



MICHIGAN MANUFACTURING

INDUSTRY CLUSTER WORKFORCE ANALYSIS



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ABOUT THIS REPORT

This report is the product of a partnership between the Michigan Center for Data and Analytics and the Michigan Department of Labor and Economic Opportunity. It is designed to explore the Manufacturing industry cluster in Michigan through leveraging a variety of data sources. These include key occupations, education and training requirements, real-time online job ad demand, labor force projections, workforce demographics, the talent pipeline, and more. The intention of this report is to support workforce development across the state and to highlight the position of Manufacturing in Michigan.



Key Findings

- Since 2011, Manufacturing employment has grown by 14.9 percent, approximately double the 7.4 percent growth for total statewide employment. Compared to the pre-pandemic year of 2019, Manufacturing cluster employment is down 6.4 percent.
- The nominal (not inflation-adjusted) average salary in the Manufacturing cluster is just over \$71,700. This is \$10,000 greater than the average salary observed for total statewide employment. The *Automotive* subcluster, the largest subcluster within Manufacturing, has an average salary of nearly \$74,200. Several other Manufacturing subclusters have average salaries well above the average statewide salary of \$61,700.
- There were just under 3,400 active registered apprentices across Michigan in the Manufacturing cluster in 2021. Of these, 7.7 percent were women and 11.6 percent were people of color, both behind the statewide shares for all apprentices. The Detroit Metro region was home to 39.7 percent of all active Manufacturing apprentices, the largest share of any region.
- Manufacturing has a much higher share of those ages 45 to 64 than total statewide employment. This age group makes up about 46.3 percent of the cluster employment, 9.3 percentage points greater than the average observed across the state.
- Most key occupations in Manufacturing require a high school diploma or equivalent or less and on-the-job training. While there are many jobs requiring a postsecondary degree, there are plenty of opportunities for those not looking to further their formal education.



Introduction

An **industry cluster** is a strong concentration of related industries in one location.

These clusters consist of related employers, suppliers, and support institutions in a product or service field. Industry clusters that are prevalent in a particular region fuel the regional economy, generate payrolls, and create innovation by leveraging the knowledge and resources of all involved.

Manufacturing has long been a critical sector in Michigan's labor force. In 2021, the cluster employed roughly one-seventh of the state's workforce. While Michigan is known for its automotive manufacturing, the cluster also has a heavy presence within metal, machinery, chemical, and food manufacturing. Occupations within Manufacturing also have a diverse set of education and training requirements. Because of this, the cluster offers an ample number of opportunities for individuals seeking work regardless of educational attainment or skill set.

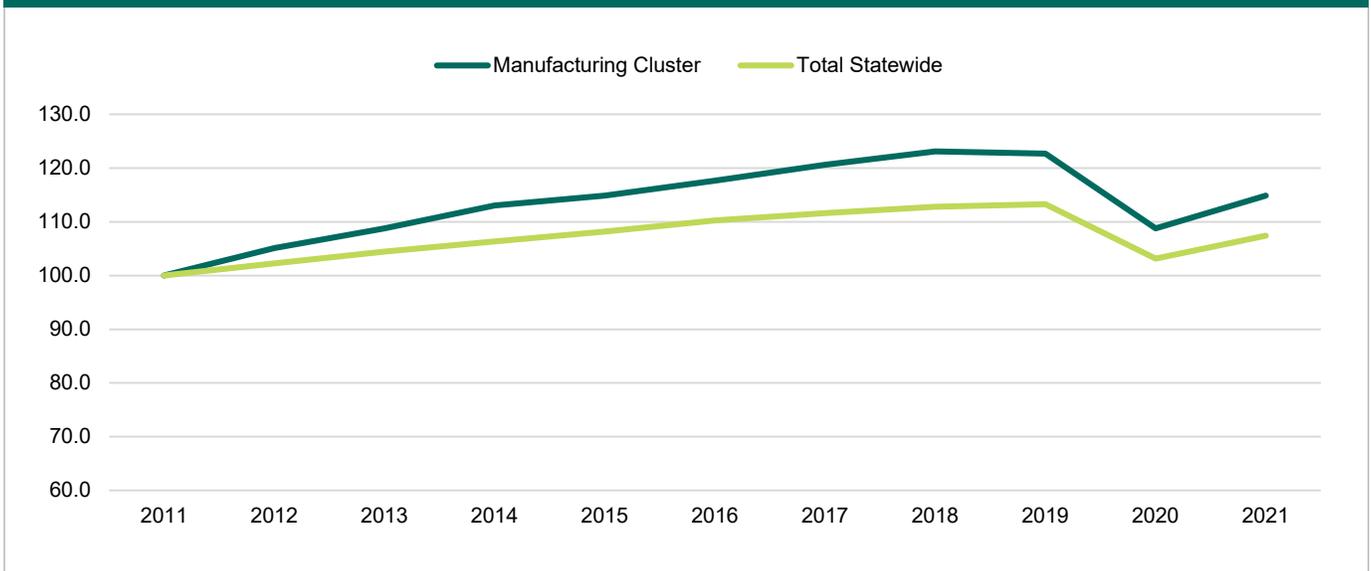
The Manufacturing cluster consists of 11 subclusters:

- Automotive
- Metals
- Chemical Products
- Machinery
- Food and Beverage
- Natural Resources
- Computer and Electronic Products
- Other
- Furniture
- Printing and Related Support Activities
- Medical Equipment and Supplies Manufacturing



Employment and Wages

FIGURE 1: EMPLOYMENT INDEX, MICHIGAN MANUFACTURING CLUSTER (INDEX YEAR: 2011)



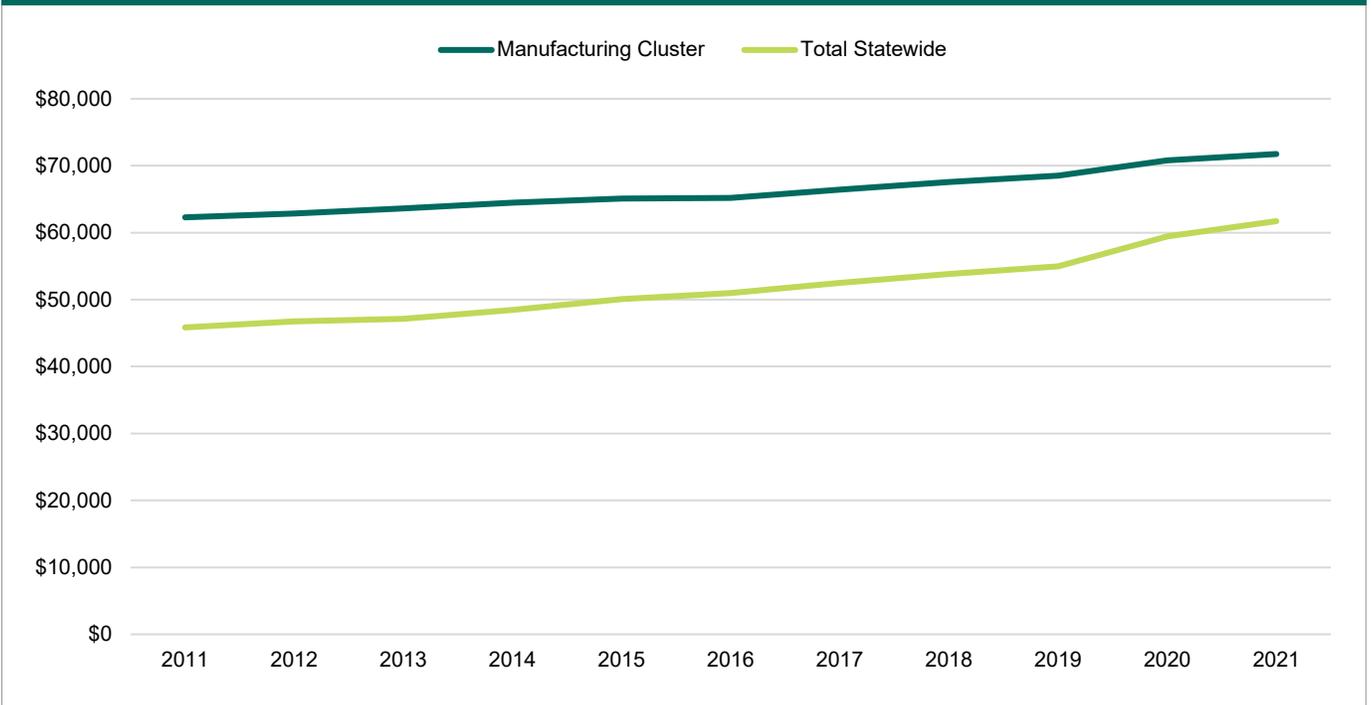
Source: Quarterly Census of Employment and Wages, Michigan Center for Data and Analytics

Figure 1 displays employment in the Manufacturing cluster and state indexed to 2011. This means employment was set equal to 100 in 2011 and percent changes were calculated from there.

Recovering from the Great Recession, Manufacturing jobs outpaced growth among all employment in Michigan until 2020. The early impacts of the COVID-19 pandemic resulted in significant declines in Manufacturing in 2020 before recovering. From 2011 to 2021, the cluster has expanded by 14.9 percent, roughly double the rate observed among total statewide employment. In 2021, both Manufacturing and total statewide employment are nearly equal to levels recorded in 2015. The Manufacturing cluster currently employs nearly 586,900 individuals in Michigan and accounts for 14.2 percent of total statewide jobs.



