

Automation Issue 67 TODAY

ASIA PACIFIC

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Connect your
Enterprise with
The Digital Thread

Unlock your Digital
Potential with the
Power of Extended
Reality

How to Make your
Warehouse Smarter

Digital Transformation
Accelerates
Biomanufacturing

From Digital Thread to Smart Manufacturing



Rockwell
Automation

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Create your Next Competitive Advantage with The Digital Thread



- The potential of digital transformation is enormous. From reduced downtime and maintenance costs to improvements in right first-time quality, digital transformation can help you to be as efficient and profitable as possible.

Imagine collaborating in real time across the value chain, validating new lines and processes virtually, simplifying data science and increasing your manufacturing flexibility – the digital thread can make this a reality. It enables seamless data flow throughout your organization, leading to improvements and benefits throughout the entire operation.

Today's manufacturers and producers continue to face many challenges. Customers expect increasingly personalized products while new competitors innovate at record rates. To make things worse, unanticipated disruptive events like COVID-19 add an extra level of challenge and complexity – making the digital thread more important than ever.

Early adopters of digital thread methodologies are already surging ahead in productivity and innovation. They are moving from siloed systems and business functions to an enterprise connected with the digital thread.

This issue of Automation Today delves into how the digital thread can help you reimagine your ambitions. It focuses on how investing in digital transformation initiatives can help you address your greatest business challenges to create your next competitive advantage.

It features the trending digital topics that can help you connect your operations to improve your performance and productivity, including: **Connect your Enterprise with the Digital Thread**; **Unlock your Digital Potential with the Power of Extended Reality**; and, **How to Make your Warehouse Smarter**.

This issue also includes the latest products and technologies, customer case studies that demonstrate how we help customers address their application challenges and recent company news and events.

I hope you enjoy this issue of Automation Today and that it helps you to identify ways in which you can unlock your digital potential to create your next competitive advantage.

Stay Safe, stay connected

Scott Wooldridge
President, Asia Pacific Region
Rockwell Automation

Rockwell Automation Named One of the 2021 World's Most Ethical Companies for the 13th Time

●●● *Rockwell Automation was recently recognized by Ethisphere, a global leader in defining and advancing the standards of ethical business practices, as one of the 2021 World's Most Ethical Companies.*

The recognition honors companies who understand the importance of leading, making hard but values-based decisions, and commitment to integrity. Rockwell Automation has been recognized 13 times and is one of only two honorees in the Diversified Machinery industry. In 2021, 135 honorees were recognized spanning 22 countries and 47 industries.

"We're honored to once again receive this recognition from Ethisphere," said Blake Moret, Chairman and CEO of Rockwell Automation. "Our commitment to integrity is a foundational element of our culture, ingrained in everything we do. And that culture is shaped by great employees who can and want to do their best work."

"While addressing the tough challenges of 2020, we saw companies lead – above all other institutions – on earning the trust of stakeholders

through resilience and a commitment to ethics and integrity," said Ethisphere CEO, Timothy Erblich.

"The World's Most Ethical Companies honorees continue to demonstrate an unwavering commitment to the highest values and positively impacting the communities they serve. Congratulations to everyone at Rockwell Automation for earning the World's Most Ethical Companies designation."

Grounded in Ethisphere's proprietary Ethics Quotient®, the World's Most Ethical Companies assessment process includes more than 200 questions on culture, environmental and social practices, ethics and compliance activities, governance, diversity and initiatives to support a strong value chain.

The process serves as an operating framework to capture and codify the leading practices of organizations across industries and around the globe. This year, the process was streamlined and the question set expanded to gauge how applicants are adapting and responding to the global health pandemic, environmental, social, and governance factors, safety, equity, and inclusion and social justice.



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2080 Plug-in Memory Module
Recipe Storage Plus Data Logging
MicroSD Memory Up To 32 GB
Real Time Clock Functionality

Lower System Cost With:
Double Density I/O - Analog/Discrete
Reduced Panel Space
BACNet Communications
High Accuracy Analog & More



2080 Plug-in Modules
Hi-Current Output (2-Ch)
Universal Analog Input (4-Ch)
Thermistor (4-Ch)
BACNet (Serial & Ethernet)
Memory Module



2085 Expansion Modules
Input/Output Analog Combo (8-Ch)
Hi-Density RTD Input (8-Ch)
Hi-Density Thermocouples (8/16-Ch)
Hi-Density Discrete Output (32-Ch)
Hi-Density Analog Output (8-Ch)
Hi-Density Universal Analog (8-Ch)
Hi-Density Analog Inputs (16-Ch)

Micro800 Lineup: spectrumcontrols.com/micro800



spectrum@spectrumcontrols.com
spectrumcontrols.com

Rockwell Automation Wins Big at 34th Annual Control Engineering 2021 Engineers' Choice Awards

- *Rockwell Automation is pleased to announce it has been honored at the Control Engineering 2021 Engineers' Choice Awards.*

Control Engineering's 34th Annual Engineers' Choice Awards program is the premier award for new products in the automation, control, and instrumentation technology markets.

The annual reader's choice program was created to provide Control Engineering's readers with information about the top new product in their fields.

The following eight products, all from separate categories, are recognized this year:

Allen-Bradley ControlLogix EtherNet/IP Communication Module
Winner: Network Integration – Ethernet Hardware, Switches category

Compact GuardLogix 5380 SIL 3 controller
Winner: Motion Control category

Plant PAx 5.0
Winner: Process Control Systems category

Allen-Bradley PowerFlex 6000T Medium Voltage Drive
Honorable Mention: Motion Control – Drives category

FactoryTalk AssetCentre
Honorable Mention: Software – Asset Management, Reporting category

FactoryTalk Linx Gateway
Honorable Mention: IIoT Connectivity – Software category

Kinetix 5300 Servo Drive
Honorable Mention: Motion Control – Drives, Servo category

Studio 5000 V33
Honorable Mention: Software – Control Design category



Automation Fair on Demand is Available Until June 2021



Automation Fair®
AT HOME

GLOBAL EVENTS

- *Join us for a new world-class experience showcasing the power and value of our IT/OT expertise.*

Automation Fair On Demand is available until June 2021 and showcases the newest products, solutions, and services in industrial automation and digital transformation:

Virtual Tours: The Rockwell Automation Experience

- The Rockwell Automation Experience enables participants to virtually tour three newly designed spaces at the Rockwell Automation Milwaukee headquarters: Digital Engineering Hall, Digital Thread Experience, and Products & Technology Showcase.
- The Digital Engineering Hall tour features machine design, operations, and maintenance, with an end-to-end demonstration of a digital engineering project.
- The Digital Thread Experience uses a real-world example to help attendees visualize moving from siloed operations to a digitally connected enterprise.
- The Products & Technology Showcase features the latest Rockwell Automation innovations in control, information and lifecycle services. After each tour, participants can discuss products and technology with Rockwell Automation experts.

