

**Taking charge:
Manufacturers support growth
with active workforce strategies**

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Introduction

As the industry grows, manufacturers are actively investing in attracting and retaining employees, drawing on innovation and an ecosystem approach to help improve the worker experience.

Key takeaways from the 2024 Deloitte and The Manufacturing Institute Talent Study

01

The US manufacturing industry has emerged from the COVID-19 pandemic on a strong growth trajectory and manufacturers studied indicated that, overall, they expect continued growth over the next 10 years as they work to meet evolving customer demands, de-risk their supply chains, and leverage government incentives and policies.

02

Deloitte and The Manufacturing Institute found that there could be as many as 3.8 million net new employees needed in manufacturing between 2024 and 2033, and that around half of these jobs (1.9 million) could remain unfilled if the talent conundrum is not solved.

03

Higher-level skills will likely be required as manufacturers continue their journey toward Industry 4.0, which could add to the skills gap. But tight labor markets have also created an applicant gap, which has challenged manufacturers' ability to fill roles across all skill levels.

04

Manufacturers seem to be commonly applying a "customer focus" to their workforce to help understand worker needs and design innovative solutions to create a better worker experience and improve retention.

05

Many manufacturers seem to be investing in partnerships and taking a regional ecosystem approach to build their talent pipeline and attract and upskill the workers that they need.

Source: 2024 Deloitte and The Manufacturing Institute talent study.

About the 2024 Deloitte and The Manufacturing Institute Talent Study

In December 2023, Deloitte and The Manufacturing Institute embarked on their sixth manufacturing talent study in more than two decades (hereafter referred to as the "study"). The study involved an online survey of more than 200 US manufacturers, interviews with more than 10 senior executives from manufacturing organizations of all sizes and across all sectors, and an extensive collation of secondary data on labor supply and demand.

- Supported by Deloitte's economics team, the study conducted proprietary analysis on labor supply and demand data to explore the potential impact of unfilled jobs on the nation's economy.
- The study also includes extensive analysis of data comprising manufacturing job descriptions and analysis of growth trends.
- Research included a targeted analysis of over 80 manufacturing companies' annual reports and investor presentations.

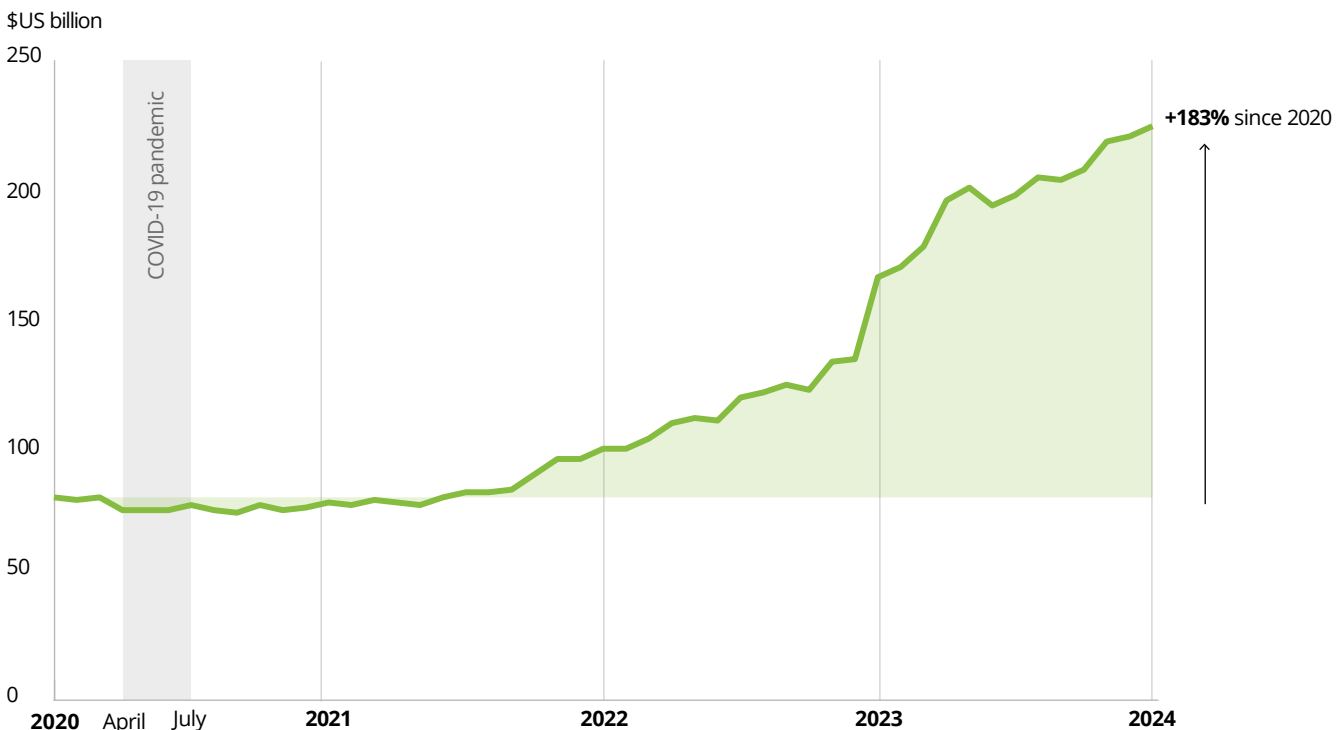
Strong growth in US manufacturing, even as talent challenges persist

The US manufacturing industry is experiencing strong growth. Manufacturing employment has surpassed pre-pandemic levels and stands close to 13 million as of January 2024.¹ The number of manufacturing establishments in the United States grew by more than 11% between the first quarter of 2019 and the second quarter of 2023, approaching 393,000 by the end of the period.² Construction spending in manufacturing—that is, dollars invested to build new or expand existing manufacturing facilities—has nearly tripled since June 2020 and was up 37% year over year in January 2024 when it reached a record high of US\$225 billion (figure 1). Even as average lead times have declined since the pandemic,³ the desire to de-risk supply chains and establish facilities closer to US customers has continued to drive investment from domestic and foreign manufacturers.⁴

Legislation and policy have also played a role. Deloitte analysis of government data as of September 2023 indicates that nearly 300 new clean technology and semiconductor and electronics

manufacturing facilities have been announced and are planned for completion by 2031,⁵ spurred in part by the Infrastructure Investment and Jobs Act (IIJA), the Inflation Reduction Act (IRA), and the Creating Helpful Incentives to Produce Semiconductors (CHIPS) Act. These projects represent over US\$430 billion invested and include announcements of more than 234,000 new manufacturing jobs to be created.⁶ The US Department of Defense launched its National Defense Industrial Strategy in January 2024 to guide investment and support the development of a modern and innovative defense industrial ecosystem. The overarching goals are to improve supply chain resiliency, enhance acquisition flexibility, develop the requisite workforce, and elevate the technological preparedness of the defense industrial base over the next three to five years.⁷ These combined efforts seem to signal a positive outlook for the manufacturing sector, with potential implications for innovation, supply base expansion, job creation, and overall industry resilience in the United States.

Figure 1. Total construction spending in manufacturing has grown significantly in recent years



Source: Deloitte analysis of data from US Census Bureau.

Workforce issues remain a leading concern for manufacturers: A skills gap and an applicant gap

Alongside this potential growth, the 2024 *Deloitte and MI Talent Study* identified another trend: There is not just a skills gap, but notably a gap in applicants for open positions in manufacturing. Three important themes, in particular, stood out in the study:

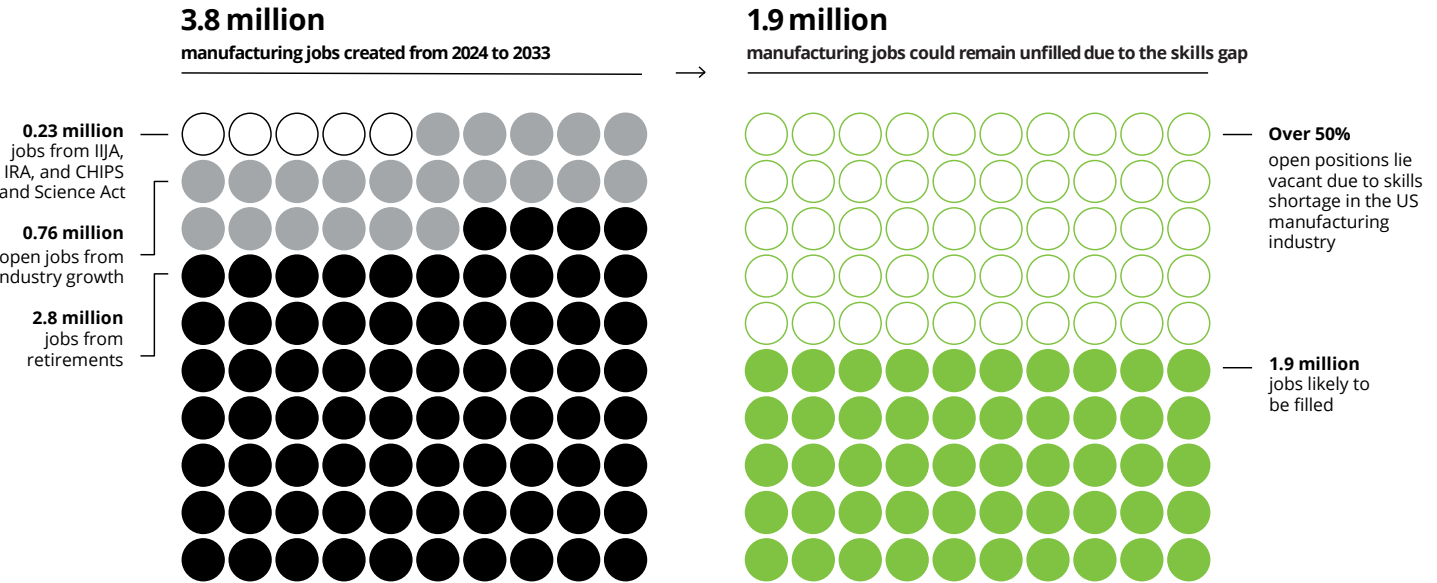
1. Industry growth is driving the need for more workers of every type—from entry-level associates to skilled production workers to engineers.
2. Skill requirements are evolving and are spread between technical manufacturing skills, digital skills, and soft skills.
3. There is a shortage of potential candidates applying for positions—whether skilled or unskilled—and manufacturers need to retain the valuable talent they have.