FIGURE 2: NOMINAL WAGE*, MICHIGAN MANUFACTURING CLUSTER, 2011–2021

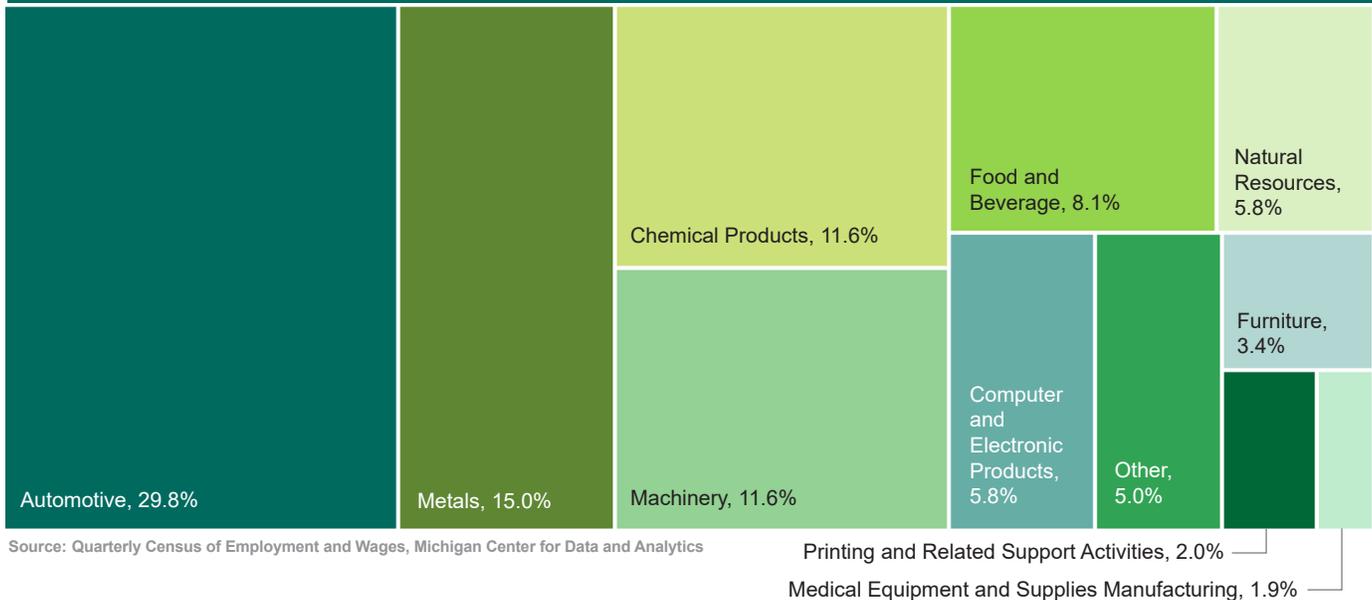


Source: Quarterly Census of Employment and Wages, Michigan Center for Data and Analytics
 *Nominal wages are not adjusted for inflation.

The Manufacturing cluster’s nominal average salary has grown slower than the total average salary in Michigan. The average salaries for the cluster and total statewide employment are shown in Figure 2. From 2011 to 2021, the average salary in Manufacturing increased by just over \$9,400 (15.1 percent). Comparatively, the total average statewide salary grew by nearly \$15,900 (34.6 percent). The average salary has progressed in Manufacturing since 2019 by 4.7 compared to 12.3 percent among total statewide employment. Currently, the average salary in the cluster sits at \$71,700 and is \$10,000 greater than that of the total average salary in Michigan.

Subclusters

FIGURE 3: SUBCLUSTER EMPLOYMENT DISTRIBUTION, MICHIGAN MANUFACTURING CLUSTER, 2021



Automotive

- Motor Vehicle Body and Trailer Manufacturing
- Motor Vehicle Manufacturing
- Motor Vehicle Parts Manufacturing

The *Automotive* subcluster employs roughly 174,800 individuals in the Manufacturing cluster statewide, and accounts for 29.8 percent of total cluster employment. The majority (69.6 percent) of this subcluster’s employment falls within the industry of *Motor vehicle parts manufacturing*. *Motor vehicle manufacturing* is the second largest industry in the group, employing 25.8 percent of individuals. The *Automotive* subcluster has an average annual salary of \$74,200, which is slightly higher than the Manufacturing cluster overall.

Metals

- Alumina and Aluminum Production and Processing
- Architectural and Structural Metals Manufacturing
- Boiler, Tank, and Shipping Container Manufacturing
- Coating, Engraving, Heat Treating, and Allied Activities
- Cutlery and Handtool Manufacturing

- Forging and Stamping
- Foundries
- Hardware Manufacturing
- Iron and Steel Mills and Ferroalloy Manufacturing
- Machine Shops; Turned Product; and Screw, Nut, and Bolt Manufacturing
- Nonferrous Metal (except Aluminum) Production and Processing
- Other Fabricated Metal Product Manufacturing
- Spring and Wire Product Manufacturing
- Steel Product Manufacturing from Purchased Steel

The *Metals* subcluster contains a wide variety of industries including, but not limited to, the cutting and forging of metals. Overall, just over 88,100 individuals are employed in this subcluster, making up 15.0 percent of total cluster employment. The largest industries within *Metals* are *Machine shops* (26.7 percent), *Coating, engraving, heat treating, and allied activities* (13.0 percent), and *Architectural and structural metals manufacturing* (12.2 percent). The average annual salary in the subcluster is around \$65,000; slightly higher than the average annual salary for all employment in Michigan (\$61,700).

Chemical Products

Basic Chemical Manufacturing
Other Chemical Product and Preparation Manufacturing
Paint, Coating, and Adhesive Manufacturing
Pesticide, Fertilizer, and Other Agricultural Chemical Manufacturing
Pharmaceutical and Medicine Manufacturing
Plastics Product Manufacturing
Resin, Synthetic Rubber, and Artificial and Synthetic Fibers and Filaments Manufacturing
Rubber Product Manufacturing
Soap, Cleaning Compound, and Toilet Preparation Manufacturing

The *Chemical products* subcluster employs 11.6 percent of the Manufacturing cluster and has an average annual salary of \$76,100. The largest industry in this group is *Plastics product manufacturing*, accounting for nearly half (49.3 percent) of *Chemical products* employment. However, this industry pays below average for the subcluster and is on par with the statewide median for all employment at \$61,700. The next largest industries included in this group are *Pharmaceutical and medicine manufacturing* (14.7 percent) and *Resin and synthetic rubber manufacturing* (8.8 percent).

Machinery

Agriculture, Construction, and Mining Machinery Manufacturing
Commercial and Service Industry Machinery Manufacturing
Engine, Turbine, and Power Transmission Equipment Manufacturing
Industrial Machinery Manufacturing
Metalworking Machinery Manufacturing
Other General Purpose Machinery Manufacturing
Ventilation, Heating, Air-Conditioning, and Commercial Refrigeration Equipment Manufacturing

Machinery makes up 11.6 percent of the Manufacturing cluster and employs 67,900 individuals in Michigan. Just under half (46.8 percent) of this subcluster's employment is in *Metalworking machinery manufacturing*. This is followed by *Other machinery manufacturing* (24.5 percent) and *Industrial machinery manufacturing* (9.3 percent). The average annual salary in *Machinery* is \$77,300, the third highest among the subclusters within *Manufacturing*.

Food and Beverage

Animal Food Manufacturing
Animal Slaughtering and Processing
Bakeries and Tortilla Manufacturing
Beverage Manufacturing
Dairy Product Manufacturing
Fruit and Vegetable Preserving and Specialty Food Manufacturing
Grain and Oilseed Milling
Other Food Manufacturing
Seafood Product Preparation and Packaging
Sugar and Confectionery Product Manufacturing
Tobacco Manufacturing

Just over 8 percent of cluster employment is within *Food and beverage*. This subcluster employs roughly 47,200 individuals in Michigan and has an average annual salary of \$55,600, which is below the average annual salary for all employment in Michigan. Employment within the subcluster is well dispersed across a range of industries. The largest industries in *Food and beverage* include *Bakeries and tortilla manufacturing* (18.6 percent) and *Beverage manufacturing* (18.0 percent).

Natural Resources

Cement and Concrete Product Manufacturing
Clay Product and Refractory Manufacturing
Converted Paper Product Manufacturing
Glass and Glass Product Manufacturing
Lime and Gypsum Product Manufacturing
Other Nonmetallic Mineral Product Manufacturing
Other Wood Product Manufacturing
Petroleum and Coal Products Manufacturing
Pulp, Paper, and Paperboard Mills
Sawmills and Wood Preservation
Veneer, Plywood, and Engineered Wood Product Manufacturing

The *Natural resources* subcluster employs just over 33,400 individuals and makes up 5.8 percent of *Manufacturing* employment. More than a quarter (26.6 percent) of this subcluster's employment is in the industry of *Converted paper product manufacturing*.

Computer and Electronic Products

Audio and Video Equipment Manufacturing
Communications Equipment Manufacturing
Computer and Peripheral Equipment Manufacturing
Electric Lighting Equipment Manufacturing
Electrical Equipment Manufacturing
Household Appliance Manufacturing
Manufacturing and Reproducing Magnetic and Optical Media
Navigational, Measuring, Electromedical, and Control Instruments Manufacturing
Other Electrical Equipment and Component Manufacturing
Semiconductor and Other Electronic Component Manufacturing

Over 33,700 individuals are employed in *Computer and electronic products*, accounting for 5.8 percent of Manufacturing cluster employment. Over half of this subcluster is contained in the industries of *Semiconductor manufacturing* (30.5 percent) and *Navigational and control instruments manufacturing* (25.1 percent). *Computer and electronic products* has an average annual salary of about \$85,500 making it the second highest-paying subcluster within Manufacturing.

Other

Aerospace Product and Parts Manufacturing
Apparel Accessories and Other Apparel Manufacturing
Apparel Knitting Mills
Cut and Sew Apparel Manufacturing
Fabric Mills
Fiber, Yarn, and Thread Mills
Footwear Manufacturing
Leather and Hide Tanning and Finishing
Other Leather and Allied Product Manufacturing
Other Miscellaneous Manufacturing
Other Textile Product Mills
Other Transportation Equipment Manufacturing
Railroad Rolling Stock Manufacturing
Ship and Boat Building
Textile and Fabric Finishing and Fabric Coating Mills
Textile Furnishings Mills

The *Other* subcluster within Manufacturing employs 29,200 individuals, making up 5.0 percent of the cluster. Nearly 16,300 (55.7 percent) of this subcluster's employment is in *Other miscellaneous manufacturing*. Overall, this subcluster has an average annual salary of \$67,400.

Furniture

Household and Institutional Furniture and Kitchen Cabinet Manufacturing
Office Furniture (including Fixtures) Manufacturing
Other Furniture Related Product Manufacturing

Furniture employs 3.4 percent, or 19,800 individuals, in the Manufacturing cluster. Just under three-quarters (74.1 percent) of this subcluster's employment is contained within the industry of *Office furniture (including fixtures) manufacturing*. The subcluster has an average annual salary of \$69,300.

Printing and Related Support Activities

Printing and Related Support Activities

The *Printing and related support activities* subcluster employs 2.0 percent of the Manufacturing cluster with about 11,700 workers. It is the lowest-paying subcluster in Manufacturing with an average annual salary of \$55,100.

