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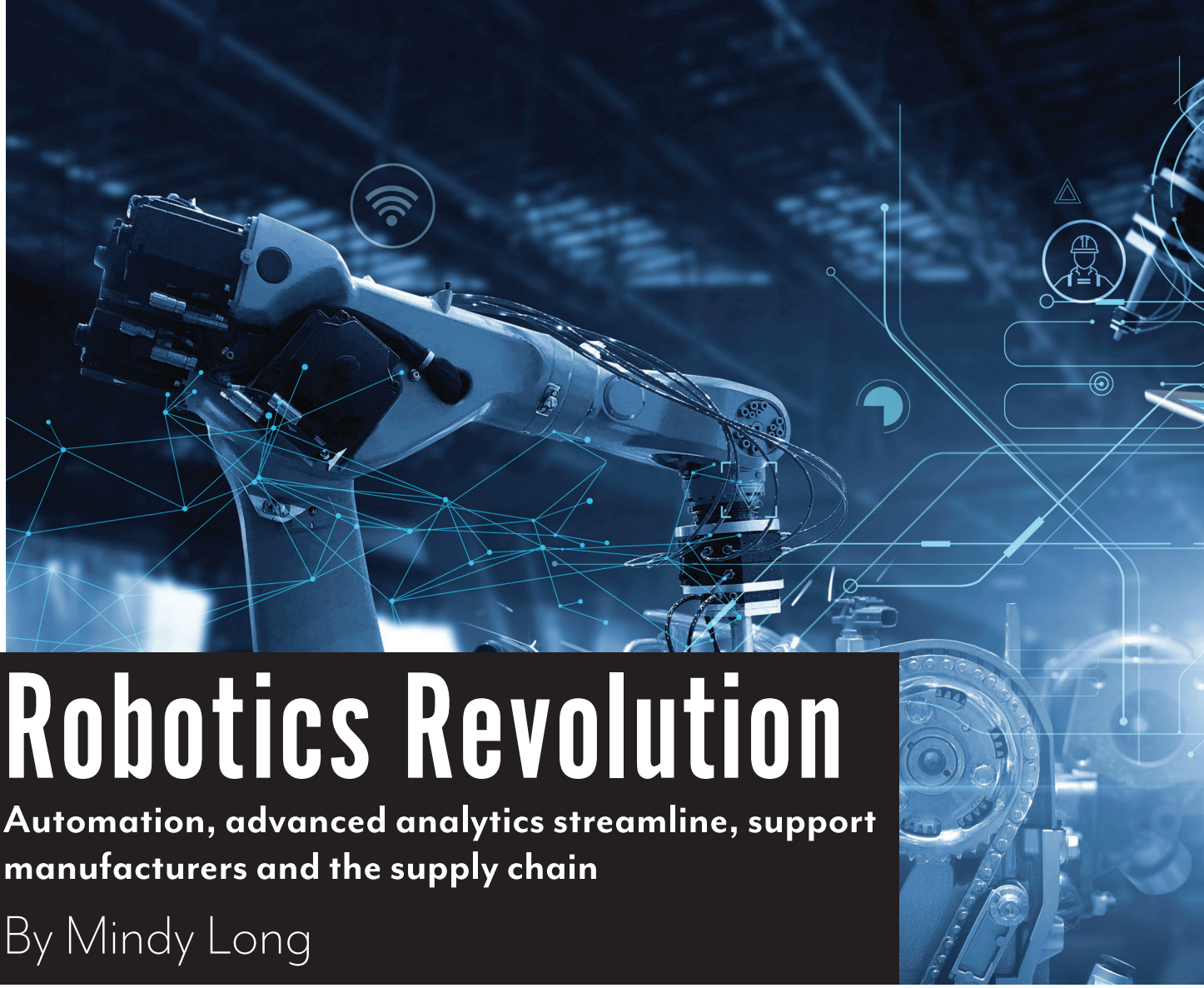

Robotics Revolution

Automation, advanced analytics streamline, support manufacturers and the supply chain

By Mindy Long

Hiring challenges, the need for efficiency and the desire to minimize risk are driving increased adoption of robotics and automation as well as artificial intelligence (AI) and machine learning (ML) at companies nationwide. Investments in technology were already on the rise pre-COVID-19, and the pace has accelerated since the pandemic hit.

"Automation will clearly reduce and/or eliminate certain manual aspects of production going forward," said Frank Hamilton, president of South Atlantic Services.

