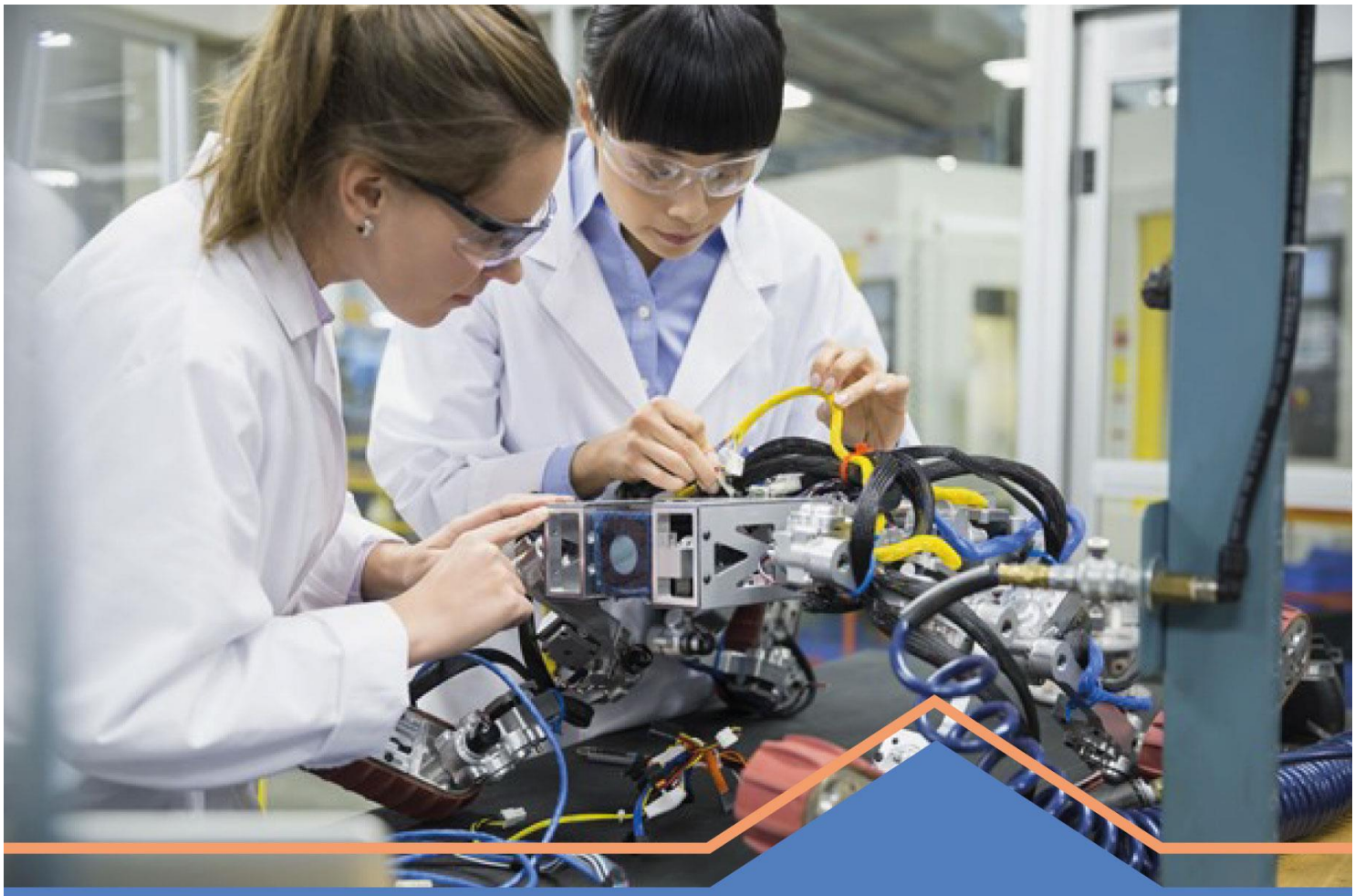

YouthBuild USA

Manufacturing

Industry Spotlight

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Overview

This industry spotlight provides an introductory overview of the **manufacturing** industry. It intends to support programs with understanding the **industry**, **career pathways,** and **occupations** and help YouthBuild participants determine whether the industry aligns with their interests and career goals.

