

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.

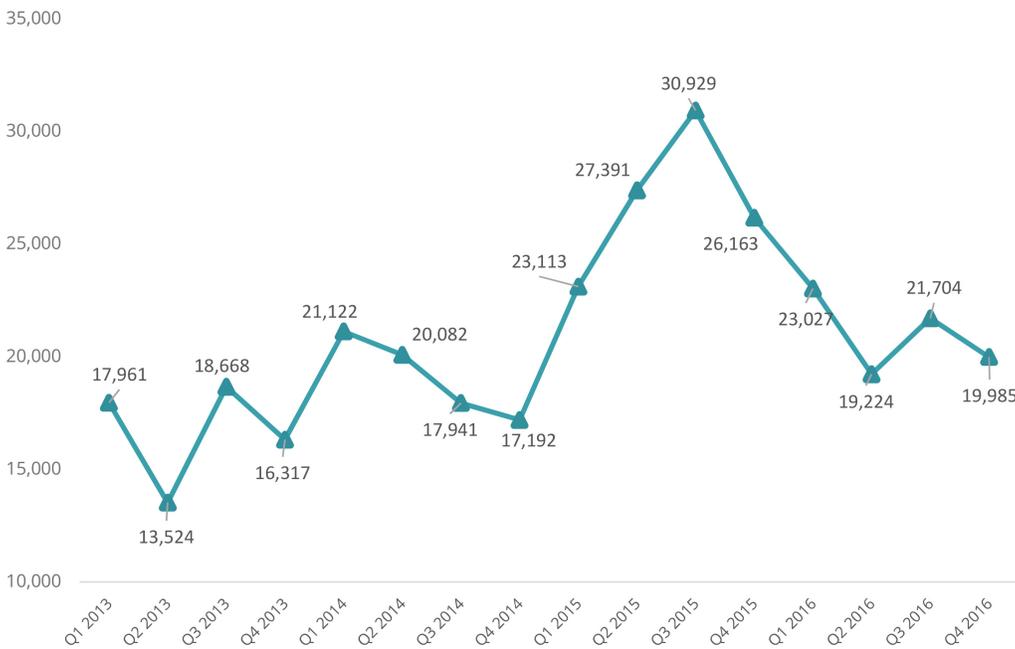
From welding to skilled metalwork, to logistics and mechanical and chemical engineering, to industrial design and manufacturing management, lightweighting-related jobs are found in nearly every manufacturing sector. This report provides an overview and examines the changing demand for workers in jobs that are related to lightweighting in Ohio. 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

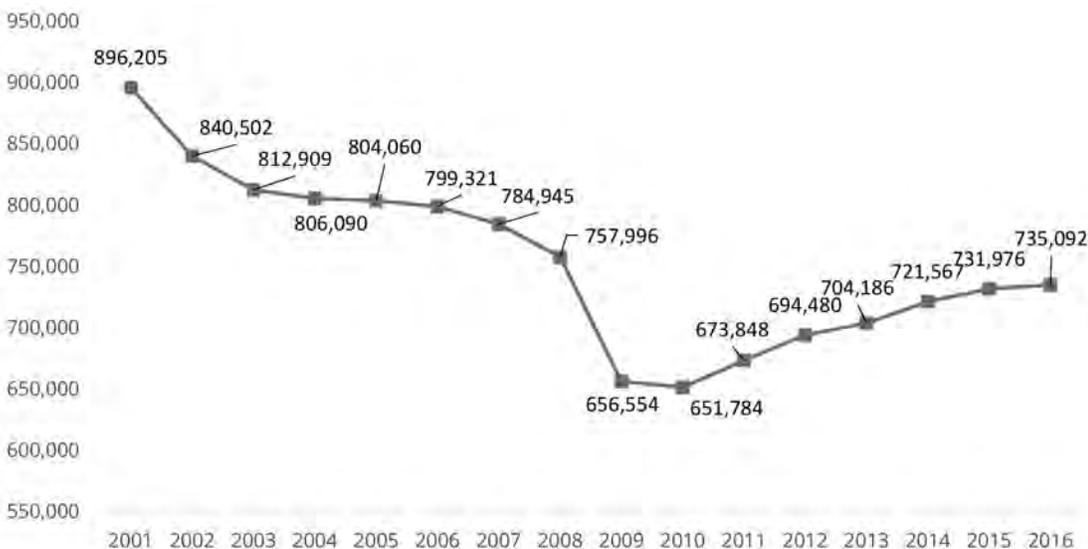
Employer demand for advanced manufacturing jobs related to lightweight advanced manufacturing in Ohio, gauged by online job postings, fell by 1,000 ads between Q3 and Q4 2016. The 19,985 ads posted during Q4 represented an eight percent decrease from the 21,704 ads during Q3 2016. This level of postings falls 24 percent lower than the 31,000 postings a year ago during Q4 2015. Despite the drop, 2016 marked the sixth consecutive year of employment growth for lightweighting-related jobs in Ohio since the depths of the Great Recession in 2010. In 2010, only 651,800 Ohio workers were employed in lightweighting-related advanced manufacturing jobs, and in 2016, employment reached over 735,000, a 13 percent increase.



