

# 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

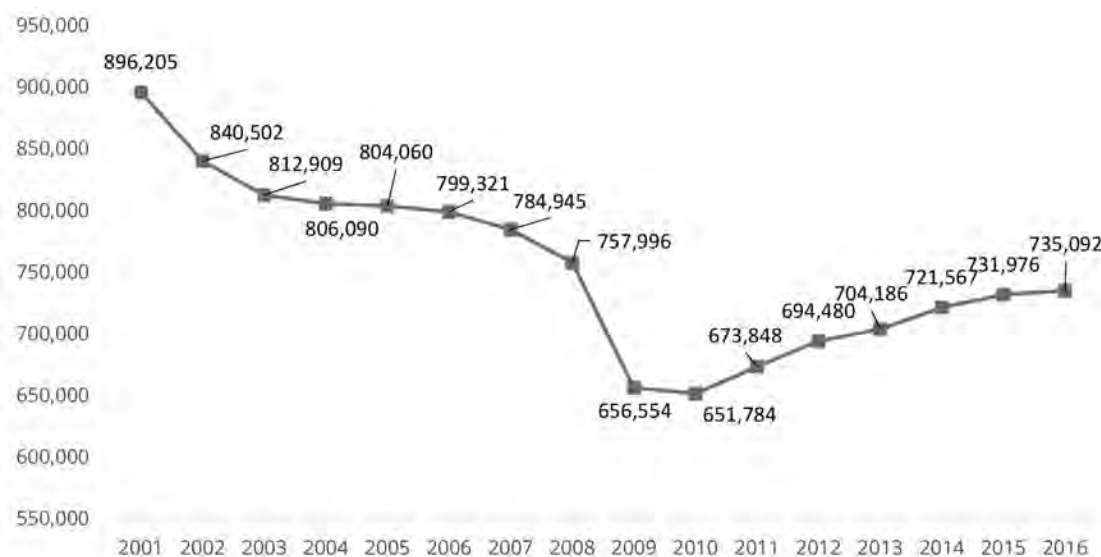
Employer demand for advanced manufacturing jobs related to lightweighting in Ohio, gauged by online job postings, increased by 2,500 ads between Q2 and Q3 2016, following three consecutive quarters of decline. The 21,700 ads posted during Q3r represented a 12.9% increase over the 19,200 ads during Q2 2016. Despite the decline in demand during the first half of 2016, online postings remain high relative to previous years. Furthermore, 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 12.8% increase.



