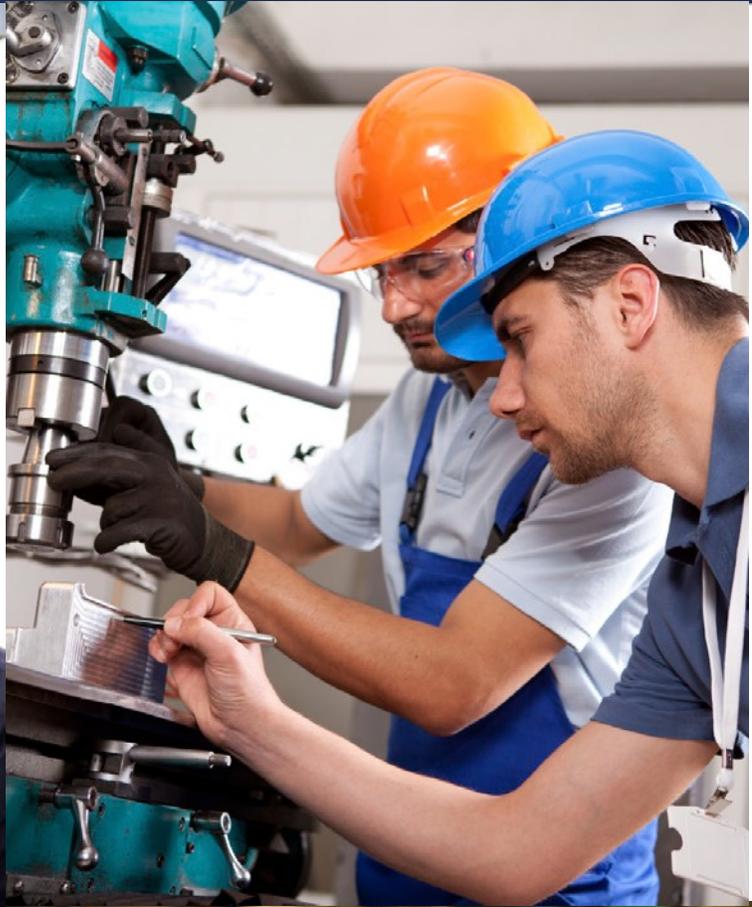


# Lightweight Technology Workforce

*Supply-Demand Annual 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, are more fuel-efficient and demonstrate better performance.

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 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 only 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.

