

New skills are required, and new roles created, through automation solutions

Robotics

Paving the Way for NextGen Careers

Robotic arms used for roboforming at a Machina Labs factory. Leveraging precise industrial robotics and AI-driven process control, roboforming rapidly shapes sheet metal into large, complex parts that are extremely expensive and slow to produce with conventional manufacturing tools. (Provided by Machina Labs)

A large, bright orange industrial robotic arm is the central focus of the image. It is mounted on a black base and is positioned in a factory or workshop environment. The background shows various industrial elements like pipes, lights, and another robotic arm. The lighting is bright, highlighting the metallic and plastic surfaces of the robot.

Brad Marley
Contributing Editor

Robots have been used in industrial settings since the 1950s, and ever since they have played a key role in helping manufacturers improve efficiency, productivity and quality. Robots can work long hours in extreme conditions without breaks, and they can be programmed to handle tasks that are too difficult or dangerous for people.

But, of course, where there are robots, there is also a need for human expertise in the form of programmers and engineers to make it all work seamlessly.

Expanded Roles and Career Paths

According to the International Federation of Robotics, the global stock of industrial robots grew

from 1 million units in 2011 to 3.5 million in 2021. This is due to a variety of factors including innovations in technology and decreasing costs of robotic solutions. This influx of new hardware and software creates an abundance of jobs that require advanced technological knowledge and problem-solving skills. The factory of the future will be staffed by robots and the humans who work alongside them to ensure the factory operates at peak efficiency.

To keep up with demand, companies are seeking highly skilled robotics engineers with expertise in areas such as machine learning (ML), control systems, artificial intelligence (AI) and computer vision, who can design, develop and maintain robots, as well as ensure their safety and efficiency.

WORKFORCE DEVELOPMENT

The Bureau of Labor Statistics reports that the demand for robotics engineers is expected to grow by 9% from 2020 to 2030, which is faster than the average growth rate for all occupations. This growth can be attributed to the ever-increasing use of robots in industries such as manufacturing, as well as healthcare and aerospace/defense.

The average salary for a robotics engineer in the United States is about \$100,000, while the average salary for a robotics technician, which requires less education and training, is about \$70,000, according to the Bureau. The two roles exemplify sustainable career options, countering the notion that manufacturing is an archaic industry offering menial jobs with limited income potential.

This is likely music to the ears of Gen-Zers, also known as the digital natives, who are joining the workforce. By demonstrating career paths that align to technology, automation can go a long way to attract a new generation to manufacturing.

Leaning into Human Intelligence

There is no replacement for human intelligence. Even the best robots on the shop floor are only capable of doing what they are programmed to do. While machines can be superior when it comes to heavy lifting, humans are driving the implementation of consistency and precision in handling repetitive tasks.

“If manufacturers seek to get the most out of their automation investment, they need to understand where human intelligence provides the highest value,” says

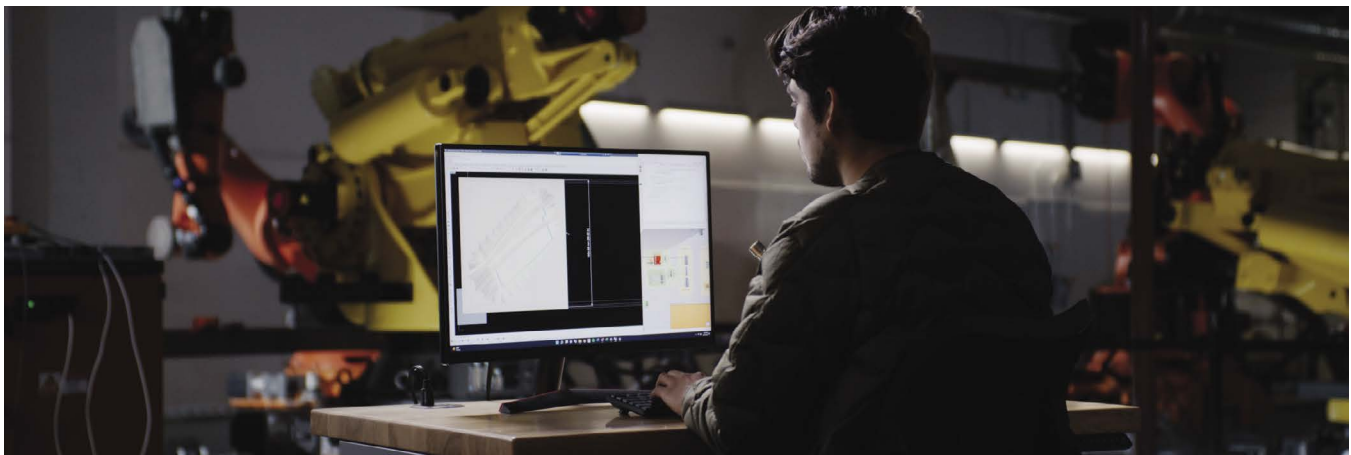
Anthony Moschella, senior vice president of product management, Vecna Robotics Inc., a flexible material handling automation company based in Waltham, Mass. Moschella is buoyed by the promise of an intelligent industrial workforce that drives transformational efficiency. He says it starts with a virtual handshake between humans and robots that acknowledges the benefits and best features of both to boost manufacturing.