Attracting and retaining talent is the primary business challenge indicated by over 65% of respondents in the National Association of Manufacturers’ (NAM) outlook survey for the first quarter of 2024.⁸ Workforce challenges have also been the top concern for manufacturers surveyed by NAM since the fourth quarter of 2017, with the exception of the pandemic.⁹ This timing coincides with the first instance when total job openings in the United States exceeded the number of unemployed Americans.¹⁰ This phenomenon is

partly due to longer-term economic factors, such as the declining population growth rate and the decreasing labor force participation rate, which has trended lower on demographic factors, including increased retirements.¹¹ In addition, even though December 2023 quit-rate data suggests some improvement as they approach pre-pandemic levels, employee turnover rates remain elevated,¹² posing a challenge for manufacturers. This could be partly attributable to the increased caretaking responsibilities many Americans of working age are facing since the pandemic,¹³ and also to the higher numbers of millennials and Generation Z workers joining the workforce,¹⁴ who bring a different set of expectations.¹⁵

Even with some recent cooling, the labor market remains tight, and the resulting applicant gap may continue. This could impact the ability of manufacturers to fully capitalize on this recent growth in public and private investment. **The net need for new employees in manufacturing could be around 3.8 million between 2024 and 2033. And, around half of these open jobs (1.9 million) could remain unfilled if manufacturers are not able to address the skills gap and the applicant gap¹⁶** (figure 2).

Figure 2. An estimated 1.9 million open positions may prove difficult to fill by 2033



Source: Deloitte analysis of data from US Bureau of Labor Statistics and estimates of private investments from Invest.gov.

Evolving skill requirements complicate the search for talent

This potential growth in the manufacturing sector appears to be creating demand for more employees across the board, even amid a historically tight labor market.¹⁷ Moreover, the growth in construction jobs fostered by policy incentives may intensify competition for welders, electricians, and other trades, which could exacerbate the imbalance in labor supply and demand in manufacturing. Further complicating the picture is the evolving landscape of skill requirements and the rearchitecting of roles that is likely to be required as manufacturers continue their journey toward the smart factory and Industry 4.0.

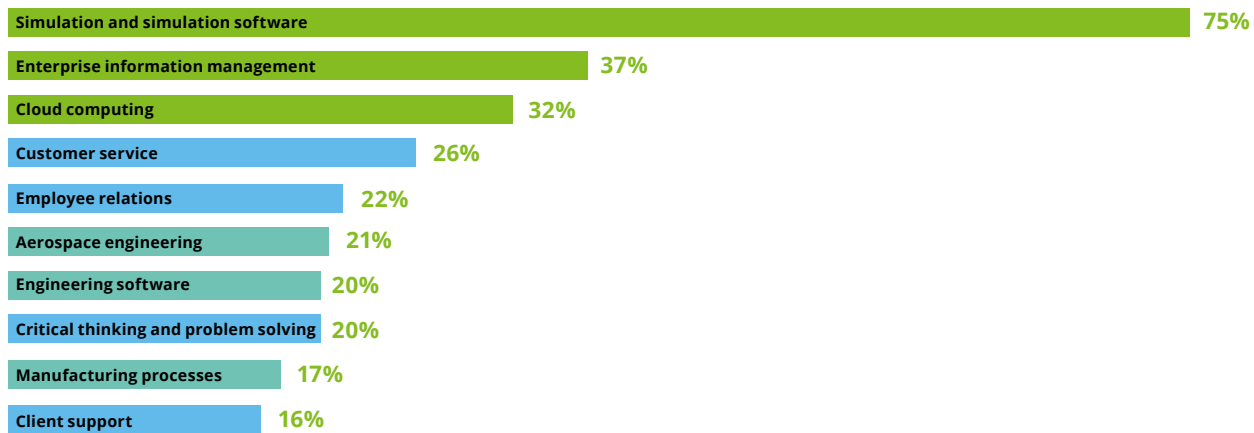
Evolving skill sets in manufacturing

The World Economic Forum's 2023 *Future of Jobs* report highlights that 40% of the current skill requirements in advanced manufacturing will evolve over the next five years.¹⁸ Manufacturers are prioritizing the development of these top three skills over the next five years: leadership skills, digital skills, and soft skills.¹⁹

To better understand the growing breadth of evolving skills that manufacturers are seeking, we analyzed the past five years of job posting data.²⁰ The research found a 75% increase in demand for simulation and simulation software skills, sought mostly for technology-enabled production or testing roles (figure 3).

Figure 3. A combination of digital skills, soft skills, and high-level technical skills show the fastest compound annual growth rates in manufacturing between 2019 and 2023

Compound annual growth rates of fastest growing major skill categories



Examples of specific skills listed under each major skill category

Simulation and simulation software	Enterprise information management	Cloud computing	Customer service	Employee relations
Computer simulation	Corporate data management	Cloud administration	Customer engagement	Diversity programs
Digital twin	Enterprise content management	Cloud application development	Customer experience strategy	Employee engagement
Dynamic simulation	Information governance	Cloud engineering	Customer experience improvement	Employee satisfaction
Real-time 3D	Knowledge management	Cloud security	Rapport building	Employer brand marketing
Virtual prototyping			Customer relationship building	Cultural assimilation
Aerospace engineering	Engineering software	Critical thinking and problem solving	Manufacturing processes	Client support
Aerodynamics	CAD programs	Analytical skills	Additive manufacturing	Aftersales
Aerostructure	Civil engineering software	Analytical thinking	3D printing	Client services
Aircraft design	Plant design systems	Brainstorming	Machining	Customer empowerment
Aircraft electronics		Change agility	Manufacturing execution systems	Customer success management
Flight control systems		Creative and complex problem-solving	Smart factory	Product support
		Innovation	Process specification	Service quality management
		Logical reasoning		
		Strategic thinking		

Customer service and client support skills showed significant upticks in demand as well, and this trend is likely to continue as manufacturers increase digital interactions with customers and expand their aftermarket services. The growing focus on employee relations skills has likely resulted from manufacturers' efforts to develop a worker-friendly environment and a dedication to hiring from more diverse talent pools.²¹ Manufacturing-specific skills, including those related to advanced processes like 3D printing, as well as cloud-based enterprise resource planning (ERP) solutions, have also experienced gains. The growth in demand for soft skills like critical thinking, problem-solving, and creativity tend to underpin many of the other skills that have shown the greatest gains, like customer service, simulation, and manufacturing processes.

Digital skills are important according to surveyed manufacturers, but soft skills are a necessary complement

One out of two respondents in our study indicated that it is "important" or "very important" for employees to have a high level of digital proficiency. Another 40% see it as "good to have," primarily for engineers and engineering technicians, operations personnel, and maintenance technicians. Manufacturers are integrating technologies such as computer numerical control, programmable logic controllers, sensors, advanced robotics, 3D printing, and others with artificial intelligence across functions.²² This integration underscores the importance of having a digitally savvy workforce with skills such as machine learning, cybersecurity, data management, and data analysis. Meanwhile, network security and the ability to work with modern ERP systems and interconnected machines are increasingly becoming important.²³ Additionally, smart factory solutions are on the rise, requiring digital skills to design, implement, and operate.

The increased adoption of digital tools and technologies tends to bring soft skills such as adaptability, problem-solving, critical and cross-functional thinking, initiative and leadership to the fore. For example, critical-thinking skills are important to evaluate the outputs from AI tools, including generative AI, and to process data mined from interconnected machines. However, digital and soft skills alone are generally not enough—for employees to successfully apply these skills, it tends to be important to have a strong foundation in the fundamentals of manufacturing, especially in highly specialized sectors such as fabricated metal product manufacturing, and aerospace and defense. For example, to learn how to effectively operate welding robots, it can be helpful—and often necessary—for a worker to have welding experience in a manufacturing environment.