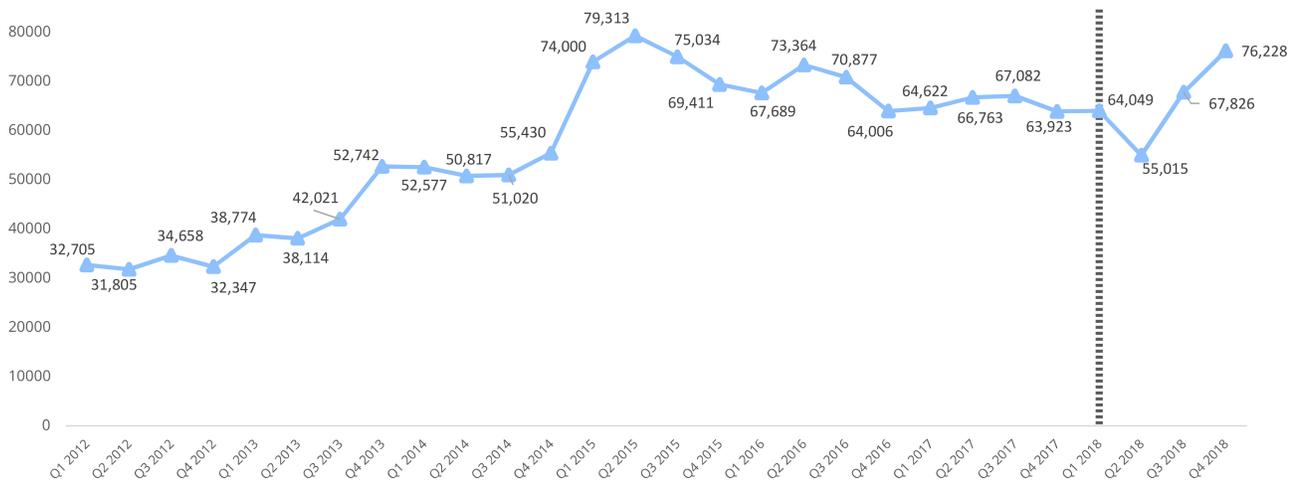


# OVERVIEW

## EMPLOYER DEMAND AND EMPLOYMENT TRENDS

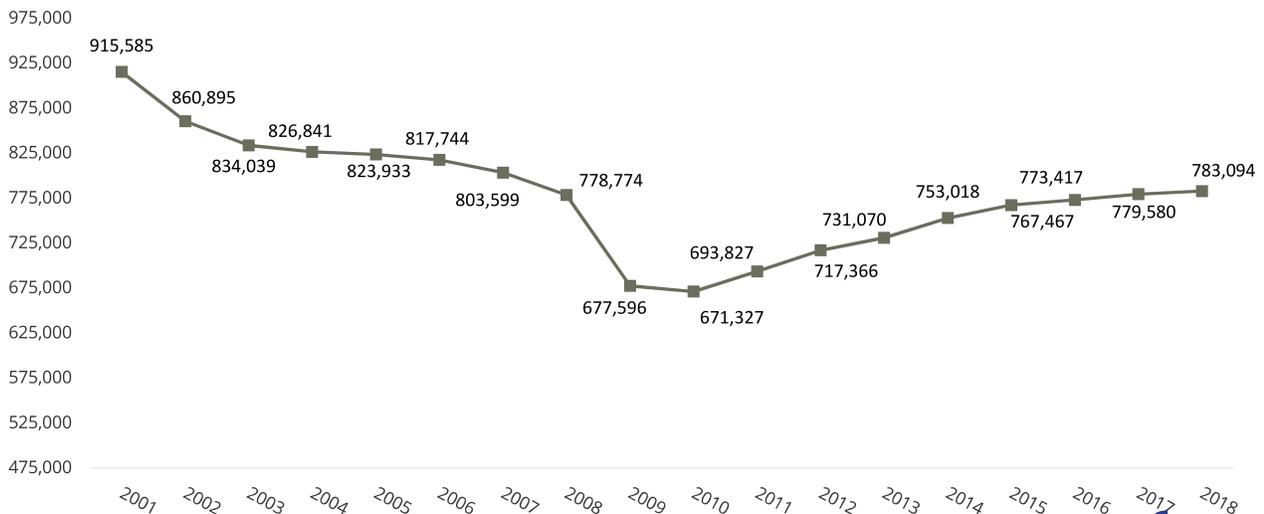
Job postings for occupations related to lightweight advanced manufacturing in Ohio increased in Q4 2018, growing 19 percent from 67,826 postings in Q3 to 76,228 postings in Q4. Since hitting a low of 671,000 workers in 2010, employment has increased for eight consecutive years. There were 783,094 Ohio workers employed in advanced manufacturing jobs related to lightweighting in 2018.

### JOB POSTINGS OVER TIME OHIO Q1 2012 - Q4 2018



A change in data de-duplication methodology of job posting estimates occurred at the time of the dotted line on the graph. Though data from before 2018 may have included duplicate postings and therefore report slightly inflated numbers, the trends shown remain consistent.

