch will be at Automation Fair, with general availability before the end of the year.

"ASEM has been in the market for more than 10 years with that remote-access solution," said Briant. "And we're bringing it to market through FactoryTalk Hub. You can invite others to collaborate through an email, to collaborate and share content inside FactoryTalk Design Studio."

FactoryTalk Optix features include browser editor/desktop editor availability, version management, remote-access integration, package and deployment on any operating system, object-oriented design, native OPC/UA connectivity, open APIs and C# availability to extend them, plus open communications and a licensing model that will allow users to pay for only what they need.

HOW TO ATTRACT AND RETAIN EMPLOYEES

By Anna Townshend

The two reasons people leave their jobs are opportunity for growth and lack of training, said Albina Ortiz, global operations manager for customer training at Rockwell Automation. At ROKLive she gave a presentation on "Leading Practices for Empowering Your Workforce During the Great Resignation." She discussed many strategies to overcome the workforce shortages that many are facing. The most important strategies include empowering the current workforce, training employees to retain them and building a company culture that values employees and supports workforce development.

Ortiz said the skills gap is only getting wider. According to analysis from Deloitte, based on data from the U.S. Bureau of Labor Statistics and Gallup, 2.7 million Baby Boomers will retire by 2025. The current expectation is that 3.4 million manufacturing jobs will be needed, and 2 million of those jobs will go unfilled.

"When we're talking about empowering our workforce, what we're talking about is giving our employees the autonomy, the tools, the training and the technology, as well as the responsibility to be able to do their jobs," said Ortiz.

Building a robust and high-performing workforce means spending less time reacting and more time planning, she explained. This includes planning individually with employees to carve their career paths in the company, but also planning as an organization. Do you know where you're going? Are your employees coming with you?

"Things change on the fly, and we have to be agile enough to be able to change on the fly," Ortiz said.

It's important to train employees in order to retain them. "For them to be self-sufficient, we have to be able to provide them with the training," Ortiz said. Not all employees learn the same, and it's important to use different types of training to match people's needs, such as e-learning formats, instructor-led training or coaching on the job. "There are so many different things that you can do to make sure that you're providing employees the training that they need, so that they can be successful in the business," Ortiz said. "Make sure you're adjusting that training and tailoring it to each individual." Every employee or those in similar positions should not all have the same training path.

Ortiz said investing in your employees isn't only about a structured program. "Get that knowledge from those people that are retiring and do some type of coaching; invest that time so that they can learn from one another," Ortiz said.

She also outlined three strategies for an agile and flexible workforce. To attract new workers to manufacturing and to a company specifically, "we need to find ways to

"Culture starts with everyone that works in the organization, including your management." Rockwell's Albina Ortiz explained how to empower and develop a vibrant workforce in these challenging times.

make ourselves attractive to them," Ortiz said. Companies need to work collaboratively with employees on programs that build their skills.

"That is your brand; this is what's going to bring employees in," Ortiz said.

Culture is also an important part of employee retention. "Culture starts with everyone that works in the organization, including your management," Ortiz said. Managers need to be spending one-on-one time with their employees to understand their career ambitions and needs. Talk with employees about where the company is and where their career path is going. That may mean modifying a position to fit the needs and skills of employees you want to retain.

"Make sure you set that brand, that image, that you want with that focus on your employees," Ortiz said. "I don't mean just create an image. You have to live, breathe and believe that image."

Ortiz encourages companies to embrace tactics that support workforce flexibility, such as partnerships, technology and investing in people.

"If you're going to give people the autonomy to make decisions on their own, you need to be supportive of that, too," Ortiz said. Employers need to understand what's important to employees. For many, that is workforce flexibility.

"It shouldn't be, this is how it is: black and white," Ortiz said. "Can you make it more flexible?" Companies retain employees through engagement, training and knowledge transfer. "Make sure that your employees feel valued and important," Ortiz said.

The initial onboarding process can be an important time to establish company culture and show employees they are valued. Do employees have everything they need at the start? Do managers meet with new employees right away, or do they just meet with HR?