Bold Conversations

- Beyond updates on industrial automation, a segment of the event was dedicated towards tackling broader industry and societal issues, with Rockwell Automation executives sharing personal experiences and thought leadership on addressing these subjects
- Topics discussed include: Inclusive Leadership During the Time of the Pandemic, Equity in Early STEM Education, Combatting Microaggressions in the Workplace, Inclusive Workplaces in a Divisive World, and more.

Other highlights of the event included keynote Perspectives into YOUR next, DX Strategists and Product and Technology Sessions. To attend Automation Fair At Home On-Demand, free online registration is required [here](#).

Rockwell Automation Announces Key Additions to Leadership Team

●●● *Rockwell Automation has recently announced new additions to its leadership team as detailed below:*

Scott Genereux
Senior vice president and chief revenue officer



Genereux will have global responsibility for total revenue performance and will oversee Rockwell's global sales and marketing strategy and functions, with specific focus on increasing software sales and annual recurring revenue (ARR).

Genereux joins Rockwell Automation with more than two decades of sales and management leadership experience. Most recently, he served as executive vice president for Worldwide Field Operations and chief revenue officer for Veritas Technologies, a leading provider of cloud data management solutions.

Prior to that, he led sales and strategy for Oracle Corporation's cloud infrastructure business. Genereux's career also includes senior sales and marketing positions with QLogic, Data Direct Networks, and Hitachi Data Systems.

Brian Shepherd
Senior vice president, Software and Control



Shepherd will lead the operating segment that includes control and visualization software and hardware, information software, and network and security infrastructure.

He brings extensive experience in leading strategy definition and end-to-end development of software solutions for manufacturing companies.

Shepherd most recently served as president, Production Software and Smart Factory, for Hexagon AB. Before that, he worked in a variety of senior leadership roles at PTC, including executive vice president and general manager of PTC's Enterprise Software

segments. He has strong technical expertise in design, simulation, manufacturing planning and execution, as well as process and quality data analytics.

The process serves as an operating framework to capture and codify the leading practices of organizations across industries and around the globe. This year, the process was streamlined and the question set expanded to gauge how applicants are adapting and responding to the global health pandemic, environmental, social, and governance factors, safety, equity, and inclusion and social justice.

Nicholas Gangestad
Senior vice president and chief financial officer



Gangestad joins Rockwell Automation after a long career with 3M, where he most recently served as the company's chief financial officer and oversaw all aspects of the financial organization including compliance, financial planning, treasury, and tax.

Before his promotion to CFO in 2014, Gangestad served as 3M's chief accounting officer, corporate controller, and also held global financial management roles overseeing teams and developing talent in Canada, Latin America, and Asia Pacific.

Bobby Griffin
Vice president, Human Resources, and Chief Diversity, Equity and Inclusion Officer



Griffin joins Rockwell Automation with more than 25 years of diversity and inclusion strategy and leadership experience at Fortune 500 companies.

He most recently served as vice president of diversity and inclusion at CBRE, a commercial real estate services company with more than 100,000 employees, operating in over 100 countries.

Griffin brings a strong, career-long track record for raising diversity and inclusion awareness, improving organizational culture, and building inclusive leadership capabilities in ways that also improve business outcomes.

Connect your Enterprise with the Digital Thread

●●● **Unlock your digital future to create your next competitive advantage. From concept to reality, technology can support improvements in large and small ways, inspiring people to deliver their best work every day.**

Success in manufacturing has always been tied to your capacity to innovate quickly. Imagine if you could gather each party and their data, around the world, together in the cloud with everyone collaborating early and often in the design process? The digital thread makes this possible. It enables seamless data flow throughout the organization, which leads to improvements and benefits throughout the entire operation.

From collaborating in real time across the value chain, to validating new lines and processes virtually, simplifying data science and increasing your manufacturing flexibility – **the digital thread** can help you reimagine your ambitions.

While an asset's lifecycle is linear, the best digital thread is a digital feedback loop. This end-to-end solution enhances decision-making through visibility into an asset's past, present, and future state. Collaborators across the value chain can easily leverage insights generated by upstream and downstream stakeholders.

Early adopters of digital thread methodology are surging ahead in productivity and innovation. They are moving from siloed systems and business functions to an enterprise connected with the digital thread. However, any company that has tried to create a digital thread knows it can be difficult to integrate data across disparate tools and systems.

Recognizing the inherent challenges in creating a digital twin, a

group of leading vendors have joined forces to create a better, less disruptive alternative. Their approach involves integrating their digital technologies and services to reduce the work you need to do to connect tools like CAD packages, simulation software and automation design software. This can help you create a digital thread while allowing engineers to keep tools that they use and prefer today.

Expanding the possibilities

A digital thread expands what is possible in your business using digital engineering. For example, it can connect a new machine's CAD model to control system code. This allows you to use simulation software to perform virtual controls testing which can help speed up machine commissioning and avoid last-minute surprises. Going a step further, you can simulate how the new machine will perform as part of a larger system to help identify issues like bottlenecks.

A digital thread can also be used to create a digital link to your products, allowing you to monitor their health and performance once they are in the hands of customers. This can improve your ability to service products. It can also help inform customers of future product changes or the development of new products.

Realizing opportunities like these can be greatly simplified with an open, integrated ecosystem of digital technologies and services. This allows you to spend less time integrating technologies and standardizing data across your industrial operations and the business functions that are adjacent to them. In addition, because the vendors involved in this effort are leaders in their respective field, you are likely to benefit from keeping some or all of the engineering tools you already use today.



