



Five ways automation will change

the manufacturing workforce

While the U.S. manufacturing industry is still the largest in the world, it has steadily been losing ground in the global market. However, investing in automation will improve U.S. manufacturers' competitive positioning and pave the way for more innovation. Automation will also inevitably have an impact on the workforce. It will eliminate some jobs, modify others, and create new ones.

To ensure America's position as the industrialized world leader, we need to start building a skilled workforce that's ready to fill manufacturing jobs of the future.

Here you'll read about the significant role manufacturing plays in the U.S. economy, and the five ways automation will ultimately change the manufacturing workforce.

A large industrial robotic arm is shown in the process of welding a metal component. The robot is white and has a long, articulated arm. It is positioned over a worktable where a metal piece is being welded. A bright, intense light is visible at the point of contact between the robot's tool and the metal, with a large spray of bright orange sparks emanating from the weld. The background is dark and industrial, with various structural elements and pipes visible. The overall scene is lit with a strong blue and green tint, giving it a futuristic or high-tech appearance.

01 Manufacturing: an essential component of the U.S. economy

01 MANUFACTURING: AN ESSENTIAL COMPONENT OF THE U.S. ECONOMY

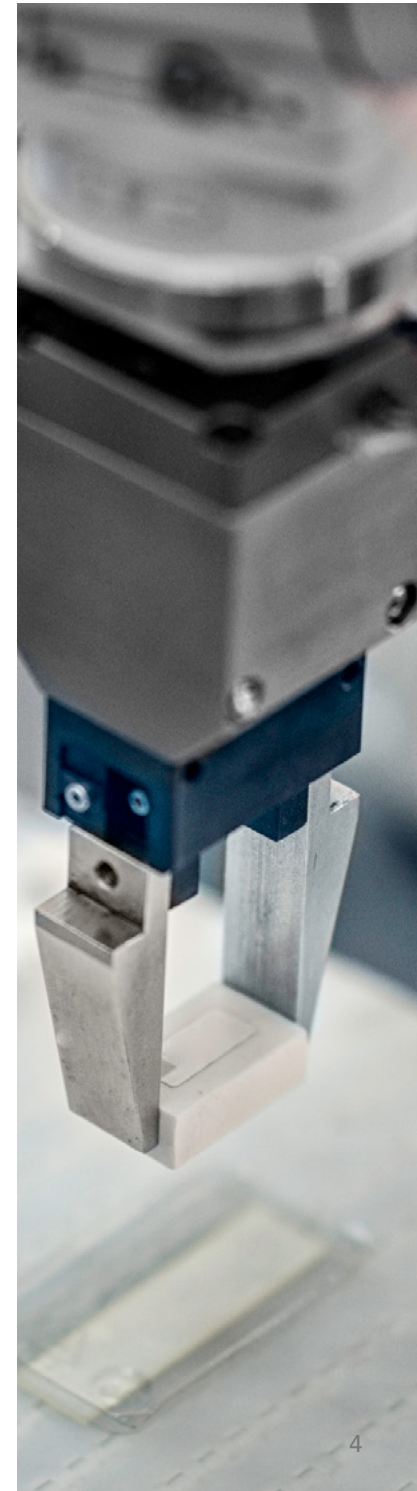
The manufacturing industry remains an essential component of the U.S. economy. In 2018, manufacturing comprised 11.6 percent of the U.S. GDP and contributed \$2.18 trillion to our economy.^[1] Every dollar spent in manufacturing adds another \$1.81 to the economy because it contributes to development in auxiliary sectors such as logistics, retail, and business services. Interestingly, according to recent research, manufacturing could constitute as much as 33 percent of the U.S. GDP if both its entire value chain and production for other sectors are included.^[2]

In 2018, manufacturing contributed \$2.33 trillion to our economy, trending up. 2018 also saw the largest increase in manufacturing jobs in 21 years, adding 248,000 new manufacturing positions to the industry.

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Research from the Bureau of Labor Statistics shows that employment in manufacturing has been trending up since January 2017. Currently, the manufacturing industry employs 12,750,000 people, which equals more than nine percent of the U.S. workforce.^[4]

Nonetheless, many experts are concerned that these employment gains are soon to be halted by the ever-rising adoption of automation. Yet automation is inevitable—and like in the previous industrial revolutions, automation is likely to result in job creation in the long term.



02 The benefits of investing in automation

02 THE BENEFITS OF INVESTING IN AUTOMATION

In an attempt to create more jobs, the new administration is reassessing free trade agreements, leveraging tariffs on imports, and promising tax incentives to manufacturers to keep their production plants in the U.S. Yet while these measures are certainly making the U.S. more attractive for manufacturers, they're unlikely to directly increase the number of jobs in the sector. What it will do, however, is free up more capital for manufacturers to invest in automation. This will have the following benefits:

- **Automation will reduce production costs and make U.S. companies more competitive in the global market.** High domestic operating costs—in large part due to comparatively high wages—compromise the U.S. manufacturing industry's position as the world leader. Our main competitor is China, where low-cost production plants currently produce 17.6 percent of the world's goods—just 0.6 percent less than the U.S.^[5] Automation allows manufacturers to reduce labor costs and streamline processes. Lower manufacturing costs results in lower product prices, which in turn will increase demand.

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- **Automation increases productivity and improves quality.** Smart manufacturing processes that make use of technologies such as robotics, big data, analytics, sensors, and the IoT are faster, safer, more accurate, and more consistent than

traditional assembly lines. Robotics provide 24/7 labor, while automated systems perform real-time monitoring of the production process. Irregularities, such as equipment failures or quality glitches, can be immediately addressed. Connected plants use sensors to keep track of inventory and equipment performance, and automatically send orders to suppliers when necessary. All of this combined minimizes downtime, while maximizing output and product quality.