LinkedIn can be an effective means to not only attract new employees, but also help focus on company culture. Globally, LinkedIn has 800 million members in more than 200 countries. "Social media is a great way to be able to bring employees in and at least get your company name out there," Ortiz said. Work the algorithm, she recommends. The LinkedIn algorithm ultimately determines what content is prioritized in your LinkedIn feed, as well as the reach your content receives in others' feeds. She recommends posting or sharing two to five times a week. And do more than share, also like comments and add your own. Ortiz said the algorithm values comments the most.

How long does it take to get a new employee up to speed? It depends on the role, Ortiz said, but on average it takes 90 days for employees to start their career journeys and up to one year for them to be fully effective in their new roles. "Do we really have that kind of time, instead of just investing in training the people we have," Ortiz asked.

EDGE-TO-CLOUD STREAMLINES DEVELOPMENT

By Anna Townshend

Salma Ghafoor, global technical lead for IoT at Rockwell Automation, was joined by Danilo Diaz, technical director of Azure IoT solutions for Microsoft, at ROKLive to discuss, "Collaborating with Microsoft at the Edge to Map the Next Frontier of Industrial Digital Transformation." Together, the two create the intelligent edge with Rockwell's FactoryTalk Edge Gateway, which can contextualize data at the edge, and Microsoft's Azure IoT Hub and Azure IoT Edge, which serve as the conduit for edge-to-cloud data. Ghafoor and Diaz outlined how this setup can manage and contextualize data down at the edge all the way up to cloud-enabled insights, helping customers define IT/OT convergence at their plants and analyze data at the component level. "Together we can deliver new benefits and new capabilities for the industry," Ghafoor said.

She said more and more customers are realizing the value of the cloud. "With the combination of an intelligent cloud and AI, you can pretty much deliver any type of intelligent application or system that you can image," Ghafoor said. With intelligence at the edge, users can get real-time insights delivered by highly responsive and contextually aware applications.

"The virtual, limitless computing power that you get in the cloud with intelligent devices at the edge is a great framework for building immersive and impactful business solutions," Ghafoor said.

Most manufacturing facilities receive data from many sources, such as programmable logic controllers (PLCs), intelligent devices or sensors, and it can be complicated to manage all that data. "Once we have that data, what we then need is a way to send that data in a secure and scalable way up to the cloud," Ghafoor said. "You can use Edge Gateway to gather the data, and your IoT Edge will then connect to it and allow you to send that to the cloud."

The edge-to-cloud system can also streamline the development process. "IT does not know where the data is because they don't have that domain knowledge," Ghafoor said. Operations technology (OT) has the needed knowledge. "Rather than IT looking for the data, OT can actually package it up and send it over to IT," Ghafoor said. Edge Gateway allows the controls engineer to identify and contextualize datasets right down at the controls level; the datasets are then extracted in such a way that they can be easily and quickly used by the cloud applications.

Traditionally, when you change the underlying equipment in the process, anything that's built on top of that also needs to be redesigned, but this system changes that process. "You build a model once, and it can be sent to multiple different endpoints," Ghafoor said. More can be done by the OT crew on the plant floor. When updates are made to the information model at the Edge Gateway,

"If I need to develop a new module, if I need to make changes, I don't need anybody at the factory." Microsoft's Danilo Diaz explained how Azure and FactoryTalk Edge Gateway work together to manage and contextualize data.

that will then automatically get synchronized and sent up to the cloud. This increases engineering efficiency for project development.

Rather than building models up in the cloud, controls engineers can build them at the edge. "It also means that we can easily deploy these because it's within the domain of our team," Ghafoor said. Collaboration between departments is no longer needed, and OT can manage the data and the models. "It also ensures that you have a single source of truth because you're building the dataset once and then leveraging it multiple times," Ghafoor said. "Once we have the models and we have the data streaming into them, we can map that out to multiple different enterprise and cloud applications."

