Celebrating 70 Years

NEW JERSEY BUSINESS MAGAZINE

OCTOBER 2024 | NJBMAGAZINE.COM

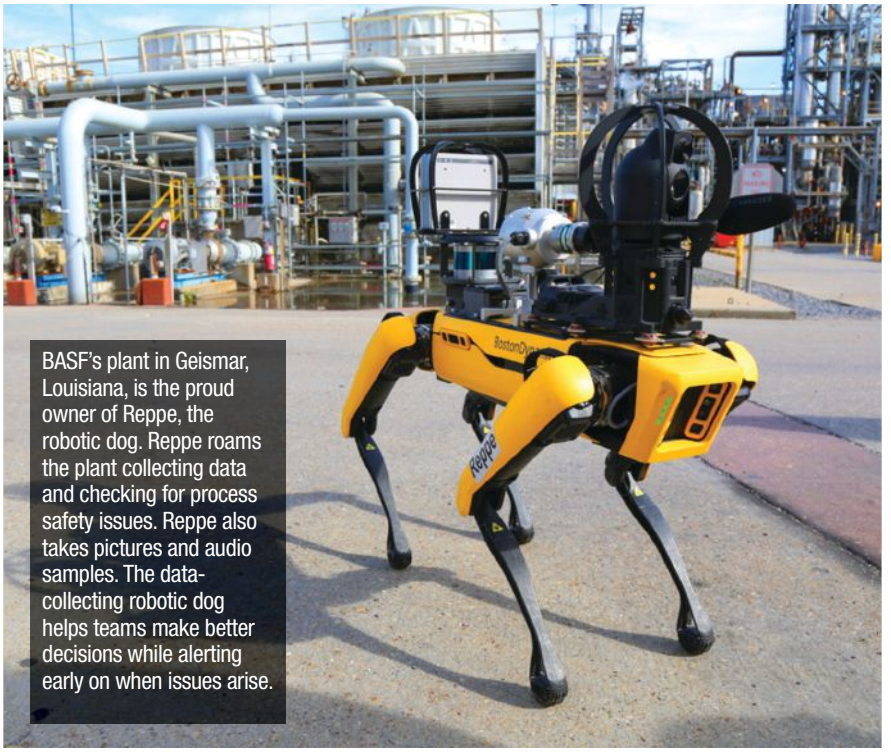
Manufacturing
Special Section p.45

The Senatorial Battle: Bashaw vs. Kim

NJBIA's Siekerka's Decade of Diligence

PAGE 20

POWERED BY NJBIA | EST. 1954 | $3.00



BASF's plant in Geismar, Louisiana, is the proud owner of Reppe, the robotic dog. Reppe roams the plant collecting data and checking for process safety issues. Reppe also takes pictures and audio samples. The data-collecting robotic dog helps teams make better decisions while alerting early on when issues arise.

Shaping Manufacturing's Future with Technology

Discover how AI, SMART technologies, 3D printing and other innovations are revolutionizing the manufacturing industry.

By Larry Feld, Contributing Writer

Manufacturing is constantly evolving, and technological innovations have arguably been the disruptive catalyst for most advancements since the electrification of the factory floor. Today, technology is also changing with increasing speed thanks to the emergence of artificial intelligence (AI) and SMART technologies (an acronym for self-monitoring, analysis, and reporting technology), which are fundamentally changing how we live and create.

From smartphones delivering GPS-accurate driving directions while adjusting to real-time traffic issues using a calming voice, to ALEXA devices delivering music and correctly answering any question imaginable, SMART technology is elevating convenient living.

According to Geeksforgeeks.org, SMART technology uses AI, machine learning, and big data analysis to provide cognitive awareness to objects that were once considered inanimate.

According to the 9th Annual State of Smart Manufacturing Report, published recently by Rockwell Automation, 95% of manufacturers surveyed report using or evaluating SMART technology, up from 84% a year prior. The organization spoke to executives at more than 1,500 manufacturers globally, including 64% representing companies with over $1 billion in revenues.