### Job postings over time Ohio

Q1 2013 - Q3 2016

Data: Burning Glass Technologies  
Analysis: Workforce Intelligence Network



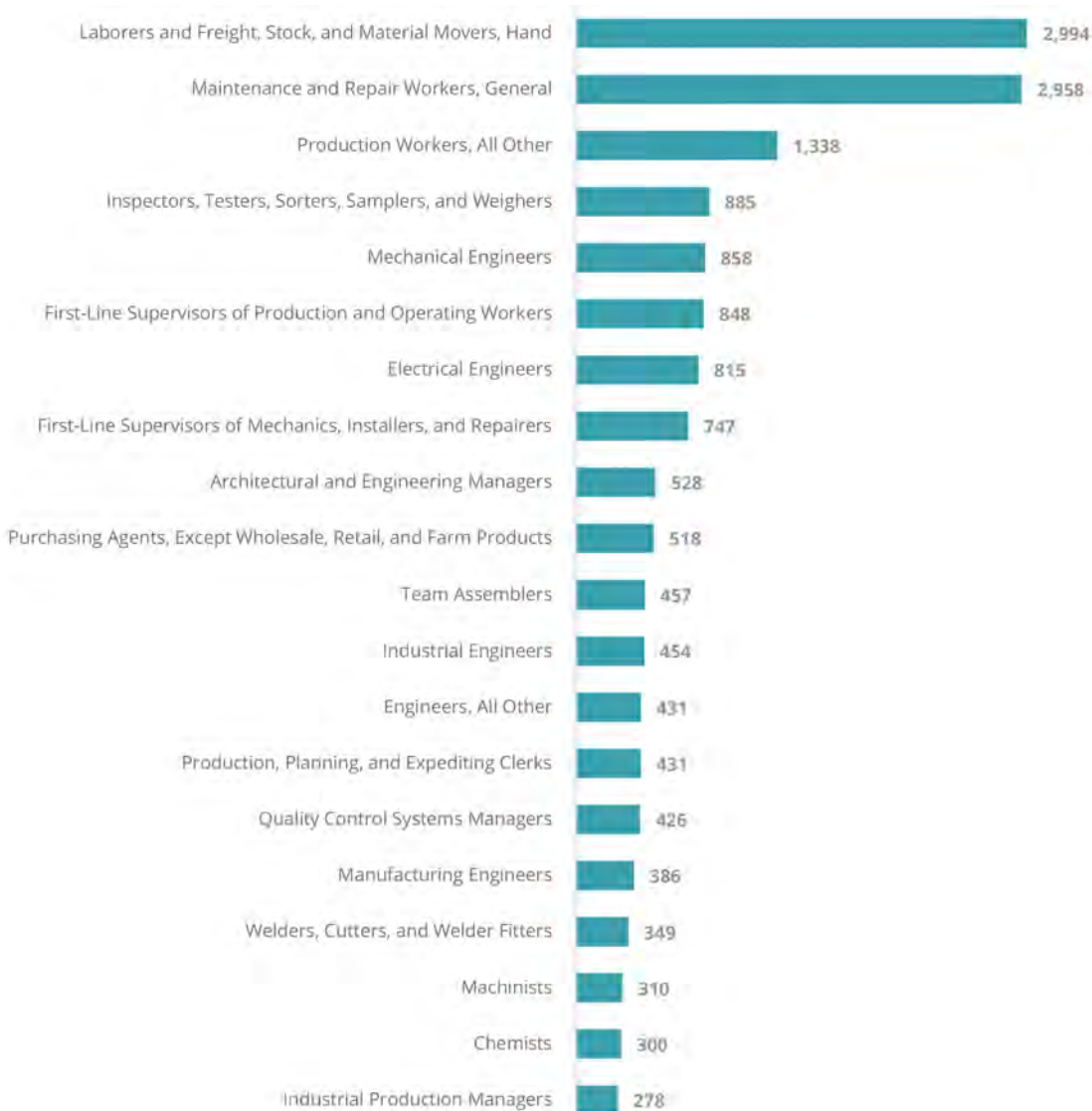
### Employment over time Ohio

Q1 2013 - Q3 2016

Data: EMSI, QWI  
Analysis: Workforce Intelligence Network

## TOP JOBS

Laborers and material movers represented the most in-demand occupation in Ohio with nearly 3,000 online job ads during Q3 2016. Despite seeing an increase in postings, maintenance and repair workers became the second most in-demand job, also just shy of 3,000 online ads. Other top posting jobs for advanced manufacturing in Ohio included various engineering positions as well as supervisors of both production workers and engineers.



### Top posting jobs Ohio Q3 2016

Data: Burning Glass  
Technologies

Analysis: Workforce Intelligence  
Network

**13%**  
**decline in demand  
for advanced  
manufacturing  
workers**

**21,704**  
**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

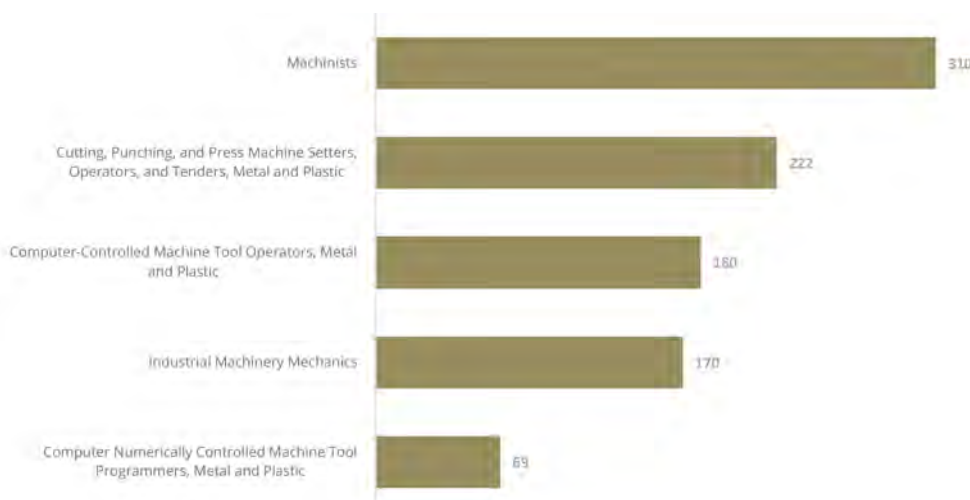
*Machinists set up and operate a variety of machine tools to produce parts and instruments. Some work on traditional industrial machinery while others operate or develop programs for computer-controlled machinery.*