This reduces your need to buy new technology and any disruption to how workers to their jobs. It also reduces the battles you need to fight to connect data across your operations.

One major consumer-good producer is using an ecosystem of digital solutions to help optimize a new product line and get it up and running faster. The company chose best-in-class tools that, while provided by different suppliers, are integrated and allow engineers to use digital engineering workflows to develop the new line.

For example, the company is pulling design data from its CAD package into industry-leading simulation software to create simulated models of some of the more complex aspects of the line. Then, the company is pulling those models into a separate emulation software to test them with the controls code and virtually commission the line.

Doing this work virtually and seamlessly thanks to integration between the different tools will help reduce engineering time and onsite commissioning time for the new line.

To help simplify implementation and enhance quality of digital initiatives across industries, Rockwell Automation created the **Digital Partner Program**. Working with companies like ANSYS and EPLAN, we can help you solve complex engineering challenges and create a digital thread that can help you be more productive not only at the design and development stage, but also in your operation and maintenance activities.

Your next competitive advantage

Speed is crucial to maintaining your competitive edge. Today's

customers expect increasingly personalized products while new competitors innovate at record rates. World class manufacturers are investing heavily in digital transformation initiatives. A holistic digital strategy, powered by the digital thread, helps manufacturers move faster by removing friction between disparate teams and systems.

Digital transformation can deliver many advantages to your systems and business functions including:

Accelerate time to value with enhanced collaboration: Digital transformation delivers the ability to collaborate in real time across the value chain. It removes dependencies by bringing every stakeholder together in real time from the start. It also allows you to emulate processes and manufacturing changes virtually and has been shown to accelerate commissioning by as much as 50%.

Empower your workforce with digital augmentation: Benefits of digital transformation include being able to leverage expertise anywhere with remote collaboration. Manufacturing expertise can be scaled across the workforce with augmented reality. Operator effectiveness and safety can be increased with high-fidelity training and on-the-job instruction. In fact, digital transformation has been shown to decrease training time by up to 75%.

Increase operational efficiency and agility: By automating IT/OT convergence you can harvest scalable insights with an

***'The biggest takeaway from the performance of digital versus nondigital industrial organizations is how the performance gap increases over time.'* - IDC**

information model optimized for the digital thread. Optimizing operations by connecting the plant to the digital content created by other business functions delivers ability to accelerate data science time to value by up to 70%. It also increases manufacturing flexibility and agility by removing friction between enterprise systems. It enables lights out manufacturing by allowing you to download and execute orders, at any plant and line around the world, without human intervention.

The digital thread in action



The story of Rockwell Automation's own digital transformation journey has pushed beyond the initial stages of the journey to reach a state of continuous improvement – so they can remain on the forefront of whatever comes next.

As both a global manufacturer and leading technology provider, Rockwell Automation is uniquely positioned to drive their own digital transformation.

As a manufacturer, about one-third of their 23,000 employees work at 20 global manufacturing plants and manage a product catalog of nearly 400,000 SKUs. And as the world's largest company dedicated to industrial automation and digital transformation, they help companies around the world improve processes, reduce inefficiencies, and increase productivity.

The Rockwell Automation manufacturing arm embraced digital transformation before it became a buzzword. They started by combining multiple, disparate systems into one enterprise resource planning (ERP) system that could manage many others around the world. In parallel, they rolled out a MES as its centralized system of record – and spent the next several years going plant by plant to connect factories, processes and people to a single MES.

This delivered high-level IT/OT convergence and gave them the foundation to standardize workflows and processes across all facilities. Rockwell Automation established a globally standardized approach for connecting their factories around the world and set the stage for the next wave of digital transformation.

The results were significant. Rockwell Automation lowered their total cost of ownership, reducing inventory days from 120 to 82 and capturing 30% in annual capital avoidance. They have

accelerated their time to market, with supply chain deliveries now up to 96% and lead times cut in half. Additionally, the company estimates it has experienced a 4-5% annual improvement in productivity.

Although well into their own digital transformation and yielding significant improvements as a result of their factories being connected with a single connected system across the globe, Rockwell Automation asked the hard question: what's next?

Rockwell Automation wanted to ensure it was realizing the full benefits of their connectivity by driving standardization across operations. To do this, a team of connected enterprise specialists focused on key use cases designed to further optimize factory assets and empower their workforce with digital tools and resources.

Optimizing people, products & processes

FactoryTalk InnovationSuite, powered by PTC was employed by Rockwell Automation to build and advance to the next stage of their transformation. Across six global facilities, the suite infused edge-to-enterprise analytics, machine learning, IoT, and augmented reality directly into their industrial operations. The technology provides a comprehensive and effective way for manufacturers to optimize their people, products, and processes, and to accelerate their industrial transformation.

While the technology on its own has enormous potential, without specific use cases that can scale to multiple scenarios and facilities, the value can be limited and never hit the double-digit impact Rockwell Automation was looking for. To ensure a successful rollout, Rockwell Automation identified use cases that would have the greatest benefit to their global operations and employees. By piloting the use cases in each location, they were able to facilitate a digital culture shift and help employees develop the right skillsets. At a high level, these use cases span from intelligent asset optimization to workforce productivity and enterprise operational intelligence.

To create an intelligent approach to asset management, the operations team leveraged real-time monitoring, diagnostics, and predictive and prescriptive analytics to gain valuable visibility and better understand the health and diagnostics of their machines. Equipped with these powerful monitoring tools, they were able to avoid unplanned downtime and maximize asset utilization. The team implemented three use cases in this area:

Throughputs

Rockwell Automation leveraged powerful real-time monitoring and analytics tools to both increase the quantity of output and decrease the labor cost per unit produced. With detailed data analysis of the production process – specifically around time between units and time per step – Rockwell Automation was able to optimize throughput for a new

At one facility, double-digit results include a 33% increase in labor efficiency, a 70% increase in outputs and a 50% reduction in training time.

product in high demand. At one facility, double-digit results include a 33% increase in labor efficiency, a 70% increase in outputs and a 50% reduction in training time.

Predictive maintenance

Rockwell Automation uses 35 injection molding machines of varying complexity and age, which made it difficult for them to efficiently determine machine status and prevent downtime. Leveraging IoT technology to collect vital, real-time information across legacy machines, they created a unified view of their factory floor, and achieved an 8% improvement in productivity.