The Edge Gateway information model also provides organizational context, showing tags and the area where the information is coming from. "It makes it much easier when you're developing your analytic solutions because the data is already labeled," Ghafoor said. This will also help reduce development time. Edge Gateway is streaming real-time series data into the model and not just the data, also the information context, as well. "That's the key differentiator," Ghafoor said.

Microsoft's IoT Edge is the software component, allowing the deployment of different modules and different functionality into an edge device, said Microsoft's Diaz. "Everything on IoT Edge is done with security in mind," he said. In part, this is why it's based on open standards, Diaz said, which have wider adoption. It's also open source, so facilities can modify it if they like. The system is also cross-platform and works on Windows and Linux.

The functionality that's available in the field can also be managed through the cloud, Diaz said. "So that means that if I need to develop a new module, if I need to make changes, I don't need anybody at the factory," he said.

It is also ISA-95-compliant. Under the Purdue model, layers in an industrial control system help reduce the damage if security is breached. "You're reducing your danger zone," Diaz said. "IoT Edge supports that architecture."

IoT Hub is an interface between the edge and the cloud, which is part of the Azure platform. "Azure is a cloud platform that has many building blocks, and these building blocks allow you to build a complete solution," Diaz said.

Data can also be stored on the cloud inexpensively, Diaz said. "You can train your model so yesterday's noise becomes the base insights," he added. He recommends keeping at least a couple months of data on the cloud, so once an anomaly is detected, the system can determine if that issue has happened before.

"We don't have something that we can sell you out of the box to run your plant," Diaz said. For that, Microsoft has partnered with Rockwell. "We want to enable our partners to build the best manufacturing solutions," Diaz said. The Microsoft platform provides the building blocks for manufacturers to create many solutions for cybersecurity, predictive maintenance or supply-chain visibility, and leveraging connected field service or remote monitoring.

"The Azure platform allows partners like Rockwell to build meaningful solutions; our customers take advantage of the platform to extend even what our partners are doing," Diaz said.

WHEN DATA EXPOSURE IS A GOOD THING

By Chris McNamara

What does it mean to expose data? And what benefits does properly exposed data offer to those who use it?

Those questions infused Michael Hart's ROKLive presentation, "Production Visibility: The Key to Continuous Improvement," which explored how clear visibility enables manufacturers to turn plant-floor insights into action. The director of product strategy with Plex Systems also explained how increased visibility, with tools such as Plex Production Monitoring and Plex Asset Performance Management, can drive continuous improvement, particularly during disruptive periods like our current state.

Industry 4.0 has delivered on many of its promises, Hart explained, but challenges persist in regard to leveraging all of the related smart technologies. And there are plenty at play—cloud computing and wireless approaches, for example. Critical, he noted, are solutions that can unite the key capabilities of, say, 40 such technologies. Just like one of the platforms at the center of his presentation.

The single-stack nature of Plex Production Management—a digital system of record and engagement—connects people, machines, systems and supply chains to automate business processes while tracking data from the plant floor to the top floor in order to drive more informed decisions, Hart said.

And why is that important? First, the speaker explained, it elevates the conversation with enhanced visibility into asset performance. It offers higher-quality insights and greater control capabilities for assets, and it improves relationships within factory walls and outside them. Think suppliers and customers.

This comprehensive visibility of operations, with properly exposed data at its core, enables business leaders to, as Hart phrases it, "solve the right problems at the right time." Those common problems likely sound familiar to all of us in this space—working with incorrect information, slow reaction times to bottlenecks, antiquated connectivity setups.

Most important to a proper connectivity setup is what Hart refers to as a "single pane of glass" between operations leaders and plant-floor personnel: two-way communication empowered with real-time data to enable everybody to make decisions with confidence and speed, affording all stakeholders immediate, constant access to those decisions. "And you can adapt this approach to your practices with visualizations that make sense for your business, all with the goal of improving operational excellence."

The end result is developing what Hart describes as "the right data for the right purposes." That might be the spindle speed of a CNC machine or the temperature of a belt in use alongside a furnace.