More manufacturing workers are likely to be needed for higher-skill roles

According to occupation data from the US Bureau of Labor Statistics (BLS), some of the fastest growing manufacturing occupations projected until 2032²⁴ tend to be well-aligned with the skills in highest demand over the last five years. As operations and products become more complex and manufacturers look to integrate the information collected from their smart connected devices, equipment, and systems, highly skilled roles could grow the fastest between 2022 and 2032.²⁵

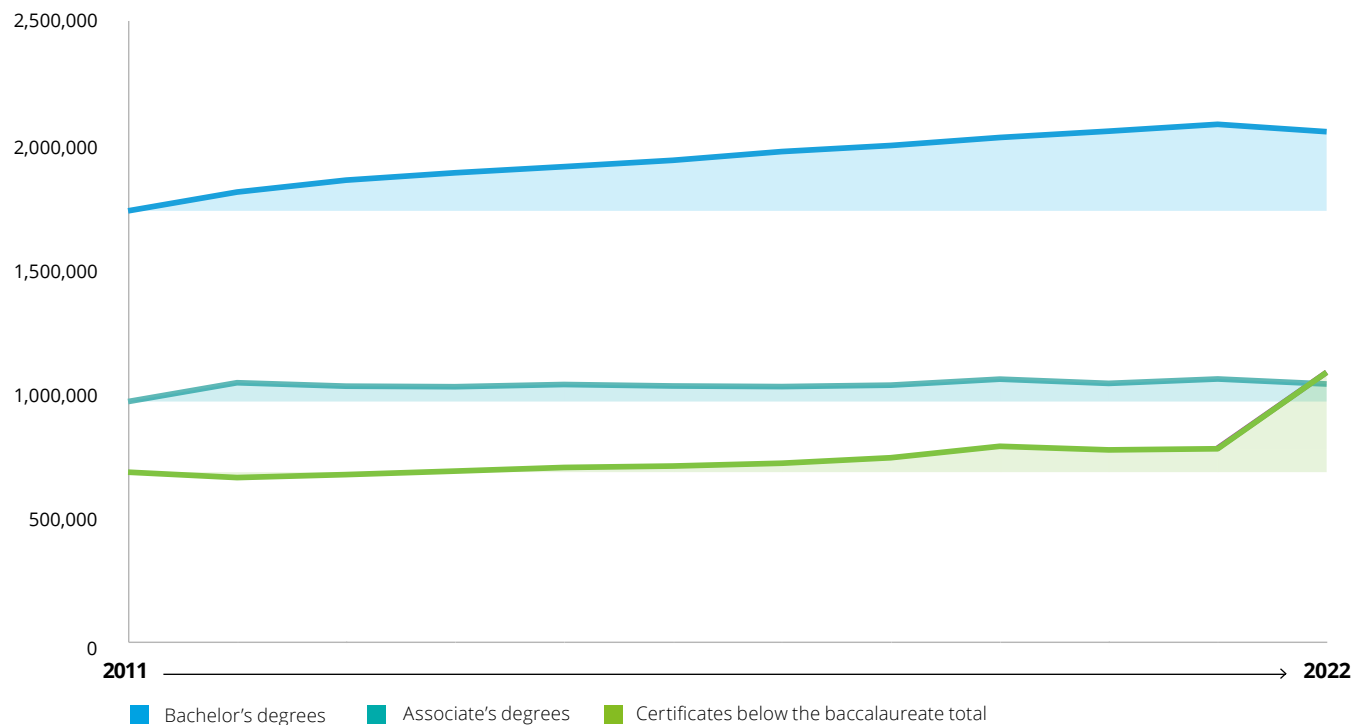
Industrial machinery maintenance technicians comprised over 270,000 employees in manufacturing in 2022 and these roles could grow as much as 16% by 2032.²⁶ Mechanical and industrial engineers combined to make nearly 370,000 employees in the sector and these occupations are each likely to expand by almost 11% over the same period.²⁷ Together, software and web developers, computer and information systems managers, and computer and information analysts constituted close to 243,000 manufacturing employees in 2022, and combined, they could increase by nearly 13% by 2032.²⁸ Although statisticians and data scientists currently make up a small portion of manufacturing employment (7,500), these roles may grow by close to 30% by 2032.²⁹

Traditional production roles are likely to also continue to be important. According to BLS data, production-related occupations currently employ the largest number of people in the sector, and BLS also projects this to be the case in 2032.³⁰ However, the fastest growing production roles are likely to be those that require higher-level skill sets, such as semiconductor-processing technicians, machinists, first-line supervisors, welders, and electronics and electromechanical assemblers.³¹ Gains are also likely for material-moving occupations such as laborers and material movers and industrial truck and tractor operators.³²

Educational trends suggest a gap

Graduation data from the National Center for Education Statistics suggests that traditional training methods may not be able to keep up. While the number of bachelor’s degrees awarded in all fields of study from 2011 to 2022 has increased, the number of associate degrees—which tend to prepare graduates for high-skill trades—has remained stagnant (figure 4). The number of certificates awarded, which can offer foundational training for skilled trades, has experienced a moderate increase over the same period, and a significant jump from 2021 to 2022, even surpassing the number of associate degrees awarded.

Figure 4. Bachelor’s degrees climb while associates degrees stagnate in the US from 2011–2022 across all fields of study



Note: Data includes all 38 fields of study reported by the National Center for Education Statistics, expanding beyond manufacturing roles. Source: Deloitte analysis of data from National Center for Education Statistics.

For degree programs most relevant to manufacturing, there has been a substantial increase in graduates from programs such as computer and information sciences and engineering (figure 5) that typically require a bachelor's degree. There has also been growth in mechanic and repair technologies degrees, as well as precision production, fueled in large part, it appears, by substantial post-pandemic upticks from 2021 to 2022. However, growth has been slow in the remaining programs that prepare graduates for higher skilled roles like engineering technologists and skilled transportation and material moving positions. Our analysis also found that the average growth in certificates awarded was more than four times the growth in associate degrees for manufacturing-related programs over 2011 to 2022.

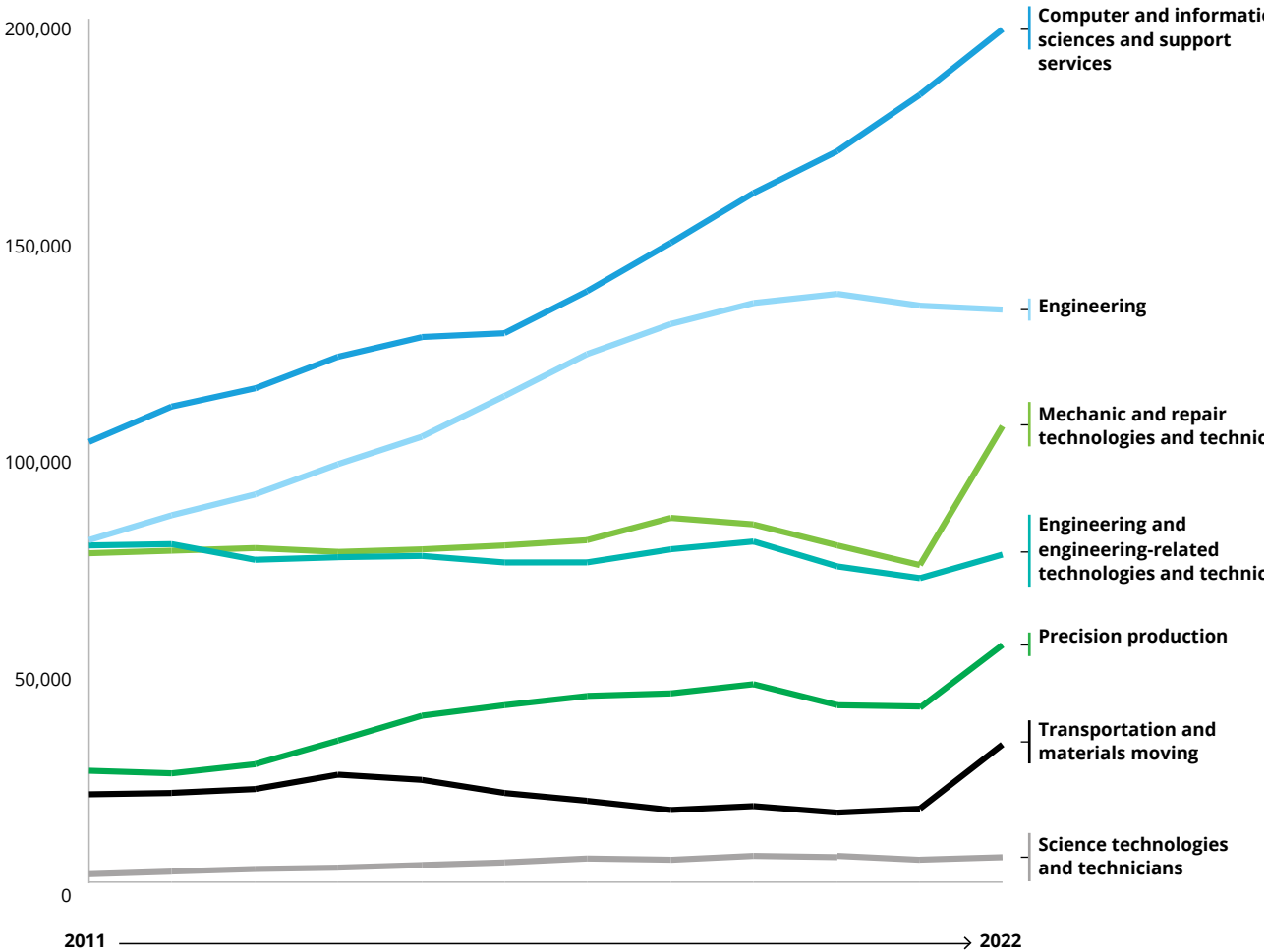
While this trend could help to grow a talent pool with the foundational knowledge companies can continue to build upon once workers are hired, it also suggests there may be a need to produce more highly skilled graduates with associate degrees. In general, if the number of people entering and graduating from degree programs that prepare them for high-skill manufacturing trades does not accelerate, the talent gap could widen.