### 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

Q3 2016

Data: Burning Glass Technologies  
Analysis: Workforce Intelligence Network

General machinists were the most in-demand occupation in the Machinists sub-group during Q3 2016. Ohio employers posted 310 online job ads for these workers between July and September 2016. The next most in-demand occupations included cutting, punching, and press machine operators, computer-controlled machine operators, and industrial machinery mechanics.

# SKILLED TRADES

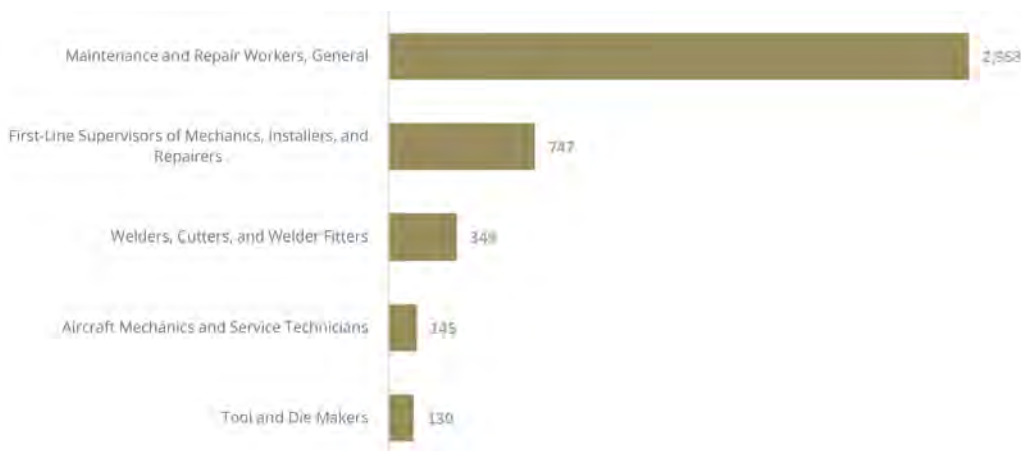


## Top posting jobs

### Assembly & Operations Q3 2016

Data: Burning Glass Technologies  
Analysis: Workforce Intelligence Network

Productions workers remained the most in-demand Assembly & Operations occupation during Q3 2016. Ohio employers posted 1,300 online job ads for these workers. The next most in-demand workers in this sub-group included inspectors, testers, and sorters (890 postings) and supervisors of production workers (850 postings).



## Top posting jobs

### Skilled Materials Workers Q3 2016

Data: Burning Glass Technologies  
Analysis: Workforce Intelligence Network

Maintenance and repair workers remained the most in-demand occupation in the Skilled Materials sub-group with nearly 3,000 online ads during Q3 2016. Additionally, demand increased for supervisors of mechanics and repairers, indicating the presence of a career pathway in this field.

# SKILLED TRADES

## IN-DEMAND TECHNICAL SKILLS

Workers in the Skilled Trades group require a wide array of high-level technical skills. While traditional skills such as machinery, welding, plumbing, and repair remain prevalent in postings, newer skills demonstrate the shifting expectations of a worker in manufacturing. Highly advanced skills like Programmable Logic Controller (PLC), Computer Numerical Control (CNC) and Calibration reflect the growing demand for workers in advanced manufacturing. The frequency of managerial skills in postings demonstrates the need for Skilled Trades workers with both experience and leadership abilities.