This enables them to enhance quality control, improve machine uptime, and ensure maintenance needs are met based on machine utilization.

Analytics

In order to reduce long production times on ball grid arrays, the team piloted a new machine learning test good and bad ball grid connections. They created a 3D profile of the paste applied to boards, which will enable them to quickly determine whether there was a bad paste profile. As a result, they were able to detect issues earlier in assembly, reduce time to fix from hours to minutes, provide better quality assurance, and reduce paste related defects by 51%.

Through each of these uses cases, Rockwell Automation was able to optimize asset efficiency, reduce machine downtime, and increase throughput to satisfy customer demand. "Now we have data sources connected and identified, and we can create new models to further improve our processes," says Lion Moeliono, IT Manager, Global Plant Systems at Rockwell Automation.

A digital workforce

Rockwell Automation sought to empower their workforce with digital tools – not only improving productivity but also creating an environment where employees feel valued for their accomplishments, day in and day out. They implemented four targeted use cases to better empower their workforce:

Work queue visibility

By combining data from IT and OT sources and visualizing it together, Rockwell Automation realized a 75% reduction in line starved-condition downtime due to lack of materials, which enabled operators to optimize their work.

Standardized performance reporting

The team needed a clearer way to see the impact of downtimes on hourly performance, so they developed a common KPI dashboard for use across all plants. Combining disparate information from scheduling systems, SAP, MES and other sources, the configurable and modular dashboard enabled workers to better visualize performance trends, make data informed decisions and increase labour efficiency by 13%.

AR-guided wiring & training quiz

Ensuring employees could wire effectively had become an increasing challenge due to turnover. Additionally, there was no objective means to measure success, resulting in risks to quality and

safety. Using AR technology to deliver a better training experience in an engaging way, Rockwell Automation was able to train employees and simultaneously measure competency to identify skills gap.

AR-guided standardized work instruction product transfer

Relocating plants between Switzerland and Poland required teams to transfer critical and detailed knowledge across countries and languages. The team in Switzerland began recording work instructions using AR technology, breaking down tasks into step-by-step instructions with pictures, video, and voiceover and reduced training by 30%.

A smart supply chain

When Rockwell Automation experienced a jump in demand for component parts for electronic assembly and had to procure material from an external source, they quickly discovered that non-conforming parts had been introduced into their supply chain.

Leveraging the intelligence from **FactoryTalk MES**, unified IT and OT systems, and standardized processes, they were able to identify the issue and trace it through their supply chain to prevent any more problems in the future. This capability can reduce recalls by 80% or more, in any given situation.

Rockwell Automation reduced recalls by 80% or more.



Building on these learnings

Looking forward, Rockwell Automation is building on these recent learnings. They are challenging themselves on how they can drive further improvements for workers, equipment, and processes, with the goal of creating even more customer and employee value.

They are arming employees with better training by leveraging breakthrough AR technology and providing opportunities for higher level responsibility as more manual tasks become automated. They are protecting their assets by turning data into improved prediction and prescription capabilities to manage machine performance and maintenance at a new level of precision.

Every day, they are learning more about the capabilities of their own technology, only limited by their imaginations and time it takes to continuously improve and transform, one step at a time. **AI**

Digital Transformation Accelerates Biomanufacturing



Digital technologies and automation help biomanufacturing companies realize economies of scale with flexibility, efficiency and confidence.

●●● Given the enormous amounts of time and money that go into developing new pharmaceutical and medical products, together with the short patent life of a product – reducing time from inception to market is critical to capture market share longer. Pressure is now building for the life sciences industry to accelerate innovation and time to market while adapting quickly to changing market demands and increasing regulatory requirements.

Cytiva brings digital manufacturing to life

Cytiva customers undertake life-saving activities ranging from fundamental biological research to developing innovative vaccines, biologic drugs, and novel cell and gene therapies.

Cytiva helps make this possible by supplying the tools and services they need to work better, faster and safer, leading to better patient outcomes. More than 7,000 associates across 40 sites support the company's vision of improving access to life-changing therapies that transform human health.

As part of its digital transformation and Industry 4.0 initiative, Cytiva needed to create a connected digital enterprise to help improve internal operations and decrease time-to-market for end customers.

"Now more than ever as an industry, we must get smaller, faster

and more cost-effective in the way we manufacture drugs, vaccines and therapeutics," said Kevin Seaver, executive general manager, automation and digital at Cytiva. "By automating processes and analyzing data, we can rethink every step of drug manufacturing and realize economies of scale with flexibility, efficiency and confidence."

Streamlining the deployment of systems, reducing islands of automation, and decreasing the time spent on gathering and cleaning data all can help biomanufacturing players accelerate their time to market.

"Our aim is to help companies go from seven years down to three or four by doing much of the engineering and automation work upfront," Seaver said.

Differentiating through automation

The Cytiva Figurate automation platform includes control and communication capabilities that turn data insights into productive outcomes for both upstream and downstream process efficiency gains. To develop and put its Figurate platform in place, Cytiva adopted the Rockwell Automation **PlantPAX** system and used its own Unicorn software to automate its bioprocess equipment. Data is made available through **MES** applications and can be integrated to include electronic batch records, scheduling and more.

The platform is designed to dramatically streamline deployment of systems for end customers. There are options for Rockwell Automation systems and others, depending on the end-user's specific needs. Standardized digital libraries – such as product code that's been tested, documented and validated – also can create more efficient process development all the way through manufacturing and automation.

For example, a customer using the PlantPAx system can operate it as a single standalone system but also operate it together with other systems. Through integration the customer can transfer not only the biopharma material but the data along with it.

Figurate can bring process data to the cloud where it can be combined with additional operational data. Using advanced analytics, these valuable insights can be used to improve operations and can then be fed back down to the system to optimize processes.

The benefits include 10-20 percent increases in production throughput, availability and production employee efficiency, as well as 5-30 percent decreases in energy use, scrap material, batch release time, maintenance, and downtime investigations.



Digitalization enhances patient outcomes

Pfizer Global Supply (PGS) produces more than 23 billion doses of medicine every year across its network of 42 global manufacturing sites.