Key Definitions

Industry: broad groups of businesses or organizations with similar activities, products, or services

Career Pathways: combine high-quality education and training to prepare individuals for work

Occupation: a set of activities or tasks that pays employees to perform

About the Manufacturing Industry

The manufacturing industry relates to the planning, managing, and processing of raw materials, substances, or components into finished products. Manufactured products and equipment used daily include commercial goods such as concrete, metals, chemicals, and machinery to personal products, like computers, phones, clothing, food, and beverages. Workers in this industry perform tasks such as operating, maintaining, and repairing machines and robots. The industry is integral to the nation's global economic competitiveness and creates millions of jobs.

Quick Facts

248,039 manufacturing firms in the U.S.

Over 12 million manufacturing workers

Contributed $2.33 trillion to the economy in 2020

Source: National Association of Manufacturers

Advanced Manufacturing

Automation and technology have forever changed the manufacturing workplace from a manual, worker-intensive process to a high-tech, pristine environment. Manufacturing.gov defines advanced manufacturing as "the use of innovative technologies to create existing products and the creation of new products."

This includes production activities that depend on automation, computation, software, sensing, and networking. Advanced manufacturing also tends to be tied to specific cutting-edge industries such as medical, aerospace, pharmaceutical, and nanotechnology. According to the Bureau of Economic Analysis, manufacturers in the United States perform nearly 62% of all private-sector R&D in the nation, driving more innovation than any other sector. As manufacturing processes continue to advance, there will continue to be a greater need for skilled talent.

Manufacturing Classification and Subsectors

The U.S. Bureau of Labor Statistics (BLS) and the North American Industry Classification System (NAICS) classifies Manufacturing as a larger **sector**. The larger manufacturing sector consists of **subsectors** or **career clusters**. According to the BLS, there are twenty-one subsectors in manufacturing. The five subsectors that employ the most people are Food Manufacturing, Transportation Equipment Manufacturing, Fabricated Metal Manufacturing, Computer and Electronic Product Manufacturing, and Machinery Manufacturing. These subsectors and their supply chains are critical to everyday life, and many are essential to the nation's security, resiliency, and emergency preparedness.

Key Definitions

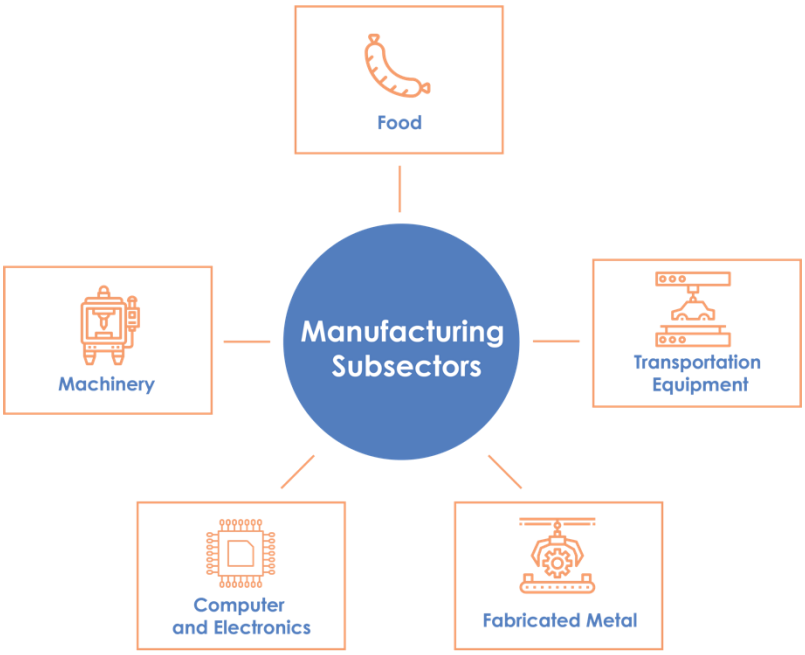
Sector: a broad term to describe the large segments of the economy