Some manufacturers are taking an active role—and the lead—in addressing talent challenges

The key question becomes: Given the talent challenges, how can manufacturers build the workforce needed to seize the growth opportunity at hand? Our study found that there is a shift underway in the sector and, in general, companies are currently taking a more active approach to addressing both the skills gap and the applicant gap. Manufacturers seem to be focusing on investing in partnerships—and the worker pipeline and the work environment—to help create the workforce they need with the requisite skill sets and improve employee retention. Our study found that the following three approaches, when used in combination, are helping some manufacturers in overcoming the talent challenges they face:

1. Understanding changing workforce expectations
2. Applying a “customer focus” to workforce challenges to create a leading worker experience
3. Taking an ecosystem approach to attract and upskill talent

Figure 5. Number of graduates for manufacturing jobs has varied by role



Note: Graduate includes certificates, associates, and bachelor's degrees for selected (manufacturing-focused) courses. Source: Deloitte analysis of data from National Center for Education Statistics.

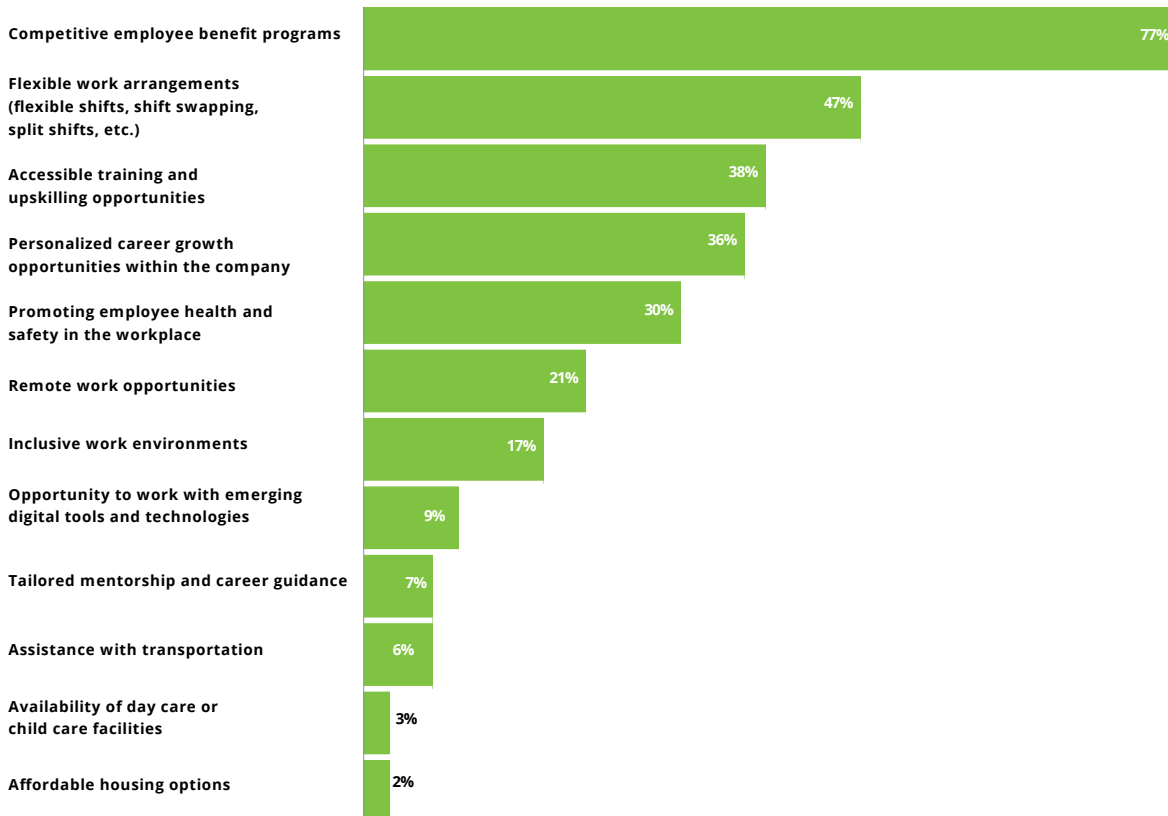
Changing workforce expectations affect hiring and retention

As more baby boomers and Generation X workers move closer to or into retirement, the workforce may be made up more of millennials and Generation Z workers, who can have a different set of expectations when it comes to work culture and the working environment itself. In one recent survey, those respondents were found to be more prone to job switching, which can impact attraction and retention.³³ Generally, surveyed executives from our study reported that higher levels of flexibility, including remote-work options, seem to be among the most impactful strategies to attract and retain employees (figure 6), which can also be challenging with fixed work schedules and traditional in-person production team settings often seen in manufacturing.³⁴

“The average tenure in our organization is reducing. So, we need to understand that even if we get a capable hire for two years, how do we then accelerate the capable hire’s onboarding and distribution of knowledge across the larger organization and develop others quickly with the expectation that they’re not going to stay with us for more than two years.”

—Interview with industry executive³⁵

Figure 6. Most impactful strategies to attract and retain employees, according to survey respondents



Source: Analysis of 2024 Deloitte and The Manufacturing Institute talent study.

Providing the flexibility that workers want

Nearly half (47%) of respondents in our study indicated that flexible work arrangements (for example, flexible shifts, shift swapping, split shifts) is the strategy that their company has found to be most impactful for retaining employees (figure 6). Flexible work was second only to competitive employee benefit programs.

Some companies have piloted or implemented child care programs and have observed significant benefits. An executive from a distribution and logistics service provider told us that a pilot child care program run by an external organization was established adjacent to a warehouse and it was utilized by close to 80% of employees, who paid for the care. The executive reported a fourfold improvement in the turnover of this facility.⁴⁰

An executive from an electric products manufacturer shared that the company developed a two-day per week part-time position that offers tuition assistance and pay without benefits that initially targeted university students.⁴¹ The executive added that once the program was off the ground, “to our surprise, there were a lot of stay-at-home parents that wanted that—they came out of the woodwork to have a two-day workweek.” They now have close to 400 employees in the successful program with good attendance and retention rates.

Some manufacturers are partnering with innovative temp agencies to provide the workforce and skills they need while providing workers the flexibility that they are looking for. Leveraging digital tools and apps, some temp agencies can provide part-time workers, including the semi-retired, college students, and caregivers, the opportunity to sign up for work slots and overtime, while providing the flexibility to cancel or swap shifts, with vacated spots being backfilled with another worker, with the help of AI tools.⁴²

A predicament to solve

The hours spent on caretaking have increased for full-time workers since the pandemic; this includes child care but also care for parents and spouses.³⁶ According to BLS data, the average number of employees who missed work in the United States in 2023 due to child care stood at 47,000—42% above the pre-pandemic 2019 average of 33,000.³⁷ In a recent Manufacturing Institute study, 49.2% of women and 8.0% of men indicated that lack of child care support was their most significant labor-force challenge.³⁸ Yet in a previous Deloitte and Manufacturing Institute study, only 8% of surveyed manufacturing leaders said that their company offered new or additional day care options.³⁹

Taking a bigger role in skills development to attract and retain employees

The applicant gap seems to be prompting more employers to focus on training as a means to attract and retain employees. According to *Deloitte's Workforce Experience* research, employees who feel they can acquire necessary skills that are important for the future are 2.7 times less likely to leave their organization in the next 12 months.⁴³ Changing skill requirements have prompted some companies to employ a “skills-based” approach that focuses on employees’ abilities and competencies rather than their job titles or formal qualifications, better aligning workers with work that fits their skills and capabilities (figure 7).