Medical Equipment and Supplies Manufacturing

Medical Equipment and Supplies Manufacturing

More than 11,400 individuals are employed in *Medical equipment and supplies manufacturing*, making up 1.9 percent of the Manufacturing cluster. The subcluster has the highest average annual salary within Manufacturing at \$88,500.

Key Occupations

Occupational analysis is important to understanding an industry cluster. Key occupations are chosen by a favorable mix of criteria that include the occupation's share of the cluster's total employment, the concentration within the cluster, and the projected outlook for that occupation. Due to the occupations having large volumes within the cluster, they are generally representative of the expected wages, education, and skills within the industry cluster.

- Of the 25 key occupations in Manufacturing, 19 typically require a high school diploma or equivalent or less formal education. Notably, nearly all of these occupations require some sort of on-the-job training. Five key occupations require a bachelor's degree. The only occupation requiring some on-the-job training in addition to a bachelor's degree is *Buyers and purchasing agents*.
- The median hourly wage for the Manufacturing cluster is \$22.60. Of the key occupations, 11 have a median wage greater than the cluster. With more time on the job, seven of the remaining 14 occupations may offer a wage greater than the median wage for the cluster.
- There are a projected 51,200 average annual openings among the cluster's 25 key occupations between 2020 and 2030. One-fifth of these annual openings are projected to be in *Miscellaneous assemblers and fabricators*. Other occupations with a large quantity of projected annual openings include *First-line supervisors of production and operating workers* (3,200) and *Inspectors, testers, sorters, samplers, and weighers* (3,100). Annual openings are due to a variety of reasons such as labor force exits and retirements, occupational transfers, and growth in the occupation.

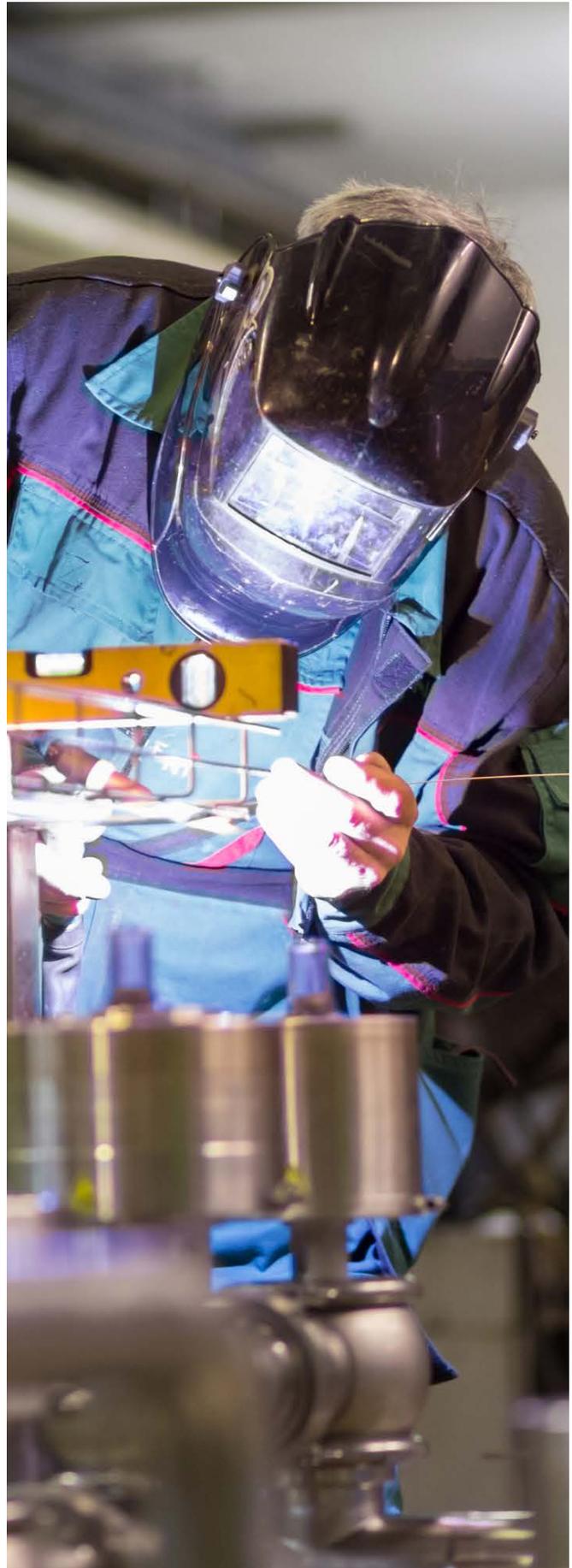


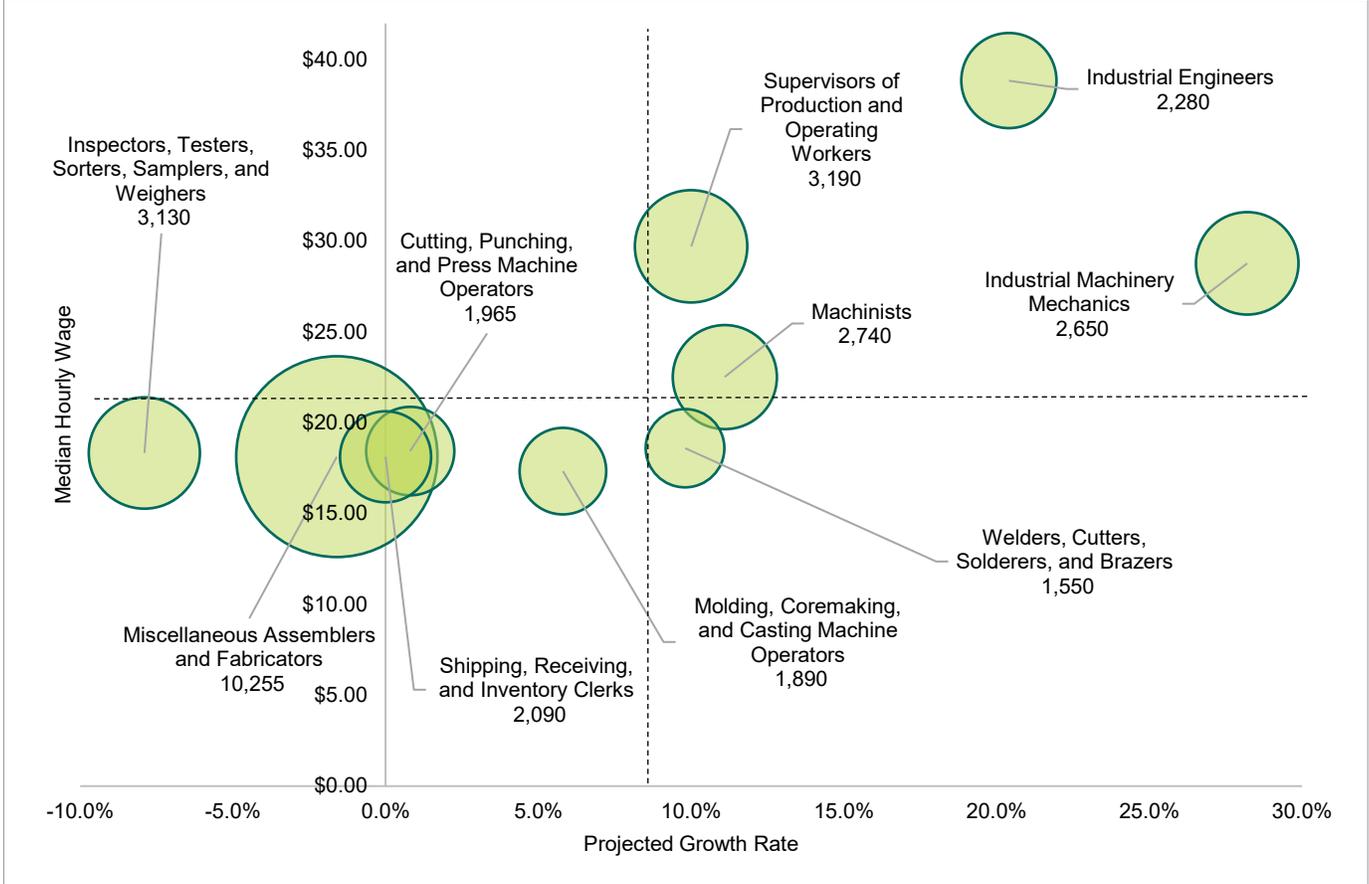
FIGURE 4: KEY OCCUPATIONS, MICHIGAN MANUFACTURING CLUSTER, 2021

KEY OCCUPATION	CLUSTER EMP.	MICHIGAN EMP.	CLUSTER WAGE RANGE (HOURLY)	ANNUAL OPENINGS	TYPICAL EDUCATION AND TRAINING OJT: ON-THE-JOB TRAINING
Miscellaneous Assemblers and Fabricators	85,910	105,940	\$17–\$24	10,255	High School Diploma or Equivalent and Moderate-term OJT
First-Line Supervisors of Production and Operating Workers	22,560	28,250	\$23–\$38	3,190	High School Diploma or Equivalent
Cutting, Punching, and Press Machine Operators	21,690	23,610	\$17–\$26	1,965	High School Diploma or Equivalent and Moderate-term OJT
Machinists	19,680	22,100	\$18–\$28	2,740	High School Diploma or Equivalent and Long-term OJT
Inspectors, Testers, Sorters, Samplers, and Weighers	17,540	29,270	\$17–\$23	3,130	High School Diploma or Equivalent and Moderate-term OJT
Industrial Machinery Mechanics	14,710	22,120	\$23–\$30	2,650	High School Diploma or Equivalent and Long-term OJT
Industrial Engineers	14,190	25,640	\$37–\$48	2,280	Bachelor's Degree
Molding, Coremaking, and Casting Machine Operators	13,030	14,690	\$14–\$19	1,890	High School Diploma or Equivalent and Moderate-term OJT
Welders, Cutters, Solderers, and Brazers	11,070	14,060	\$18–\$23	1,550	High School Diploma or Equivalent and Moderate-term OJT
Shipping, Receiving, and Inventory Clerks	10,510	23,350	\$17–\$22	2,090	High School Diploma or Equivalent and Short-term OJT
Industrial Production Managers	10,340	13,470	\$39–\$62	930	Bachelor's Degree
Mechanical Engineers	9,670	32,520	\$31–\$48	2,920	Bachelor's Degree
Tool and Die Makers	9,550	10,270	\$23–\$37	1,045	Postsecondary Nondegree Award and Long-term OJT
CNC Tool Operators	9,420	10,260	\$18–\$24	815	High School Diploma or Equivalent and Moderate-term OJT
Packaging and Filling Machine Operators	8,120	10,710	\$14–\$22	1,370	High School Diploma or Equivalent and Moderate-term OJT
Electrical, Electronic, and Electromechanical Assemblers	7,770	8,670	\$14–\$19	1,315	High School Diploma or Equivalent and Moderate-term OJT
Industrial Truck and Tractor Operators	7,600	26,150	\$17–\$22	2,735	No Formal Education Credential and Short-term OJT
Engine and Other Machine Assemblers	7,530	7,830	\$18–\$29	745	High School Diploma or Equivalent and Moderate-term OJT
Multiple Machine Tool Setters and Operators	6,530	7,400	\$15–\$24	945	High School Diploma or Equivalent and Moderate-term OJT
Production, Planning, and Expediting Clerks	5,880	9,780	\$21–\$29	1,035	High School Diploma or Equivalent and Moderate-term OJT
Packers and Packagers, Hand	5,000	13,030	\$14–\$17	2,225	No Formal Education Credential and Short-term OJT
Buyers and Purchasing Agents	4,740	14,410	\$24–\$38	1,385	Bachelor's Degree and Moderate-term OJT
Chemical Equipment Operators	4,370	4,470	\$18–\$30	485	High School Diploma or Equivalent and Moderate-term OJT
Architectural and Engineering Managers	4,080	11,380	\$49–\$73	860	Bachelor's Degree
Coating and Painting Machine Operators	3,870	5,440	\$15–\$21	600	High School Diploma or Equivalent and Moderate-term OJT