Subsectors: part of a larger sector

Career Clusters: occupations in the same field of work that require similar skills

Durable and Nondurable Goods

Manufacturers produce two types of goods - durable and nondurable. Durable goods are expensive items that last three or more years, whereas nondurable goods last less than three years. Durable goods include items such as automobiles, appliances, furniture, and engines. Nondurable goods include food, pharmaceuticals, clothing, personal care products, and household supplies. Consumer behavior and spending impact the production of goods.



During economic recessions, consumers may cut back on buying durable goods, whereas spending on nondurable goods remains unchanged. As demand for products fluctuate during the economic cycle, manufacturers in all twenty-one sectors respond by adjusting supply.

Manufacturing Industry Career Facts

The manufacturing industry can be rewarding for workers interested in working with advanced technology, learning STEM subjects, and creating tangible products. The industry employs workers in hundreds of occupations, and more than half are in production occupations. **Learn more in the following sections about whether a career pathway in the manufacturing industry is the right pathway for your program and participants.**

Good Paying Jobs

According to the National Association of Manufacturers (NAM), the average manufacturing worker in the United States earned $88,406 in 2019, including pay and benefits. Manufacturers have one of the highest percentages of eligible workers for health benefits provided by their employer. 92% of manufacturing employees were eligible for health insurance benefits in 2020, according to the Kaiser Family Foundation.

YouthBuild Program Tip
Find Your Local Living Wage

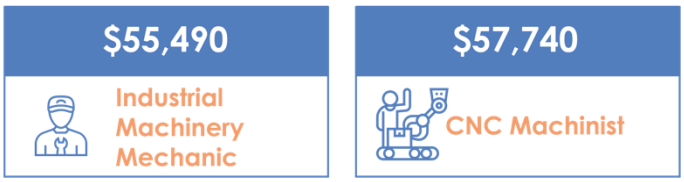
What is considered a good salary in one region may not be in another. To determine a viable, living wage in a specific region, use the **MIT living wage** calculator.

Image 1.0 includes examples of salaries for occupations that are expected to grow faster than average. These occupations usually require a high school diploma. BLS projects 44,100 job openings for production assistants by 2029.

Image 1.1 includes examples of salaries for occupations that are expected to grow much faster than average. These occupations typically require training in vocational schools, related on-the-job experience, or an associate's degree. Employees in these occupations usually need one or two years of training involving both on-the-job experience and informal training with experienced workers. BLS projects 40,500 jobs openings for industrial machinery mechanic by 2029.

