

Lightweight Technology Workforce

Supply-Demand Quarterly Update



ABOUT THIS REPORT

Lightweight Innovations for Tomorrow (LIFT) is a public-private partnership that develops and deploys advanced lightweight materials manufacturing technologies and implements education and training programs to prepare the workforce. An educated and skilled workforce is critical to the future of manufacturing. Under the direction of Emily Stover DeRocco, LIFT's Education & Workforce Director, LIFT's State Teams, engaging manufacturers, educators, workforce and economic developers, and state and local officials, are designing and implementing a cohesive strategy to deliver the talent necessary to the long-term health of the U.S. defense and commercial industrial bases.

Lightweight materials are increasingly important to the competitiveness of transportation manufacturing sectors, including suppliers in the automotive, aircraft, heavy truck, ship, rail, and defense manufacturing industries. Lighter vehicles for the military, industry, and consumer alike, have better performance and use less fuel.

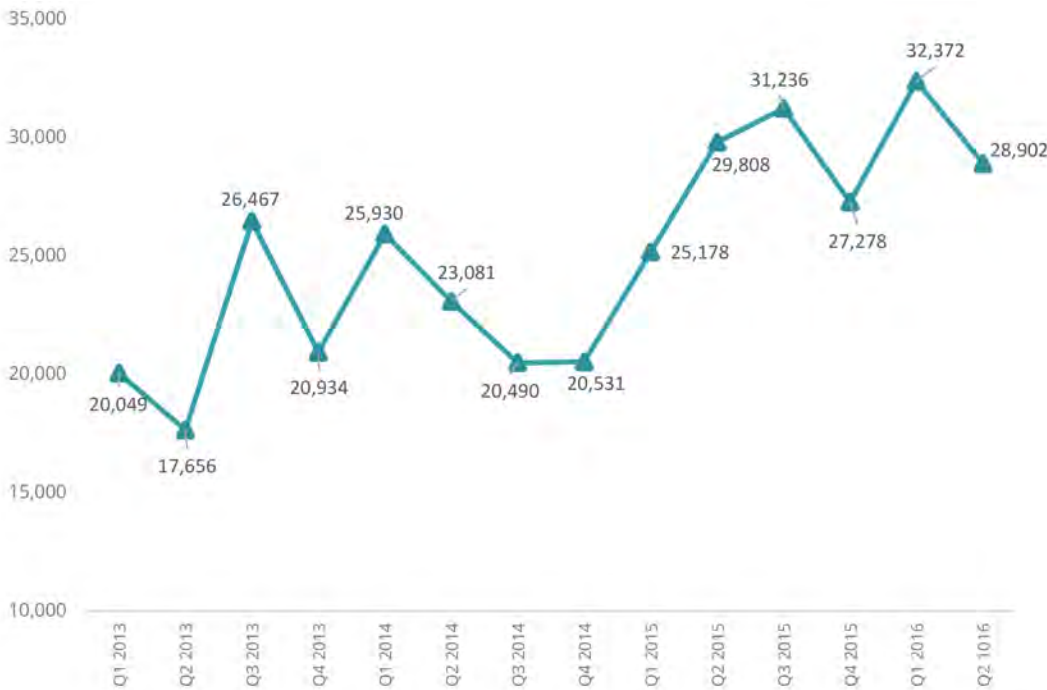
From welding to skilled metalwork, to logistics and mechanical and chemical engineering, to industrial design and manufacturing management, lightweighting-related jobs are found in nearly every manufacturing sector. This report provides an overview and examines the changing demand for workers in jobs that are related to lightweighting in Michigan. This analysis is meant to further enhance the future development of lightweighting workforce education and training in the region.

Of particular note, throughout this analysis and report, we rely not just on national databases related to traditional occupations and job families. The pace of change in the manufacturing industry, largely resulting from technology infusion and forces of globalization, is reflected in rapid-fire change in the knowledge, skills and abilities the manufacturing workforce requires. To provide the best available analyses, this report integrates intelligence gathered from the real time, transactional labor market reflecting the realities of demand and supply, the changing nature of manufacturing employment, and the competencies that are needed in the 21st century manufacturing workforce.



EMPLOYER DEMAND AND EMPLOYMENT TRENDS

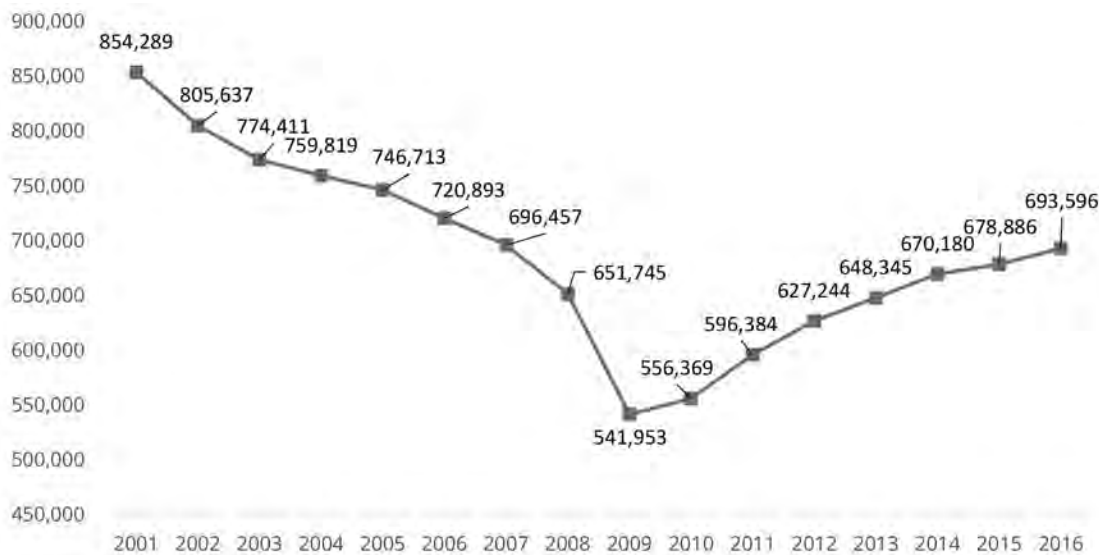
Online job ads for occupations related to lightweighting were down 11% to 28,902 in Q2 2016, compared to 32,372 in Q1 2016. This level of postings was 3% lower than the 29,808 online postings for lightweighting-related occupations in Michigan in Q2 2015, a year ago. On the other hand, 2016 marked the seventh consecutive year of employment growth for lightweighting-related jobs in Michigan since the depths of the Great Recession in 2009. In 2009, only 540,500 Michigan workers were employed in lightweighting-related advanced manufacturing jobs, and in 2016, employment reached nearly 700,000.