- |   |   |
|---|---|
| <ul style="list-style-type: none"><li>• Repair/Inspection</li><li>• Scheduling/Supervisory Skills</li><li>• Machinery</li><li>• Welding</li><li>• Plumbing</li><li>• Programmable Logic Controller (PLC Programming)</li><li>• Computer Numerical Control (CNC)</li></ul> | <ul style="list-style-type: none"><li>• Machining/Machine Operation</li><li>• HVAC</li><li>• Occupational Health and Safety</li><li>• Electrical systems/wiring</li><li>• Lean Manufacturing</li><li>• Mig and Tig Welding</li><li>• Forklift Operation</li><li>• Calibration</li></ul> |
|---|---|

## IN-DEMAND EMPLOYABILITY SKILLS

In addition to having advanced technical skills, Skilled Trades workers must also maintain traditional foundational skills critical to succeeding in a workplace. Ohio employers hiring Skilled Trades workers most often post employability skills such as communication, problem solving, and ability to perform physical labor. The high number of postings advertising for computer or strong math skills demonstrates the need for higher education in advanced manufacturing workers. Additionally, the prevalence of skills related to supervising and leadership underscores the need for first-line managers of manufacturing workers.

- |  |  |
|--|--|
| <ul style="list-style-type: none"><li>• Communication Skills, Team Work/Collaboration,</li><li>• Troubleshooting, Preventative Maintenance, Problem Solving, Work Area Maintenance</li><li>• Ability to Perform Physical Labor</li><li>• Supervisory Skills, Organizational Skills, Leadership</li><li>• Writing</li></ul> | <ul style="list-style-type: none"><li>• Computer Skills, Microsoft Office</li><li>• Detail-Oriented, Planning, Editing, Multi-tasking</li><li>• Mathematics</li><li>• Quality Assurance and Control</li><li>• Planning</li></ul> |
|--|--|

## IN-DEMAND EXPERIENCE & EDUCATIONAL ATTAINMENT

Advertised experience in online job postings for Skilled Trades workers in Ohio reveals that a substantial majority (92%) of openings require less than five years' experience. With nearly half of the postings with experience criteria advertising less than two years, entry-level jobs are available for qualified workers. While low levels of experience typically dominate online postings, Ohio employers often expect candidates to have relevant education or training, and advanced jobs in lightweight manufacturing require training beyond a high school education. If individuals interested in advanced manufacturing careers can learn valuable in-demand technical skills, they can fill the entry-level openings. Ohio employers seeking workers with six or more years of experience are most likely in search of seasoned workers for supervisor or management positions.

### Experience in-demand

Q3 2016

Data: Burning Glass Technologies

Analysis: Workforce Intelligence Network



### Education & training in-demand

Q3 2016

Data: Burning Glass Technologies

Analysis: Workforce Intelligence Network



The average advertised salary in online job postings during Q3 2016 for Skilled Trades workers in Ohio was \$41,200, or 22% 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 since most openings are entry-level. With experience, wages will grow into higher brackets. The two middle wage brackets saw yet another increase in the number of online ads between Q2 and Q3 2016.