Image 1.0
Jobs that require some preparation

Image 1.1
Jobs that require medium preparation

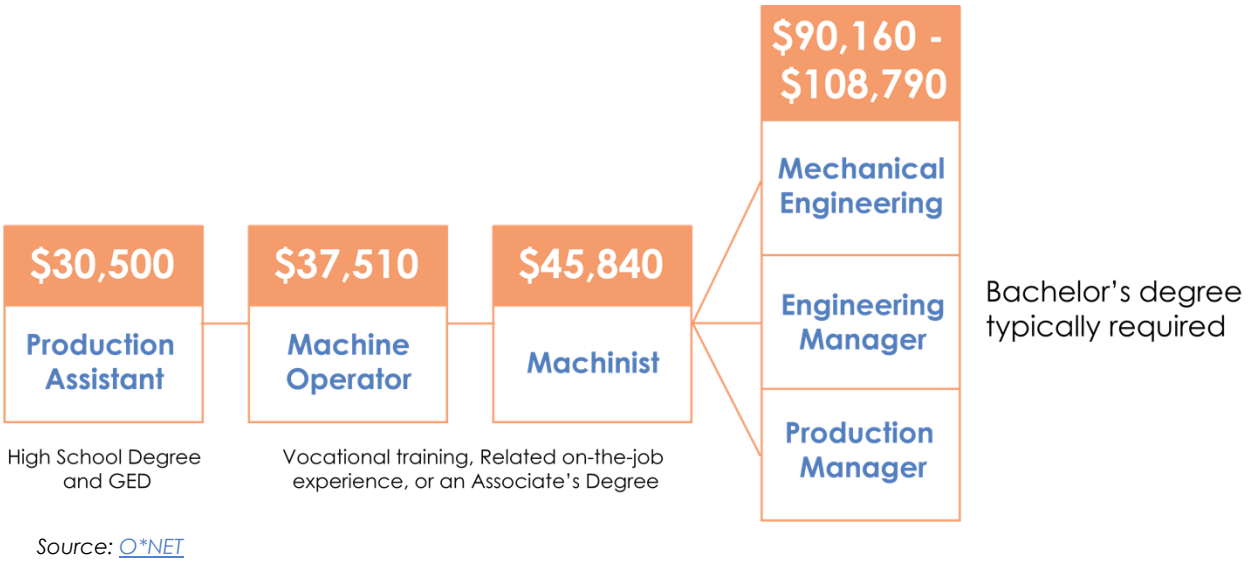


Accessible Entry Points and Opportunities for Advancement

Manufacturing occupations are available for individuals at all education levels, from less than a high school diploma to a college degree. Several occupations deal with installation, maintenance, repair, and production, which require a high school diploma to enter. Beyond that, plenty of occupations require earning a certificate or a degree from a community college, industry association, or technical school. Management and engineering roles typically require at least a bachelor's degree.

Image 2.0 represents a potential career path in production and the educational attainment and training needed to advance.

Image 2.0
Career Progression from Production to Management



*Source: O*NET*

Credential Options for Career and Wage Progression

Industry-recognized credentials can increase employability and wages. Credentials have grown in popularity as manufacturers experience a skills mismatch and talent shortage. High-quality credentials contain competencies developed with input from employers and are often associated with a specific job or career cluster. Industry-recognized certifications indicate the mastery of skills that result from a final assessment. The national certification bodies below are prominent examples of entities that offer manufacturing credentials endorsed by a leading trade association within the industry.

- American Welding Society
- Manufacturing Skill Standards Council (MSSC)
- Tooling U-Society of Manufacturing Engineers
- National Institute for Metalworking Skills
- National Coalition of Certification Centers
- National Association of Manufacturers

YouthBuild Program Tip
Identify Stackable Credentials

Programs can work with employers to identify the most valuable stackable credentials recognized by the industry nationwide. While there are common basic concepts and personal effectiveness skills applicable across all subsectors, some technical skill requirements may differ depending on the employer. By mapping out the credentials accumulated over time to build YouthBuild participants' qualifications, YouthBuild programs can help them continue to move along on a career path or up a career ladder to potentially different and higher-paying jobs.

There are entry-level credentials that indicate a prospective employee has a foundational understanding of introductory manufacturing concepts and potential entry into manufacturing work.

Table 1.0 includes examples of industry-recognized credentials commonly recommended as a starting point to enter the industry. In addition to these credentials, many manufactures seek workers with strong personal effectiveness and digital skills.

Table 1.0
ACT WorkKeys® - The assessments measure foundational skills required for success in the workplace and help measure the workplace skills that can affect job performance. Individuals who successfully complete the three WorkKeys assessments—Applied Math, Graphic Literacy, and Workplace Documents—earn the WorkKeys National Career Readiness Certificate® (WorkKeysNCRC®), a valuable credential for participants and job seekers seeking to verify foundational workplace skills.
SME's Certified Manufacturing Associate (CMfgA) Certification: An industry certification focused on basic manufacturing concepts and designed for individuals new to manufacturing who may not currently possess enough knowledge or experience for more technical certifications. The certification demonstrates that the individual has a basic understanding of shop math, assembly maintenance, machining, and inspection. This certification can be the first step into more advanced technical certifications that lead to machining, welding, general production, industrial maintenance, and engineering occupations.