Job postings over time Ohio

Q1 2013 - Q4 2016

Data: Burning Glass Technologies
Analysis: Workforce Intelligence Network



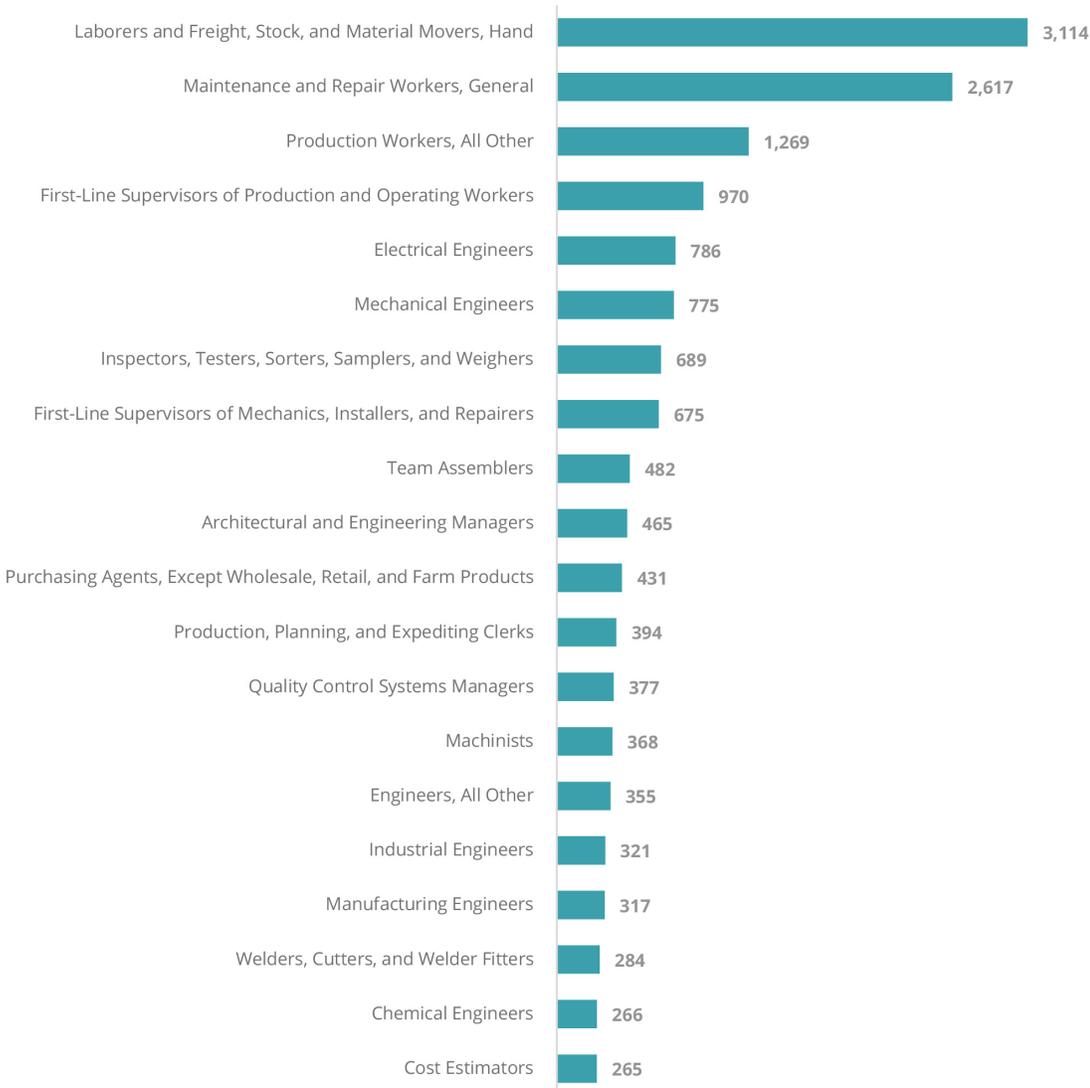
Employment over time Ohio

Q1 2013 - Q4 2016

Data: EMSI, QWI
Analysis: Workforce Intelligence Network

TOP JOBS

Laborers and freight workers represented the most in-demand occupation in Ohio with over 2,617 online job ads during Q4 2016. Maintenance and repair workers (2,617 postings) and production workers (1,269 postings) were also in high demand showing a need for skilled tradesmen. Rounding out the top of the list, tradesmen supervisory roles (with over 970 postings each) and engineers (electrical and mechanical with almost 800 postings each) were also sought by employers during Q4 2016. Although there is a large need for workers within the lightweighting industries, there is also a need for those who can innovate the workplace and manage the business process.