Manufacturers seem to recognize the value of upskilling and are using a variety of strategies to train employees, irrespective of role or function, to create an agile workforce. Internal training academies or programs were highlighted as instrumental in helping employees adapt to new technologies and processes.

Many companies are also leveraging e-learning platforms to facilitate flexible and self-paced learning opportunities and are sponsoring industry workshops, conferences, and seminars to help ensure employees are apprised of industry trends and leading practices. Some employers are conducting regular skills assessments of employees to track progress and refine training programs to meet evolving needs.

Mentoring, knowledge transfer, and rotational programs for new hires are gaining traction among manufacturers and are intended to enrich employees’ experiences while helping to ensure well-rounded skill development. Such programs can encourage employees to gain experience across departments, which helps enable a versatile workforce.

Figure 7. Surveyed skills-based organizations see results

Organizations that embed a skills-based approach are more likely to ...



Notes: Skills-based organizations’ ratio reflects the combined weighted ratios of the HR executive survey item, “Our organization’s business and HR executives are aligned on the importance of skills in making decisions about work,” and the worker survey items: “My employer treats workers as whole, unique individuals who can each offer unique contributions and a portfolio of skills to the organization,” “My organization supports me in pursuing opportunities to create value through activities that are outside of the direct scope of my job,” and “My organization makes it easy to apply my skills where they are most needed.”; Results are defined as 11 business and workforce outcomes: meeting or exceeding financial targets, anticipating change and responding effectively and efficiently, innovating, achieving high levels of customer satisfaction, positively impacting society and communities served, improving processes to maximize efficiency, being a great place to grow and develop, placing talent effectively, providing workers with a positive workforce experience, providing an inclusive environment, and retaining high performers.

Source: Deloitte analysis of Deloitte skills-based organization survey, May–June 2022.

Providing additional support that employees seek

There is growing recognition that many job seekers need support services to help them meet the requirements of a full-time job, and these can range from help with the daily commute to finding affordable housing close to their job.⁴⁵ Reliable transportation to complete a daily commute can be a challenge for some employees, especially in rural areas with limited or no public transit.⁴⁶ An executive from an electric products manufacturing company mentioned that “[reliable] transportation was the number one reason people were leaving our roles.”⁴⁷ The company partnered with a transportation service provider to offer subsidized rides to employees to and from work.⁴⁸ An automotive manufacturer in a rural area is collaborating with other companies and city and county government to investigate the local obstacles to transportation and devise pilot programs to improve transportation in the area.⁴⁹

Finding affordable housing is also a challenge for some employees, especially given that the median home price in the United States increased by 37% between January 2019 and November 2023 and the average rental price in US cities rose by 26% over the same period.⁵⁰ Our interviews emphasized some manufacturers are working with a state or local government to investigate and develop affordable workforce housing options and opportunities.⁵¹

“STEM has been defined for years as science, technology, engineering, and mathematics. But STEM to us is soft skills, technical or technology skills, engagement, and motivation. Those are the skills we need. The rest of it can be taught all day long.”

—Interview with industry executive⁴⁴

Applying customer focus to create a leading workforce experience

Creating and improving products and processes is the core of what manufacturers do. They use a variety of strategies and frameworks to accomplish these objectives, such as “define, measure, analyze, improve, and control” (DMAIC)⁵² and Design Thinking.⁵³ This focus on what the customer needs could be applied to creating innovative workforce solutions, especially when the optimal worker experience is a guiding principle. One executive emphasized that empowering talent organizations to be innovative is important, as “challenging them to be entrepreneurs and find new disruptive ways of doing things can bring great ideas.”

Another executive said, “We want our customers to be first. We want our employees to be first. We want to meet them where they are, which means we adjust how we do things.” According to a study on the American workplace, employees in the manufacturing industry seem to be less engaged when compared to other industries.⁵⁴ Actively disengaged employees are almost twice as likely to seek new jobs than engaged employees.⁵⁵

Creating a sense of purpose

According to The *Deloitte Global 2022 Gen Z and Millennial survey*, nearly 40% of millennials and Gen Zs have turned down a job because it didn’t match their values. On the other hand, respondents who are happy with their company’s impact on society and the environment are more likely to stay with the company for over five years.⁵⁶ Executive interviews indicated that providing a sense of purpose, emphasizing the importance of culture, and establishing clear leadership can provide motivation and help drive performance.

In particular, multiple executives highlighted that centering at least part of their mission statement on green products and projects and their benefit to the planet has helped them to attract and retain talent. An executive from a household electronics manufacturer expressed it this way: “This population cares about the planet and they want companies who are responsible in the way they manage their company. Sustainability is a very key part of what we do in our business—it’s important to our associates and it’s important to our customers.”⁵⁸

Promoting a work environment focused on health, safety, and comfort

Several executives that we interviewed indicated that creating a comfortable working environment was important not only for attracting new talent but could also make the difference between keeping or losing employees to a competitor. As one executive summed it up, “We have to provide ways for people to feel safe and comfortable when they come to work. It’s really important that employees feel like their companies care about them—that they see them—and that they believe that their employees’ health and well-being are important.” And the needed improvements can be as intuitive as better lighting in the parking lot or improving the cafeteria.

“People who have been here for a long time and new hires are seeking a sense of belonging and being part of something bigger. It’s not a mantra that we just talk about with a certain level of employees—it’s deep throughout the organization, and when they come to work, they know what they are coming to work for, and they sign up to that purpose.”

—Interview with industry executive⁵⁷

One executive indicated that before acquiring and completely renovating a 50-year-old manufacturing facility, their company surveyed employees to determine what was most important to them in a working environment. Improved lighting, including natural light, and air quality were at the top of workers’ lists, and the renovated smart factory design was based on the feedback received.⁵⁹

Technology can help engage and empower workers—and make their jobs better, safer, and easier

Technology plays an important role in shaping the future of workforce development. It can act as a magnet in both attracting and retaining skilled individuals. As gleaned from our interviews, high-tech manufacturing environments seem to appeal to the workforce. Manufacturers that have built smart factories to enhance performance are also noting higher retention in these high-tech facilities.⁶⁰

Deloitte Global’s *Millennials and Gen Z Study* highlights that more than one-third of surveyed millennials and Gen Zs believe that AI and other technologies can augment jobs or various job functions over the next decade.⁶¹ In another recent study, over half of the surveyed workforce believe it is important for manufacturers to focus on the consistent availability of technology to attract more people, whereas only 31% of manufacturing executives agreed to prioritize technology to attract employees.⁶²

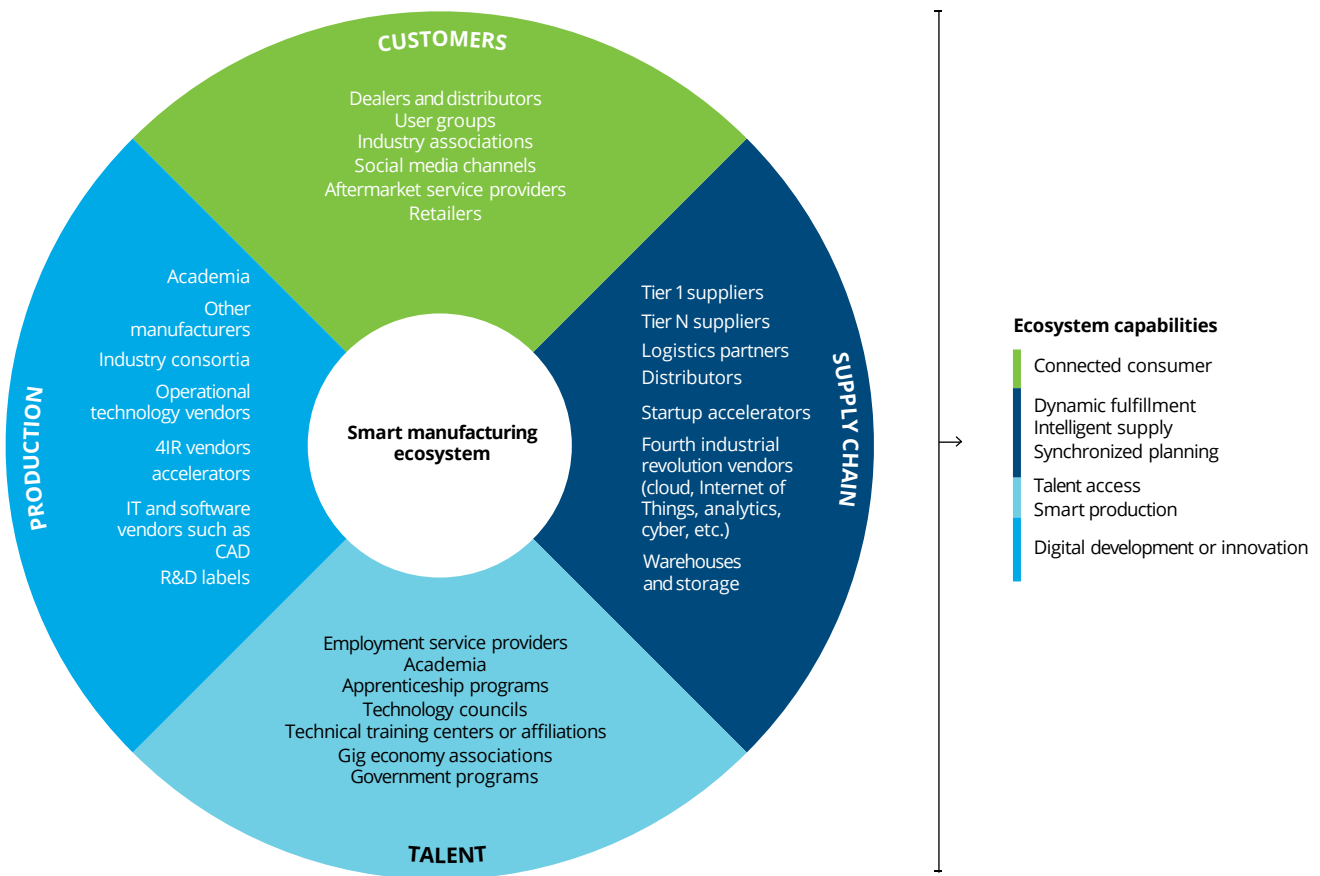
Enhanced employee engagement can be achieved by integrating technology into manufacturing processes. Digital tools including AI, generative AI, and automation can be used to augment mental and physical human capabilities to optimize production, make jobs easier, and provide autonomy by giving operators new channels to report production issues, which can enable efficient triage and rapid problem resolution. The integration of technology has also helped to revolutionize upskilling in the industry. Most companies we interviewed are exploring the potential of augmented or virtual reality (AR or VR) for comprehensive training, potentially allowing workers to acquire new skills using these tools. An executive mentioned that VR has reduced training time for welders at the company by 50% to 60%. The flexibility in technology-facilitated trainings can enable individuals to upskill at their convenience, helping to foster a more dynamic and efficient learning environment.