Table 1.1 includes examples of credentials that lead to entry-level jobs but cover more technical concepts and skills.

Table 1.1
Certified Production Technician (CPT) ® 4.0: Recognizes mastery of the foundational, core competencies of advanced manufacturing production at the entry-level to front-line supervisor through successful completion of the assessments. The certification consists of 5 stackable credentials: Safety & Employability, Manufacturing Process & Production, Quality Practices & Measurement, Maintenance Awareness, and Green Production. MSSC strongly recommends that individuals be at 9th-grade math and 10th-grade reading levels before taking the course.
Certified Manufacturing Technologist (CMfgT) Certification: An entry-level certification benefits both new manufacturing engineers and experienced manufacturing engineers without other credentials. Examples of topics covered in this credential include quality and continuous improvement, manufacturing management, automated systems, control, product process, and design. A minimum of four years combined manufacturing-related education and/or work experience is recommended. Recertification every three years is required.

YouthBuild Program Tip
Use State DOL Resources

Many state labor departments have information on apprenticeship programs and how to become an apprentice in a specific location. Some community colleges and trade schools have apprenticeship programs as well. For more information, contact your State Department of Labor.

Earn While you Learn Opportunities

Registered Apprenticeship Programs (RAP) can be an effective approach to gaining the credentials, competencies, and experience needed for a career in manufacturing. A RAP is a "earn while you learn" training model that combines on-the-job work experience, classroom learning, mentorship, and credential attainment. According to the U.S. Department of Labor (DOL), manufacturing was one of the top industries with the most active apprentices in 2020. Over 16,500 apprentices enrolled and 1,682 active programs registered. High-demand manufacturing apprenticeships include CNC Machine Operator, Machinist, Industrial Maintenance Repairer, Tool and Die Maker, and Plastics Fabricator.

Innovative, Safe, and Fascinating Environment

Modern manufacturing work sites consist of large conveyor belts, machines, robotic equipment, and areas for processing or storing materials and products. Manufacturers also usually have office space to oversee sales, manufacturing, human resources, and other business-related functions. Manufacturers are becoming more advanced, and many have adapted cutting-edge technology, including 3D printers, robotics, laser cutters, and even drones. Workplace safety standards are a high priority for manufacturers, and automation has made it a much safer environment than in the past. With rapid innovations and transformations constantly happening in manufacturing, there is always room to grow and learn in the field. Since manufacturing has become so high-tech, STEM skills are incredibly valuable. While basic STEM skills, math, and computer aptitude are needed to enter and excel in the industry, manufacturers also seek detail-oriented, dependable individuals who are willing to learn, and demonstrate teamwork and problem-solving skills.

YouthBuild Program Tip
Get Involved with National Manufacturing Day

Manufacturing Day is a national initiative led by The Manufacturing Institute and NAM. Manufacturers across the country and trade organizations get involved to raise awareness of careers in manufacturing. The initiative addresses common misperceptions about the manufacturing industry. For more information on how to get involved, visit the National Manufacturing Day website.

National Career and Occupation Outlook

According to a 2021 study by Deloitte and The Manufacturing Institute, 2.1 million manufacturing jobs could go unfilled by 2030. The cost of those missing jobs could potentially total $1 trillion in 2030 alone. The industry still predicts a skills mismatch and shortage of employees that will essentially create challenges in the future due to an aging workforce, lack of attraction or interest, and lack of adequate job training programs, despite the pandemic in 2020.