Source: Cluster employment, Michigan employment, and Wage range: Occupational Employment and Wage Statistics, Michigan Center for Data and Analytics (2021); Annual Openings: 2020–2030 Long-term Occupational Projections, Michigan Center for Data and Analytics; Typical Education and Training: U.S. Bureau of Labor Statistics

Note: Cluster employment is the total count of the occupation within the defined industry cluster, while Michigan employment is the total count of that occupation in the state across all industries.

FIGURE 5: KEY OCCUPATIONS, MICHIGAN MANUFACTURING CLUSTER, 2021



Source: 2021 Occupational Employment and Wage Statistics, Michigan Center for Data and Analytics (Wages); 2020–2030 Long-term Occupational Projections, Michigan Center for Data and Analytics (Projected Growth Rate and Annual Openings)

Figure 5 displays several key occupations within the Manufacturing cluster that show a diverse mix of projected long-term growth, projected annual openings, and statewide median wages. The size of the bubbles in the chart are determined by projected annual openings. The lines at 8.8 percent and \$21.73 represent the statewide projected employment growth through 2030 and the 2021 statewide median wage.

Just four key occupations displayed have a median hourly wage greater than the statewide median. These include *Industrial engineers* (\$38.85), *Supervisors of production and operating workers* (\$29.72), *Industrial machinery mechanics* (\$28.79), and *Machinists* (\$22.53).

Of the key occupations displayed, two are projected to contract between 2020 and 2030 while two are expected to expand by greater than 20 percent over the period. Employment change among those listed range from -7.9 percent for *Inspectors, testers, sorters, samplers, and weighers* to 28.2 percent for *Industrial machinery mechanics*. *Industrial engineers* have a projected growth rate of 20.4 percent.

Potential Manufacturing Career Pathway



Helpers – Production Workers

- \$17.30
- High School Diploma or Equivalent
- Short-term On-the-Job Training

Engine and Other Machine Assemblers

- \$23.12
- High School Diploma or Equivalent
- Moderate-Term On-the-Job Training

First-Line Supervisors of Production and Operating Workers

- \$29.61
- High School Diploma or Equivalent

First-Line Supervisors of Mechanics, Installers, and Repairers

- \$36.11
- High School Diploma or Equivalent
- Certification

Industrial Engineering Technicians

- \$29.02
- Associate Degree

Mechanical Engineering Technicians

- \$29.32
- Associate Degree

Career/ Technical Education Teachers, Secondary School

- \$29.80
- Bachelor's Degree

Pathway Source: <https://careerwise.minnstate.edu/careers/transportation-systems-infrastructure-pathway.html>

Wage Range: 2021 Occupational Employment and Wage Statistics, Michigan Center for Data and Analytics

Typical Education and Training: U.S. Bureau of Labor Statistics

High School Diploma or Equivalent or Short-term Training

Helpers—Production Workers
Industrial Truck and Tractor Operators
Laborers and Freight, Stock, and Material Movers, Hand
Light Truck Drivers
Packers and Packagers, Hand

There are several occupations in the Manufacturing cluster that require a high school diploma or equivalent and/or short-term training (one month or less). With lower educational and training requirements, more individuals across the state can seek employment in this cluster without having to further their education or complete long-term training (more than 12 months). *Laborers and freight, stock, and material movers, hand* is the largest occupation in this category with nearly 14,400 individuals employed in the cluster statewide. The occupation only requires short-term training with no formal educational credential needed. The median hourly wages of the highlighted occupations in this tier vary from \$14.39 for *Packers and packagers, hand* to \$18.21 for *Industrial truck and tractor operators*.

Postsecondary Certificate or Moderate-term Training

Cutting, Punching, and Press Machine Setters, Operators, and Tenders, Metal and Plastic
Electrical, Electronic, and Electromechanical Assemblers, Except Coil Winders, Tapers, and Finishers
Engine and Other Machine Assemblers
Miscellaneous Assemblers and Fabricators
Molding, Coremaking, and Casting Machine Setters, Operators, and Tenders, Metal and Plastic

Occupations in this tier typically require a postsecondary certificate or moderate-term training (more than one month and up to 12 months). Most jobs with these requirements offer higher median wages than those with less education and training. This offers good opportunities for those who want to advance their career without a postsecondary degree or long-term training. The occupations highlighted in this category each require a high school diploma or equivalent and moderate-term training. *Miscellaneous assemblers and fabricators* employ the largest number of individuals in this tier with roughly

85,900. Median wages range from \$17.35 to \$23.12 for the five occupations spotlighted in this category.

Associate Degree or Long-term Training or Apprenticeships

Industrial Engineering Technologists and Technicians
Industrial Machinery Mechanics
Machinists
Mechanical Engineering Technologists and Technicians
Tool and Die Makers

There are several well-paying occupations in Manufacturing that require an associate degree, long-term training, or the completion of an apprenticeship. Within this tier, *Machinists* and *Industrial machinery mechanics* have the highest employment levels at 19,700 and 14,700, respectively. Wage progression in this tier is also quite noticeable from the previous category. Median wages for the occupations in this group all sit above the statewide median wage of \$21.73 and range from \$22.53 to \$29.33.

Bachelor's Degree or Higher

Electrical Engineers
General and Operations Managers
Industrial Engineers
Industrial Production Managers
Mechanical Engineers

Occupations that require a bachelor's degree or higher in the Manufacturing cluster tend to be much higher paying than jobs in other tiers and are also well above the statewide median wage. Many types of engineers and managers are included in this group, which require on-the-job experience. The largest occupation in this tier is *Industrial engineers* with 14,200 individuals, more than half of total employment statewide for this occupation. The median hourly wages for the occupations in this category range from \$38.44 for *Mechanical engineers* to \$60.26 for *General and operations managers*.



Apprenticeships

The Manufacturing industry cluster is a traditional apprenticeship industry along with Construction as these clusters typically account for a majority share of registered apprentices. In 2021, there were just under 3,400 active Manufacturing registered apprentices in Michigan. Just over 61 percent of these active registered apprentices were in the industries of *Motor vehicle manufacturing*, *Metalworking machinery manufacturing*, and *Motor vehicle parts manufacturing*. The cluster fell behind the statewide share across all demographic groups. Of the nearly 3,400 active apprentices, 7.7 percent were women, 11.6 percent were people of color, 5.9 percent were veterans, and youth made up 0.4 percent. The Detroit Metro region had the largest share of active apprentices in the cluster at 39.7 percent, largely due to its heavy presence in *Motor vehicle manufacturing*. This was followed by West Michigan (29.5 percent) and Southwest Michigan (13.0 percent).

There were significantly more new registered apprentices in the Manufacturing cluster toward the end of the last decade than at the beginning. There were fewer than 600 new apprentices each year from 2008 to 2014, and more than 1,000 each year between 2017 and 2019. With the early impacts of the COVID-19 pandemic, there were only 600 newly registered Manufacturing apprentices in 2020 followed by nearly 1,000 in 2021. Registered apprenticeship completers have increased nearly every year since 2013 and there have been more than 600 each year since 2019.