Job postings over time
Michigan

Q1 2013 - Q2 2016

Data: Burning Glass Technologies
Analysis: Workforce Intelligence Network



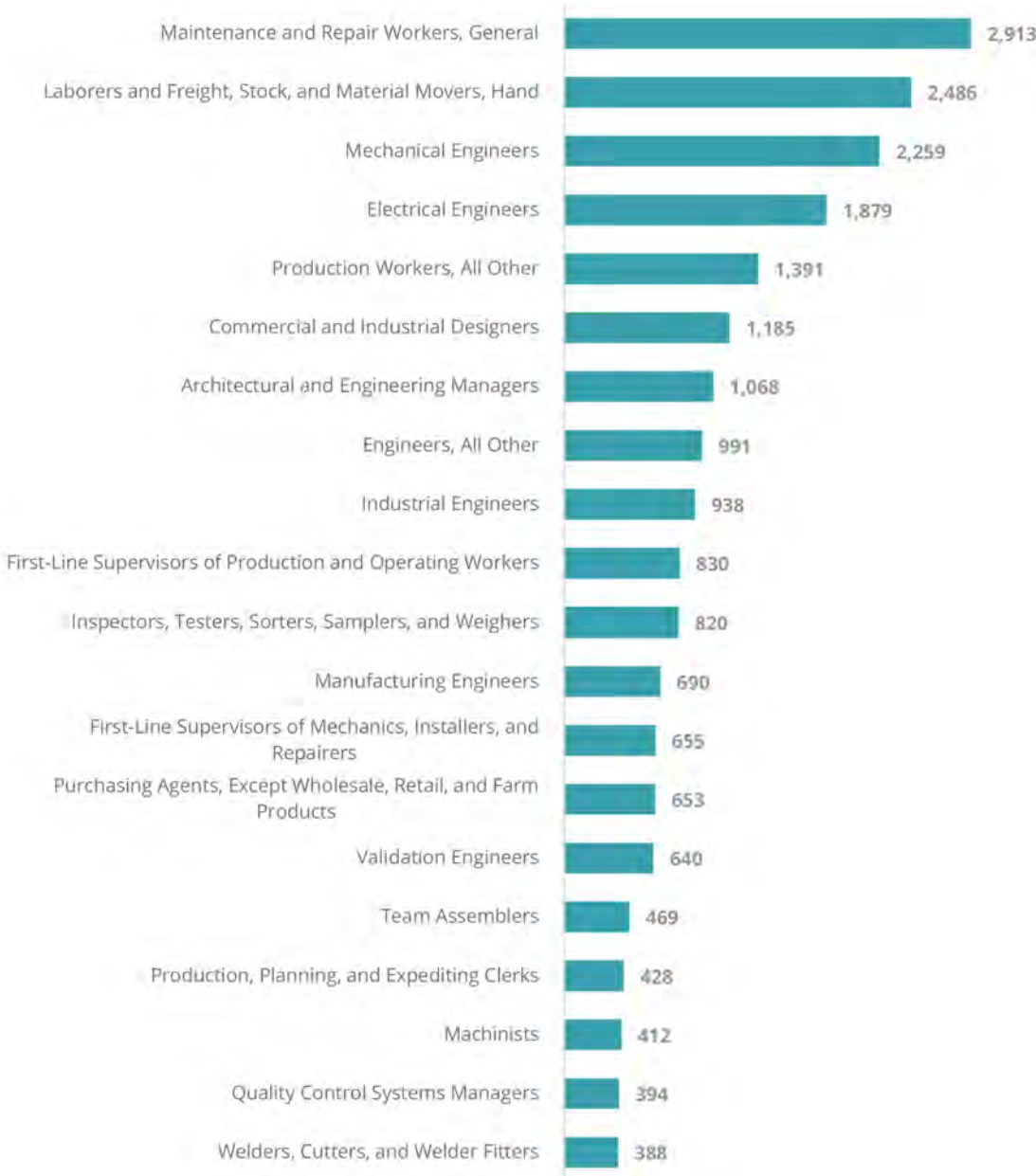
Employment over time
Michigan

Q1 2013 - Q2 2016

Data: EMSI, QWI
Analysis: Workforce Intelligence Network

TOP JOBS

The top in-demand occupation related to lightweight advanced manufacturing was maintenance and repair workers, with 2,913 online job postings in Michigan during Q2 2016. Laborers and freight, stock, and material movers (2,486 postings), mechanical engineers (2,259 postings), and electrical engineers (1,879 postings) were also in high demand during this time period. Lightweighting-related employer demand in Michigan was further dominated by Engineering and Design occupations like commercial and industrial designers (1,185 postings), for example.