BASF

For example, at the North American headquarters of BASF Corporation in Florham Park, the company relies heavily on SMART manufacturing. Its "Verbund" (a German word that means combine, cooperate, association, or composite) production facilities and technologies are intelligently connected to ensure they efficiently use resources and minimize waste. According to the company, production, energy flow, logistics, and infrastructure are networked together, allowing efficient value chains from basic chemicals to highly refined products.

BASF also uses digital tools to improve maintenance efficiencies, optimize manual work processes, and improve asset utilization. Drones, for example, are being employed to inspect hard-to-reach places like internal vessels, flare tips, and pipe racks. According to the company, drones help BASF increase safety and efficiency.

Although larger companies appear to be grasping SMART technologies, smaller companies – while embracing automation and 3D printing technologies – may not be incorporating AI so far.

Marotta Controls

"AI has not penetrated our process yet," says Steve Fox, senior vice president, power and actuation systems at Marotta Controls, an 81-year-old Montville-based manufacturer of control systems used in aerospace, marine, tactical, and space industries. "Now, our use of automation is a different story. We have been successful in automating our testing processes. As a result, what used to take a few hours is now taking about 15 minutes," he says, adding that many of the company's machine tools are also employing automation.

"Eventually, AI will help us with tool machining by helping us automatically adjust for wear in the tools," Fox

notes. He also admits that AI has been a welcomed advancement in office productivity software.

NJIT

At the New Jersey Institute of Technology (NJIT) in Newark, today's engineering students are introduced to a hands-on experience from the beginning of their academic journey.

The institution has also invested in a 25,000-square-foot manufacturing laboratory it calls Makerspace. Equipped with nearly $6 million in the latest manufacturing machinery, Makerspace is an immersive kitchen of sorts where students explore their creative design ideas while developing hands-on expertise with the latest systems, equipment, and techniques.

"We built the Makerspace at NJIT with the clear understanding that there is a new way to manufacture, which is different than classical manufacturing," notes Moshe Kam, dean of NJIT's Newark College of Engineering. "We need students to have direct access to these new materials and machinery; not just simulate them, and not just have them do computations. We want them to have an opportunity to train themselves on these new technologies," Kam says.

Besides training the next generation of engineers, NJIT is also utilizing the Makerspace to help local small manufacturers with workforce development. It offers certificate programs for workers to acquire hands-on experience and training on the latest equipment.

"Small manufacturers are sending us students for training," Kam notes. "We are getting positive feedback that students [we send back] are ready to work on Day One with the machinery. We are giving them hands-on experience on these advanced machines," he explains.

According to Sam Lieber, associate professor and acting chair of the School of Applied Engineering and Technology and a maker-mentor at Makerspace, the facility has sparked tremendous growth in NJIT's workforce development programming.

"Makerspace has contributed to the development of several workforce development programs offering credentialling at several levels. In particular, we have a workforce development program for both high school students and displaced workers who are

acquiring new skills by learning how to operate computer-driven equipment," Lieber says.

3D Printing

One technology currently altering turnaround times and transforming the improvement process for components is 3D printing. At a time when supply chain security is a concern, 3D printing is also a way to bring some component manufacturing back home.

"With 3D printing, we can fine-tune designs and make small engineering improvements to a part without wasting a $100,000 mold casting," explains Daniel J. Brateris, executive director of experiential learning at NJIT.

Besides offering rapid change, 3D printing is also innovating how materials are used.

Montville-based Marotta Controls develops its own automated test equipment to help clients and suppliers improve the speed of quality assurance testing of components.

"We are using 3D printing to create a product being used in submarines," adds Marotta's Fox. "It is the first 3D printed part approved by the Navy. The part is extremely sophisticated; it is essentially like a layer cake of different materials, and in this instance, 3D printing was the only way to produce it."