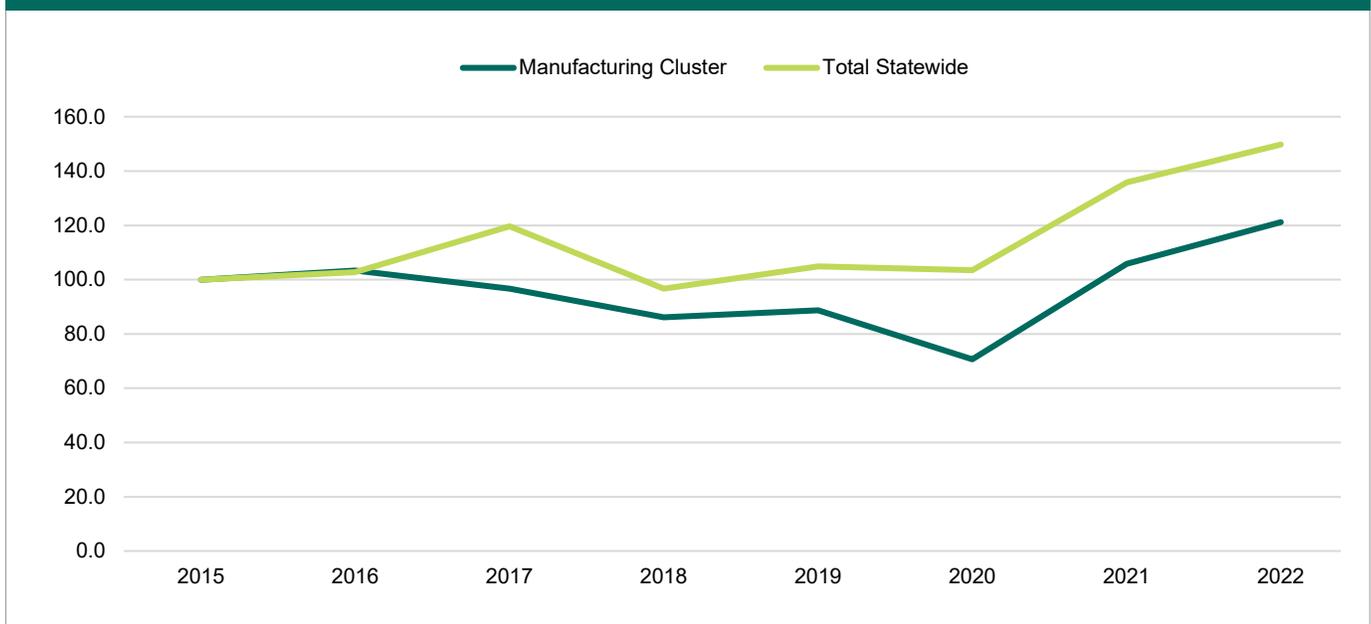
Real-Time Demand

Real-time demand is measured as the number of job advertisements posted online for an occupation or industry. The data is provided by Burning Glass Technologies and The Conference Board Help Wanted Online. Over time, online job advertisements have become more prevalent as technology becomes a more prominent method of communication. The use of online job postings still varies by industry with some areas of the economy being more reliant on methods such as word-of-mouth or local advertisements. Online job advertisements, however, can provide a mix of information about an industry cluster such as total available ads, top requested skills and certifications, minimum education requirements, and more.

Between 2015 and 2020, online job advertisements had been on a downward trend in the Manufacturing cluster (Figure 7). After the initial impacts in 2020 from COVID-19, online job advertisements began to increase in the cluster, just like what was observed at the total statewide level. However, the Manufacturing cluster has been well behind the state in terms of growth since 2016. In Figure 6, online job advertisements in the Manufacturing cluster and the state are indexed to 2015. Each level of 2015 online job advertisements were set equal to 100 and the changes were calculated from there. In both 2021 and 2022, the cluster surpassed its 2015 job advertisement levels.

Real-time demand is measured as the number of job advertisements posted online for an occupation or industry.

FIGURE 6: ONLINE JOB ADVERTISEMENTS INDEX, MICHIGAN MANUFACTURING CLUSTER (INDEX YEAR: 2015)



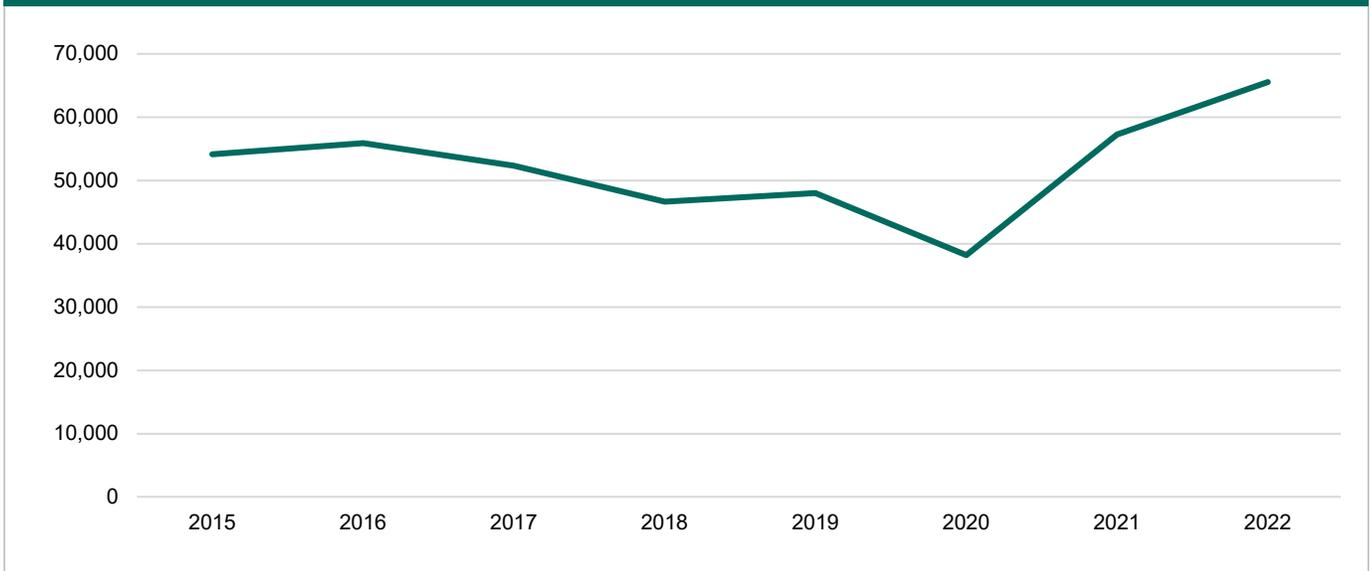
Source: The Conference Board Help Wanted OnLine, Burning Glass Technologies

Between 2016 and 2020, Manufacturing experienced a decline in annual online job advertisements by 17,700. This is in part due to COVID-19 impacting the job market in early 2020, however, the cluster was already experiencing a steady decline before the pandemic took place. Six occupations had declines in online postings by more than 1,000 from 2016 to 2020. *Software developers, applications; Computer occupations, all other; Engineers, all other; Mechanical engineers; Electrical engineers; and Managers, all other* experienced high losses over this time period. However, these occupations also assisted in the sharp incline for the industry cluster between 2020 and 2022.

Minimum education requirements in online job ads for this cluster are mainly split between high school diplomas or equivalent and bachelor's degrees. Few job ads for this cluster require at least an associate degree and even less require a master's degree or above. This is typical of the education and training requirements for key occupations in Manufacturing. It is not a cluster that advertises heavily for workers with higher levels of education.



FIGURE 7: ONLINE JOB ADVERTISEMENTS, MICHIGAN MANUFACTURING CLUSTER



Source: The Conference Board Help Wanted OnLine, Burning Glass Technologies



The top 10 certifications and baseline or specialized skills for a cluster are determined by the number of times the skill or certification is listed in an online job advertisement for a specific time period (July 2021 to June 2022). Certifications are designated credentials earned by an individual to verify skills or knowledge gained to perform a job. Baseline skills are often called “foundational skills” and are defined as the common, nonspecialized skills that cut across a broad range of occupations. Lastly, specialized skills include professional and job-specific skills requested in job advertisements.

Certifications and Skills Requested in Michigan Manufacturing Cluster Online Job Ads

Top 10 Certifications

- American Board for Engineering and Technology (ABET) Accredited
- Certified Public Accountant (CPA)
- Contractors License
- First Aid CPR AED
- IT Infrastructure Library (ITIL) Certification
- OSHA Forklift Certification
- Project Management Certification
- Project Management Professional (PMP)
- Six Sigma Black Belt Certification
- Six Sigma Certification

Note: Driver's license is not listed here but did appear in the top 10 certifications for every industry cluster.

Top 10 Baseline Skills

- Communication Skills
- Creativity
- Detail-Oriented
- Microsoft Excel
- Microsoft Office
- Organizational Skills
- Planning
- Problem Solving
- Teamwork/Collaboration
- Troubleshooting

Top 10 Specialized Skills

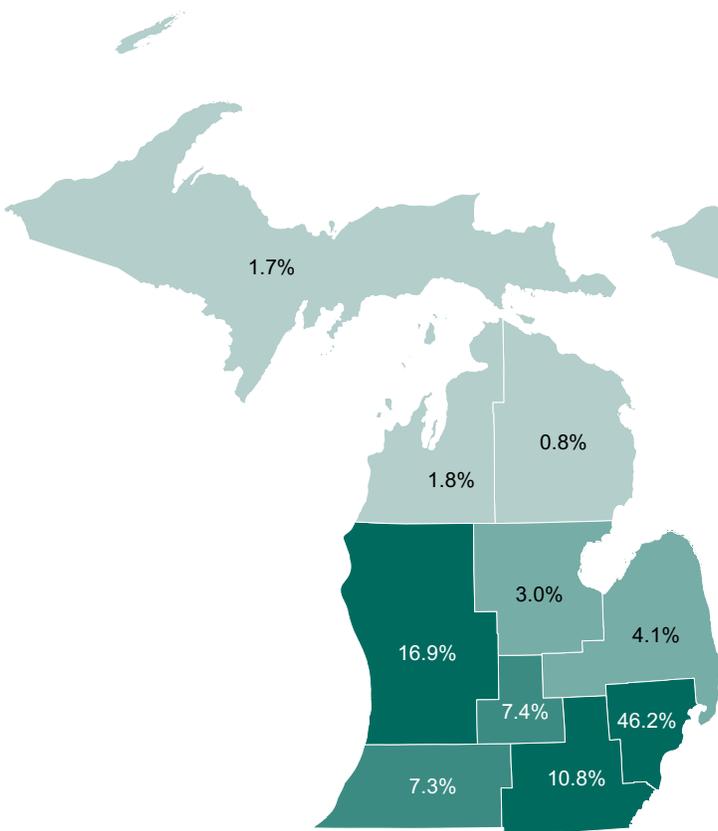
- Budgeting
- Customer Service
- Scheduling
- Sales
- Repair
- Packaging
- Product Development
- Project Management
- SAP
- Software Development

Source: The Conference Board Help Wanted OnLine, Burning Glass Technologies

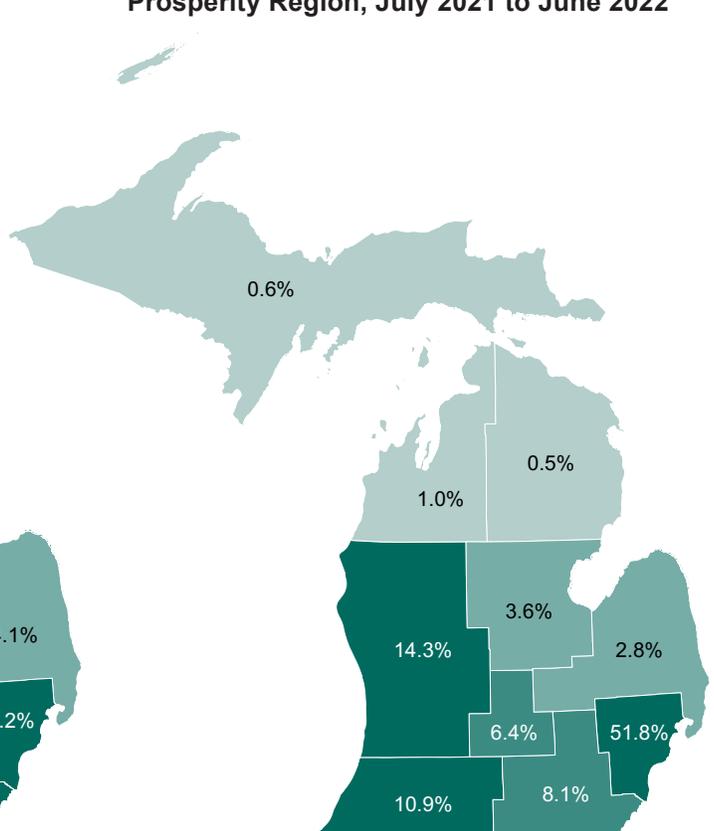


Over 85 percent of all online job advertisements in Manufacturing are spread across the Detroit Metro, Southeast, Southwest, and West Michigan prosperity regions. This is not surprising, as Manufacturing has a heavy presence in each of these regional economies. This industry cluster is prominent across the state overall, however, the Upper Peninsula and Northeast regions rely the least on Manufacturing. This is true in the share of job ads for this cluster by region, but also in the Manufacturing cluster's share of total employment in these two regions.