Top posting jobs Michigan Q2 2016

Data: Burning Glass Technologies
Analysis: Workforce Intelligence Network

11%
*decline in demand
for advanced
manufacturing
workers*

28,902
*Total online job
ads in Q2 2016*

**Maintenance and
repair workers:
top in-demand job**



INTRODUCTION TO SKILLED TRADES

Skilled Trades workers are the builders and makers of America. They work directly with advanced materials, assemble complicated products, and are experts in welding and machinery. They ensure that designs and plans are carried out to every detail and specification. These workers do everything from welding, to setting and managing computer-numerically-controlled machines, to overseeing manufacturing floors. These skilled workers are essential to manufacturing of lightweight materials.

The 71 individual occupations within this cluster can be split into three distinct occupation sub-groups; Machinists, Assembly & Operations workers, and Skilled Materials Workers.

Machinists

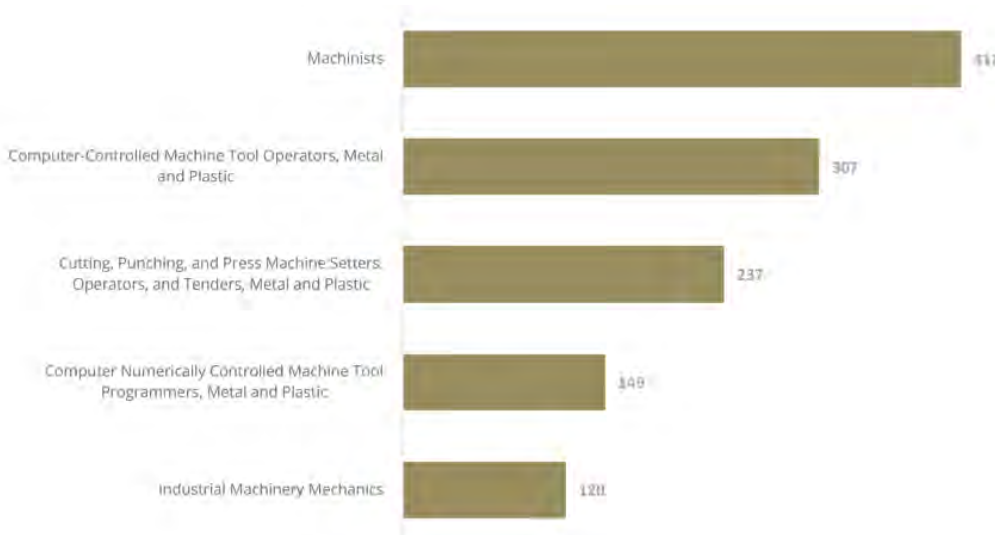
Machinists set up and operate a variety of machine tools to produce parts and instruments. Some work on traditional industrial machinery while others operate or develop programs for computer-controlled machinery.

Assembly & Operations

Assembly & Operations workers assist other Skilled Trades workers during production. Some perform quality assurance inspections, assist with assembly, or perform supervisory duties on the factory floor.

Skilled Materials Workers

Skilled Materials workers perform numerous roles from general maintenance to welding. All Skilled Materials workers must have intimate knowledge of lightweight metals and techniques in order to conduct proper repairs and/or assembly.



Top posting jobs

Machinists Q2 2016

*Data: Burning Glass Technologies
Analysis: Workforce Intelligence Network*

General machinists were the most in-demand occupation in the Machinists sub-group in Q2 2016. Michigan employers posted 412 online job ads for these workers between April and June, 2016. The next most in-demand occupations included computer-controlled machine tool operators (307 postings), cutting, punching, and press machine operators (237 postings), and computer numerically controlled machine tool programmers (207 postings).

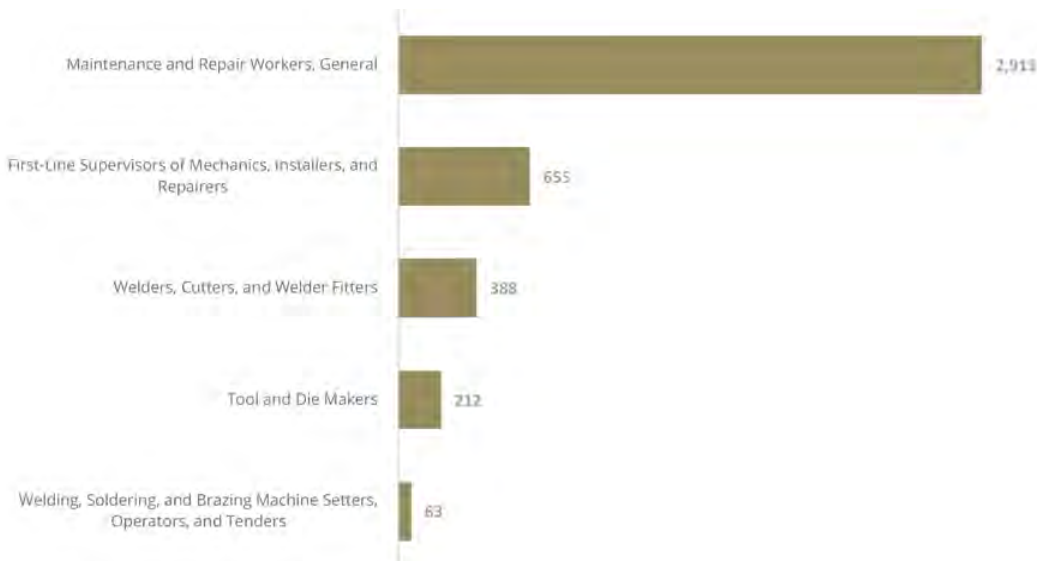
SKILLED TRADES



Top posting jobs Assembly & Operations Q2 2016

Data: Burning Glass Technologies Analysis: Workforce Intelligence Network

Production workers were in high demand in Q2 2016. Michigan advanced manufacturing employers posted nearly 1,400 online job ads for these workers. The next most in-demand workers in the Assembly and Operations sub-group included first-line supervisors of production and operating workers as well as inspectors, testers, sorters, samplers, and weighers, both with over 800 online job ads. Supervisory roles like quality control systems managers (394 postings) also appeared in the top jobs list for this sub-group.