In 2016, PGS embarked on a digital transformation to support the Pfizer purpose of 'breakthroughs that change patients' lives' by transforming operations into a seamless, data-driven insight engine that drives world-class performance.

However, this would be no simple task. PGS manufacturing facilities, representing a heritage of more than 30 legacy pharmaceutical companies, had a diverse ecosystem of systems and datasets, as well as differing process and equipment standards. Insights were difficult to ascertain. Changing the range of solutions used at the operational technologies (OT) layer would be a complex, multi-year effort.

When developing their digital transformation strategy, PGS took the time to understand its business challenges and the technology landscape across the industry. "The idea of creating a new organizational structure for how you want your plant to run, or new processes and codifying how standard work is done could be greatly

enhanced through digital capabilities," said Mike Tomasco, vice president, digital manufacturing, Pfizer.

While its digital transformation journey continues, PGS has documented major improvements to-date in areas like cycle time, manufacturing throughput, yield, and right-first-time quality. At just one manufacturing site, the digital transformation program has been credited with enabling the manufacture of 3 million additional doses of one product above what was planned for in 2019.


Safety first and quality always

Eli Lilly and Company has been reaping the benefits of its IT/OT collaboration since the early 2010s. For example, IT and OT collaborated to develop an understanding of industrial cybersecurity risks, a plan to mitigate immediate risks and an ongoing strategy for best available protection. This IT/OT partnership also helps drive company's global serialization program.

The company is also modernizing its data and analytics architecture. This involves incorporating critical capabilities such as cloud, edge storage and computing, and the industrial IoT. "We are really at the crux of shop floor data and the integration of IT/OT information at the shop-floor layer, and being able to turn that data into information to make better decisions whether that be on the shop floor or in our labs," said Dave Sternasty, vice president of corporate engineering and global health, safety and environment.

Eli Lilly and Company expects it will take at least 10 years to fully realize its **digital transformation** vision across its major sites. This includes an aspirational goal of having the ability to deliver on the vision of a predictive plant by 2023.

To help with technology implementations both at the strategic and execution levels, the company engages its core partners like Rockwell Automation, Microsoft and others. It is also putting a focus on hiring and developing workers who are digitally enabled.

Continuing to develop and build on the strong partnership between IT and OT will continue to be central to the company's digital transformation. "We have had this relationship in place for years," said Karen Harris, vice president and information officer, manufacturing and quality, Eli Lilly and Company. "It aligns with our broader Team Lilly approach, where we believe it is really the cross-functional teams and cross-functional relationships that really drive success. It's that teamwork that helps us advance our agenda." 



Stanley Black & Decker's Digital Transformation Journey Accelerates Innovation



For the largest tool manufacturer in the world, innovation is the most powerful tool

●●● Digital transformation is an innovation and productivity accelerator but it is also a multifaceted undertaking with a number of important considerations. Today, only 16 percent of industrial organizations have embarked on enterprise-wide digital transformation programs. The ultimate goal of any digital transformation program is to turn investment into results but this can be easier said than done.

The first step in any digital transformation journey is to develop a strategic plan that addresses priority use cases, business justification, change management, and an execution roadmap for technology implementation and support. Customize these fields to your unique objectives and digital maturity level.

An outcome-based approach to technology can help identify the most attainable, high potential use cases that bring faster return on investment. With a business-first mindset, begin by identifying your biggest challenges, the underlying use cases, and key enablers such as the technology, processes and people that solve them. Collaborate with partners that have global OT and IT expertise who can help you quickly identify and implement repeatable, scalable, cost-effective solutions.

The Rockwell Automation **Digital Transformation Strategy Consulting** team can help you not only navigate the digital transformation process but also accelerate its value. We can work with you on a strategic plan that addresses priority use cases, business

justification, change management, and an execution roadmap for technology implementation and support. All customized to your unique objectives and digital maturity level.

Stanley Black & Decker knew that digital transformation is the key to creating a more collaborative and innovative brand so they called on Rockwell Automation to help accelerate their journey.

The task at-hand

What does the largest toolmaker in the world do when it wants to build something new? That was a central question for **Stanley Black & Decker**, the 177-year-old creator of some of the most iconic industrial and household tools on the market. The company had a desire to innovate all areas of its business, including operations and manufacturing, workforce enablement, and supply chain.

As Stanley Black & Decker embarked upon its **digital transformation**, the company wanted to leverage Industry 4.0 tools, technologies and strategies to help its customers. The company also wanted to rethink how it enables its own business through technology, how it makes products and how it sells those products through the supply chain.

At the end of its four-year effort, Stanley Black & Decker's leadership hopes to create \$200 - \$250M of value capture with an additional benefit of around \$100M in enterprise shared services value.

Creating a Connected Enterprise

Stanley Black & Decker has continually performed at a high level but found that some processes required intense manual efforts to deliver on expected results. Leaders knew that a digital transformation program could help modify processes to be more data-driven and automated across the entire supply chain, and ultimately improve performance.

“One of the biggest challenges, especially for a traditional industrial manufacturing company is the issue which I call lazy, rusty asset syndrome,” said Sudhi Bangalore, vice president, Industry 4.0, Stanley Black & Decker. “We have plants that are really old – tremendously profitable but have a lot of legacy both in terms of practices as well as assets and processes.”

The first step to enabling digital transformation was to create a smart **Connected Enterprise** to act as a backbone for uncovering and unleashing data. This involved building a holistic set of enterprise applications and control towers to connect 122 factories and 15 distribution centers.



Investing in people

A second incentive for a digital transformation program is Stanley Black & Decker’s focus on creating value and opportunity for employees. Through comprehensive up-skilling and reskilling of 61,000 employees, the company is creating new and more rewarding career paths for employees and increasing retention.

“We never went into a plant and said, ‘we’re going to design something for you.’ We always leverage plant champions for insight.”

For example, an approach to ‘elevating work’ could mean taking an employee trained in assembly and reskilling them to also play a role in quality oversight using data-driven systems and digital tools. Enabling employees with high-value digital skills also empowers them to make more strategic business-driven decisions, leading to new ideas and a better approach to work.