## WAGES

### Advertised wages

Q2 2016

Data: Burning Glass Technologies

Analysis: Workforce Intelligence Network



**0-5 years**

Experience most in-demand by Ohio employers

**\$41,203**

average advertised salary

**4,500**

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

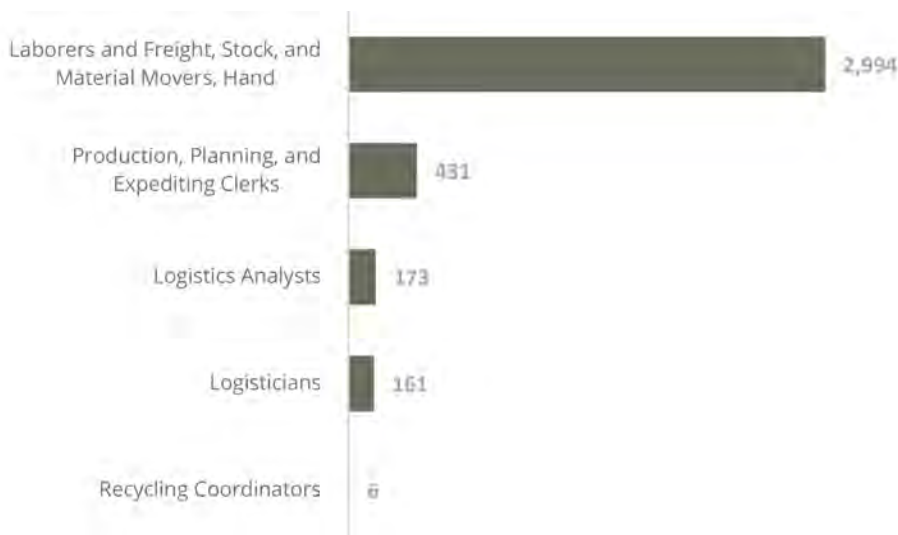
#### Logistics

Q3 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 Q3 2016. Ohio employers posted nearly 3,000 online job ads for these workers between July and September 2016. Despite the overwhelming demand for these workers in this sub-group, other Logistics jobs remain in high demand. Online ads for production clerks more than doubled between Q2 and Q3 while logistic analysts and logisticians had a similar amount of postings across quarters, indicating continued strong demand.



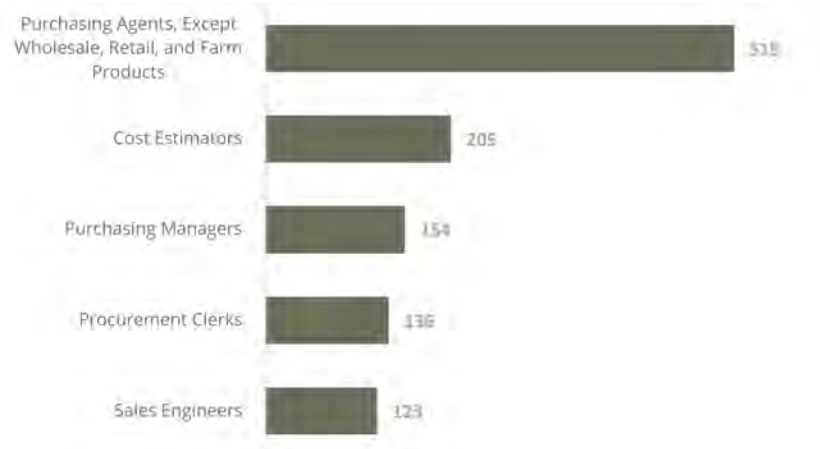
# ADMINISTRATION

## Top posting jobs

### Procurement & Purchasing Q3 2016

Data: Burning Glass Technologies  
Analysis: Workforce Intelligence  
Network

Purchasing agents remained the most in-demand occupation in the Procurement and Purchasing sub-group during Q3 2016. The number of postings in Q3 remained similar to the amount in Q2, indicating that Ohio employers continue to struggle finding these workers. The other top jobs in this sub-group include cost estimators, purchasing managers, procurement clerks, and sales engineers.

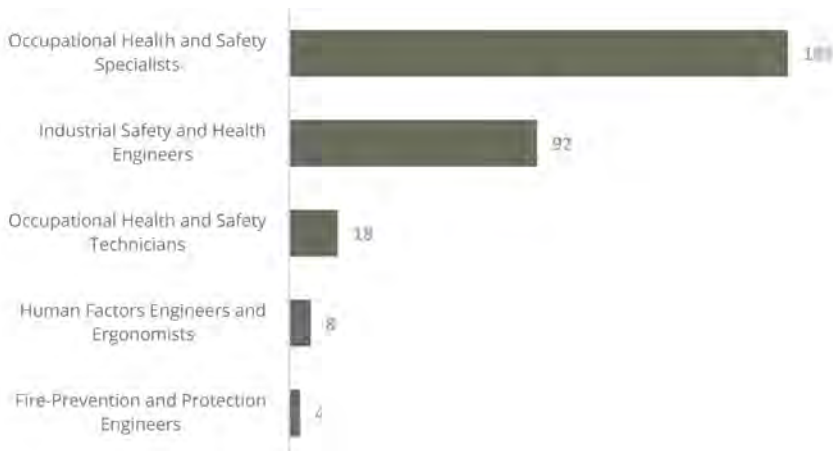


## Top posting jobs

### Human Safety Q3 2016

Data: Burning Glass Technologies  
Analysis: Workforce Intelligence  
Network

Occupational health and safety specialists remained the highest in-demand occupation in the Human Safety sub-group during Q3 2016 with 185 online job ads. Ohio employers posted nearly an identical amount during Q2 (186 ads) for the same position. Also in high demand were industrial safety and health engineers (92 ads).