Share of Total Job Advertisements by Michigan Prosperity Region, July 2021 to June 2022



Cluster Share of Manufacturing Job Advertisements by Michigan Prosperity Region, July 2021 to June 2022



Source: The Conference Board Help Wanted OnLine, Burning Glass Technologies

Employment Projections

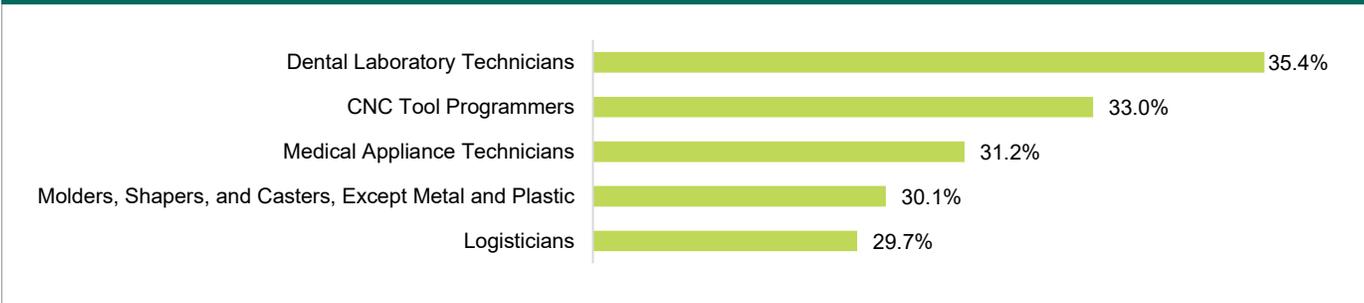
Projections do not exist for industry clusters, but they do exist for industries and occupations that make up the industry cluster. Although projections through 2030 show nearly 9 percent growth in total statewide employment, it is important to remember that these projections begin with a base year of 2020, where total employment was down compared to prior years.

The occupations with the highest projected growth rates through 2030 in the Manufacturing cluster are shown in Figure 8. Apart from *Logisticians*, which typically requires a bachelor’s degree, the other four are commonly obtainable with either a high school diploma or equivalent or a postsecondary certificate and moderate- to long-term training. As a result, there are projected to be many new opportunities for those who are not seeking to further their education. Among these five occupations, there are expected to be nearly 2,100 average annual openings between 2020 and 2030.

Figure 9 displays the occupations with the largest number of projected annual openings through 2030 in the cluster. Four of the five occupations, excluding *Mechanical engineers*, only require a high school diploma or equivalent and moderate-term training or on-the-job experience. It is important to note that while some occupations may be projected to contract, they will still produce many annual openings. Employment for *Inspectors, testers, sorters, samplers, and weighers* is projected to decline by 7.9 percent, but the occupation is still expected to have the fourth highest number of annual openings.

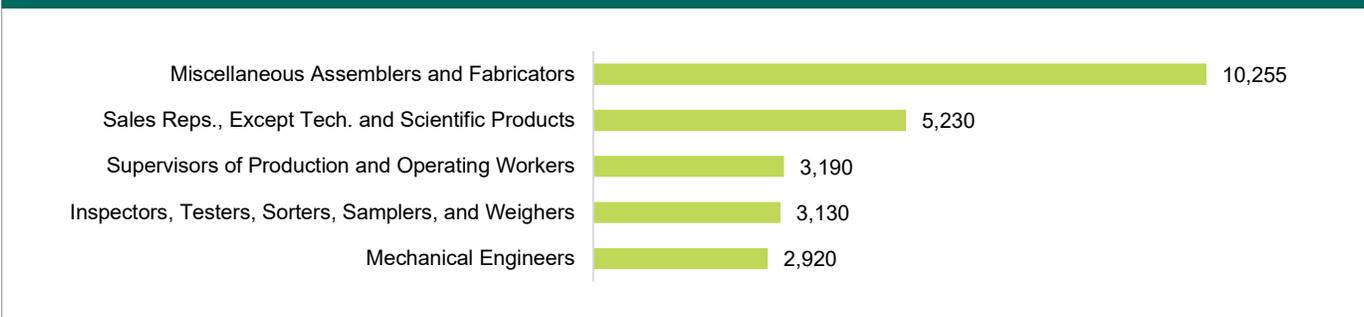
Together, these five occupations are projected to provide just over 24,700 openings each year between 2020 and 2030.

FIGURE 8: MICHIGAN MANUFACTURING CLUSTER OCCUPATIONS WITH THE MOST PROJECTED GROWTH THROUGH 2030



Source: 2020–2030 Occupational Employment Projections, Michigan Center for Data and Analytics

FIGURE 9: MICHIGAN MANUFACTURING CLUSTER OCCUPATIONS WITH THE MOST PROJECTED ANNUAL OPENINGS THROUGH 2030



Source: 2020–2030 Occupational Employment Projections, Michigan Center for Data and Analytics

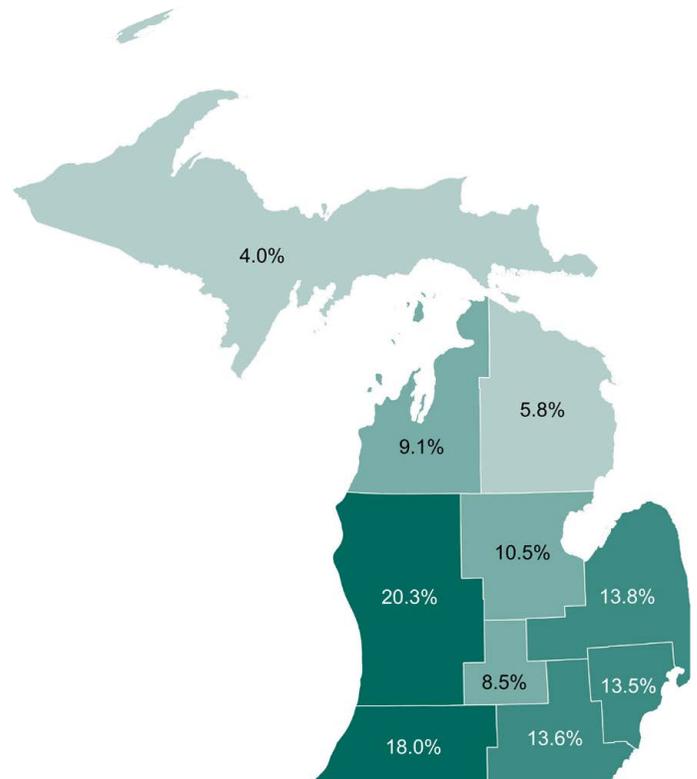


Workforce Demographics

Data on workforce demographics such as gender, age, education, and race and ethnicity are important to identifying industry cluster characteristics and evaluating potential disparities. Understanding and addressing gaps in education and skills across demographic groups can aid in the growth of an industry cluster. To maintain a young workforce across an industry cluster, employers may need to acclimate to what their workforce values, such as opportunities for financial and professional gain. The following section displays characteristics of the Manufacturing cluster workforce in Michigan. These data analyses rely on the Longitudinal Employer-Household Dynamics and may vary slightly from industry data published by the Quarterly Census of Employment and Wages due to limitations in data availability and differences in collection periods.

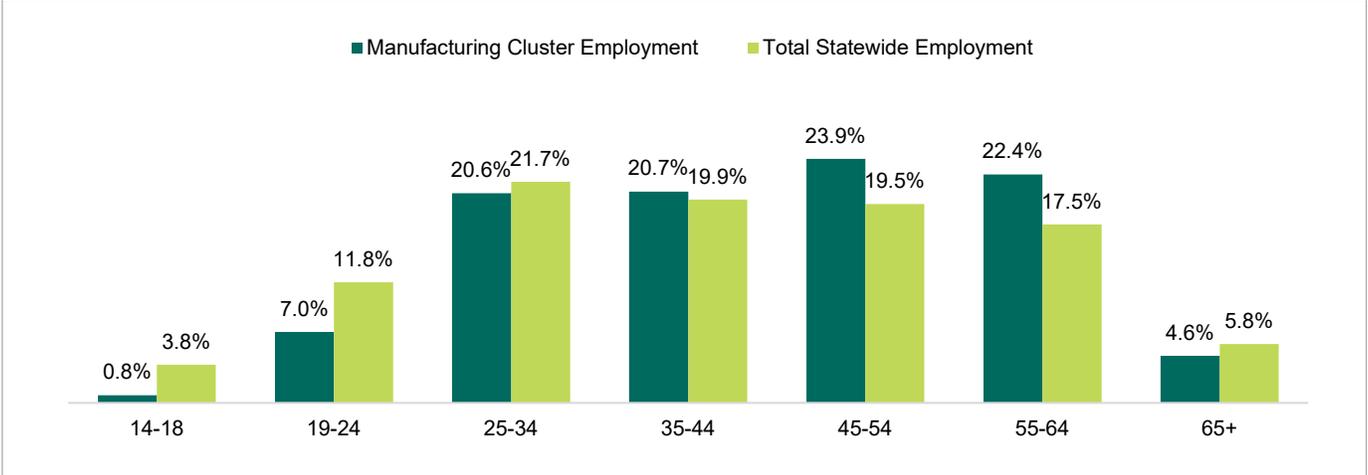
The West and Southwest Michigan regions have the largest share of their employment in the Manufacturing cluster at 20.3 percent and 18.0 percent, respectively. West Michigan has a much heavier presence within *Furniture and related product manufacturing* than other regions of the state. The Upper Peninsula has the smallest share of employment in Manufacturing at just 4.0 percent.