YouthBuild Program Tip

Use Labor Market Information

National career and occupation projections can help YouthBuild programs understand labor demands and trends. On a local level, labor market information may vary. Programs are encouraged to converse with employers regarding local job openings and skills needed to fill those jobs.

Workforce and Industry Trends

While advancements in robotics, automation, and artificial intelligence continue to transform the manufacturing floor and the nature of jobs, employers still need workers to design, operate, maintain, and fix machines. Other industry trends that will influence emerging occupations include:

- Jobs developing and driving automation are expected to thrive
- Supply chain resilience and the Internet of Things *(see IT spotlight)* has increased demand for advanced logistics skills
- Manufacturers are adapting diversity, equity, and inclusion initiatives to close the opportunity gap

Source: Burning Glass Technologies, After the Storm Report, 2020

Entry-Level Job Openings

The need for entry-level workers in manufacturing has never been greater. According to the same study, many manufacturers are having a hard time filling entry-level production association positions. These jobs do not require technical knowledge, such as team assemblers, production helpers, or hand-held tool cutters and trimmers. Rather, they need personal effectiveness skills, such as following directions, willingness to learn, and accountability. These entry-level positions could be filled by high school graduates or people recently displaced from industries impacted by job losses, such as hospitality and food services in 2020.

Middle-Skills Job Openings

Middle-skills jobs such as computer numerical control (CNC) machinists, welders, and maintenance technicians are expected to be in demand as well. Middle-skill jobs typically require some level of technical training or applied skill that can take between several months to more than a year. Some also require licensing and certification.

Manufacturing Career Pathways

Within the manufacturing industry, there are four common career pathways that offer various occupations.

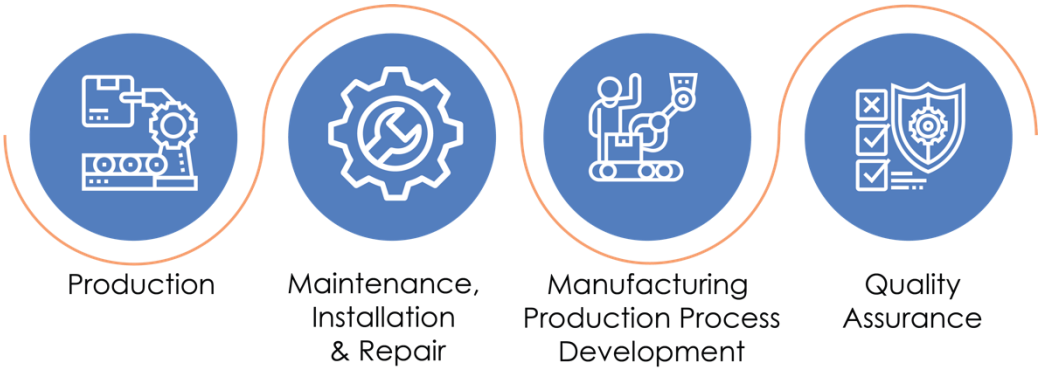


Table 2 includes occupations organized by each of the four common career pathways in the manufacturing industry. While national labor market information can provide insight on general industry trends and occupations in demand, DOL YouthBuild grantees are encouraged to consult with local employers and workforce development stakeholders to identify how to meet local economy and regional business needs. For local labor market data and information, visit the Department of Labor's state labor market projection website at projectionscentral.org or contact your local Workforce Development Boards.

YouthBuild Program Tip

How to Evaluate Viable Occupations Based on Regional Needs

To determine the occupations that are most viable in the culinary and hospitality industry, YouthBuild programs can utilize and consider the following criteria:

- **Competitive and Family-Sustaining Wages:** Does the occupation offer competitive, family-sustaining wages?
- **Occupation Growth:** Is there a local demand for these roles? Is there enough supply to meet demand?
- **Accessibility:** Are there accessible entry-level points? Is the employer willing to create more accessible entry-level points?