# ADMINISTRATION

## IN-DEMAND TECHNICAL SKILLS

Occupations in the Administration group require a wide array of high-level technical skills and managerial skills. Hands-on skills such as forklift operation, inspection, and other manufacturing floor-based skills are present in postings. Additionally, skills necessary for the business process such as purchasing, scheduling, inventory management, and budgeting demonstrate the need for works with a balanced skill set.

- |                          |                                     |
|--------------------------|-------------------------------------|
| • Forklift Operation     | • Labeling                          |
| • Microsoft Office       | • Inspection                        |
| • Purchasing/Procurement | • Inventory Management              |
| • Scheduling             | • Budgeting                         |
| • Customer Service       | • Scanners                          |
| • Project Management     | • SAP                               |
| • Logistics              | • Inventory Control                 |
| • Contract Management    | • Supply Chain Management/Knowledge |

## IN-DEMAND FOUNDATIONAL SKILLS

In addition to having strong manufacturing and/or business skills, Administration workers also need a strong base of traditional foundational skills critical to succeeding in a workplace. Employers hiring Administration workers in Ohio most often post employability skills like communication, ability to perform physical demand, organizational, and detail-oriented. With continuing advancements in technology, it is critical that these workers have strong computer and mathematics skills.

- |                                      |                                    |
|--------------------------------------|------------------------------------|
| • Communication                      | • Team work/collaboration          |
| • Ability to perform physical demand | • Mathematics                      |
| • Computer knowledge                 | • Multi-tasking                    |
| • Writing                            | • Research                         |
| • Organizational abilities           | • Work area maintenance            |
| • Planning                           | • Building effective relationships |
| • Detail-oriented                    | • Quality assurance control        |
| • Problem solving                    | • Time management                  |

# IN-DEMAND EXPERIENCE & EDUCATIONAL ATTAINMENT

Advertised experience in online job postings for Administration workers in Ohio reveals that a majority of openings require just two years or less experience. In contrast, during Q2, the majority of postings required three to five years of experience. This shift demonstrates that more entry-level opportunities exist, or are at least being advertised. With the demanding workload, critical thinking, and decisive atmosphere, more employers now expect candidates to have relevant education or training, as evidenced by the over 1,000 postings for candidates with a Bachelor's degree. Job postings requiring five or more years of experience most likely indicate supervisor or manager positions.

## Experience in-demand

Q3 2016

Data: Burning Glass Technologies

Analysis: Workforce Intelligence Network



## Education & training in-demand

Q3 2016

Data: Burning Glass Technologies

Analysis: Workforce Intelligence Network



The average advertised salary in online job postings during Q3 2016 for Administration workers in Ohio was \$36,391, or 11% higher than median earnings of all workers in the state (\$33,800). An overwhelming 73% of postings advertising salaries offered less than \$35,000 annually. While all wage brackets saw an increase in the number of postings between Q2 and Q3, less than \$35,000 had the largest increase, resulting in a drop in the average advertised salary between quarters.

## WAGES

### Advertised wages

Q3 2016

Data: Burning Glass Technologies

Analysis: Workforce Intelligence Network



**264**  
job postings  
advertising salaries  
over \$50,000

**\$36,391**  
average  
advertised salary

**1,077**  
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

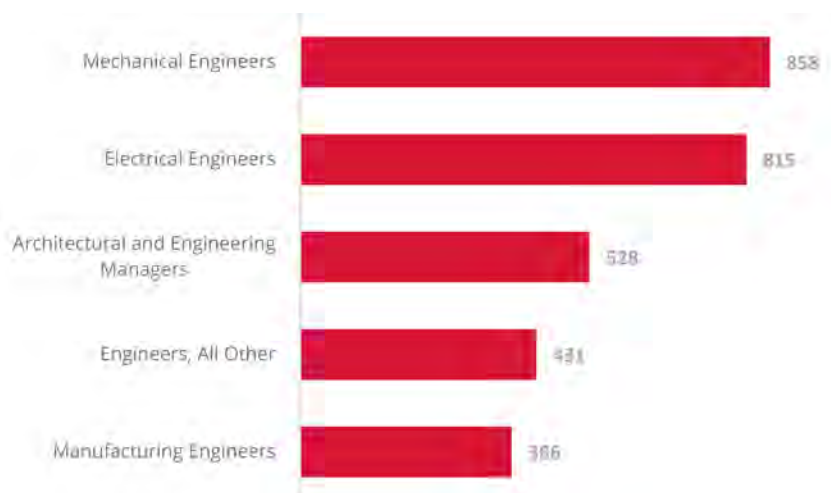
*Chemical Engineers & Metallurgy workers perform duties related to the research, design, development, and testing of chemicals and metal materials. These workers often lead the charge in finding cutting-edge uses of lightweight metal materials.*