Top posting jobs Skilled Materials Workers Q2 2016

Data: Burning Glass Technologies Analysis: Workforce Intelligence Network

The most in-demand lightweighting-related occupation in Michigan in Q2 2016 was general maintenance and repair workers. The 2,913 online job ads for this occupation was more than four times the demand for the next most in-demand Skilled Materials group occupation, first-line supervisors of mechanics, installers, and repairers (655 postings). In fact, with 2,913 online job ads posted, this occupation was also one of Michigan's most in-demand lightweighting-related jobs, overall.

SKILLED TRADES

IN-DEMAND TECHNICAL SKILLS

The occupations in the Skilled Trades group require a wide array of high-level technical skills. Traditional skills like repair, inspection, machinery, and welding are still present in Skilled Trades job postings. The increased demand for managers in Skilled Trades occupations in Michigan is demonstrated in the posting for skillsets like supervisory skills, budgeting, and customer service. As employers seek more managers, the job postings have reflected the need in an evolving list of skills. Advanced technical skills like mathematics and programming also appear on Q2 2016's skills list, further illustrating a shift in Skilled Trades employment to more advanced education and technology requirements.

- Repair/Inspection, Cleaning
- Machinery/Machining/Machine Operation
- Welding
- Scheduling
- Supervisory Skills/Budgeting
- Computer Numerical Control (CNC)
- Plumbing/HVAC
- Customer Service
- Lathes
- Micrometers/Calipers
- Programmable Logic Controller (PLC)
- Forklift Operation

IN-DEMAND EMPLOYABILITY SKILLS

While Skilled Trades workers now need advanced technical skills, they also need to maintain more traditional employability skills critical to succeeding in a workplace. Employers hiring Skilled Trades workers often indicate a desire for employability skills like communication, problem solving, the ability to perform physical labor, and creativity/analytical ability in their advertisements. These types of skills are crucial for Skilled Trades so that they can collaborate effectively and especially in high-demand supervisor rolls.

- Communication Skills, Team Work/Collaboration
- Troubleshooting, Preventative Maintenance, Problem Solving, Work Area Maintenance
- Ability to Perform Physical Labor
- Supervisory Skills, Organizational Skills, Leadership
- Writing
- Computer Skills, Microsoft Office
- Detail-Oriented, Planning, Editing
- Mathematics
- Quality Assurance and Control
- Planning

IN-DEMAND EXPERIENCE & EDUCATIONAL ATTAINMENT

Of the 4,692 Skilled Trades group job postings that specified a desired experience level in Q2 2016, 86% were available to workers with less than 5 years of experience. Entry-level Skilled Trades positions were available to Michigan workers with willingness to undertake some post-secondary training in applicable skills, like mathematics, welding, or programming, which would qualify them for one of the 4,314 jobs requiring a high school diploma or some vocational training. Job postings that required more than 5 years of experience (660 in Q2 2016) were most likely for supervisor or management roles in the Skilled Trades and will require advanced educational attainment, possibly a bachelor’s degree, as specified in 961 job postings.

**Experience in-demand
Q2 2016**

Data: Burning Glass Technologies
Analysis: Workforce Intelligence Network



**Education & training in-demand
Q2 2016**

Data: Burning Glass Technologies
Analysis: Workforce Intelligence Network



Though a majority of advertised salaries in the Skilled Trades group in Q2 2016 were below \$35,000 per year, the average advertised salary for Michigan workers in this group was \$38,372 per year. This salary was 13% higher than the Michigan’s median annual earnings for all workers in 2014, \$34,000, but 4% lower than the state’s median earnings for all workers in the Skilled Trades group in 2014, \$38,522. Higher wages in the Skilled Trades group would be available with some vocational training, as well as advancement to managerial and supervisory roles.

WAGES

**Advertised wages
Q2 2016**

Data: Burning Glass Technologies
Analysis: Workforce Intelligence Network



0-5 years
Experience most in-demand by Michigan employers

\$38,522
average advertised salary

4,796
postings requiring an associate's degree or less



INTRODUCTION TO ADMINISTRATION

Purchasing materials, ensuring worker safety around machines and with materials, and coordinating and analyzing material and goods movement are essential administration jobs related to lightweighting. Without workers focused on worker safety, production would slow down, and more workers would be injured. Procurement professionals require an extensive understanding of the materials that they purchase. Logistics workers range from materials movers to logistics analysts. While these jobs are focused on administration, all of the workers in this occupation category must have detailed knowledge of materials, goods movement, and worker safety to help ensure smooth and seamless production.

There are 17 individual occupations within this cluster, which can be split into three distinct occupation sub-groups: Procurement & Purchasing, Human Safety, and Logistics Workers.