Table 2: Manufacturing Occupations by Career Pathways		
Maintenance, Installation & Repair		
Occupation	2020 Median Salary	Typical Entry-Level Education
*Industrial Machinery Mechanics	$55,490	Training in Vocational Schools, Related on-the-job experience, or an Associate's Degree
*Maintenance and Repair Workers, General	$40,850	Training in Vocational Schools, Related on-the-job experience, or an Associate's Degree
*Maintenance Workers, Machinery	$50,100	Training in Vocational Schools, Related on-the-job experience, or an Associate's Degree
*Medical Appliance Technicians	$41,750	Training in Vocational Schools, Related on-the-job experience, or an Associate's Degree
*Medical Equipment Repairers	$51,610	Training in Vocational Schools, Related on-the-job experience, or an Associate's Degree
Manufacturing Production Process Development		
Occupation	2020 Median Salary	Typical Entry-Level Education
*Aerospace Engineering and Operations Technologists	$68,570	Training in Vocational Schools, Related on-the-job experience, or an Associate's Degree
Electro-Mechanical and Mechatronics Technicians	$59,800	Training in Vocational Schools, Related on-the-job experience, or an Associate's Degree
Mechanical Engineering Technicians	$58,230	Training in Vocational Schools, Related on-the-job experience, or an Associate's Degree
Robotics Technicians	$59,800	Training in Vocational Schools, Related on-the-job experience, or an Associate's Degree

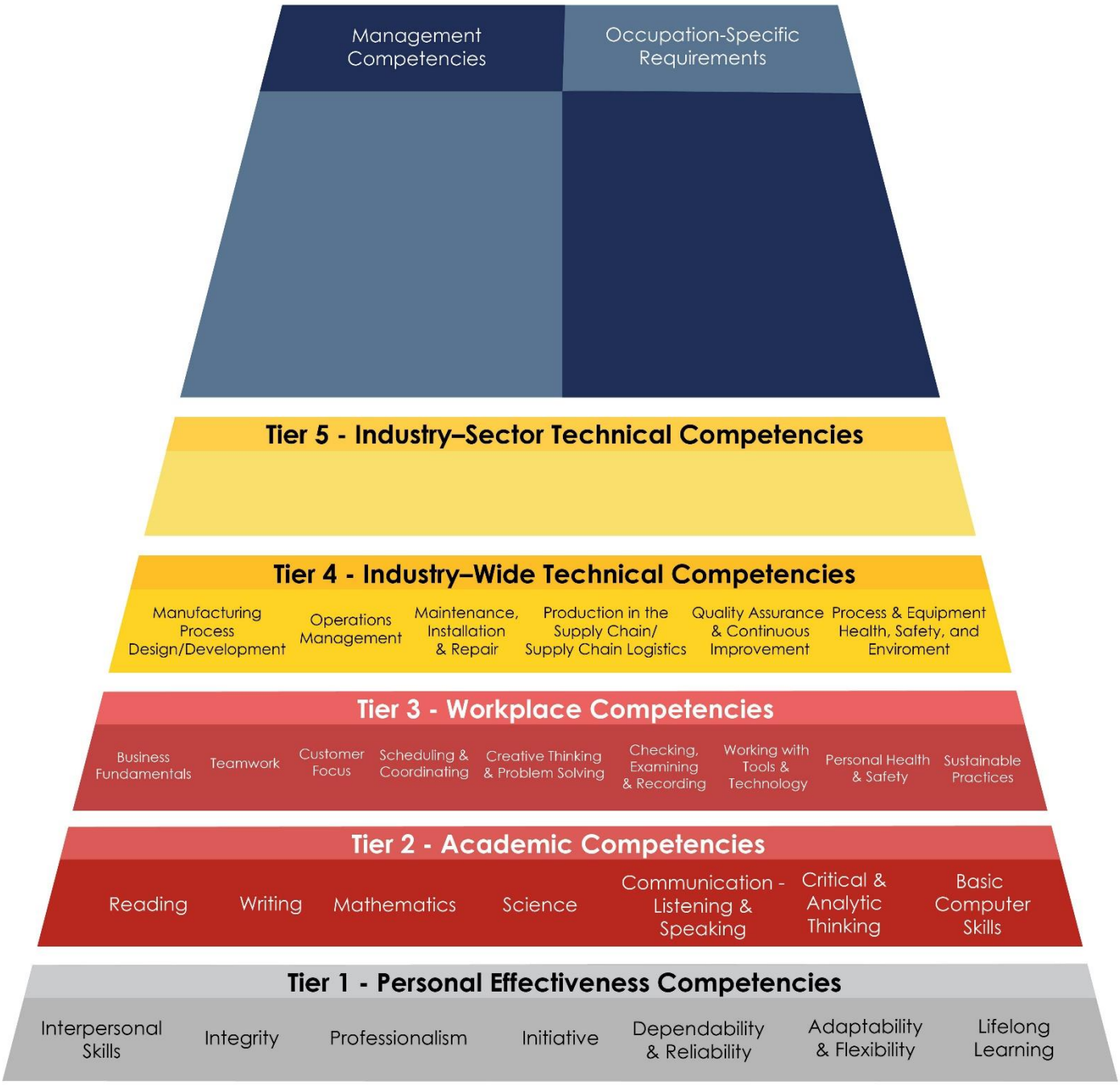
Production		
Occupation	2020 Median Salary	Typical Entry-Level Education
*Computer Numerically Controlled Tool Programmers	$57,740	Training in Vocational Schools, Related on-the-job experience, or an Associate's Degree
*Production Workers	$30,500	High School Diploma
*Recycling and Reclamation Workers	$31,120	High School Diploma
Machinists	$45,840	Training in Vocational Schools, Related on-the-job experience, or an Associate's Degree
Tool and Die Makers	$54,760	Training in Vocational Schools, Related on-the-job experience, or an Associate's Degree
Welders, Cutters, Solderers, and Brazers	$44,190	High School Diploma
Semiconductor Processing Technicians	$40,500	High School Diploma
Quality Assurance		
Occupation	2020 Median Salary	Typical Entry-Level Education
*Weighers, Measurers, Checkers, and Samplers, Recordkeeping	$36,650	High School Diploma
Production, Planning, and Expediting Clerks	$49,640	Training in Vocational Schools, Related on-the-job experience, or an Associate's degree