Robotics and Automation in Manufacturing

According to the International Federation of Robotics, robot density per 10,000 workers in North America jumped 28% in the first quarter of 2022 compared to a year earlier, the highest rate of growth in the decade-plus since records have been kept. Plus, data for 2021 shows that 486,700 industrial robots were installed globally, a 27% increase year-on-year.

While automation and robotics have long been used in the automotive industry, their use has significantly expanded across multiple industries, including logistics and other forms of manufacturing. In the first quarter of 2022, non-automotive customers ordered more robots than automotive customers in North America.

At Allegheny Petroleum Products Co., the nitrogen blanketing blending area will be using a remote terminal unit or controller to open or close automated in-line valves through programmable logic. The company also uses Emerson's DeltaV automation system and Simultaneous Metered Blender.

Ron Sandoe, project manager for Allegheny Petroleum, said automation increases manufacturing efficiency and accuracy while reducing employee and environmental exposure.

Hiring challenges are changing the return on investment (ROI) for robotics. The U.S. manufacturing skills gap could leave as many as 2.1 million jobs unfilled by 2030, according to a study by Deloitte and The Manufacturing Institute. "The labor shortage will not be solved any time soon," Hamilton said, adding that the cost for manpower has risen sharply while the cost of automation has decreased over the past 10 years. "The ROI on automation investment is better."

Barbara Kudis, president of Allegheny Petroleum Products Co., agreed that there have been times when the labor shortage and labor rates have become more of a determining

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> ***Barbara Kudis**, President, Allegheny Petroleum Products Co.*

factor in assessing ROI. For example, Allegheny Petroleum is adding automated labelers to its pail packaging line. "We can't find that level of labor worker at a price that makes sense, so the ROI of purchasing a $75,000 asset makes sense now when it didn't before," she said.

However, the goal isn't to replace employees but to get more productivity with the same number of employees to stay competitive in the long run. "Implementing more technologies and using technology to help us become more disciplined in our work tasks helps build the foundation for company growth," Kudis said.

Hamilton noted that automation often requires upgrades in the type of maintenance personnel needed to maintain the automated equipment. "Demand for maintenance folks with programmable logic controller knowledge will increase in the trend to greater automation," Hamilton said.

Growth Potential in Supply Chain

Warehouses and distribution centers across the country face increasing customer demands and labor challenges, and automation can help them do more with less. Automation in warehouses can include automated guided vehicles to transport materials, automated storage and retrieval systems, and robotic arms.

Mike Cicco, CEO of FANUC America, sees significant potential for automation in the logistics market. "There hasn't been an opportunity like this since the automotive industry started to use robots to see how many different opportunities we can scale to in this area," he said during remarks in June at Automate, the largest automation trade show in North America.

Sean Hillard, business development manager for BRT Inc., said the carrier is working to automate as many of its back-office processes as possible. "Specifically, we are automating where we need to get load data from a customer, and then return information back to the customer after delivery. This information could include in and out times at a terminal, delivery confirmations or invoicing data."

Photos courtesy of Allegheny Petroleum Products Co.

As part of Allegheny Petroleum's Simultaneous Metering Blend system, this batch blending skid includes three flow loops that meter and dose ingredients from storage tanks to finishing tanks.

Automating these areas allows BRT to continue growing its fleet size and transporting more loads while maintaining a smaller office staff than if the fleet had to manually send data exchanges, said Hillard.

Customers increasingly want information closer to real time. "Because of this, we are working on putting systems in place to provide real-time tracking and notifications for pickups and deliveries," Hillard said, adding that, unfortunately, this hasn't yet translated into any relief to the issues of loads being moved around and cancelled due to a product not being ready for pickup.

One of BRT's challenges as a small fleet is the cost associated with implementing AI software. "As the technology continues to grow and mature, this challenge will slowly fade," Hillard said. "We definitely will keep looking at options since we know at some point the benefits and costs will align for us."