Logistics

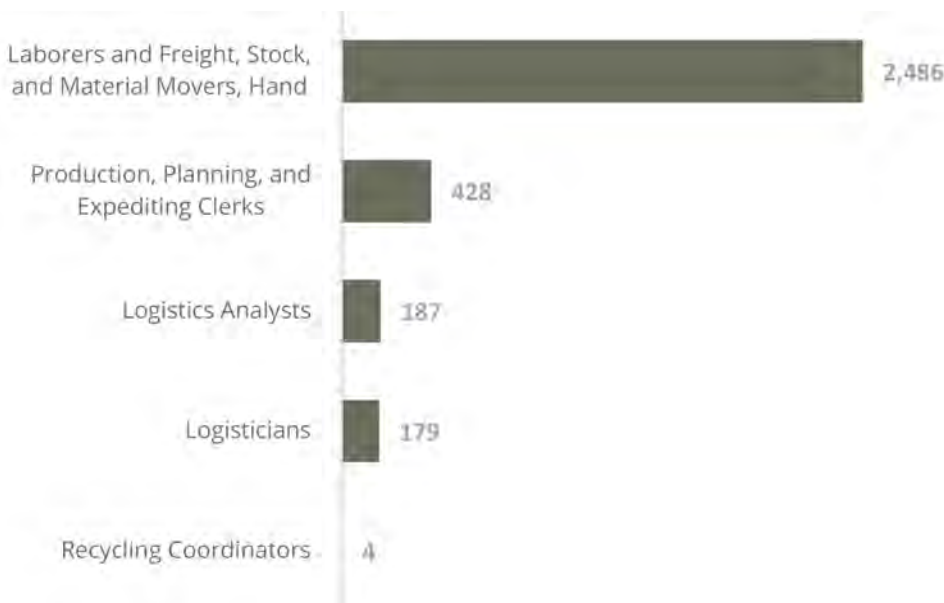
Logistics workers ensure transportation optimization of materials within organizations, from designing efficient supply chain processes to engaging in the actual transport of material and freight.

Procurement & Purchasing

Procurement & Purchasing workers ensure that all of the machinery, equipment, tools, and supplies necessary for metal manufacturers are ready and available for production.

Human Safety

Human Safety workers plan, implement, coordinate, review, and inspect safety programs and protocols to ensure a safe workforce environment.



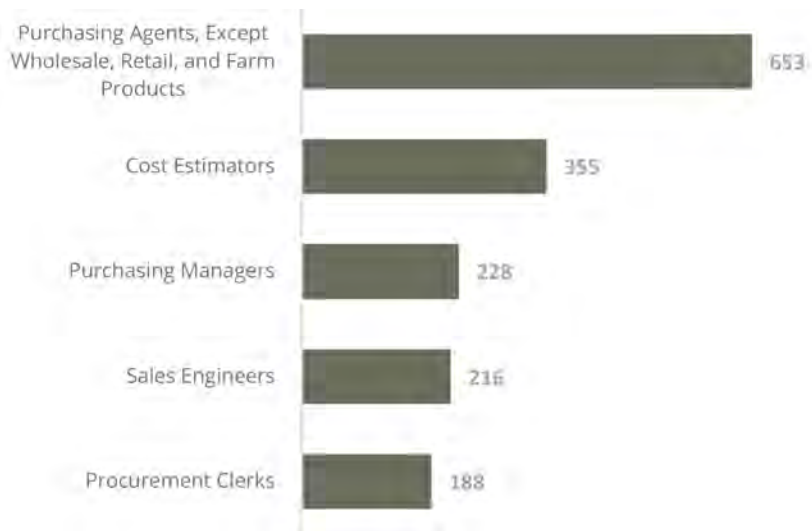
Top posting jobs

Logistics Q2 2016

*Data: Burning Glass Technologies
Analysis: Workforce Intelligence Network*

The most in-demand Logistics occupation in Michigan in Q2 2016 was laborers and freight, stock, and material movers. Other top Logistics jobs included production, planning, and expediting clerks (428 postings), and logistics analysts (187 postings).

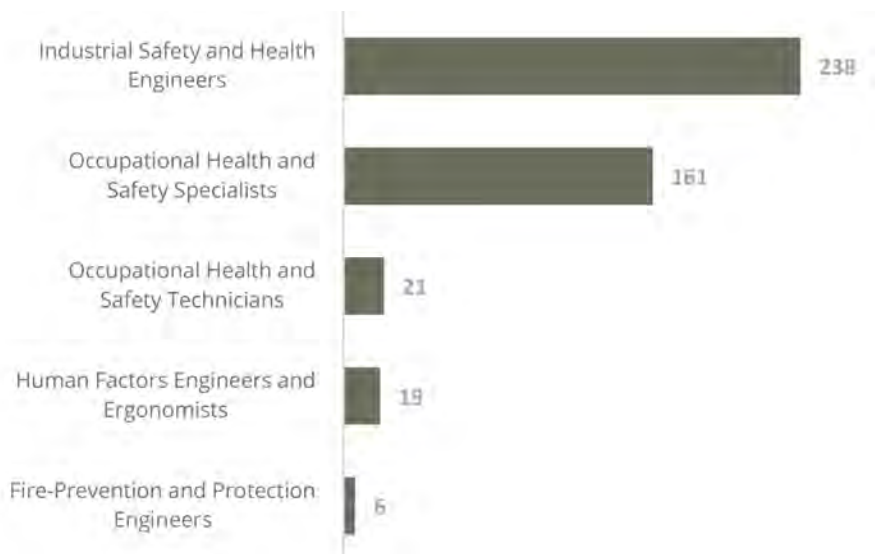
ADMINISTRATION



Top posting jobs Procurement & Purchasing Q2 2016

Data: Burning Glass Technologies
Analysis: Workforce Intelligence Network

Purchasing agents were the top in-demand Procurement and Purchasing workers in Michigan in Q2 2016. Michigan employers posted 653 online job ads for purchasing agents, 355 for cost estimators, and 216 for sales engineers, all occupations with skills important to the manufacture of lightweight products.



Top posting jobs Human Safety Q2 2016

Data: Burning Glass Technologies
Analysis: Workforce Intelligence Network

Employer demand in the Human Safety occupation sub-group was largely split between industrial safety and health engineers (238 postings) and occupational health and safety specialists (161 postings) in Q2 2016. Other in-demand Human Safety workers included occupational health and safety technicians, human factors engineer and ergonomists, and fire-prevention and protection engineers.

ADMINISTRATION

IN-DEMAND TECHNICAL SKILLS

Job postings in the Administration occupation group seek skills and experience in purchasing, procurement, budgeting, inventory management, customer service, scheduling, and project management. Other technical skills that Michigan employers may seek in Administration workers include forklift operation, logistics, SAP, inspection, repair, mathematics, and enterprise resource planning (ERP).