"If you start to see workers engage and driving real change in production solutions, you are going to see significant improvements." Plex Systems' Michael Hart emphasized how data can empower and energize an organization's workforce.

In these situations, the Plex Asset Performance Management solution enables greater machine monitoring, more granular asset-health reporting and the development of sharper historical data, added Hart. "With those in place you can drive toward continuous improvement," he said, advising that these drastic improvements might require some culture change among those who will be implementing and benefiting from these improvements.

This solution, Hart explained, allows bi-directional connections throughout facilities focused on job types, the personnel tasked with those jobs, associated known faults in assets and processes and alerts about elements to monitor. "Once all of this this is figured out, you can pull all the noise away, extract the right information and begin true condition-based monitoring and maintenance."

A lot of us are not there yet. Nowhere close, really. Many digitalization projects get to a certain point and then stop, said Hart. They reach an end-of-life state. And that discourages those who had been the projects' most vocal cheerleaders. "But if you start to see workers engage and driving real change in production solutions, you are going to see significant improvements. This opens up opportunities to have those conversations. To get feedback from operators about how to improve processes. It's a chance to start the connected-worker conversation."

That conversation benefits all parties.

During his presentation, Hart recalled an anecdote of touring an industrial plant that had recently adopted Plex Production Monitoring. He noticed an operator using his smartphone to snap a photo of the dashboard screen on his machine. The Plex rep asked what the operator was up to. The operator explained that run times displayed on the dashboard were the best they'd ever been and he wanted proof to show his boss.

Sure, his boss could and likely would easily access this data through the software solution. But the enthusiasm exhibited by the operator was an indicator to Hart of true buy-in, actual enthusiasm for a digital solution that warranted memorializing via digital photo.

HOW TO TEST CAPABILITIES WHEN PHYSICAL MACHINERY ISN'T READY

By Mike Bacidore

The ability to simulate machinery for testing can be highly beneficial. "It's a great thing if you want to test a machine, but they're not ready for you," explained Michael Harris, senior project engineer, Rockwell Automation.

He and colleague Jeff Theisen, principal application engineer at Rockwell Automation, demonstrated drive simulation using three software packages—Emulate3D, FactoryTalk Logix Echo and Studio 5000 Logix Designer—during ROKLive 2022 in Orlando, Fla.

"The most exciting thing about this functionality is that I can build my PLC program as if it would be connected to physical hardware and then test it without the devices being present and without having to make any modifications to the project itself," explained Harris. "This will save countless hours of commissioning time and delays waiting for the machine to become available."

The technology is a new catalog of Emulate3D, a bunch of aspects created to fulfill the CIP Class 1 connection and "make the yellow triangles go away," explained Harris. "There are several drives we support—ArmorStart 284E, PowerFlex 525, PowerFlex 75x and PowerFlex 755T drives. This is not a full emulation of the drive. You cannot open the add-on profiles or the control loops, and we only support velocity mode right now," he said.

"The demo can be run on the PanelView or from the pendant that exists in Emulate3D." Rockwell Automation's Jeff Theisen, along with colleague Mike Harris, simulated drive capabilities using Emulate3D, FactoryTalk Logix Echo and Studio 5000 Logix Designer.

"I'm talking about simulating the drive capabilities. The newest drive, the 755TS, is in the TotalForce family. It's very similar to the 755."

Included in the firmware for the PowerFlex 755TS is the anti-sway feature, also called anti-slosh, explained Theisen. "It's important to control the movement. It's a command notch filter. It's also used on a bottling line." The model is created in a CAD package and imported into Emulate3D.

"The demo can be run on the PanelView or from the pendant that exists in Emulate3D," explained Theisen during his demonstration. "In my Logix program, I'm going to add the drives. You select the drive the same as if it were a physical drive. You bind an aspect to a tag in a visual. You find, for example, the crane. You make a Class 1 connection, which is a CIP protocol in Emulate3D. I can control the drive the same as if it were a physical drive, except I'm programming in Emulate3D."