### 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.*

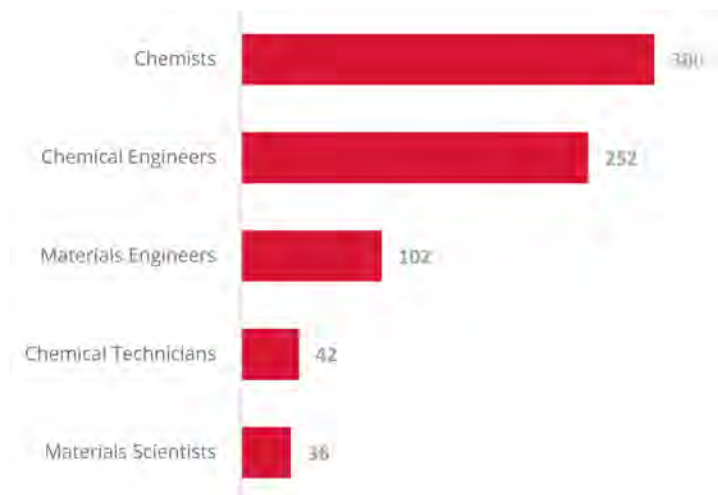


### Top posting jobs Electrical & Mechanical Q3 2016

Data: Burning Glass Technologies  
Analysis: Workforce Intelligence Network

Mechanical engineers became the most in-demand occupation in this sub-group during Q3 2016 with 860 postings. Electrical engineers also remained in high demand with 815 online ads this past quarter. The over 500 postings for architectural and engineering managers indicates room for career growth for engineers with experience.