Manufacturing Cluster Share of Total Employment by Michigan Prosperity Region



Source: Longitudinal Employer-Household Dynamics, U.S. Census Bureau

FIGURE 10: MICHIGAN MANUFACTURING CLUSTER EMPLOYMENT BY AGE, THIRD QUARTER 2021

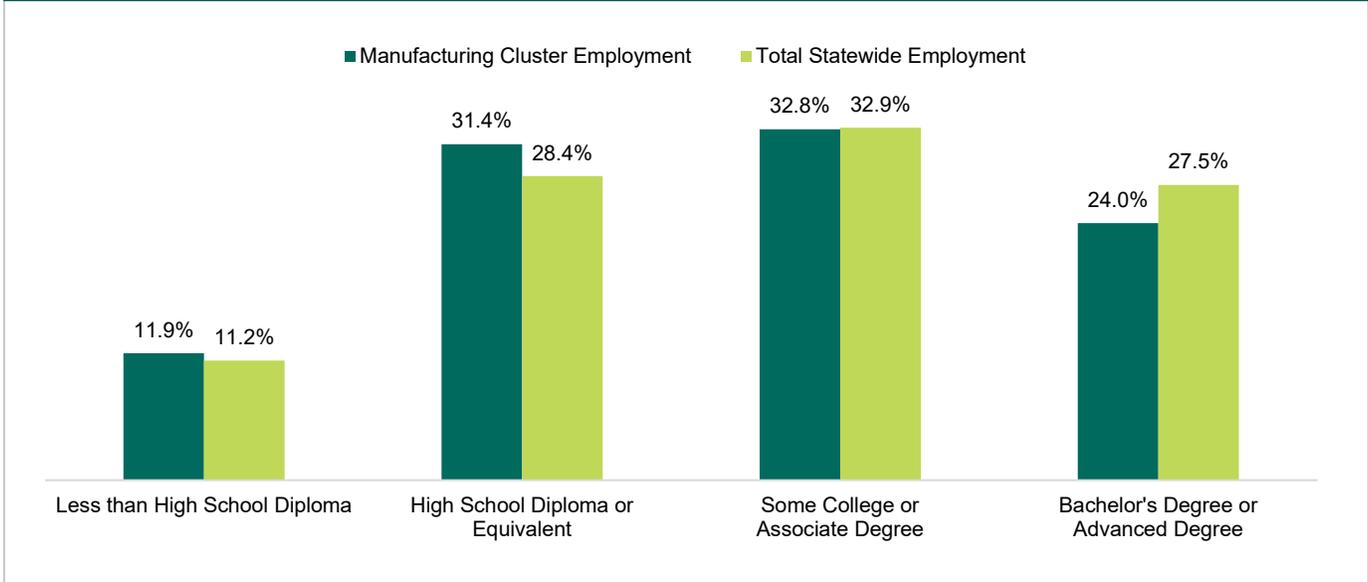


Source: Third Quarter 2021 Longitudinal Employer-Household Dynamics program, U.S. Census Bureau

The Manufacturing cluster has a much higher share of employment in the 45-to-64 age group compared to the state. At 46.3 percent of the Manufacturing workforce, the share of 45- to 64-year-olds in the cluster is 9.3 percentage points greater than the statewide average. The cluster also has a slightly higher share of employment among those ages 35 to 44. On the other side, employment among those under the age of 25 make up a significantly lower share in Manufacturing than that of total statewide employment.

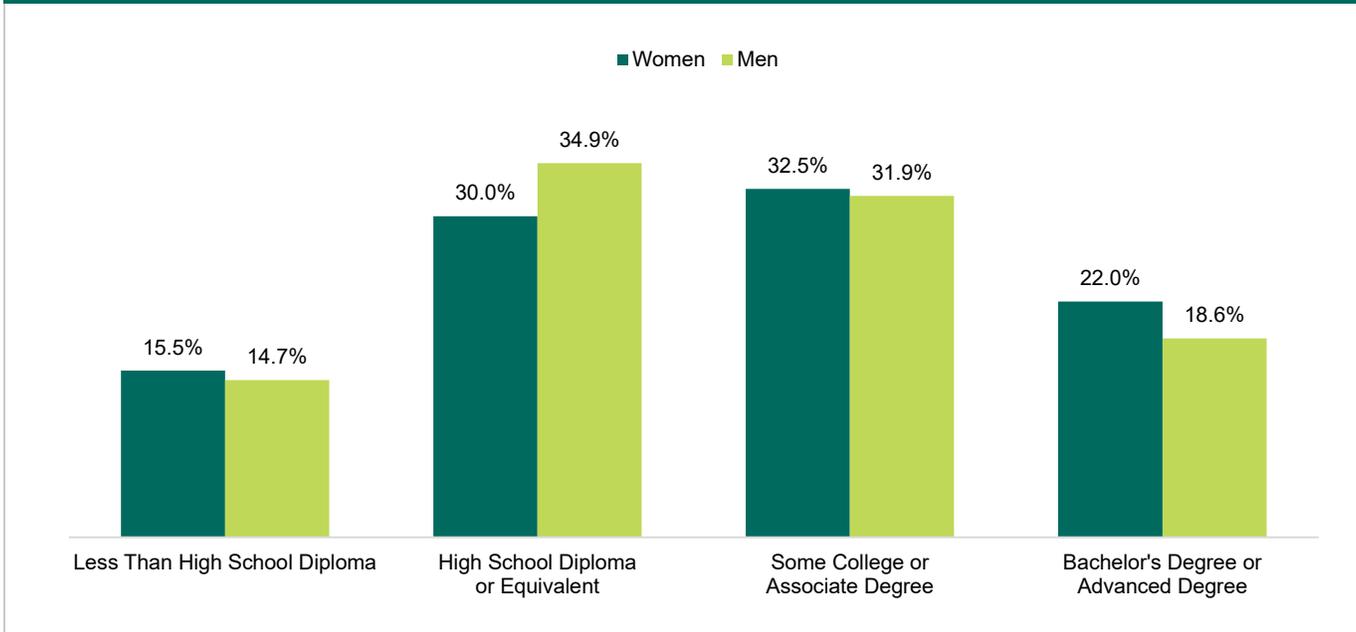
The share of employment by educational attainment level is shown in Figure 11. In Manufacturing, the share of individuals with a high school diploma or equivalent or less is 3.7 percentage points greater than the statewide average. This difference is counteracted by having a 3.5 percentage point deficit among those with a bachelor's degree or higher.

FIGURE 11: MICHIGAN MANUFACTURING CLUSTER EMPLOYMENT BY EDUCATION, THIRD QUARTER 2021



Source: Third Quarter 2021 Longitudinal Employer-Household Dynamics program, U.S. Census Bureau

FIGURE 12: MICHIGAN MANUFACTURING CLUSTER QUARTERLY AVERAGE EARNINGS BY EDUCATION AND GENDER, THIRD QUARTER 2021

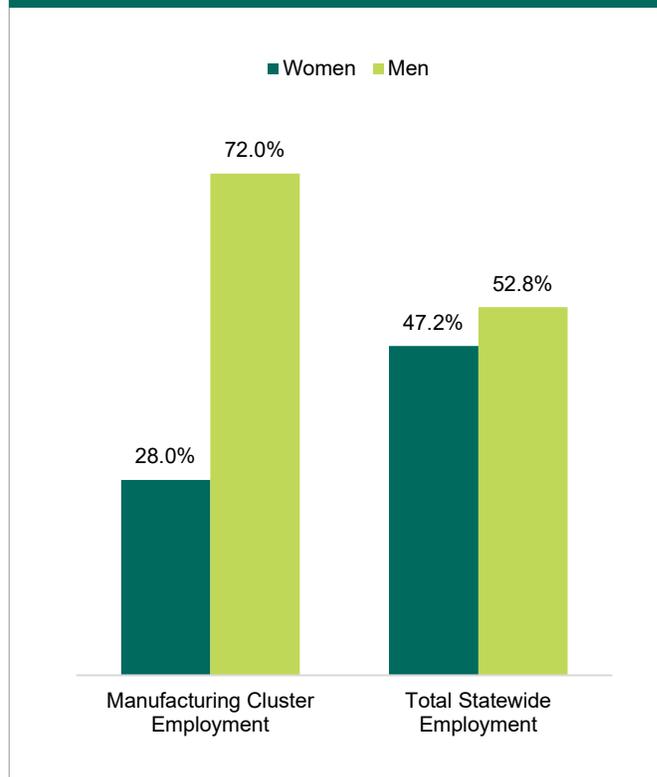


Source: Third Quarter 2021 Longitudinal Employer-Household Dynamics program, U.S. Census Bureau

Employment by educational attainment in the cluster is similar for both men and women. Those with a high school diploma or equivalent see the largest difference, with men having a share nearly five percentage points greater than women. Among those with some college or an associate degree, men have a share 0.6 percentage points less than women. Monthly average earnings for both men and women increase with higher levels of educational attainment, however men have higher earnings across all attainment levels. In fact, with increasing educational attainment, the gap in earnings widens. Monthly data can fluctuate slightly, but among those with less than a high school diploma, women have monthly average earnings that are over \$1,000 less than men. This widens all the way up to nearly \$2,000 among those with a bachelor's degree or higher. A woman in Manufacturing with a bachelor's degree or higher only makes slightly more than a man with some college or an associate degree.

Just under three-quarters (72.0 percent) of Manufacturing employment are men. Comparatively, the share for total statewide employment is just 52.8 percent. Manufacturing is one of several clusters that employ a significant share of men. Other clusters that have more than 70 percent of their employment held by men include Construction, Energy, and Mobility.