Taking an ecosystem approach to attract and upskill talent

The smart manufacturing ecosystem

A previous Deloitte report highlighted the possible value of using an ecosystem approach to accelerate smart manufacturing, specifically in improving innovation by enabling better collaboration among partners who share the common goal of developing and implementing smart factory solutions (figure 8).⁶³

Figure 8. Smart manufacturing ecosystem

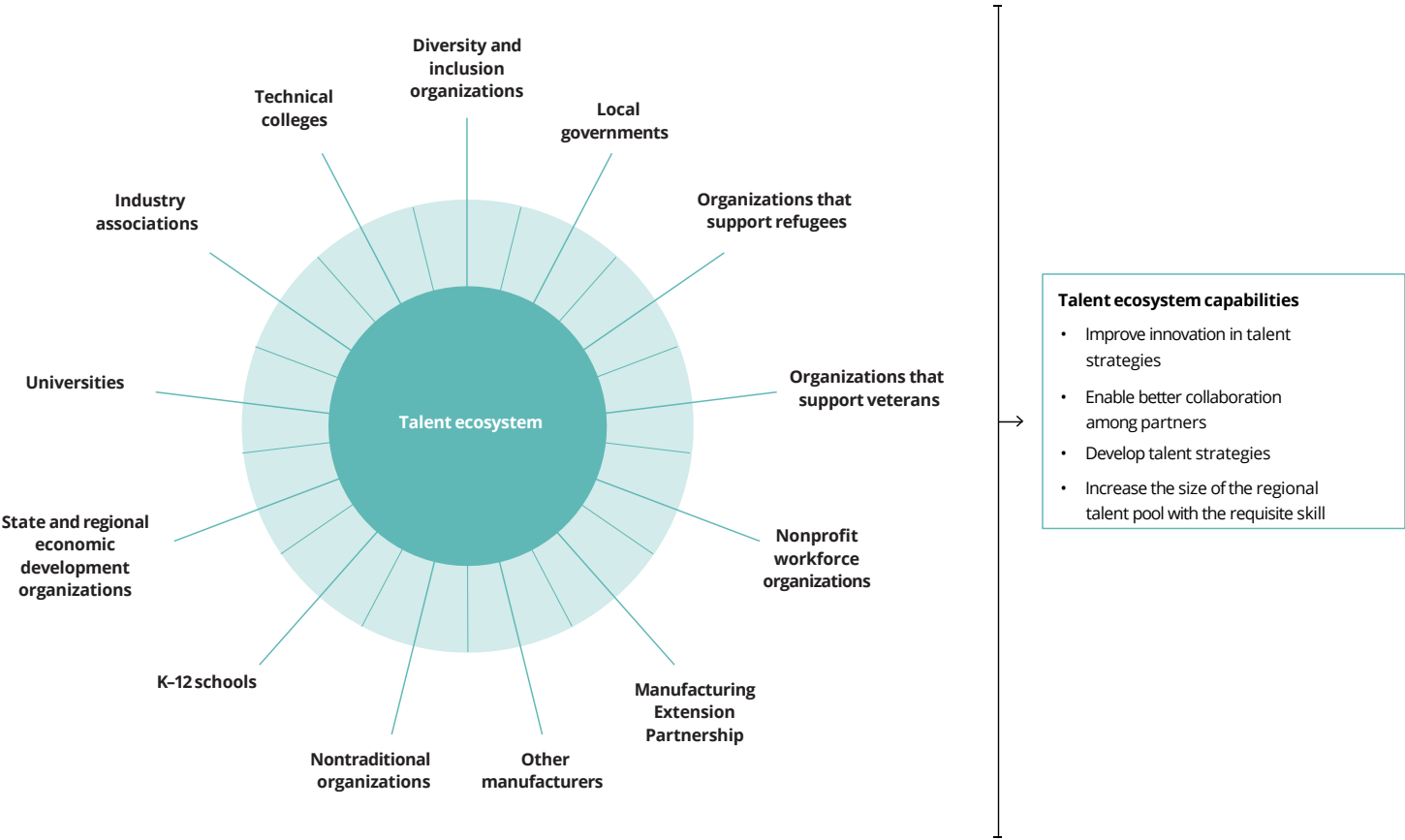


Note: Ecosystem capabilities are constantly developing and may not be limited to the ones mentioned above.
Source: Deloitte analysis.

In its general form, a business ecosystem involves organizations coming together, or partnering, to solve shared problems and meet shared objectives.⁶⁴ Collaboration, co-innovation, and co-evolution are at the heart of what drives an ecosystem.⁶⁵ (An example of a smart factory ecosystem is described in the sidebar titled “The smart manufacturing ecosystem.”)

A talent ecosystem is anchored by regional organizations that can contribute to helping companies attract, upskill, and even retain the workers that they need. It includes traditional organizations that develop talent, such as K-12 institutions, technical colleges, and universities, as well as a wide range of partners beyond education. Similar to the production ecosystem approach to accelerate smart manufacturing practices, a talent ecosystem can help improve innovation in talent strategies by enabling better collaboration among partners who share the common goal of developing and implementing workforce solutions. Figure 9 highlights some of the potential participants and capabilities manufacturers can forge by implementing a talent ecosystem.

Figure 9. The talent ecosystem



Note: Nontraditional organizations in the above are community-based that work with people struggling with financial hardship and formerly incarcerated individuals. Source: Analysis of 2024 Deloitte and The Manufacturing Institute talent study.