Top posting jobs Ohio Q4 2016

Data: Burning Glass Technologies
Analysis: Workforce Intelligence Network

8%
**decline in demand
for advanced
manufacturing
workers**

19,985
**Total online job
ads in Q2 2016**

**Materials movers:
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

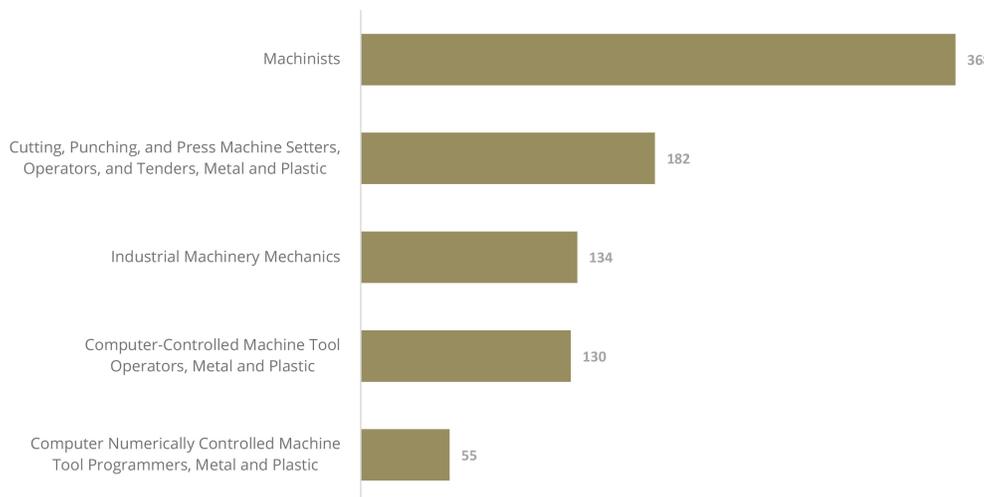
Machinists set up and operate a variety of machine tools to produce parts and instruments. Some work on traditional industrial machinery while others operate or develop programs for computer-controlled machinery.

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

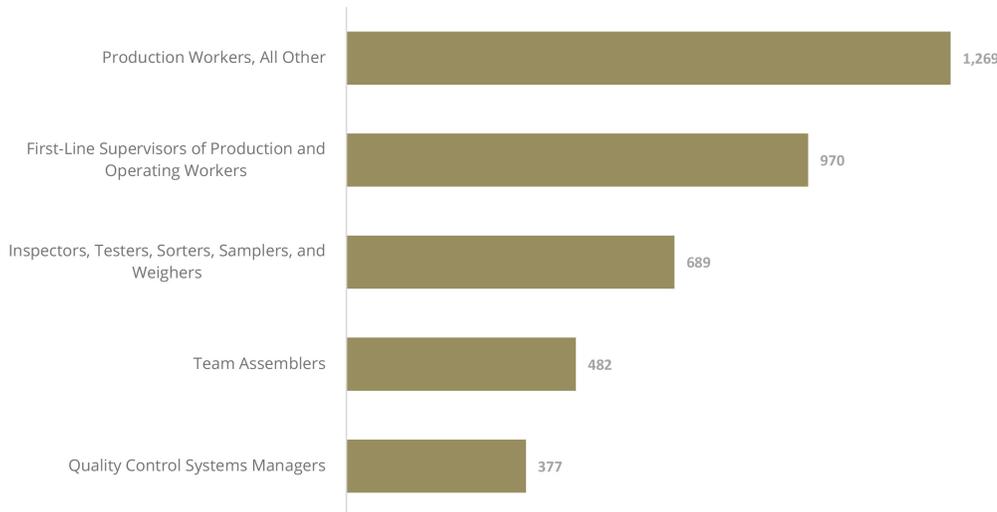
Machinists

Q4 2016

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

General machinists were the most in-demand occupation in the Machinists sub-group during Q4 2016. Ohio employers posted 368 online job ads for these workers between October and December 2016. The next most in-demand occupations were cutting, punching, and press machine operators (182 postings), industrial machinery mechanics (134 postings), computer-controlled machine tool operators (130 postings), and computer-controlled machine tool programmers (55 postings).

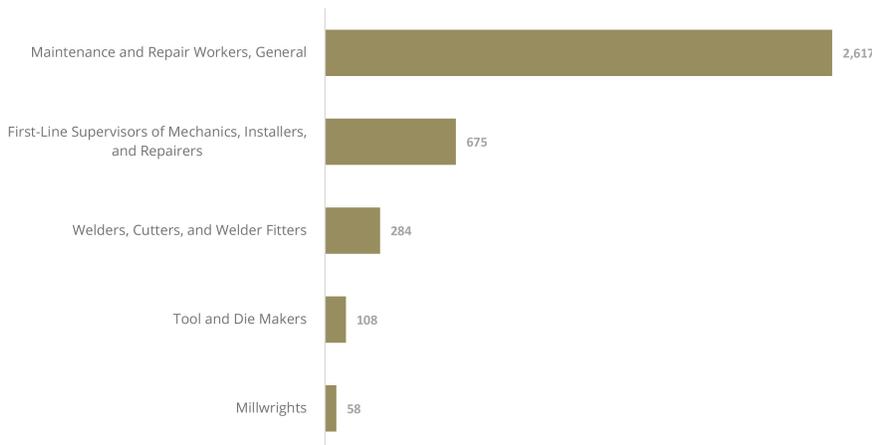
SKILLED TRADES



Top posting jobs Assembly & Operations Q4 2016

Data: Burning Glass Technologies
Analysis: Workforce Intelligence Network

Production workers were in high demand in Q4 2016. Ohio advanced manufacturing employers posted over 1,200 online job ads for these workers. The next most in-demand workers in the Assembly and Operations sub-group were first-line supervisors of production and operating workers (970 postings). Inspectors, testers, sorters, samplers, and weighers (689 postings), team assemblers (482 postings), quality control systems managers (377 postings) also appeared on the top jobs list for the Assembly and Operations sub-group.