Building an infrastructure to support remote enablement is also part of the digitalization program. Spurred partly by the pandemic, remote access, monitoring and control will encourage

employees to collaborate across factories, regions and countries to make strategic data-driven decisions even while off site.

Driving engagement

At about 18 months into a multi-year program, Stanley Black & Decker is well on its way to full scale digital transformation, and still learning in the process.

“One strategy we put into practice was to leverage people across the organization to help ‘champion’ change,” Bangalore said. “We are combatting skepticism and driving adoption through smart engagement of plant champions who are helping build the bridge between technology and its impact on people.”

Another area that has brought about a lot of learning has been the timeframe. The company wants to connect its many sites in a timeframe of months, not years.

“That has been a foundation focus and one that has taken a lot of testing,” Bangalore said. “And we’re getting to a point where we’re now comfortable in saying that we are ready to actively deploy it at scale in each plant in about a month or two.”

Making digital transformation work

As can be seen through Stanley Black and Decker’s transformation journey, the road to greater operational efficiency and lower costs starts with a hard look at your organization in terms of where you are, what you have and where you want to be.

Companies that have successfully moved past the pilot phase started by evaluating current and future business requirements, technology infrastructure and organizational readiness. This holistic view can help define early on how to make digital transformation work for you and where to start.

With the right strategy in place, successful companies have been able to articulate the return on investment and value of digital transformation. They have developed a clear strategy to improve KPIs including yield, asset and labor utilization, quality and cost effectiveness. In addition, they have gained alignment and drove adoption across their organization.

Digital transformation will continue to be a priority for successful companies as they start on the journey to their next competitive advantage. **AI**



Unlock your Digital Potential with the Power of Extended Reality

●●● *Life sciences organizations must embrace digital transformation if they are to survive in a post-pandemic world.*

According to the Harvard Business Review, in 1958, the average lifespan of companies listed in Standard and Poor's 500 was 61 years. By the 1980s it was down to 25 years. Today, it is less than 18 years. The rate of change in the world has increased dramatically due to digital transformation.

Companies across the life sciences industry were disproportionately impacted due to the pandemic. The industry reeled as workplaces became remote overnight. For many, protecting employees came at the expense of effective collaboration. This not only impacted product development and manufacturing, but sales, training, and product servicing, as much of the industry was underprepared to solve challenges traditionally resolved in person in this new remote working environment.

The pandemic has made it clear that the companies who focused on building their digital capabilities in recent years have had a significant advantage in adapting in response to the crisis.

The digital thread

Why do some companies fail to embrace a digital world while others thrive? The organic evolution of processes and technologies has resulted in a disjointed experience within the product lifecycle, from discover and create to make and sell. The solution is the digital thread.

Harnessing the **Digital Thread** enables seamless data flow throughout the organization, which leads to improvements and benefits throughout the entire operation. The focal point of the digital thread is the **digital twin**, or the virtual representation of the physical product. The digital twin can be used in design, testing, monitoring, servicing, and other functional areas to augment product management capabilities.

Imagine collaborating in real time across the value chain, validating new lines and processes virtually, simplifying data science and increasing your manufacturing flexibility. Unanticipated disruptive events like COVID-19 have made the digital thread more important than ever.

What is extended reality?

Extended reality (XR) is the visualization and enablement component of a digital thread. Kalypso, a Rockwell Automation

company, helps companies leverage extended reality tools to create multiple digital threads - the digital fabric and foundation for Industry 4.0.

Extended reality is a key enabler of digital transformation. As part of the connected enterprise, extended reality uses a mix of wearable and handheld augmented reality (AR), mixed reality (MR), spatial computing and virtual reality (VR) tools to overlay additional digital information into how work gets done, enabling more efficient learning, remote working and significant business benefits.

Bringing digital information into view for product manufacturing, user training and service value chain, extended reality leverages 3D geometry, audio, video, text and other media from multiple sources, including product lifecycle management systems. This occurs at any point in the product lifecycle from design, testing, quality assurance, even to after product launch.

Extended reality in action

Smart factories, enabled by digital technologies and concepts, may not be as futuristic as you think. More and more companies are seeing real business value from initiatives related to augmented and mixed reality, overall equipment effectiveness, product lifecycle intelligence, and robotic process automation.

The factory of the future is here today. Imagine you are an operations manager walking on the shop floor in the calm minutes before production starts for the day. By switching on your mixed reality smart safety glasses and scanning the floor, you instantly see real time results on several key performance indicators and other metrics overlaid in your field of vision – allowing you to quickly spot any process issues.

A mixed reality system can unlock immense value by making real-time data and information available to everyone, along with many benefits including improved data-based decision making, faster training of new associates, and giving everyone the tools to be a problem solver.

Integrating plant equipment on an Internet of Things (IoT) platform delivers insights into production processes, allowing you to respond quickly and flexibly to meet production deadlines. This production data can be used along with a machine learning algorithm to predict when machine components were likely to breakdown – reducing costly downtime.

This modern digital infrastructure dramatically improves your ability



to innovate and deliver. Measuring overall equipment effectiveness (OEE) provides a single metric that factors in the availability, performance and quality of a plant. It is an effective way to measure the improvements of digital transformation initiatives in a plant and set goals for further improvements.

Emulating manufacturing virtually

Virtual commissioning can help you to accelerate your time to quality production. This can be seen in a recent use case where a complete, fully functional digital representation of a Rockwell Automation contactor production line was emulated using **Emulate3D** digital twin software.

This digital representation was used to learn about the line's physical constraints and the automation code that controls the process. With virtual commissioning in **Emulate3D**, you can validate and optimize PLC code without needing to start a single piece of equipment.

Emulating the physical processes enables you to optimize production. Imagine testing 'what if' scenarios on your line without risk. Using physics-based modelling software from **Ansys**, you can test the forces acting on your equipment, and evaluate how speed, temperature, or humidity might affect these forces. This could have massive implications on lifetime maintenance and operating costs for the line.

The value of emulating production for the contractor line comes from the underlying data. Before equipment arrives at the plant, you start to understand how the line operates in different conditions. This knowledge is crucial to building a baseline understanding of line optimization. In addition, capturing the context of data available from your line this early in the process simplifies industrial analytics.