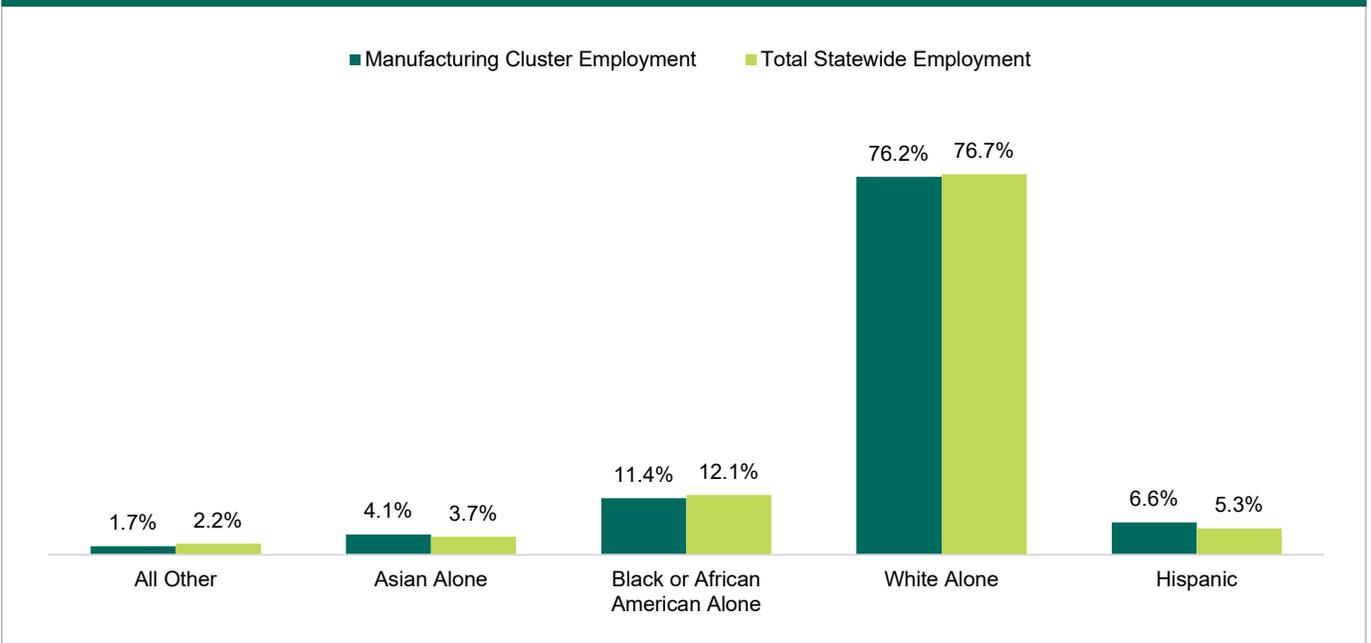
FIGURE 13: MICHIGAN MANUFACTURING CLUSTER EMPLOYMENT BY GENDER, THIRD QUARTER 2021



Source: Third Quarter 2021 Longitudinal Employer-Household Dynamics program, U.S. Census Bureau



FIGURE 14: MICHIGAN MANUFACTURING CLUSTER EMPLOYMENT BY RACE AND ETHNICITY, THIRD QUARTER 2021



Source: Third Quarter 2021 Longitudinal Employer-Household Dynamics program, U.S. Census Bureau

Michigan and the Manufacturing cluster are closely aligned in terms of employment share by race and ethnicity. The largest difference is among Hispanic individuals with a share that is 1.3 percentage points greater in the cluster. Every other group has a difference of less than a percentage point between the cluster and all employment.

Talent Pipeline

Data for education program completers of instructional programs are available from the National Center for Education Statistics. These data can be used to estimate ever-changing levels of supply for some occupations in the labor market. There are no officially defined programs for clusters. Certain programs are more likely to lead to work in the Manufacturing cluster than others, but there are opportunities across the educational spectrum including business, social work, and manufacturing programs to name a few. This section will highlight only a few of hundreds of possible programs that can lead to a job in the Manufacturing cluster. Many factors can shift completers, such as an increase in student enrollment during periods of high unemployment or difficulties attending school during a pandemic. For example, demand for workers may be causing upward pressures on programs while other factors such as a lack of instructors are causing total completers to decrease.

Within the Manufacturing cluster, *Business administration and management, general* and *Mechanical engineering* had the most bachelor's-level program completers in 2021 with 2,865 and 1,907, respectively. These top bachelor's programs were consistent with program completers in both the Construction and Mobility clusters. Other common bachelor's programs which lead to the Manufacturing

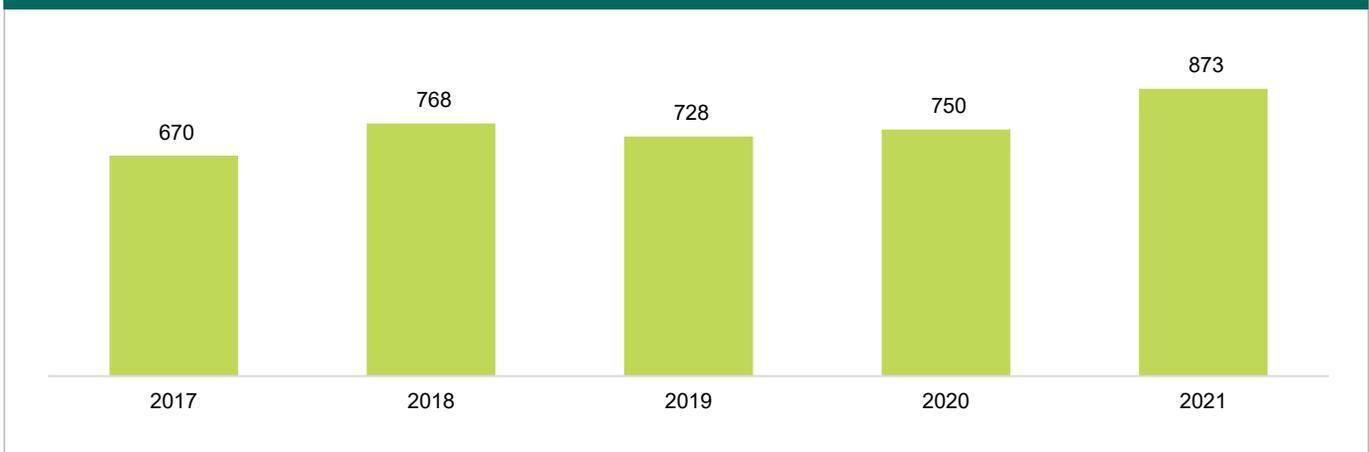
cluster include, but are not limited to, *Accounting* (1,571), *Finance, general* (1,544), *Electrical and electronics engineering* (873), and *Logistics, materials, and supply chain management* (832).

The majority of master's degree completers in Manufacturing were in *Business administration and management, general* with 3,010. Other critical programs included *Mechanical engineering* (507), *Accounting* (399), and *Electrical and computer engineering* (309).

There are several short-term certificate programs which may also lead to the Manufacturing cluster. The largest of such programs include *Truck and bus driver/commercial vehicle operator and instructor* (497), *Welding technology/welder* (353), and *Business administration and management, general* (196). This is followed by *Industrial mechanics and maintenance technology/technician* (181) and *Lineworker* (105). These programs are typically only captured in the data if they are completed at federally funded institutions. There are likely further short-term training programs in the state at unreported educational centers.

Other programs which could lead to employment with the Manufacturing cluster include *Mechanical engineering*, *Human resources management*, and *Chemical engineering*.

FIGURE 15: MICHIGAN ELECTRICAL AND ELECTRONICS ENGINEERING BACHELOR'S PROGRAM COMPLETERS, 2017–2021



Source: National Center for Education Statistics, Integrated Postsecondary Education Data System



Conclusion

Manufacturing has been, and continues to be, a critical sector in Michigan. It is an extremely economically diverse cluster and not solely focused on the automotive industry. The cluster has a wide array of occupations with varying education and training requirements. Individuals working in Manufacturing can progress to higher-paying jobs by continuing their education and training. Manufacturing is well-represented across most of the state, particularly in West and Southwest Michigan. Some challenges do face the cluster, however, such as unequal pay among men and women across each educational level.

Strengths

Above-Average Earnings

The average salary in Manufacturing sits at \$71,700, making it one of the higher-paying industry clusters. Comparatively, the average salary for all employment in Michigan is \$61,700. While employment has yet to recover to pre-pandemic levels, above-average pay can be an effective recruiting tool going forward.

Traditional Apprenticeship Sector

Along with Construction, Manufacturing is a traditional apprenticeship industry cluster. This means that historically, the cluster is well represented among apprentices. There were nearly 3,400 active registered apprentices across Michigan in 2021. Slightly under 40 percent of these apprentices were in the Detroit Metro region. Both West Michigan (29.5 percent) and Southwest Michigan (13.0 percent) also had a higher share of Manufacturing apprentices. Apprenticeships often lead to high-paying careers post-completion.

Low Barriers to Education

Most key occupations in the Manufacturing cluster require a high school diploma or equivalent or less. This is most often combined with some sort of on-the-job training to develop skills. However, these low educational barriers help to provide those across the state with a diverse set of jobs that they can work in without having to further their education.

Economically Diverse Industries

Manufacturing in Michigan is not just concentrated in the Automotive sector. While *Automotive* does have the highest share of employment (29.8 percent), plenty of other subclusters have a sizable share allowing for individuals to work in different types of manufacturing. Other subclusters include *Metals* (15.0 percent), *Chemical products* (11.6 percent), and *Machinery* (11.6 percent).



Challenges

Wage Gap Across Educational Attainments

The quarterly average earnings for women across each level of educational attainment is significantly less than that of men. Women with a bachelor's degree or higher see the largest difference, earning about \$2,000 less per month on average. This is not unique to Manufacturing, however, as women face a wage gap in all other industry clusters.

Future Changes in Technology

As technology becomes more advanced, the Manufacturing cluster evolves with it. With these changes, jobs in the sector may require higher levels of on-the-job training or further education in the near future. However, these advancements could become a future strength, as several jobs may become less physically demanding, allowing the cluster to attract a wider variety of workers.

Small Representation in Northern Regions

Both the Upper Peninsula (4.0 percent) and Northeast (5.8 percent) regions in Michigan have a much smaller share of Manufacturing employment than the rest of the state. Comparatively, Manufacturing makes up 14.2 percent of employment statewide. The Northwest region also is below average at 9.1 percent but is slightly higher than the share in South Central Michigan of 8.5 percent.



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