Top posting jobs Skilled Materials Workers Q4 2016

Data: Burning Glass Technologies
Analysis: Workforce Intelligence Network

The most in-demand lightweighting-related occupation in Ohio during Q4 2016 was general maintenance and repair workers. The 2,617 online job ads for this occupation is approximately four times the demand for the next most in-demand Skilled Materials group occupation, first-line supervisors of mechanics, installers, and repairers (675 postings). Welders, cutters, and welder fitters (284 postings) and tool and die makers (108 postings) also appeared on the top jobs lists within Skilled Materials Workers.

SKILLED TRADES

IN-DEMAND TECHNICAL SKILLS

Occupations in the Skilled Trades group require a wide array of high-level technical skills. Traditional skills like machinery, welding, plumbing, repair, and inspection, are still present in Skilled Trades job postings. The increased demand for managers in Skilled Trades occupation in Ohio, though, is demonstrated in the posting for skillsets like supervisory skills, customer service, and budgeting. As employers seek more managers, the job postings have reflected the need for an evolving list of skills. Advanced technical skills such as, computer numerical control and programming also appear in many Q4 2016 postings and show a shift in Skilled Trades to a demand for more educated and critically thinking workers.

- Repair/ Inspection
 - Scheduling
 - Supervisory Skills
 - Machinery
 - Welding
 - Hand Tools
- Machining
 - Microsoft Excel
 - Plumbing
 - Customer Service
 - Computer Numerical Control (CNC)
 - Packaging

IN-DEMAND EMPLOYABILITY SKILLS

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

- Communication Skills
 - Ability to Perform Physical Labor
 - Troubleshooting/ Problem Solving
 - Preventive Maintenance
 - Computer Skills/ Microsoft Office
 - Writing
- Detail-Oriented
 - Quality Assurance and Control
 - Organizational Skills
 - Planning
 - Mathematics
 - Work Area Maintenance

IN-DEMAND EXPERIENCE & EDUCATIONAL ATTAINMENT

Advertised experience in online job postings for Skilled Trades workers in Ohio reveals that a majority of openings require less than five years of experience. The high number of job postings requiring little to no experience indicates that entry-level jobs are available for qualified workers. Despite the low levels of experience required for many Skilled Trades job postings, more employers now expect candidates to have relevant education or training, as evidenced by the over 3,579 postings in Q4 2016 requiring short-term post-secondary training. If potential candidates can learn valuable in-demand technical skills like welding, programming, or mathematics through a short-term training program, they can begin to fill the entry-level openings that have such high demand amongst Ohio employers. Job postings requiring five or more years of experience most likely indicate supervisor or management positions.

Experience in-demand

Q4 2016

Data: Burning Glass Technologies

Analysis: Workforce Intelligence Network



Education & training in-demand

Q4 2016

Data: Burning Glass Technologies

Analysis: Workforce Intelligence Network



The average advertised salary in online job postings during Q4 2016 for Skilled Trades workers in Ohio was \$42,373, 25 percent higher than median earnings of all workers in the state (\$33,800). The majority of postings advertising salary offered less than \$35,000, most likely because most openings are entry-level. With experience, wages will grow into higher brackets.

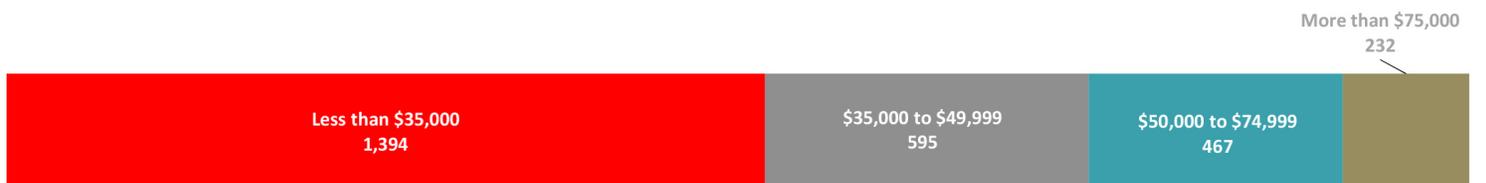
WAGES

Advertised wages

Q3 2016

Data: Burning Glass Technologies

Analysis: Workforce Intelligence Network



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

\$42,373
average advertised salary

3,900
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.