Following Theisen's demo, Harris then created a demonstration from scratch using FactoryTalk Logix Echo. "Assume the hardware's not ready to test," he said. "I've got my 755TS drive with supported data links. If the drive isn't configured with the same data links that your project is configured for, you get those yellow triangles."

FactoryTalk Logix Echo supports the ControlLogix L8 family of CPUs, and it does not support SafetyNet. "Echo takes on the IP address of your Ethernet driver," explained Harris. "If I click on 'Add Aspect,' it's going to show me every aspect. In 10 minutes, I had this working, or you can go the full-blown model."

To emulate an unmodified ControlLogix program, Harris executed these high-level steps:

- launch FactoryTalk Logix Echo
- add controller to Echo
- download unmodified application file to emulated controller
- place controller in run mode
- minimize Echo and leave running in the background.

Emulating the drive was equally straightforward:

- launch Emulate3D
- add device (e.g., conveyor) with a motor that the drive can run
- add Allen-Bradley Velocity Drive aspect to the device
- open I/O browser
- add I/O server pointing to the emulated controller
- bind PLC tags to Allen-Bradley Velocity Drive properties
- start I/O server
- play the model.

After completing the 13 steps, Harris started and stopped the drive the same way he would have if it had been a physical drive and trended the drive status, speed feedback and output current to demonstrate that Emulate3D was providing the same information that a physical drive would have provided.

The contrast between what Theisen demonstrated and what Harris demonstrated was to show that the Emulate3D model could be as complex or as simple as required to allow the Logix project to be tested without hardware. "If they have a complex system that requires a complex model with interactions, they can build that," explained Harris. "If it is a less complicated system, and they only needed a few motors to control, that can be done, as well. The solution is completely scalable, in that they only need to model what is required to be able to verify their code."

Users don't need to spend weeks modeling the entire system if it had no impact on the outcome, explained Harris. "I was testing my single drive application in under 20 minutes, and that was going slow so that people could follow along."

Theisen's demonstration also showed that, by using Emulate3D, some of the drive functionality can be demonstrated without requiring a larger demo. The reference notch used to demonstrate anti-sway is included out of the box. Other functionality can be implemented by the user by writing custom script.

HOW AUTOMATION TECHNOLOGY CAN FILL EMPLOYEE GAPS

By Jim Montague

Multiple factors are piling up to worsen the U.S. and international workforce shortage and likely extend it for years. Luckily, automation can help fill some of these personnel gaps until the slow process of educating more students in schools and training recruits by employers can recover some of these shortfalls.

"We're hearing about companies facing 20-40% shortfalls in employees throughout their organizations," says Tony Kaczmarek, vice president of product management at Plex Systems, a Rockwell Automation company. "This will continue to be a big issue for years to come."

There are an estimated 2.1 million open positions that may prove difficult to fill by 2030 due to persistent skills gaps, according to recent analysis by Deloitte of data from the U.S. Bureau of Labor Statistics. This is because about 4 million manufacturing jobs will need to be filled during 2020-2030, including 1.5 million new jobs due to expected growth in manufacturing and 2.5 million open jobs due to retirements, but the analysis estimates that only 1.9 million of these jobs are likely to be filled.

"Retirements have been increasing for years, and the need for new skills to handle new technologies have been growing, too," added Kaczmarek. "These created huge gaps in the workforce, but they're accelerating even more because of the pandemic and recent supply-chain issues. Plus, added regulatory compliance, quality and track-and-trace requirements for products are also piling on demands for even more skills.

"At the same time, finding just the right person for a position is more difficult than ever. Due to these issues, it's also harder to find the time to innovate, deliver products on time, compete and grow, while trying to keep operators, technicians and other employees happy, especially when many of them have to work 10-hour shifts and/or on weekends. Everything just keeps piling on," said Kaczamarek, who presented "Combatting the Skilled Workforce Shortage With Process Automation" at ROKLive 2022 in Orlando, Fla.