Virtual reality technology has been used to capture key maintenance procedures on the contactor line. These virtual reality experiences created in **Vuforia Studio** leverage the 3D digital content captured during the product and machine design process. This enables new or reassigned workers to ramp up on their new position in a risk-free, hands-on setting.

With **FactoryTalk Smart Object** Rockwell Automation has built the capability directly into the control automation layer to capture the OT context of data throughout the digital thread – helping to simplify machine learning. This enables lights-out manufacturing through automated workflows.

For example, if a customer were to order 10,000 contactors, the order would be placed through the Rockwell Automation supply chain. The company's ERP receives that order and verifies and allocates the raw materials needed to the appropriate plant for manufacture within the requested shipping date. That plant's MES then automatically schedules the order, books raw materials from stores and assigns them to a manufacturing line to orchestrate production.

The manufacturing line receives line setup parameters from MES and executes the order while providing consumption data back to ERP. This sequence of events demonstrates how the order travels from the customer to the production line, without requiring human intervention.

Transforming productivity

Over the years, Kalypso's expertise in extended reality technology and solutions has helped many customers improve productivity and efficiency in many areas including:

Collaboration: XR tools allow multiple users to visualize and interact with a product's digital twin in a real or virtual environment. This helps to reduce development lead time by increasing speed and accuracy in design reviews. Real results show an impressive 80-90% reduction in time for design reviews and a 75-90% reduction in time for quality inspections.

Training: By using virtual and augmented reality tools to guide trainees to understand the working procedures of machinery and maintenance needed in various scenarios, results show a greater than 90% improved first-time operation success rate.

Work instructions: XR tools can be beneficial in helping employees working on plant floor cells to assemble components correctly and in the right order. In fact, Kalypso has shown that extended reality technologies can increase productivity by approximately 10-35%.

Remote service: XR can allow a product to be identified in the field, to gather and provide information, and execute activities related to that product. This helps to ensure effectiveness of service and shared visibility together with employee safety.

Immersive product experiences: XR and VR eliminates the requirement for sales professionals to enter their customers' sites by providing a virtual product demonstration. It can be used to simulate the spatial configuration and user experiences of products even without their physical presence. **AT**

How to Make your Warehouse Smarter

●●● **The right warehouse management system can help reveal any roadblocks in your system so you can streamline your warehouse operations – delivering improved efficiency and profitability**

Consumers are driving demand for new and innovative products. Variety is key as consumers seek more personalized products and services. From food and beverage choices to seasonally evolving clothing and homeware trends – manufacturers are challenged to get new high-quality products through their facility while keeping prices competitive.

Rising demand for personalized products together with a desire to get products to market quickly are driving the trend to small lot production, also known as ‘the lot size of one’. In addition to the constantly changing products that consumers are purchasing, the pandemic has also resulted in a significant change to the way they are shopping.

A recent study by **Nielsen** showed that e-commerce has been on the rise during the pandemic. Online shopping increased by 53% as more people self-isolated and worked from home. Furthermore, consumers are demanding fast delivery times, requiring manufacturers to have efficient supply chain processes.

Manufacturers need to be agile throughout their entire supply chain, from raw materials to manufacturing, warehousing to distribution and finally to the end customer.

A connected supply chain can help improve performance and productivity. By linking processes via the Internet of Things, organizations can achieve end-to-end supply chain alignment. A first step to achieving an agile, connected supply chain is for organizations to streamline manufacturing and logistics operations.

Aligning manufacturing and logistics

As product variety increases dramatically, concepts like lean manufacturing and inventory stock reduction become increasingly important. By delivering just in time, work in progress materials can be massively reduced so that the only materials on the shop floor are those either currently or very soon in use in production. This requires that material-handling be as efficient as possible to get the right quantities of the right inventory to each production point at the right moment.

For manufacturing companies to streamline manufacturing and logistics operations, it is crucial to optimize both data and material flows between logistics and production. FactoryTalk Warehouse

can help. It integrates seamlessly with any Manufacturing Execution System (MES) and offers premier integration with Rockwell Automation MES solutions.

FactoryTalk Warehouse can control all warehouse activities required to support production operations, including inbound processing, storage and operation, and outbound processing. Specifically, FactoryTalk Warehouse supports:

1. **Inbound processing activities:** including goods receipt processing, quality inspection, deconsolidation labelling and put-away with location determination based on material and storage conditions
2. **Storage and operation activities:** including stock records, stock adjustment (e.g., based on stock counting), rearrangements of logistic units and sublots, management of the status of batches and sublots, transport orders based on material and storage conditions and tracking the cool chain
3. **Outbound processing activities:** including goods issue processing, picking with location determination, consolidation, packing, wave management and shipping orders

Most manufacturing systems include two touch points between MES and Warehouse Management System (WMS) because MES governs production and WMS controls warehouse inventory and material moves. The first feeds components and other work in progress materials to production lines and the second is at the end of the lines where finished goods need to be moved to the warehouse for shipping.

As the demand for personalized products increases, this results in smaller lot sizes for manufacturers. As such, it is critical that MES and WMS work in close concert around issues like reducing work

'FactoryTalk Warehouse can help you effectively manage your production inventory'





in progress inventory levels and increasing inventory visibility. Rather than one system passing a set of data or requests to another in batch mode, it is more efficient to synchronize the two.

Agility is key

Being able to move quickly and easily in response to changing customer demand is key to developing a competitive advantage in today's business environment. Manufacturers often need to modify existing workflows or create new workflows to support new products or new operations. When the solution is not modular, this can be a complex and time-consuming process.

FactoryTalk Warehouse streamlines the process by providing the necessary tools to easily modify or build the warehouse workflows. When users modify or build workflows, they can use a library of standard functions (called widgets) to define workflow sequences. It also guides and helps operators to execute workflows effectively and efficiently and includes HTML5 web clients that support mobile terminals.

Simplifying compliance

Manufacturing compliance is of critical importance to the industry. It helps to ensure operational efficiency and safety while fostering customer confidence and trust. In both regulated and non-regulated industries, implementing a GMP-compliant system can help you to control and record operation execution.

FactoryTalk Warehouse uses e-signatures to control who can execute each critical warehouse operation and transaction logs to record operation execution. This helps you to meet and demonstrate compliance as required, or simply to manage operations more effectively.