- Purchasing, Procurement, Budgeting, Cost Control, Inventory Management and Control
- Customer Service, Listening
- Scheduling
- Forklift Operation
- Logistics, Supply Chain Management and Knowledge
- SAP
- Project Management, Contract Management
- Inspection, Repair, Labeling, Packaging
- Mathematics
- Enterprise Resource Planning (ERP)

IN-DEMAND FOUNDATIONAL SKILLS

Basic skills desired by Michigan employers hiring Administration workers are focused on communication, organizational, and computer skills as well as physical demand and problem solving. Q2 2016 job postings in the Administration group also indicate that these workers should have strong writing skills, be creative, and be able to multi-task in their roles as purchasing agents, occupational health and safety specialists, and logisticians.

- Communication Skills, Team Work/Collaboration
- Microsoft Office, Computer Skills
- Writing
- Ability to Perform Physical Labor
- Problem Solving, Planning, Project Management
- Organizational Skills, Detail-Oriented
- Customer Service, Building Effective Relationship, Listening
- Multi-tasking
- Cost Control, Cost Estimation
- Mathematics

IN-DEMAND EXPERIENCE & EDUCATIONAL ATTAINMENT

The desired experience and education levels for Michigan Administration jobs were split between entry-level work that would be attainable with a high school diploma or some vocational training and other positions that would require 3 to 5 years of experience with, possibly, a bachelor's degree. Of the job postings that specified a desired educational attainment, 1,429 and 1,612 required associate's degree or less and a bachelor's degree, respectively. For instance, Michigan workers could work as laborers and material movers with some short-term training. Other Administration occupations require a bachelor's degree to work in logistics.

Experience in-demand

Q2 2016

Data: Burning Glass Technologies

Analysis: Workforce Intelligence Network

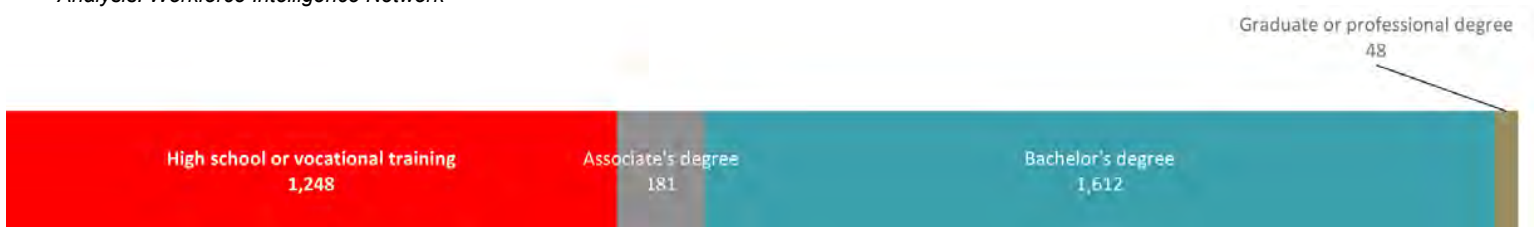


Education & training in-demand

Q2 2016

Data: Burning Glass Technologies

Analysis: Workforce Intelligence Network



Of the 5,370 Administration group job postings in Michigan during Q2 2016, 22% (1,207 postings) advertised an annual salary. A majority of the 1,207 postings advertised a salary less than \$35,000 a year but the mean advertised salary for this occupation group was \$40,644. This salary was 20% higher than Michigan's median annual earnings for all workers in 2014, but 13% lower than the state's median salary for Administration occupations in 2014, \$46,883.

WAGES

Advertised wages

Q2 2016

Data: Burning Glass Technologies

Analysis: Workforce Intelligence Network



326
job postings
advertising salaries
over \$50,000

\$40,644
average
advertised salary

1,612
job postings requiring
a bachelor's degree



INTRODUCTION TO ENGINEERING & DESIGN

Engineers and industrial designers create the blueprints for all things manufacturing. These workers not only envision the products of the future but they also ensure that the products are functional, safe, reliable, and durable.

There are 52 individual occupations within this groups which can be split into four distinct occupation sub-groups; Electrical & Mechanical Engineering, Chemical Engineering & Metallurgy, Industrial Designers & Drafters, and Process Engineering & Testing.

Electrical & Mechanical Engineers

Electrical & Mechanical Engineers perform duties related to the research, design, development, and testing of mechanical functioning, electrical, and manufacturing equipment, components, or systems for commercial, industrial, military, or scientific use.

Chemical Engineers & Metallurgy

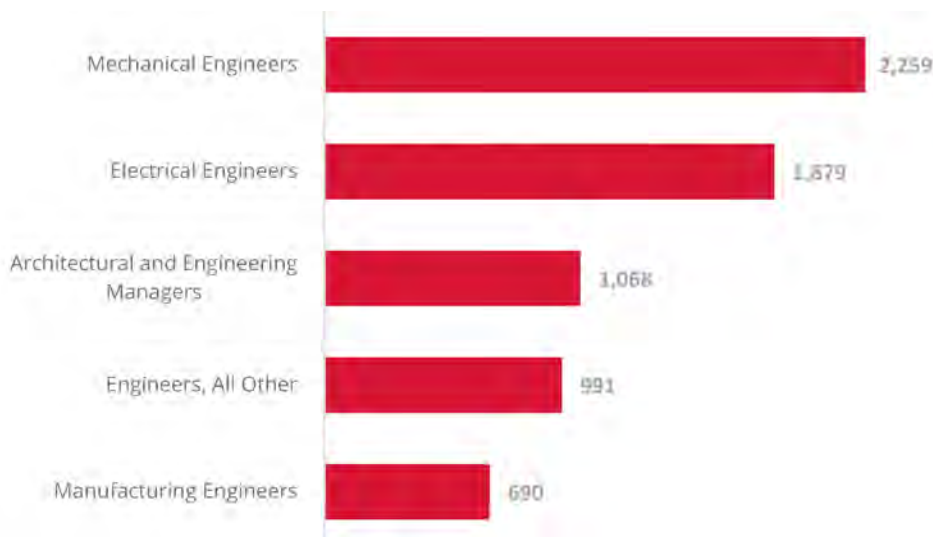
Chemical Engineers & Metallurgy workers perform duties related to the research, design, development, and testing of chemicals and metal materials. These workers often lead the charge in finding cutting-edge uses of lightweight metal materials.