- **Manufacturers will re-invest in innovation and R&D.** Cutting-edge technologies such as robotics, additive manufacturing, and augmented reality (AR) are likely to be widely adopted within a few years. For example, Apple® CEO Tim Cook recently announced the tech giant's \$1 billion investment fund aimed at assisting U.S. companies practicing advanced manufacturing.^[6] To remain competitive, manufacturers will have to re-invest a portion of their profits in R&D. An important aspect of innovation will involve determining how to integrate increasingly sophisticated technologies with human functions to create highly effective solutions that support manufacturers' outcomes.

Technologies such as robotics, additive manufacturing, and augmented reality are likely to be widely adopted soon. To remain competitive, manufacturers will have to re-invest a portion of their profits in R&D.

03 The impact of automation on the U.S. manufacturing workforce

A man wearing a yellow hard hat and a high-visibility yellow safety vest over a dark sweater is looking down at a tablet computer. He is in a factory or industrial setting, with blurred machinery and equipment in the background. The image has a blue tint.

03 THE IMPACT OF AUTOMATION ON THE U.S. MANUFACTURING WORKFORCE

Automation doesn't mean the end of American manufacturing jobs, but it does mean that the nature of the work will change dramatically. It will affect the manufacturing workforce in the following five ways:

1. Certain jobs will be eliminated. Recent research by the McKinsey Global Institute shows that only five percent of all jobs are likely to disappear completely due to automation. Roles that don't require specialized training or higher education and those that consist of repetitive, routine physical tasks are at the highest risk of being automated. In manufacturing, this includes low-level assembly line work, as well as occupations such as welders, solderers, and cutters.^[7]

Naturally, as machine learning accelerates, it's possible that more jobs will be eliminated in the future. In addition, by 2025, 3.5 million jobs will be created in manufacturing—yet due to the skills gap, an astounding 2 million will remain unfilled.^[8] Without the right talent, automation will be the only way manufacturers can move forward.

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2. Current jobs will be modified. In 60 percent of all occupations, 30 percent of the tasks can be automated.^[7] This shows that at least in the beginning phases of Industry 4.0, automation will change workers' job responsibilities by primarily providing an auxiliary function. As a result, employers will expect employees to shift their focus away from routine tasks and do more productive things with their time. For example, a robot can easily fetch, lift, and put parts in place so a worker can perform the precision work needed to assemble them correctly.

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3. New jobs will be created. There are several ways automation will create new jobs. First, lower operating costs will make U.S. products more affordable, which will result in rising demand. This in turn will increase production volume and create more jobs. Second, while automation can streamline and optimize processes, there are still tasks that haven't been or can't be fully automated. Supervision, maintenance, and troubleshooting will all require a human component for the foreseeable future. Third, as more manufacturers adopt new technologies, there's a growing need to fill new roles such as data scientists and IoT engineers. Fourth, as technology evolves due to practical application, new roles that integrate human skills with technology will be created and quickly become commonplace.

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4. There will be a skills gap between eliminated jobs and modified or new roles. Manufacturing employers are already struggling to find qualified workers due to the existing skills gap. Workers who lose their jobs to automation won't possess the skills needed for modified or new roles, and those whose roles are going to change will require additional training. Manufacturers must find quick and effective ways to bridge the skills gap and bring their existing workforce up to speed.

Part of this involves investing in retraining and upskilling existing talent. Since technology is evolving at such a rapid pace, this will be an ongoing necessity—one that employers should take into account in their workforce development strategies. At the same time, manufacturers should partner with educational institutions that offer vocational training in STEM fields. By offering students on-the-job training, they can foster a skilled and loyal workforce.

Finally, since automation can't yet create or innovate, employers need to recruit for critical-thinking skills and innovation. Engineers typically possess some or all of these abilities, but for most, manufacturing hasn't been a first-choice industry. Now, with exciting technological advancements and the need for continuous innovation, manufacturers stand a better chance of attracting and retaining top engineering talent.

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5. The manufacturing workforce will keep evolving. While it's impossible to predict what new technologies will be developed, manufacturers must ensure their workforce keeps pace. This begins with being aware of the various technological advancements, how they can be implemented to achieve operational objectives, and how they're impacted by policy developments. Advocacy groups like the [National Association of Manufacturers](#) can help companies remain informed about these matters.

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In addition, manufacturers must invest in talent acquisition and development—both to build expertise in-house and to facilitate continuous innovation. Since manufacturers don't necessarily have in-house expertise regarding evolving workforce trends and attracting top talent, hiring a workforce solutions partner can be a strategic decision that frees employers up to focus on their core business.



04 Building the manufacturing workforce of the future starts now



04 BUILDING THE **MANUFACTURING** **WORKFORCE** OF THE FUTURE STARTS NOW

Clearly, automation will have far-reaching effects on manufacturing. To remain competitive in the global market, we must establish a high-innovation, high-wage economy where technological advancements don't simply replace current jobs, but instead create new ones—and perhaps even new industries.

That's why it's essential for employers to proactively prepare for these changes to ensure that the U.S. has a workforce that's skilled, nimble, and most of all, motivated to fill its manufacturing jobs of the future.

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Laura has a Bachelor of Science in engineering and is active with SME and Society of Automotive Engineers. Across her career, she has also been involved in several global collaborations, which has helped her gain the powerful global engineering solution skills she has today.



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SOURCES:

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