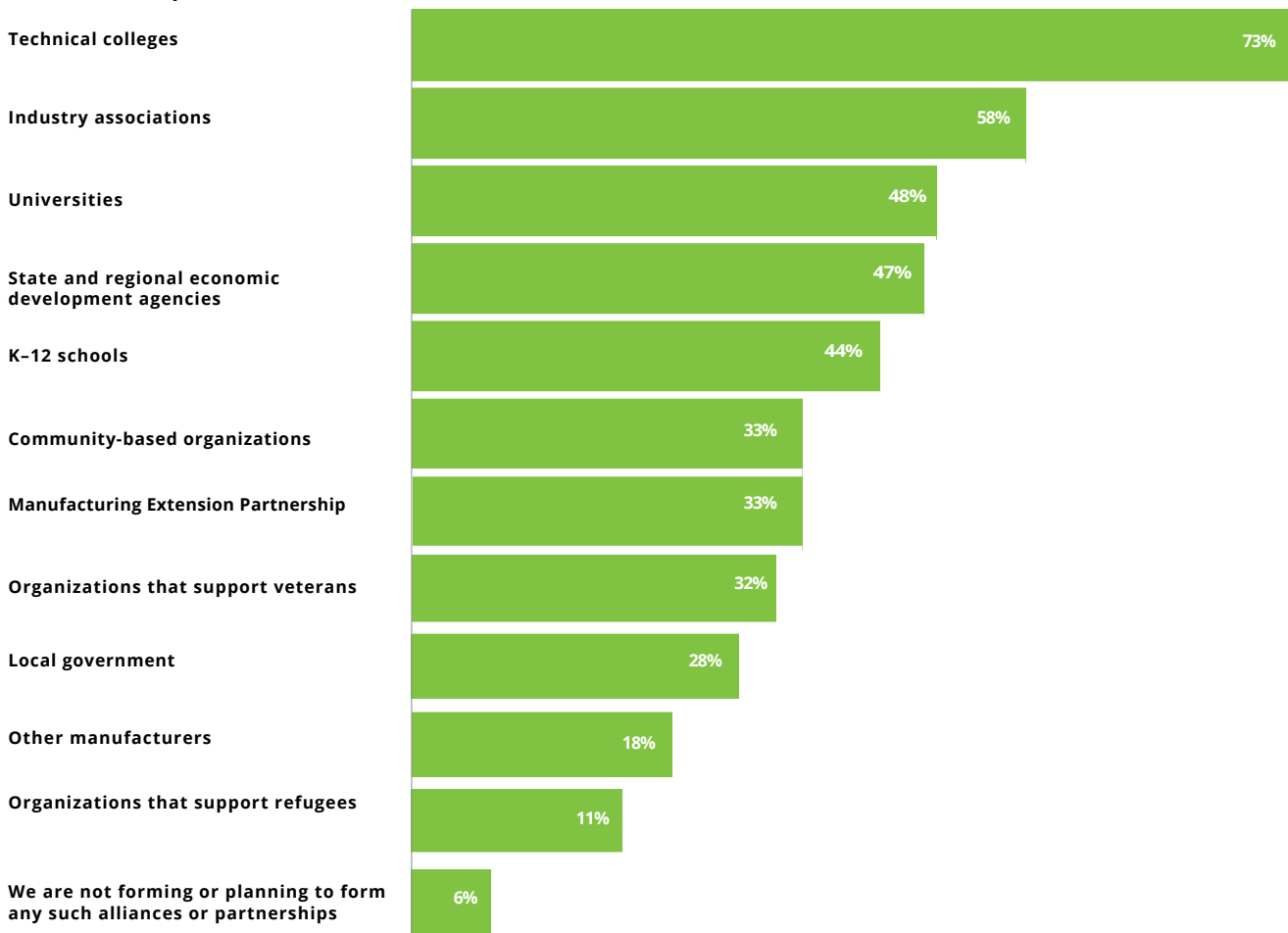
The talent ecosystem in action

Many companies have had to move beyond traditional talent approaches and innovate to improve their talent strategies. As one executive says, “We’ve had to break a lot of paradigms and change our mindset to adapt.” But manufacturers are no strangers to breaking paradigms: The industry is the leading sector in the United States for innovation, accounting for 53% of all private-sector research and development.⁶⁶ Increasingly, manufacturers seem to be leveraging this innovation foundation to implement an ecosystem approach and improve worker experience. (An example of a talent ecosystem in action is described in the sidebar titled “Cultivating the future smart factory workforce with an ecosystem approach.”)

Our study corroborates that most manufacturers are establishing ecosystems to help expand their talent pool and develop the requisite skills. Ninety-four percent of surveyed manufacturers indicated that they are forming at least one partnership to improve job attraction and retention.⁶⁷ On average, our study respondents are partnering with four or more organizations to form an ecosystem (figure 10). So, what partnerships are some manufacturers forging and how are they leveraging these to help overcome talent hurdles?

Cultivating the future smart factory workforce with an ecosystem approach
 Wichita State University emphasizes applied learning experiences across all majors, including industry-driven and technology-transfer projects, to help students gain practical skills and knowledge that help prepare them for professional settings, including smart factory environments. The university fosters an ecosystem that prioritizes and streamlines collaboration with industry partners, which supports regional innovation and helps to build a well-prepared workforce for advanced manufacturing and other sectors.⁶⁸

Figure 10. Partnerships that surveyed manufacturers are forming to help improve attraction and retention of a qualified workforce



Partnerships to build awareness of manufacturing careers and opportunities

Manufacturers across the nation open their doors on National Manufacturing Day to provide plant tours to the local community, including students, parents, teachers, and guidance counselors from K-12 schools.⁶⁹ A past Deloitte study has indicated tours of advanced manufacturing facilities for students can be an effective strategy for increasing interest in manufacturing jobs.⁷⁰ Several manufacturing executives indicated that company representatives regularly visit local K-12 schools to talk about the company, careers offered, and the high-tech environment in manufacturing facilities to inspire students to consider manufacturing careers.⁷¹ Several companies have also donated manufacturing equipment to schools to spark interest and support skills development.⁷²

In partnership with an engineering and construction firm and a welding equipment manufacturer, the American Welding Society offers nationwide grants to high school programs that do not currently have welding programs.⁷³ The grant provides a kit with a welding machine and other equipment to give students the opportunity to experience welding—many for the first time—and possibly inspire them to consider a career in the field. In another example, a flooring manufacturer implemented a work-based learning program in partnership with local high schools, which provides flexible and paid work experiences in several departments, as well as opportunities to advance into an apprenticeship program.⁷⁴ The company reported that, in 2023, it achieved 100% retention of graduating seniors and hired over 50 students from the program.⁷⁵

Partnerships to build, leverage, and support training programs

Some manufacturers are finding innovative ways to form partnerships to work with local technical colleges—as well as organizations throughout the talent ecosystem—to build the workforce that they need. Employer-led consortia to create programs that suit shared workforce development needs seem to have become more commonplace. Some consortia are even led by local workforce, government, or economic development agencies to build a workforce with the requisite skills to support a specific manufacturing sector in a region.⁷⁶

Many states have implemented manufacturing career pathways from the National Career Clusters® Framework⁷⁷ to create programs that meet state needs, and an updated framework design is expected in fall 2024.⁷⁸ Strong workforce training programs can be important for attracting new businesses and keeping existing companies within a state.⁷⁹ In Georgia's QuickStart program, the Technical College System of Georgia partners with manufacturers to establish new facilities or expand in the state to develop and deliver customized training programs to create a skilled workforce ready to begin production.⁸⁰ Since its inception, QuickStart has trained over 1 million workers and companies often cite it as an

important factor for choosing to set up new facilities or expand in Georgia.⁸¹ The Virginia Talent Accelerator Program, a partnership between the Virginia Economic Development Partnership and the Virginia Community College System, offers recruitment and training services to greenfield or expanding facilities in the state of Virginia.⁸² The Greater Wichita Partnership worked with Deloitte to develop an action plan to help the region build a workforce for the future. The plan emphasizes the need for collaboration among industry, education, and community stakeholders to drive inclusion, expand the talent pool, invest in skill development, and support innovation. Together, they can provide access to upskilling opportunities focused on high priority skills such as communication, computer literacy, and project management.⁸³

Some manufacturers are partnering with community organizations. For example, a large automotive manufacturer partnered with Goodwill to administer credentialled training programs in local communities focused on developing digital skills, including IT support, and even training auto technicians.⁸⁴ Other companies have partnered with Goodwill to take advantage of the trained talent pool that they offer through the Talent Source program,⁸⁵ or the manufacturing services that they offer, including producing and packaging automotive components, and even manufacturing uniforms for the US military.⁸⁶

Apprenticeships and programs for work study also appear to be on the rise. The number of apprentices in advanced manufacturing occupations increased to 59,500 in fiscal 2023, which is nearly triple the total in fiscal year 2021.⁸⁷ Nearly half (47%) of survey respondents in the *2022 Deloitte and The Manufacturing Institute Perceptions* study indicated that apprenticeships, work studies, or internships at manufacturing companies would be the most effective way to increase interest in manufacturing as a career choice.⁸⁸ The Manufacturing Institute's FAME program is one example that has helped to bolster the pipeline for maintenance technicians (see sidebar titled "FAME: Developing regional pools of maintenance technicians"). The Inflation Reduction Act offers tax credits to companies who hire employees from registered apprenticeship programs, which may increase the demand for apprenticeship programs and help expand training opportunities.⁸⁹

Partnerships that look beyond the traditional talent pipeline

Manufacturers have focused efforts on increasing the size of their talent pool and created a more diverse and inclusive workforce by partnering with a variety of organizations to engage groups that may have unique barriers to entering or re-entering the workforce.

Individuals that were formerly incarcerated who seek a “second chance”

Several manufacturers have established a sense of purpose, given back to their local community, and even improved retention rates by providing work opportunities to applicants that were formerly incarcerated, who are reentering the workforce. A packaging manufacturer reported that almost 70% of its nearly 200-person workforce comprised second-chance individuals—and the company's attrition rate is 25 percentage points lower than the sector average.⁹⁴ In a recent study, 82% of managers reported that second-chance individuals may add even more value to their companies than those not part of the program.⁹⁵ Through the Workforce Opportunity Tax Credit, companies can also receive up to US\$2,400 per employee.⁹⁶ However, people that were formerly incarcerated may face unique challenges related to transportation, housing, and job flexibility. Partnerships with local organizations can be essential for providing this support in cases where manufacturers don't have the expertise or resources in house (see sidebar titled “Resources supporting job-seekers that were formerly incarcerated”).