Designers & Drafters

Designers & Drafters collaborate with other workers within the Engineer group to prepare detailed diagrams and designs of machinery, devices, and manufactured products. They combine their artistic talents and knowledge of lightweight metal capabilities to create both functional and appealing product designs.

Process Engineers & Testing

Process Engineering & Testing workers design processes and test manufacturing machinery to ensure that production of lightweight metal materials meet both internal and external safety and quality requirements.



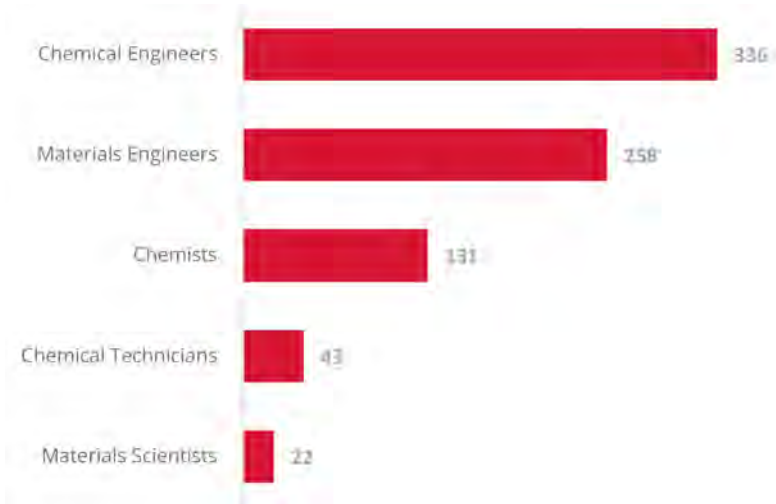
Top posting jobs

Electrical & Mechanical Q2 2016

*Data: Burning Glass Technologies
Analysis: Workforce Intelligence Network*

Electrical and mechanical engineers with skillsets applicable to lightweight, advanced manufacturing were in high demand in Michigan in Q2 2016. Michigan employers posted 2,259 online job ads for mechanical engineers and 1,879 ads for electrical engineers between April and June, 2016. Other in-demand occupations in the Electrical and Mechanical Engineering sub-group included architectural and engineering managers (1,068 postings) and manufacturing engineers (690 postings).

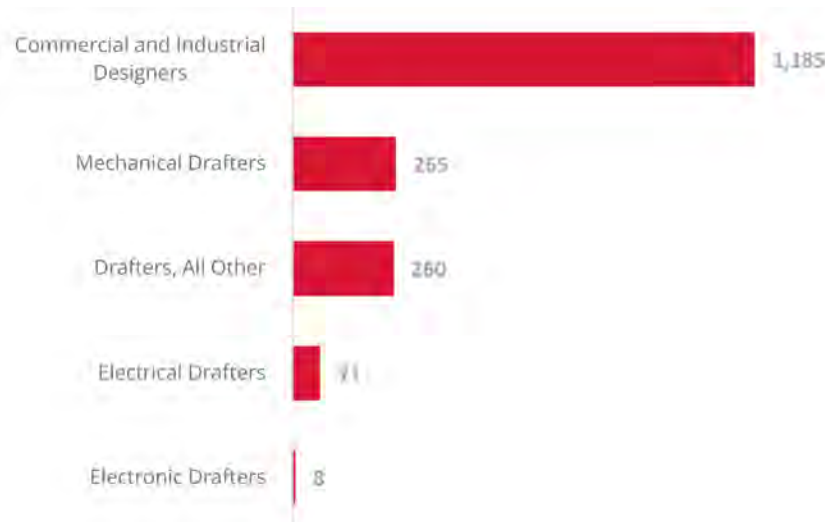
ENGINEERING & DESIGN



Top posting jobs Chemical & Metallurgy Q2 2016

Data: Burning Glass Technologies
Analysis: Workforce Intelligence Network

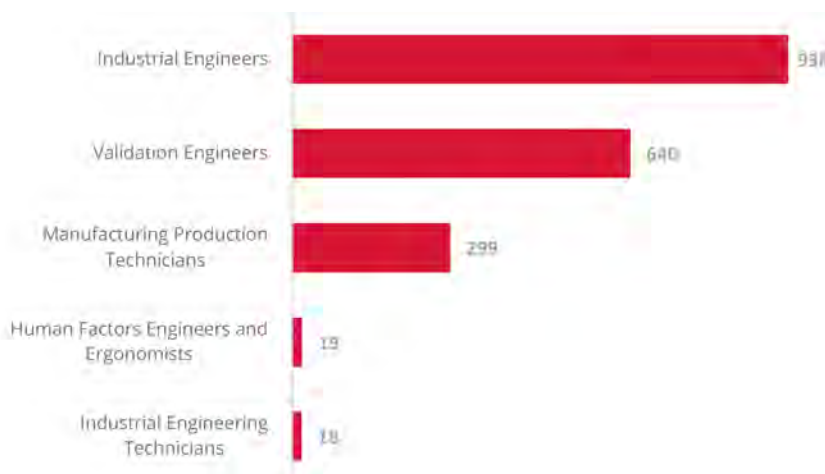
The most in-demand Chemical Engineering and Metallurgy occupation in Michigan in Q2 2016 was chemical engineers. Michigan employers posted 336 online job ads for chemical engineers and 131 for chemists. Materials engineers (258 postings) were also in high-demand.