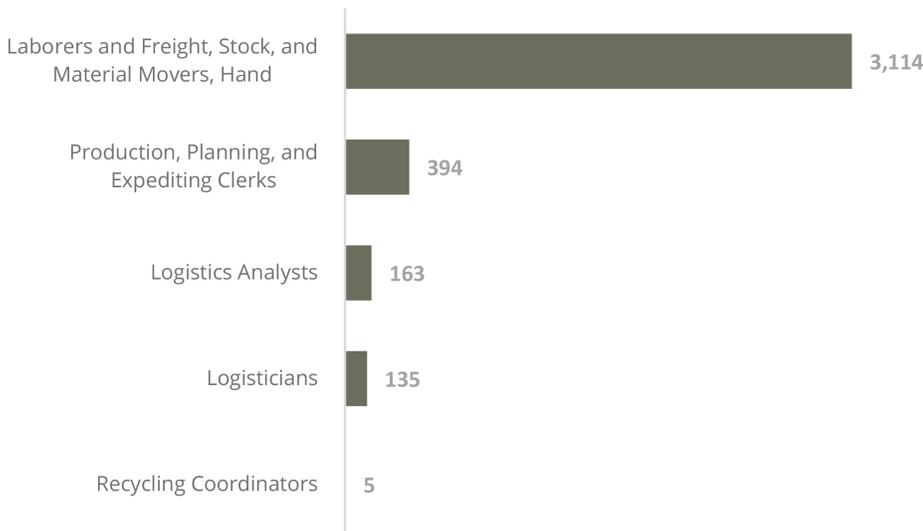
Human Safety

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

Top posting jobs

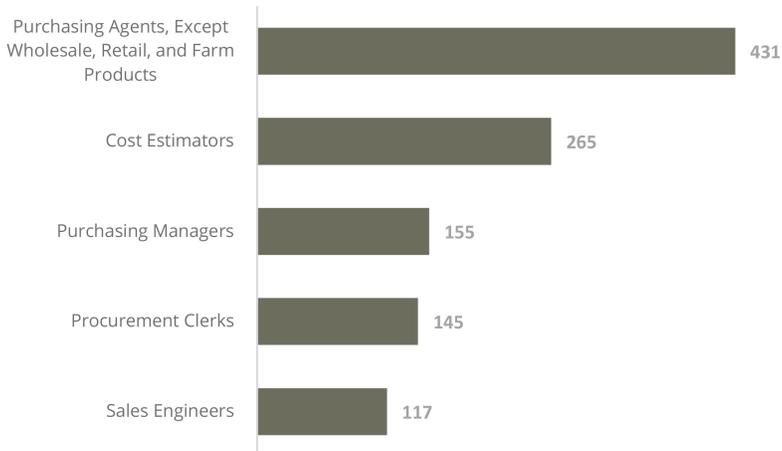
Logistics Q4 2016

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



Laborers and freight, stock, and material movers were the most in-demand occupation in the Logistics sub-group during Q4 2016. Ohio employers posted 3,114 online job ads for these workers between October and December 2016. The next most in-demand occupations included production, planning, and expedition clerks (394 postings). Supervisory and higher skilled positions in the Logistics sub-group were also highly sought with logistics analysts (163 postings), logisticians (135 postings) and recycling coordinators (5 postings) rounding out the top five in-demand Logistics occupations.

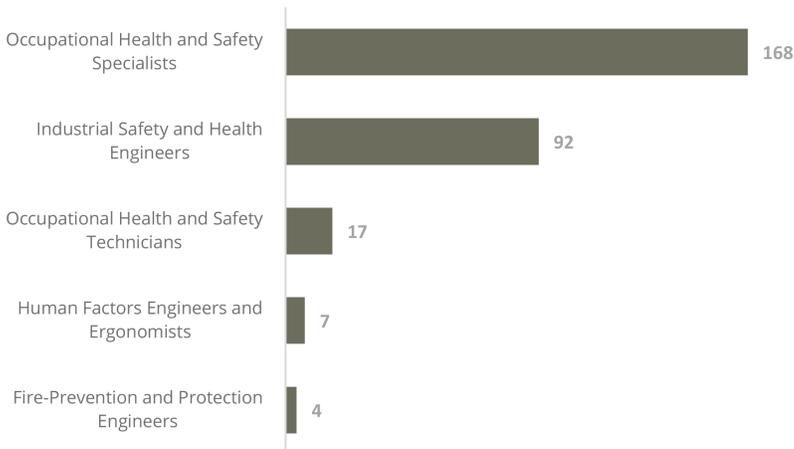
ADMINISTRATION



Top posting jobs *Procurement & Purchasing* Q4 2016

Data: Burning Glass Technologies
Analysis: Workforce Intelligence Network

Purchasing agents were the most in-demand occupation in the Procurement and Purchasing sub-group during Q4 2016. Ohio employers posted 431 online job advertisements for these workers between October and December 2016. Other front-end supply chain workers like procurement clerks (145 postings) and sales engineers (117 postings) were also in high demand. Ohio employers are hiring for supervisory and analytical occupations in Procurement and Purchasing with cost estimators (265 postings) and purchasing managers (155 postings) appearing within the top five.