It also relies on the continued improvement of autonomous technology driven by cloud infrastructure and the “network effects” of deploying robots as a cohesive system, with humans in the mix. At the end of the day, Vecna Robotics asserts that industry leaders in material handling will win on data and the ability to optimize workflows between skilled workers and intelligent automation systems.

Individuals who were once given mundane tasks, such as lifting and welding, might manage a fleet of robots doing those same tasks on the shop floor today. Those robots need the intelligence of humans to select the right workflows and ensure they are as efficient as possible.

These tasks, which are defined as “low value,” are ideal for robots because they don’t require a nimbleness that robots don’t possess. When humans are responsible for the work, it costs too much to shift workflows.

“Human intelligence is too valuable to waste on repetitive tasks that could cause injury or worse,” says Moschella. “If a company wants to deploy robots, they should start small and see how robots and automation can be weaved into the fabric of their manufacturing process.”



Roboforming from Machina Labs is derived from software, not molds or dies.

Safety Meets Sci-Fi on the Shop Floor

Robots are ideal to take on jobs that humans can't do or don't want to do. This is the work that requires hours of concentration, causes fatigue, sets the stage for potential human error or injury and, in rare cases, death.

According to the National Safety Council, the most common injuries across U.S. manufacturing are:

- Contact with objects and equipment (34%)
- Overexertion and other bodily reactions (32%)
- Falls, slips and trips (18%)
- Repetitive motion (6%)
- Exposure to harmful substances or environments (5%)

Companies such as Sarcos Robotics Corp., based in Salt Lake City, are designing, developing and manufacturing a broad range of advanced mobile robotic systems that redefine human possibilities and enable safe and productive workforces.

"Most manufacturers are having a hard time filling the jobs that are considered dull, dirty and dangerous, so it's become apparent those jobs should be replaced with automation," explains Kristi Martindale, chief product and marketing officer, Sarcos Robotics. "By doing so, we can market to a younger generation with manufacturing careers steeped in high-tech that are more appealing to this segment of the workforce."

Sarcos has built a product called the Guardian XO, which is a full-body exoskeleton that an employee can climb into, facilitating the melding of human intelligence with the power and precision of a machine. It allows humans to complete heavy-duty tasks that can't be done by a fully autonomous machine, while reducing the risk of serious injury.

Because many shop floor injuries are due to repetitive work or lifting heavy, awkwardly shaped items, exoskeletons can be the perfect complement humans need to get more work done, while enticing those who may never have considered manufacturing to look at it more closely.

"Robots are the great equalizer for the manufacturing workforce because they don't care who is operating them," says Martindale. "Robot operator is a new career that has recently come to the forefront, and we're seeing a lot of promise as to how it can be deployed across the workforce to attract new workers."

Next Gen Factories Require Reskilling

Machina Labs, a Chatsworth, Calif.-based startup founded in 2019, aims to revamp centuries-old manufacturing by combining the latest in robotics and AI to build the next generation of factories. The industrial tech company supports the idea of a more diverse workforce as a way to not only open up manufacturing prowess, but pave the way to bring more manufacturing jobs back to the U.S.

"When we introduce robotics into the (manufacturing) game, we are enabling economics that make it possible to do manufacturing well in the United States again," asserts Ed Mehr, CEO and co-founder, Machina Labs. "There is a lot of talk about robots replacing humans, but the real conversation should center around what hiring will look like when we have more automation at our fingertips."



The Guardian XO full-body exoskeleton makes light work of heavy-duty tasks, empowering the operator to safely lift and manipulate up to 200 pounds (90 kilograms) without fatigue or strain.

But, Mehr believes reskilling is necessary. This is supported by the World Economic Forum (WEF) "Future of Jobs Report 2023," which states that within companies surveyed, the majority of the fastest growing roles are technology-related jobs related to AI, ML and business intelligence. The report reveals that six in 10 workers will require training before 2027, but only half of workers have access to adequate training opportunities today. The highest priority for skills training from 2023-2027 is analytical thinking, which is set to account for 10% of training initiatives, on average.



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“We can’t hire the people we need right now because there are not enough people available with these specific skills,” Mehr notes. “In order to meet demand, manufacturing companies need to start thinking about how they can help improve skillsets to better meet their needs.”

Automation is designed, in part, to help manufacturers become more profitable, expand, explore new markets or products, and be able to bring on new staff to meet the evolving needs of their customers.



The **Guardian XO** is the first battery-powered industrial robot to combine human intelligence, instinct and judgment with the power, endurance and precision of machines.

A modern manufacturing facility requires the skilled workers who can orchestrate the shop floor, manage workflows and maintain an optimal balance of human and machine.

When manufacturing merges the best of human intelligence and the best of robotic and automation solutions, the industry will realize the potential for optimal production, quality and profitability, as well as the exciting career opportunities that enable people to learn, and earn, for years to come. 📶

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