Top posting jobs Designers & Drafters Q2 2016

Data: Burning Glass Technologies
Analysis: Workforce Intelligence Network

Michigan employers were seeking commercial designers and drafters that have skills transferrable to lightweight, advanced manufacturing in Q2 2016. Commercial and industrial designers garnered 1,185 online job postings, more than four times the demand for the next top job, mechanical drafters, which pulled in 265 postings.



Top posting jobs Process & Testing Q2 2016

Data: Burning Glass Technologies
Analysis: Workforce Intelligence Network

The most in-demand Process Engineering and Testing occupation in Q2 2016 in Michigan was industrial engineers (938 postings). Michigan employers were also seeking validation engineers (640 postings) and manufacturing production technicians (299 postings) that could work in advanced manufacturing settings.

ENGINEERING & DESIGN

IN-DEMAND TECHNICAL SKILLS

Engineering occupations demand a broad range of technical skills. Many engineers are expected to know AutoCAD, programming, and other software skills. Knowledge in mechanical and electrical engineering is valued and applied to the specific engineering role. Q2 2016 job postings illustrate that higher up, managerial engineering roles require strong project management, process improvement, and budgeting skills.

- Mechanical Engineering
- Validation, Product Development, Manufacturing Processes, Product Design
- Project Management, Budgeting
- Electrical Engineering
- Computer Aided Drafting/Design (CAD), AutoCAD
- Scheduling
- Automotive Industry Experience
- CATIA
- Packaging
- Purchasing, Cost Control

IN-DEMAND FOUNDATIONAL SKILLS

Beyond the science, mathematics, and engineering technical skills required for lightweighting-related engineering employment, engineers are expected to have basic, foundational skills, too. Michigan employers seeking to hire engineers value candidates with strong communication and team work skills, research skills, and demonstrated problem solving experience.

- Communication Skills
- Problem Solving, Troubleshooting
- Writing
- Microsoft Office, Computer Skills
- Project Management, Planning, Organizational Skills, Detail-Oriented
- Research
- Team Work/Collaboration
- Quality Assurance and Control, Cost Control
- Mathematics
- Creativity

IN-DEMAND EXPERIENCE & EDUCATIONAL ATTAINMENT

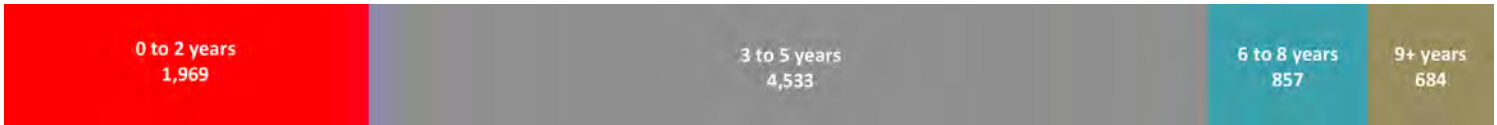
According to Q2 2016 job postings in the Engineering and Design occupation group, many engineering jobs in Michigan were available to workers with fewer than 5 years of experience. Yet, engineers were often required to have at least a bachelor's degree: 8,393 Engineering and Design job postings in Q2 specified that candidates should have a bachelor's degree. Engineering jobs like technician positions were available to candidates with associate's degrees or other short-term training certificates.

Experience in-demand

Q2 2016

Data: Burning Glass Technologies

Analysis: Workforce Intelligence Network

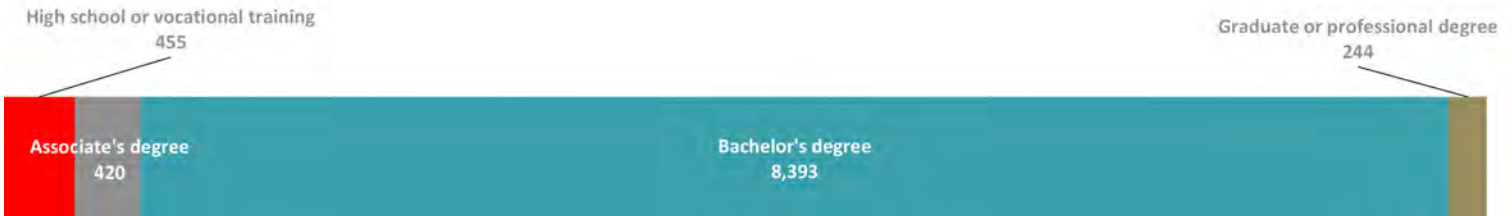


Education & training in-demand

Q2 2016

Data: Burning Glass Technologies

Analysis: Workforce Intelligence Network



Of the 12,469 Engineering and Design group job postings in Michigan in Q2 2016, 13% (1,597 postings) advertised an annual salary. The 1,597 postings illustrated that these occupations were the highest paid of the lightweighting-related occupations in Michigan. The high educational attainment required to secure most engineering positions translates into high earnings. Most of the advertised salaries (54%) in Q2 postings were over \$75,000 per year with the mean advertised salary \$75,262. This salary was over twice as much as the Michigan's median annual earnings for all workers in Engineering and Design in 2014, \$34,000, but 7% lower than the state's median 2014 salary for Engineering and Design occupations in 2014, \$80,891.

WAGES

Advertised wages

Q2 2016

Data: Burning Glass Technologies

Analysis: Workforce Intelligence Network



8,393
job postings
requiring a
bachelor's degree

\$75,262
average
advertised salary

1,344
job postings with
salaries greater than
\$50,000



For more information about LIFT and additional workforce data visit www.lift.technology