Top posting jobs *Human Safety* Q4 2016

Data: Burning Glass Technologies
Analysis: Workforce Intelligence Network

Occupational health and safety specialists were the highest in-demand occupation in the Human Safety sub-group during Q4 2016. Ohio employers posted 168 job ads between October and December of 2016 for these workers. Designing a safe work environment appears to be a top priority within this field as the other top jobs focus on designers and engineers focused in safety. They include industrial safety and health engineers (92 postings), occupational health and safety technicians (17 postings), human factors engineers and ergonomists (7 postings) and fire-prevention and protection engineers (4 postings).

ADMINISTRATION

IN-DEMAND TECHNICAL SKILLS

Occupations in the Administration group require a wide array of high-level technical skills and managerial skills. Traditional skills like forklift operation, inspection, and other machine-based skills are present within some of these postings. With the idea of administrators typically overseeing business processes, skillsets like purchasing, project management, and inventory management were highly sought after in Q4 postings. As employers seek more managers, the job postings have reflected the need for an evolving list of skills. More technical skills like logistics were also in-demand, showing an interest in creative and critical thinkers to fill these administration positions.

- Forklift Operation
- Purchasing
- Scheduling
- Procurement
- Inspection
- Customer Service
- Inventory Management
- Project Management
- Labeling
- Scanners
- Logistics
- Data Entry

IN-DEMAND FOUNDATIONAL SKILLS

While Administration workers now need advanced technical and managerial skills, they also need to maintain more traditional foundational skills critical to succeeding in a workplace. Employers hiring Administration workers often post employability skills like communication, problem solving, physical demand, and creativity and analytical ability in their advertisements. With the variety of platforms used in managing the manufacturing process, computer skills and knowledge of Microsoft Office are also imperative within this occupation group. These types of skills are crucial for Administration workers so that they can collaborate effectively, especially in high-demand supervisor roles.

- Communication Skills
- Ability to perform physical labor
- Detail-Oriented
- Computer Skills/ Microsoft Office
- Writing/ Research
- Planning
- Organizational Skills
- Problem Solving
- Mathematics
- Team Work/ Collaboration
- Building Effective Relationships
- English

IN-DEMAND EXPERIENCE & EDUCATIONAL ATTAINMENT

Advertised experience in online job postings for Administration workers in Ohio reveals that a majority of openings require less than five years of experience. A majority of these postings desired those with three to five years of experience indicating want for some skills be developed. Another large group of postings (1,174 postings) desired entry-level experience (less than two years), demonstrating a great opportunity to enter the Administration field. With the demanding workload, critical thinking, and decisive atmosphere, more employers now expect candidates to have relevant education or training, as evidenced by the 974 postings in Q4 2016 requiring bachelor's degrees. With high postings for customer contact and front end positions, some can begin to fill entry-level openings with post-secondary training completed (1,445 postings). Job postings requiring five or more years of experience most likely indicate supervisor or analyst positions.

Experience in-demand

Q4 2016

Data: Burning Glass Technologies

Analysis: Workforce Intelligence Network

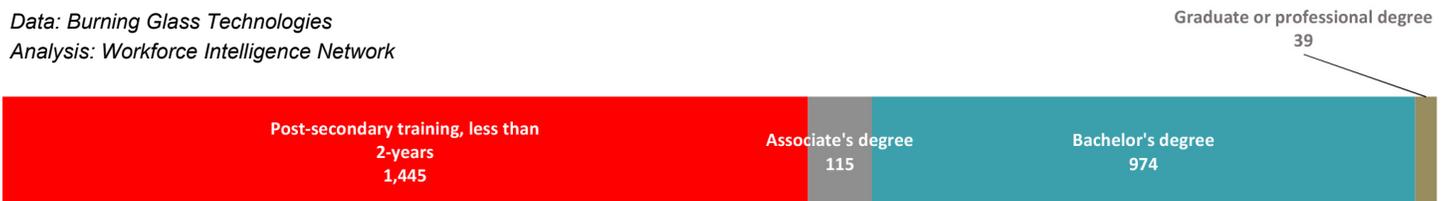


Education & training in-demand

Q4 2016

Data: Burning Glass Technologies

Analysis: Workforce Intelligence Network



The average advertised salary in online job postings during Q4 2016 for Administration workers in Ohio was \$38,374, 14 percent higher than median earnings of all workers in the state (\$33,800). While the majority of postings advertising salary offered less than \$35,000, the two highest wage brackets saw an increase in the number of online ads. The \$50,000 to \$75,000 wage bracket had postings increase from 138 in Q3 2016 to 181 in Q4 2016 (24 percent increase) indicating that employers are searching for more talented individuals to aid in the supply chain and management of lightweighting.