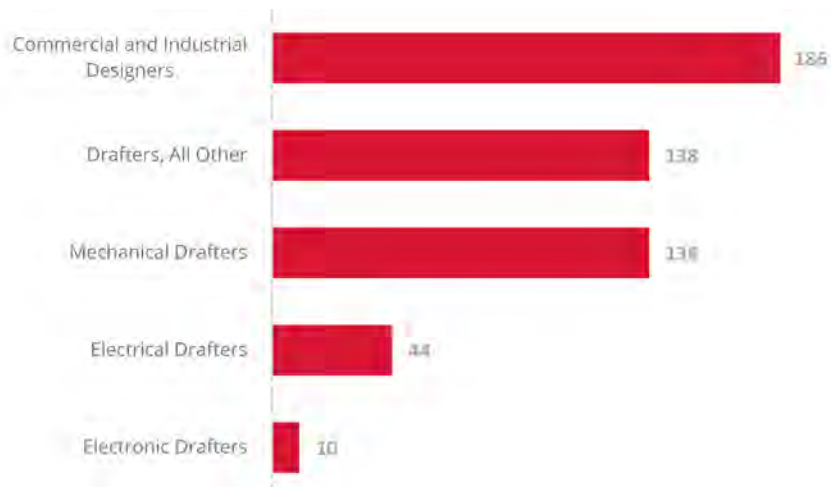
# ENGINEERING & DESIGN



## Top posting jobs Chemical & Metallurgy Q3 2016

Data: Burning Glass Technologies  
Analysis: Workforce Intelligence Network

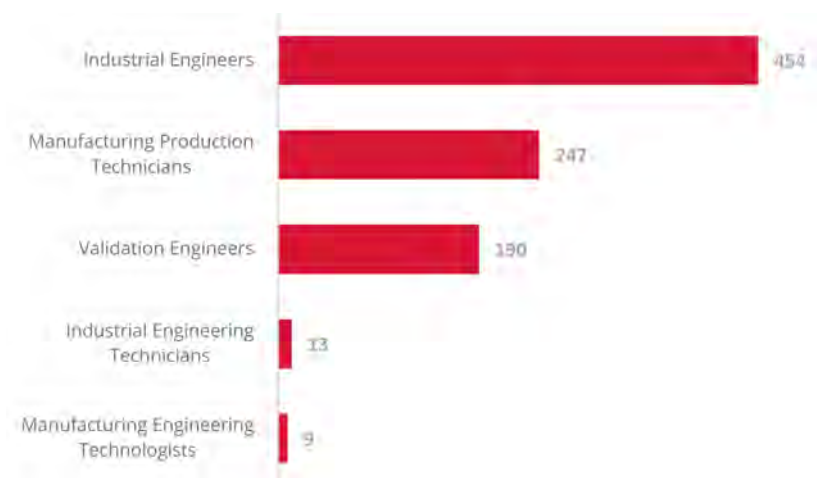
An increase in postings between Q2 and Q3 2016 caused chemists to become the most sought after position in the Chemical and Metallurgy sub-group with 300 online ads. Chemical engineers, the previous quarter's top posting job, remained in high demand with 250 ads during Q3. Ohio employers also posted over 100 ads for materials engineers this past quarter.



## Top posting jobs Designers & Drafters Q3 2016

Data: Burning Glass Technologies  
Analysis: Workforce Intelligence Network

Commercial and industrial designers remained the most sought after occupation in this sub-group with 186 online ads during Q3. Ohio employers also posted 138 online ads for both drafters, all other and mechanical drafters. These positions are unique to the Engineering group in that they do not require a Bachelor's degree for entry-level openings.



## Top posting jobs Process & Testing Q3 2016

Data: Burning Glass Technologies  
Analysis: Workforce Intelligence Network

Industrial engineers continue to dominate online ads for the Process & Testing sub-group—Q3 postings for this occupation (454 ads) were nearly doubled the next most in-demand job, manufacturing production technicians (247 ads). Ohio employers also posted 190 ads for validation engineers this past quarter.

# 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 highly demanded. These technical skills are a necessity, bringing about the innovation and bettering of the industry from within. Employers, however, have been pushing for these engineers and designers to have management skills as well, such as project management, budgeting, and scheduling. In addition to 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.

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

## IN-DEMAND FOUNDATIONAL SKILLS

While Engineer 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 and knowledge of Microsoft Office are also important within 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
- 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

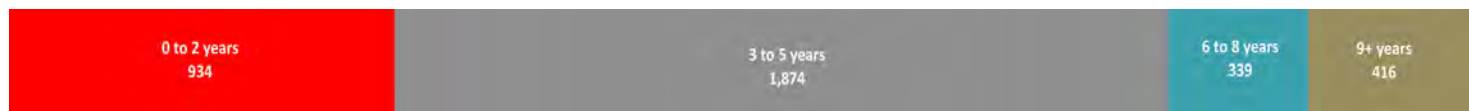
Advertised experience in online job postings for Engineer and Design workers in Ohio indicates that of the postings with desired experience indicated, over half preferred candidates with three to five years' experience. While this analysis shows that Ohio employers most often prefer engineering candidates with relevant industry experience, over 900 online ads also indicated openings at the entry-level (0 to 2 years' experience). In order to enter an occupation in this occupation group, prospective candidates almost always need a bachelor's degree in a relevant field—over four-fifths of Q3 postings advertising education requested a bachelor's degree. Opportunities do exist for candidates with vocational training or an Associate's, however, as Ohio employers posted 550 ads advertising these levels of education.

## Experience in-demand

Q3 2016

Data: Burning Glass Technologies

Analysis: Workforce Intelligence Network



## Education & training in-demand

Q3 2016

Data: Burning Glass Technologies

Analysis: Workforce Intelligence Network



Of the online postings that included salaries, about three-fourths advertised annual wages of over \$50,000. The high educational attainment required to secure most engineering positions translates into higher earnings. The average advertised salary for Q3 2016 among Ohio's Engineering and Design occupations was \$70,689, more than double the median annual earnings for all Ohio workers (\$33,800).

## WAGES

### Advertised wages

Q3 2016

Data: Burning Glass Technologies

Analysis: Workforce Intelligence Network



**3,465**  
job postings  
requiring a  
bachelor's degree

**\$70,689**  
average  
advertised salary

**833**  
job postings with  
salaries greater  
than \$50,000





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For more information about LIFT and additional workforce data visit [www.lift.technology](http://www.lift.technology)