Automation to the rescue

To relieve the pressure of multi-factor workforce shortages, Kaczmarek reported that Plex has been helping customers for 20 years with an equally varied selection of remedies. He explained that processes and workplaces can be improved with automation, selective augmentation, communication and connection, training and a larger labor pool. In general, automation includes preparing to operate with fewer people, offloading mundane, repetitive and non-value-added processes and gaining uncompromised accurate and precise data.

"Automation and Orchestration software has many out-of-the-box tools to help users employ MES with Plex, such as pre-built screens and logic, sample objects, and a code-free environment to meet users' specific needs." Plex Systems' Tony Kaczmarek suggested automation to ease the worker dearth.

"In the Plex ecosystem, we're also seeing more reskilling of workers to take on new roles and fill some of these workforce gaps. This can include database support staff taking on some business analyst tasks," said Kaczmarek. "For instance, a welding line using our Mach2 software recently went from six to two people, but they implemented a virtual poka-yoke system to ensure correct actions in their clamping and other procedures, and this let them transition from mostly recording production events to performing other useful tasks." Poka-yoke is a Japanese method for using an automatic procedure or device to prevent accidental errors by users in real-time.

Mach2, newly rebranded as Plex Automation and Orchestration, lightens potentially overwhelming workloads by using data and triggers to re-normalize operations. For example, it may combine two human-machine interfaces (HMIs) into one display to simplify the input that operators must take in. The company also seeks to alleviate users' concerns about excessive oversight.

"Many operators are worried that Big Brother is taking over, but what's really happening is an effort to empower them. The software shows them added evidence and more in-depth information, so they have a better chance of resolving problems, instead of everyone continuing to blame each other," explained Kaczmarek. "Also, simplifying these functions democratizes and widens the available labor pool because more people can perform them."

Plex MES Automation and Orchestration software is part of Plex's Smart Manufacturing Platform, which consists of its manufacturing execution system (MES), manufacturing automation, quality management system (QMS), supply chain planning (SCP) and business operations sections. So far, the software is installed in about 8,500 workstations at 30-50 companies.

"Using data from just one cycle of a customer's operating process, we can build an automation and orchestration solution," said Kaczmarek. "This automation covers part counting, production and scrap recording, documenting serialized pieces, lineside labeling, machine state and status updates, job setup and data collection. The software can use this information to do a ton of things, but mainly identify the pain that a user's process is experiencing, address it with a robust SCADA (supervisory control and data acquisition) system and employ a no-code environment to add value."

Augment and communicate

In the operator augmentation realm, MES Automation and Orchestration software seeks to resolve other pain points, such as OEM requirements, validation tasks and workflow issues.

"We can make sure users are following the right procedures by employing pick-to-light, vision systems or augmented reality (AR) tools, which can show them where components need to go," added Kaczmarek. "These are similar to the poka-yoke system at the welding application, which also verifies that users are completing all their necessary steps outside the light curtain and then showing parts produced inside the light curtain. In packout applications, operator augmentation covers automating machine counts and recording, barcode readers, small and mixed lots, point-of-use lineside labeling and weigh scales. There's a lot of variability and configurability in these applications, which make it useful to capture configurability KPIs."

To connect and communicate faster and more accurately—and improve trust—MES Automation and Orchestration software replace physical whiteboards and other old tools with area overviews, digital whiteboards, operator interfaces, performance dashboards, source materials depletion, job and container completion forecasts, operator feedback, bulletins and bigger screens renderings on tablets PCs, smartphones and laptops.

"Automation and Orchestration has many out-of-the-box tools to help users and machines employ MES with Plex, such as pre-built screens and logic, sample objects and a code-free environment to meet users' specific needs," added Kaczmarek. "These include production and scrap recording, lineside labeling, job and work-center setup, work center performance, timeline ribbons, machine states, performance KPIs and connections to asset performance management (APM) for deeper drives into outcomes and better insights. For instance, Hatch used these tools to achieve a 20% improvement in production throughput due to greater equipment and operator efficiency."