WAGES

Advertised wages

Q4 2016

Data: Burning Glass Technologies

Analysis: Workforce Intelligence Network



306
job postings
advertising salaries
over \$50,000

\$38,374
average
advertised salary

974
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

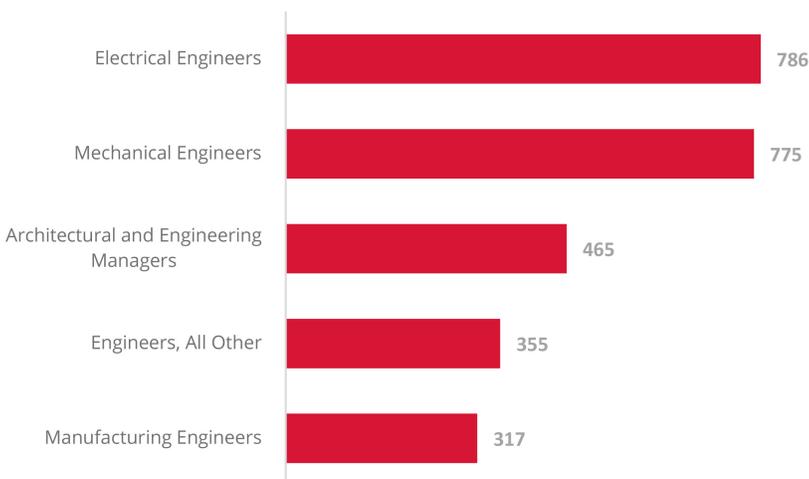
Chemical Engineers & Metallurgy workers perform duties related to the research, design, development, and testing of chemicals and metal materials. These workers often lead the charge in finding cutting-edge uses of lightweight metal materials.

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.



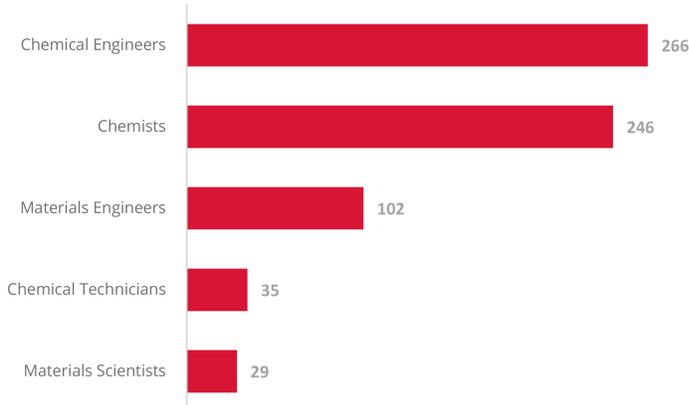
Top posting jobs

Electrical & Mechanical Q4 2016

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

Electrical engineers took the top in-demand job spot in Ohio within the Electrical and Mechanical sub-group. A total of 786 job ads were looking for individuals to work within this particular occupation. The remaining top five Electrical and Mechanical sub-group occupations were dominated by mechanical engineers (775 postings), architectural and engineering managers (465 postings), all other engineers (355 postings), and manufacturing engineers (317 postings).

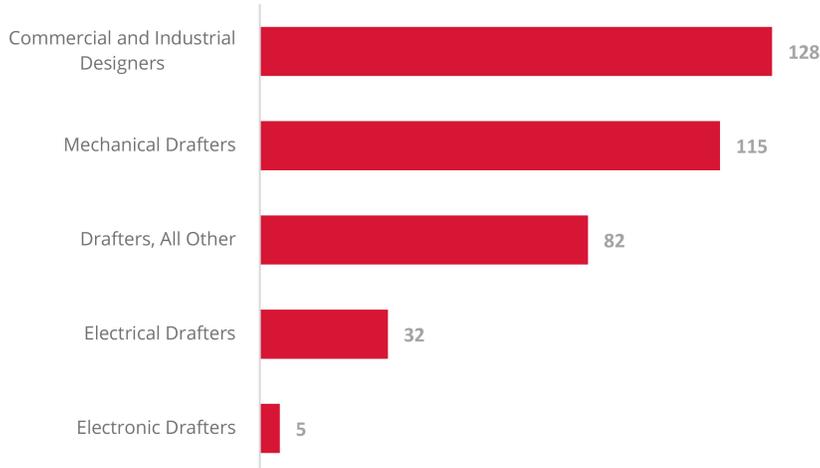
ENGINEERING & DESIGN



Top posting jobs Chemical & Metallurgy Q4 2016

Data: Burning Glass Technologies
Analysis: Workforce Intelligence Network

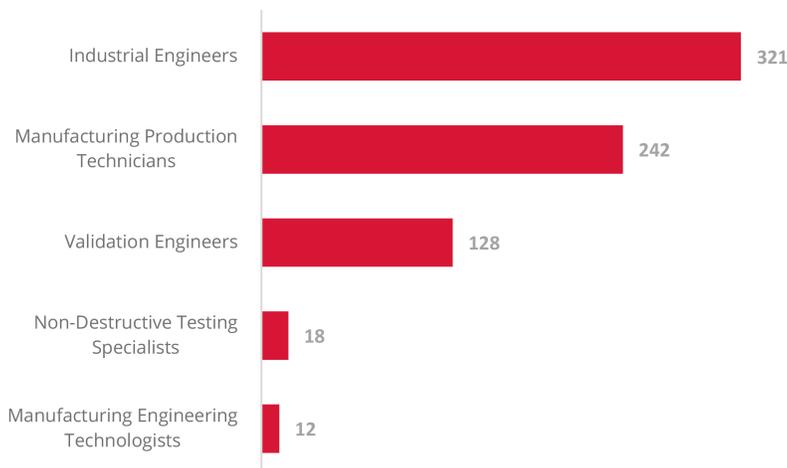
Chemical Engineers were the most sought after workers within the Chemical and Metallurgy sub-group. With 266 online postings, chemical engineers took the number one spot within the sub-group. Other in-demand positions included chemists (246 postings), materials engineers (102 postings), chemical technicians (35 postings), and materials scientists (29 postings).