Optimize warehouse management

Manufacturers are continually challenged to produce and ship product to customers faster, more cost effectively and with increased quality. By identifying challenges and bottlenecks in your warehouse processes you can optimize warehouse management, functionality and productivity.

The ultimate goal is to establish a smart warehouse with connected technology where goods are received, identified, sorted, organized and moved for shipment automatically.

FactoryTalk Warehouse makes this possible by helping to improve all aspects of managing production inventories including inputs, work in progress products, and mobile equipment, through improved visibility and inventory workflows.

As more organizations see the value in digitizing their warehouse operations, there will continue to be a key focus on the importance of smart warehouse management systems – helping to deliver your next competitive edge. **AT**



New Inverter Enhances QuickStick HT Intelligent Conveyor System Performance

●●● The QuickStick HT intelligent conveyor system from Rockwell Automation is designed to transport large loads with the intelligence of independent cart technology. The most common applications for the technology are in the automotive industry. However, it is also well-suited for heavy-load material handling, ride conveyance and hazardous material handling, including glovebox applications.

The industry-leading system has a new QuickStick HT 5700 inverter, which increases performance. It can now achieve velocities of 5+ m/s. Additionally, the update allows for the use of a smaller Kinetix 5700 power supply, reducing the control cabinet size and saving space on the plant floor. The updated system also includes integrated functional safety. It has hardwired Safe Torque Off and Safe Stop 1 timed, SIL3/PLe.



New Contactor Options Provide Energy Savings

●●● The expanded Allen-Bradley Bulletin 100-E energy-saving IEC contactor line from Rockwell Automation can help industrial companies save energy and reduce engineering time.

With new sizes from 9 to 96 A, these contactors save energy by reducing inrush apparent power (VA) by up to 68% and sealed VA by over 75% compared to standard, non-electronic coils. The electronic coils also save engineering time by covering 20 to 500 V AC/DC coil voltages with only four coil options, greatly simplifying selection.

The contactors allow coil input terminals to be moved from the line to load side of the contactors without disassembly. This can make wiring and access easier when building starter assemblies. The contactors also offer a direct PLC interface option for contactors above 100A, as well as a full line of accessories, safety versions and reversing contactors.

All Allen-Bradley contactors are tested in combination with relevant motor overload relays and circuit breakers to provide two- or three-component motor starters. Using the online Global Short-Circuit Current Rating tool, users can obtain documentation certifying the compliance of specific product combinations to IEC and UL standards.

Introducing the World's First CIP Safety Over Ethernet/IP Safety Light Curtain

●●● Industrial companies can help protect personnel and equipment with new presence-sensing safety light curtains from Rockwell Automation. The Allen-Bradley 450L GuardShield safety light curtains are designed to improve productivity and increase efficiency while helping provide personnel safety. This light curtain is the first product of its kind to provide CIP Safety over EtherNet/IP.

CIP Safety over EtherNet/IP enables smart safety within a Connected Enterprise and provides rich data from the plant floor. The 450L GuardShield light curtains support linear, star and DLR networks and are ideally suited for applications where safe, easy and frequent access to the machine is required.

The 450L safety light curtains are unlike traditional safety light curtains, which are based on separate transmitter and receiver units. Patented technology allows each transceiver to be used as a transmitter or receiver via an innovative plug-in module.

The 450L-E option provides advanced functionality, including integrated laser alignment, cascading, blanking and integrated muting.

The 450L safety light curtains are TÜV certified PLe, Type 4 IEC 61496-1/-2, SIL CL3 per EN ISO 13849-1 and IEC 62061.



New Safety Devices Enhance Safety and Productivity



●●● Manufacturers can harness the power of data to substantially improve their safety compliance and performance using two new smart safety devices from Rockwell Automation.

The new **Allen-Bradley SafeZone 3 laser scanner with CIP Safety over EtherNet/IP** and **Allen-Bradley GuardShield 450L light curtain with CIP Safety over EtherNet/IP plug-in** give users access to critical data needed for a comprehensive picture of machine or production line status. Ultimately, these devices create smart machines that provide meaningful information so users can monitor machine health, increase uptime, improve flexibility and enhance safety, while lowering total cost of ownership.

These smart devices provide diagnostic information that can deliver valuable insights, such as where safety-related failures are occurring or if workers are following standard operating procedures. Users can put these insights to work to improve the productivity and sustainability of their production equipment.

“For many manufacturers, this new way to understand safety not only helps keep people and processes safe, but also significantly expands productivity,” said Lee Lane, vice president and general manager, Sensing, Safety & Industrial Components Business, Rockwell Automation. “Traditional safety devices provide little or no data. Smart safety devices provide better visibility into operations and help users understand process states, environmental conditions, and other factors that affect safety and productivity.”

The new SafeZone 3 laser scanner with CIP Safety provides area detection inside a work cell. The addition of CIP Safety allows users to simultaneously operate multiple safety zones instead of switching from one to another. It also extends the scanner’s field range and provides vital diagnostic data over a single EtherNet/IP connection.

This can improve productivity, such as by notifying workers with an alarm if they are nearing a hazard to help prevent a machine from slowing down or stopping. In addition, the CIP Safety capability expands available diagnostic data to alert users of common failures, such as the presence of dust on the scanner’s lens.

The GuardShield 450L light curtain with CIP Safety over EtherNet/IP plug-in protects personnel from injuries related to hazardous machine motion. The CIP Safety plug-in gives users more access to diagnostic data to improve productivity and flexibility.

For example, users can see exactly which beams are tripped on the light curtain to better understand the cause of a downtime event. Or they can take a sample of the light screen every 100 milliseconds to track profiles of products running through it and identify potential quality issues.

CIP Safety is an extension to the Common Industrial Protocol (CIP), the application-layer protocol for EtherNet/IP. Smart products that use CIP Safety with technologies such as GuardLink help improve safety and productivity and simplify wiring. They also offer premier integration with an Allen-Bradley Compact GuardLogix SIL 3 control system by using the Studio 5000 Logix Designer application.

These and other smart products, such as the 843ES safety encoder and CompactBlock Guard Safety I/O universal encoder module, are part of the Rockwell Automation safety portfolio that combines simpler connectivity and powerful data for smarter, higher-performing production.

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