*O*NET the U.S. Department of Labor's Occupational Information Network, categorizes occupations with an asterisk as Bright Outlook, meaning they are anticipated to grow more quickly than others on a national level. Wages listed are as of May 2020. For the most current wage information, visit O*NET.*

Industry Skill Needs and Competencies

CareerOneStop, in partnership with the Department of Labor, offers the Manufacturing Competency Model that employers and industry associations developed. This model identifies a multi-tier set of building blocks defining the competencies needed for success, starting with Personal Effectiveness Competencies and building up to Management Competencies and Occupation-Specific Requirements. A detailed description of all the specific skills that comprise each tier of competencies can be accessed in the competency models.

Advanced Manufacturing Competency Model



Source: [Competency Model Clearinghouse, CareerOneStop]

YouthBuild Program Tip

Building Competency Models

DOL YouthBuild grantees' program model is designed to address the first three tiers of the competency model. In the upper tiers of the competency model, it is essential to work with industry partners to customize a Construction Plus (C+) pathway that meets the local needs of employers.

Conclusion

The manufacturing industry offers the opportunity to create and build products, which can be very rewarding for individuals who seek tangible results in their work. YouthBuild programs can use the Industry Spotlights to gain a basic understanding of the manufacturing industry while continuing to monitor local labor market information and work alongside employers to design C+ pathways. YouthBuild participants willing to learn and further develop their STEM, critical thinking, and problem-solving skills should consider exploring a career in manufacturing.