Top posting jobs Designers & Drafters Q4 2016

Data: Burning Glass Technologies
Analysis: Workforce Intelligence Network

Commercial and industrial designers were the most sought after workers within the Designers and Drafters sub-group in Q4 2016. A total of 128 job postings were looking for workers to fill open commercial designer positions. The remainder of the top five jobs for this sub-group includes mechanical drafters (115 postings), all other drafters (82 postings), electrical drafters (32 postings), and electronic drafters (5 postings).



Top posting jobs Process & Testing Q4 2016

Data: Burning Glass Technologies
Analysis: Workforce Intelligence Network

Industrial engineers were the highest in-demand occupation within the Process and Testing sub-group in Ohio. A total of 321 online job postings sought these particular engineers within the Ohio. Validation engineers (128 postings) and manufacturing engineering technologists (12 postings) were also highly sought engineers within the sub-group. Manufacturing production technicians (242 postings) and non-destructive testing specialists (18 postings) also held spots within the top five in-demand jobs within the Process and Testing sub-group.

ENGINEERING & DESIGN

IN-DEMAND TECHNICAL SKILLS

Occupations in the Engineering and Design group require a wide array of high-level technical skills and managerial skills. Advanced technical skills such as mechanical and electrical engineering, AutoCAD, and programmable logic controller programming were all in high demand. Employers have been pushing for engineers and designers to have management skills as well, such as project management, budgeting, and scheduling. In addition to a desire for creative and innovative personalities, a push for leaders within this field is evident. Those who can bring these kind of skills to the field could potentially lead the change and improvements of the lightweighting industry, making these skills invaluable for Ohio employers.

- Project Management
- Mechanical Engineering
- Electrical Engineering
- AutoCAD
- Budgeting
- Repair
- Manufacturing Processes
- Scheduling
- Programmable Logic Controller (PLC) Programming
- Computer Aided Drafting/Design (CAD)
- Inspection
- Technical Support

IN-DEMAND FOUNDATIONAL SKILLS

While Engineering and Design workers need advanced technical and managerial skills, they also need to maintain more traditional foundational skills critical to succeeding in a workplace. Employers hiring these workers often post employability skills like communication, problem solving, and creative thinking abilities in their advertisements. With a desire to innovate through technology computer skills, knowledge of Microsoft Office is also important in this occupation group. These types of skills are crucial for Engineers and Designers so that they can collaborate effectively and better processes and procedures within firms.

- Communication Skills
- Troubleshooting/ Problem Solving
- Writing/ Research
- Planning
- Team Work/ Collaboration
- Computer Skills/ Microsoft Office
- Organizational Skills
- Quality Assurance and Control
- Detail-Oriented
- Physical Demand
- Leadership
- Mathematics

IN-DEMAND EXPERIENCE & EDUCATIONAL ATTAINMENT

Advertised experience in online job postings for Engineering and Design workers in Ohio reveals that a majority of openings require less than five years of experience. A majority of these postings desired workers with three to five years of experience indicating want for some skills be developed. Another large group of postings (819 postings) required entry-level experience (less than two years), indicating that opportunity to enter the field exists. With the demanding workload, critical thinking, and decisive atmosphere, more employers now expect candidates to have relevant education or training, as evidenced by the 3,000 postings in Q4 2016 requiring bachelor's degrees. Opportunities do exist for candidates with post-secondary training certificates or an associate's degree – Ohio employers posted 568 ads advertising these levels of education.

Experience in-demand

Q4 2016

Data: Burning Glass Technologies

Analysis: Workforce Intelligence Network



Education & training in-demand

Q4 2016

Data: Burning Glass Technologies

Analysis: Workforce Intelligence Network



Only 19 percent of Q4 2016 postings in the Engineering & Design occupation group advertised salaries. Of those, the majority (742 postings) advertised annual salaries above \$50,000 per year. The high educational attainment required to secure most engineering positions translates into high earnings. The mean advertised salary for Q2 2016 among Ohio's Engineering and Design occupations was \$70,510. This salary is over twice as much as the Ohio's median annual earnings for all workers, \$34,800.

WAGES

Advertised wages

Q4 2016

Data: Burning Glass Technologies

Analysis: Workforce Intelligence Network



3,000
job postings
requiring a
bachelor's degree

\$74,211
average
advertised salary

752
job postings with
salaries greater
than \$50,000



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