Refugees and immigrants

Some companies have partnered with local organizations and resettlement groups to access a diverse talent pool of refugees and immigrant populations. A furniture manufacturer began hiring refugees nearly four decades ago and today they make up nearly half of the company's workforce.¹⁰⁰ Not only does it help to fill a need for workers, but it can also provide a sense of purpose as the company and workforce help community members. An executive from a large manufacturing company stated that new partnerships were needed to implement a similar program, but the benefits have been well worth it.¹⁰¹ While a majority of companies that have implemented refugee hiring programs report higher retention rates and lower turnover, there are unique challenges to overcome, including language and cultural barriers.¹⁰²

Veterans

According to the study, nearly one-third of surveyed manufacturers are partnering with organizations that support veterans. Their military experience often instills technical, leadership, and communication skills that are important for success in a manufacturing environment.¹⁰⁴ But transitioning into a civilian workplace is not without its challenges.¹⁰⁵ It can be difficult for veterans to communicate how the skills, traits, and work habits developed in the military align with those listed on job requisitions. Partner organizations that support veterans, and programs like The Manufacturing Institute's Heroes MAKE America,¹⁰⁶ can help manufacturers make these connections, provide veterans with access to manufacturing-specific training and certification, and help companies establish a pool of veteran candidates.¹⁰⁷

“In the past, we said you had to be fluent in English, and we were missing out on a very hardworking, committed workforce. We teamed up with our local community partners and have been able to access a diverse group of refugees and immigrants from Afghans to Cubans, to other Spanish-speaking populations. It's been tremendously successful—the retention rate is significantly better than other populations—it's 76%. We are also developing an app so that they have access to translation available at their fingertips.”

—Interview with industry executive¹⁰³

FAME: Developing regional pools of maintenance technicians

One example of an innovative program to build regional pools of maintenance technicians—which are in high demand in advanced manufacturing environments—is the FAME program, which was started by an automotive manufacturer and transferred to The Manufacturing Institute to boost its national reach.⁹⁰ Students attend classes at a local community college two days a week and work three days for a local sponsoring manufacturer.⁹¹ They are paid a competitive wage and engage in hands-on training and classroom education to develop technical and professional skills related to manufacturing. Graduates earn an associate degree and are certified as an Advanced Manufacturing Technician. The automotive manufacturer worked closely with its initial community college partners to tailor the program to meet its needs.⁹² Today, the program has grown to nearly 40 employer-led chapters in 14 states, and it has produced over 1,800 graduates since 2012 who have benefitted from a 90% placement rate.⁹³

Resources supporting job seekers that were formerly incarcerated

The Manufacturing Institute recently released its “Second Chance Hiring Toolkit for Local Communities,” which leverages data from successful second chance programs across the United States. The toolkit recommends identifying a local hub organization to form partnerships between employers and community-based reentry organizations to build regional programs.⁹⁷ An example of a partnership model is the Beacon of Hope Business Alliance in Cincinnati, Ohio, which is operated by Cincinnati Works, a nonprofit organization whose mission is to provide workforce training and support services that people living in poverty need to become economically self-sufficient.⁹⁸ The goal of the alliance is to support job seekers that were formerly incarcerated, as they seek meaningful employment.⁹⁹ It is an ecosystem of partners that includes employers, community-based organizations that provide workforce training and support, a local government reentry and rehabilitation office, a nonprofit legal organization, and faith-based organizations.

Workplace accommodations

Some people have unique abilities that can make them a good fit for certain manufacturing roles—including skilled production jobs like computer numerical control machine operators—that are generally difficult for manufacturers to fill.¹⁰⁸ There may be individuals with remarkable intellectual and visual abilities, as well as a high propensity to learn, who may also be neurodiverse and require additional accommodations in the workplace.¹⁰⁹ An automotive aftermarket parts supplier and a large heavy equipment manufacturer have formed innovative partnerships with organizations in their communities, which specialize in working with and training people with disabilities for the workforce.¹¹⁰ These partnerships have led to the partner organization providing contract manufacturing services, as well as direct hiring of employees by the manufacturer. Moreover, individuals with physical limitations may be able to pursue additional employment opportunities with the advancement of digital technologies and robotics, as their qualifications and certifications could still enable them to engage in remote control monitoring of robotics, for example. The potential pool of talent is significant. Over 33 million working-age Americans were identified as having a disability in 2023—only 7.5 million are currently employed, and only 9.1% are employed in manufacturing.¹¹¹

A dedicated focus on the talent development team

It can take dedicated effort, and perhaps additional resources, including staff members with additional experience and skill sets, for talent organizations to take an ecosystem approach and focus on the many aspects of worker experience. An individual or group within the company should be responsible for getting out into the community and building relationships with the full spectrum of organizations within the ecosystem. Professionals with an economic development, business development, or sales background may be particularly well-suited for this role. On the other hand, experience performing research and analysis may be most helpful for benchmarking and comparing existing innovative talent programs. Partnering closely with plant managers, front-line supervisors, and other production leaders to offer training and support when implementing new and innovative talent programs may be necessary. Finally, new positions may be needed to support the needs of applicant groups.

Final thoughts: The road ahead

Manufacturers are taking an active role and applying an innovative mindset to address talent challenges that face the industry. The approaches will likely continue to be needed as manufacturers compete for workers in the current labor market. To help address the skills gap and the applicant gap, companies should consider leveraging an ecosystem approach to attract more workers to the industry and provide them with the skills they need. However, the manufacturing industry is poised for growth in the next decade and the challenge is not just finding and upskilling the people needed to take on the approximately 3.8 million projected possible new jobs, but also retaining them. Workers' experiences can not only shape their professional journey but can also foster an inclusive and collaborative workplace that can help increase employee retention.

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Authors

John Coykendall | jcoykendall@deloitte.com

John Coykendall is a vice chair, Deloitte LLP, and the leader of the US Industrial Products & Construction practice. John has more than 25 years of consulting experience focusing on global companies with highly-engineered products in the Aerospace and Defense, Industrial Products and Automotive industries. Coykendall advises senior executives on driving impactful and sustained performance improvement, through both top-line growth and margin improvement initiatives. He has led large-scale transformation efforts to help businesses with strategic cost transformation and operations/supply chain initiatives. Coykendall has an undergraduate degree from Lafayette College in Business & Economics and Government & Law and an MBA from Duke University.

Victor Reyes | vreyes@deloitte.com

Victor Reyes is a managing director in Deloitte's Human Capital practice, focused on helping organizations reimagine their people strategies and HR capabilities to deliver business results, enhance talent experience, and anticipate and embrace future workforce challenges. He serves as Deloitte's Human Capital consulting leader for the Industrial Products & Construction sector. In his more than 23 years as a management consultant, he has designed and implemented programs that include talent strategy, acquisition, and development; HR technology strategy and deployment; global shared services and outsourcing; mergers, acquisitions and divestitures; and workforce analytics. Reyes holds an MBA from Harvard Business School and a BA in Government from Harvard College.

Kate Hardin | khardin@deloitte.com

Kate Hardin, Executive Director of Deloitte's Research Center for Energy and Industrials, has worked in the energy industry for 25 years. She currently leads Deloitte's research on the impact of the energy transition on the energy and industrial manufacturing sectors. Before that, Hardin led IHSMarkit's integrated coverage of transportation decarbonization and the implications for automotive and energy companies. Hardin has served as an expert in residence at Yale's Center for Business and Environment, and she is also a member of the Council on Foreign Relations. Hardin has an MBA from the Yale School of Management and a MA in Russian studies from Yale University.

John Morehouse | jmorehouse@deloitte.com

John Morehouse is the research leader for industrial products manufacturing in the Deloitte Research Center for Energy & Industrials. He has over 25 years of experience in manufacturing-related roles in industry, academia, and government.

Gardner Carrick | gcarrick@nam.org

Gardner Carrick is the Chief Program Officer for The Manufacturing Institute, the non-profit affiliate of the National Association of Manufacturers. Mr. Carrick leads the Institute's efforts to create a world class workforce for the U.S. manufacturing sector. He oversees all of the MI's program activities, including the Institute's FAME education program, Heroes MAKE America program, Women MAKE America team and workforce initiatives. As a widely respected resource and advisor across the workforce development ecosystem, he is also creating a new national recognition program for the industry-based credentials used in most manufacturing education programs. And he is leading a public-private partnership to determine the outcomes of manufacturing education programs and develop solutions to improve their results.

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Industry Leadership

John Coykendall

Vice Chair
US Industrial Products and Construction leader
Deloitte LLP
jcoykendall@deloitte.com
+1 203 905 2612

John Coykendall is a vice chair, Deloitte LLP, and the leader of the US Industrial Products & Construction practice. John has more than 25 years of consulting experience focusing on global companies with highly-engineered products in the Aerospace & Defense, Industrial Products, and Automotive industries.

Deloitte Research Center for Energy & Industrials

Kate Hardin

Executive director
Deloitte Research Center for Energy & Industrials
Deloitte Services LLP
khardin@deloitte.com
+1 617 437 3332

Kate Hardin has over 25 years experience at the intersection of energy and industry, and is the executive director of the Deloitte Research Center for Energy & Industrials.

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