The Value of Data Analysis

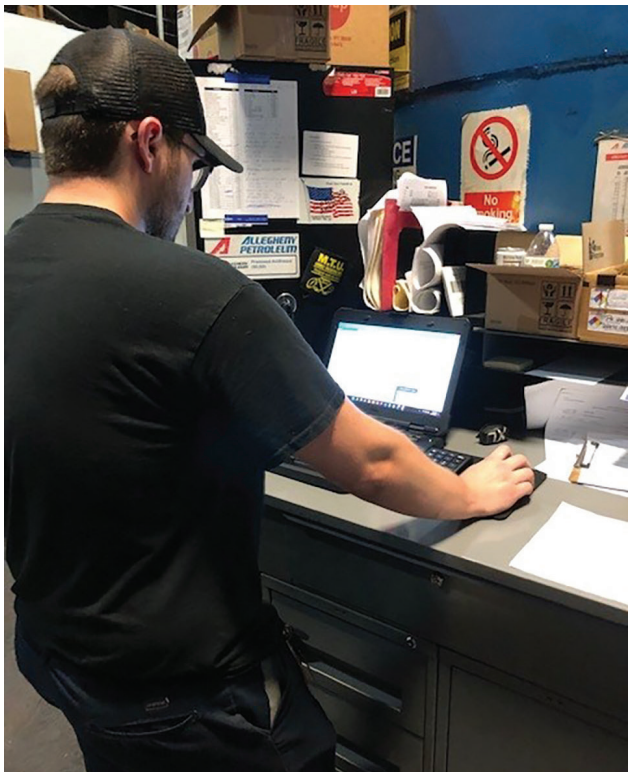
AI and ML can automate a wide range of activities on the manufacturing side as well. "I think AI and ML are already having a big impact on manufacturing, and we're only scratching the surface at this point," said Douglas Salas, chief technology officer of Datacor Inc.

Allegheny Petroleum is using AI and ML for analytics to maximize bulk tank efficiency and detect leaks at customers' locations. "We are working on better algorithms to warn humans of potential conditions such as tank leaks or unusual level change patterns," Sandoe said.

Datacor has been leveraging optical character recognition technology plus a proprietary ML algorithm to automate the accounts payable process for customers. "Invoices received by users of our products can automatically be processed by our software; all relevant, human-readable data is extracted from the invoice; and an automated matching process instantaneously produces voucher data in our core ERP [enterprise resource planning software]," Salas said.

The software learns over time to recognize invoice types and where to extract pertinent information. With continued use, the software reaches nearly perfect accuracy rates. "This process would have typically required a human to manually identify key fields on a paper invoice, perform entry of this data into the ERP system and conduct manual matching to purchase order," Salas said. "Each of these steps are time consuming and introduce a high probability for human error."

AI and ML can also provide value around pricing analytics. "With large volumes of transactional data passing



An Allegheny Petroleum Products production team member works on real-time data entry.

through our systems, we are able to provide insights that can drive changes to pricing, delivering measurable increases in revenue," Salas said.

Using AI and ML, Datacor's system can look for patterns in pricing, volume and mix. "We can identify products that may have stale or unchanged pricing, and we can catch and highlight products that may have seen increases to the raw components that make up the product but don't reflect accurate pricing for these increases," Salas said.

It's not uncommon for a business that manufactures many different products to have a poor handle on pricing and margins, particularly for lower-volume customers, Salas explained. "With frequent changes to the cost of goods sold, it becomes very difficult to track and maintain margins," he said, adding that there is simply too much data, which is changing constantly, to rely on simple reports and human attention. "We can leverage AI and ML to bring focus to those products and prices, which can have a big impact on the bottom line."

Salas said there are obvious areas where AI and ML can have a significant impact on predictive maintenance in manufacturing. That is because the data sets that can be used to train ML algorithms are being amassed as a regular part of operations. For example, chemical products being built

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***Douglas Salas**, Chief Technology Officer, Datacor Inc.*

as part of a standard or custom batch process are constantly passing through quality checks and step analysis. "Data is collected at all stages of the manufacturing process, and this data can be used with AI to inform our customers when equipment is needing service, is producing batches with characteristics that may indicate pending equipment failures, or simply exhibits patterns that suggest maintenance or inspection is required," he said. "ML algorithms leveraged against large data sets like this one provide insight into maintenance concerns that would otherwise go undetected by human view reports or inspections of produced products."

Adapting to Change

While new technology and AI and ML can create new efficiencies, companies must focus on change management as well.

Kudis said Allegheny Petroleum has experienced a drive for real-time data entry at all levels of production and administration. "It sounds like a simple concept that creates efficiencies and eliminates opportunity for errors, but like with everything, there was a lot of resistance to change at first," she said. "Once we got past the learning curve, fear of technology and some resistance, it has turned out to be beneficial and really has brought people together teaching each other and self-discovery of the capabilities of our systems."

Adopting new technology and driving change can be a slow process. "None of this happens overnight. There is rarely an off-the-shelf plug-and-play solution without a lot of research, collaboration, planning, training, implementation, etc.," Kudis said. "We have made a commitment to continuous improvement, so we just take things one step at a time, and over a number of years, we have really come a long way in our use of technology."

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