

CTE: DEVELOPING THE MANUFACTURING WORKFORCE

Career and technical education (CTE) supports America's manufacturing needs by

preparing learners to enter this critical workforce, which employs almost **13 million**¹ people nationwide, with millions² more individuals needed by 2030 to meet demand.

CTE programs in manufacturing develop students' technical, academic and employability skills through work-based and hands-on learning, ensuring that they are prepared to enter a **high-wage, in-demand** career in areas such as semiconductor manufacturing, electric vehicle (EV) and battery manufacturing, and supply chains.

This infographic describes a small sample of the career opportunities available in the manufacturing sector.

SEMICONDUCTOR MANUFACTURING

- The U.S. semiconductor industry directly employs more than **275,000**³ individuals domestically, with tens of thousands more jobs projected owing to increased investments.
- Technicians working in contaminant-free cleanrooms comprise as much as **38%**⁴ of the workforce in semiconductor manufacturing.
- Semiconductor processing technicians earn a median annual salary of almost **\$45,000**⁵, up to **\$72,000**, while engineers specializing in semiconductor technology can make more than **\$100,000**.⁶
- Apprenticeships, industry credentials, postsecondary certificates and degrees can help individuals develop a career in semiconductor manufacturing: **60%**⁷ of these jobs don't require a bachelor's degree.



EV AND BATTERY MANUFACTURING

- There are **260**⁸ U.S. firms engaged in hybrid and EV manufacturing in 2023, with more expected as demand increases.
- Career opportunities include industrial maintenance technicians, who earn a median salary of **\$60,000**⁹ annually and are in high demand – job openings are projected to increase by **13%**¹⁰ through 2032.
- Chemical engineers, another in-demand occupation, can work in battery research and development and make more than **\$100,000**¹¹ per year.
- Postsecondary certificates and degrees, industry credentials and apprenticeships can help individuals build **fulfilling careers** in this manufacturing sub-sector, with many opportunities for workers with less than a bachelor's degree.



SUPPLY CHAINS

- Through 2025, there will be as many as **770,000**¹² jobs available for supply chain technicians in the United States in manufacturing and other sectors.
- Experienced supply chain technicians who install, operate and maintain automated material handling systems can earn **\$84,000**¹³ annually.
- **Digital competencies** and data analysis skills are increasingly important for predicting product demand and managing supply chains.
- Professional certifications, apprenticeships, postsecondary certificates and degrees can help individuals **succeed** in this career pathway.



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MORE JOBS IN MANUFACTURING

In addition to the jobs already profiled, CTE prepares youth and adults for these further occupations in manufacturing:

- Assembler
- Manufacturing engineer
- Production manager
- Logistics technician
- Quality assurance technician
- Industrial designer
- Computer numerical control (CNC) machinist
- Welder
- Occupational health and safety specialist
- Forklift technician

At St. Philip's College in San Antonio, Texas, students can earn an associate degree in advanced manufacturing technology while completing a registered apprenticeship through TX FAME-Alamo, a partnership of regional manufacturers including Toyota, Caterpillar and more.

HOW CTE PREPARES THE MANUFACTURING WORKFORCE

CTE programs of study and career pathways prepare secondary, postsecondary and adult learners for the manufacturing workforce in many ways:

- **Courses** in computer integrated manufacturing, production systems, mechatronics, welding and more spanning secondary and postsecondary education.
- Opportunities to earn **postsecondary certificates and degrees** in welding technology, precision machining technology, logistics and supply chain management, advanced manufacturing technology and more.
- Opportunities to earn **credentials** from organizations like Autodesk, the Manufacturing Skill Standards Council, the National Coalition of Certification Centers and NOCTI-America Makes, among many others.
- **Work-based learning** experiences like job shadowing, internships and apprenticeships.
- Competitive events, service learning and leadership development through **career and technical student organizations** such as SkillsUSA and the Technology Student Association.
- **Activities** that build technical, academic and employability skills such as teamwork, communication and problem solving.

Learn More

This Sector Sheet highlights just a few occupations within the manufacturing workforce. To learn more, please visit the U.S. Department of Labor at www.CareerOneStop.org/ExploreCareers and MyNextMove.org.

Citations

¹ U.S. Bureau of Labor Statistics. (2023, August). *Manufacturing: NAICS 31-33*. Retrieved from <https://www.bls.gov/iag/tgs/iag31-33.htm>

² Wellener, P., Reyes, V., Ashton, H., & Moutray, C. (2021, May). *Creating pathways for tomorrow's workforce today*. Deloitte Insights. Retrieved from <https://www2.deloitte.com/us/en/insights/industry/manufacturing/manufacturing-industry-diversity.html>

³ Semiconductor Industry Association. (2022). *2022 state of the U.S. semiconductor industry*. Retrieved from https://www.semiconductors.org/wp-content/uploads/2022/11/SIA_State-of-Industry-Report_Nov-2022.pdf

⁴ Global Opportunity Forum. (2022, October). *Looking for a job in the lucrative semiconductor industry? Start here*. Retrieved from <https://goi.mit.edu/2022/10/25/looking-for-a-job-in-the-lucrative-semiconductor-industry-start-here>

⁵ U.S. Bureau of Labor Statistics. (2022, May). *Occupational employment and wage statistics: Semiconductor processing technicians*. Retrieved from <https://www.bls.gov/oes/current/oes519141.htm>

⁶ U.S. Bureau of Labor Statistics. (2023, February). *Occupational outlook handbook: Electrical and electronics engineers*. Retrieved from <https://www.bls.gov/ooh/architecture-and-engineering/electrical-and-electronics-engineers.htm#tab-5>

⁷ Muro, M., Brachman, L., & You, Y. (2023, January). *With high-tech manufacturing plants promising good jobs in Ohio, workforce developers race to get ready*. Brookings Institution. Retrieved from <https://www.brookings.edu/articles/with-high-tech-manufacturing-plants-promising-good-jobs-in-ohio-workforce-developers-race-to-get-ready>

⁸ IBISWorld. (2023, January). *Hybrid & electric vehicle manufacturing in the US - Number of businesses 2005-2029*. Retrieved from <https://www.ibisworld.com/industry-statistics/number-of-businesses/hybrid-electric-vehicle-manufacturing-united-states/>

⁹ U.S. Bureau of Labor Statistics. (2022, September). *Occupational outlook handbook: Industrial machinery mechanics, machinery maintenance workers, and millwrights*. Retrieved from <https://www.bls.gov/ooh/installation-maintenance-and-repair/industrial-machinery-mechanics-and-maintenance-workers-and-millwrights.htm#tab-5>

¹⁰ Ibid.

¹¹ U.S. Bureau of Labor Statistics. (2023, June). *Occupational outlook handbook: Chemical engineers*. Retrieved from <https://www.bls.gov/ooh/architecture-and-engineering/chemical-engineers.htm>

¹² National Center for Supply Chain Automation. (N.d.). *Supply chain technician career information*. Retrieved from <https://supplychainautomation.com/career-information/>

¹³ Ibid.