### EMPLOYMENT OVER TIME OHIO 2001 - 2018



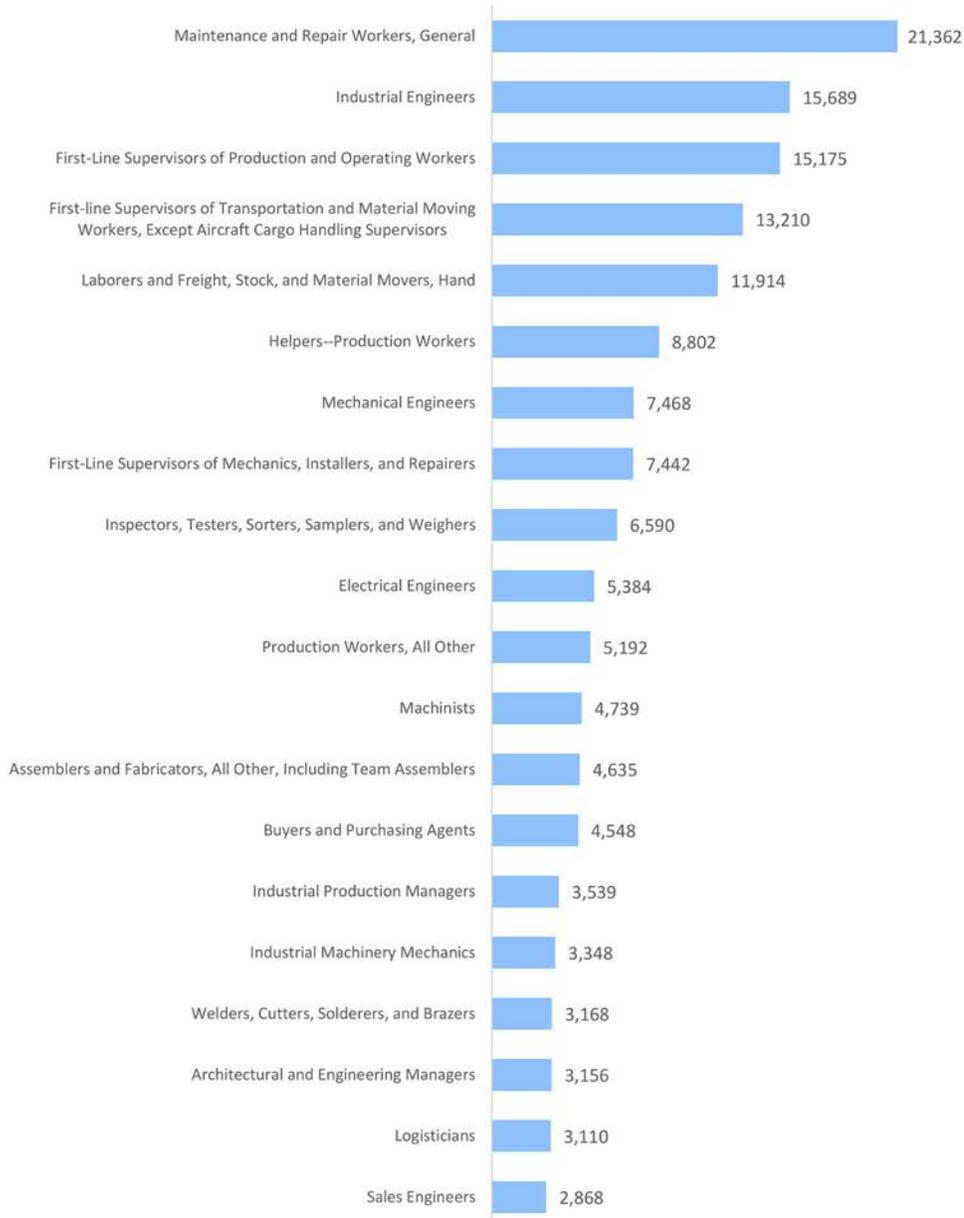
Data: Emsi  
Analysis: Workforce Intelligence Network

# OVERVIEW

## TOP JOBS

Maintenance and Repair Workers, General remain the most in-demand lightweighting-related occupation in Ohio, with over 21,362 online job ads during 2018. Industrial Engineers earned their second-place position during 2018 with 15,689 postings. Management roles were also in demand in 2018, with both First-line Supervisors of Production and Operating Workers and First-line Supervisors of Transportation and Material Moving Workers, Except Aircraft Cargo Handling Supervisors also in the top five.

### ★ TOP POSTING JOBS OHIO 2018



**19%**

*increase in demand for advanced manufacturing workers since 2017*

**76,228**

*Total online job ads in Q4 2018*

**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.*

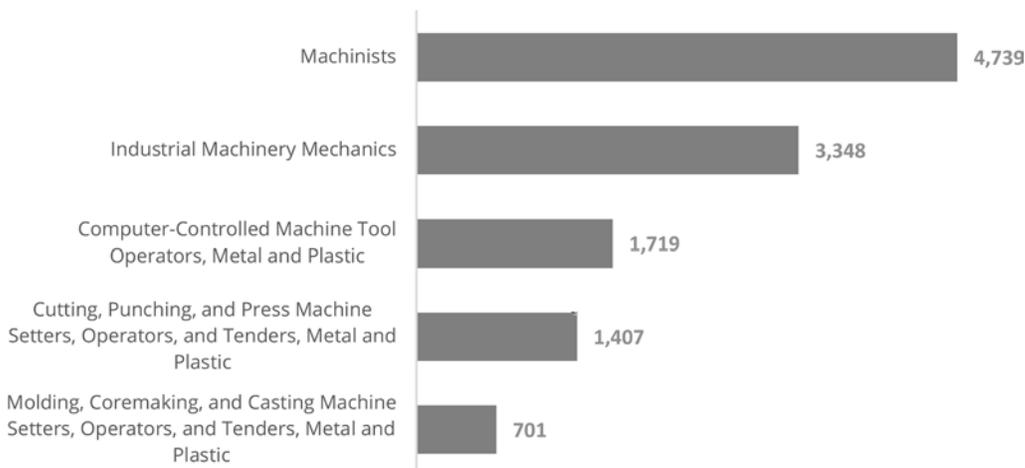
### Assembly & Operations

*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 OHIO 2018



### Machinists

General machinists remained the most in-demand occupation in the Machinists sub-group during 2018 with 4,739 job postings, followed by Industrial Machinery Mechanics with 3,348 postings. With about half has many postings each, other high-demand jobs included Computer-Controlled Machine Tool Operators, Metal and Plastic and Cutting, Punching and Press Machine Setters, Operators, and Tenders, Metal and Plastic.

# SKILLED TRADES

## ★ TOP POSTING JOBS OHIO 2018

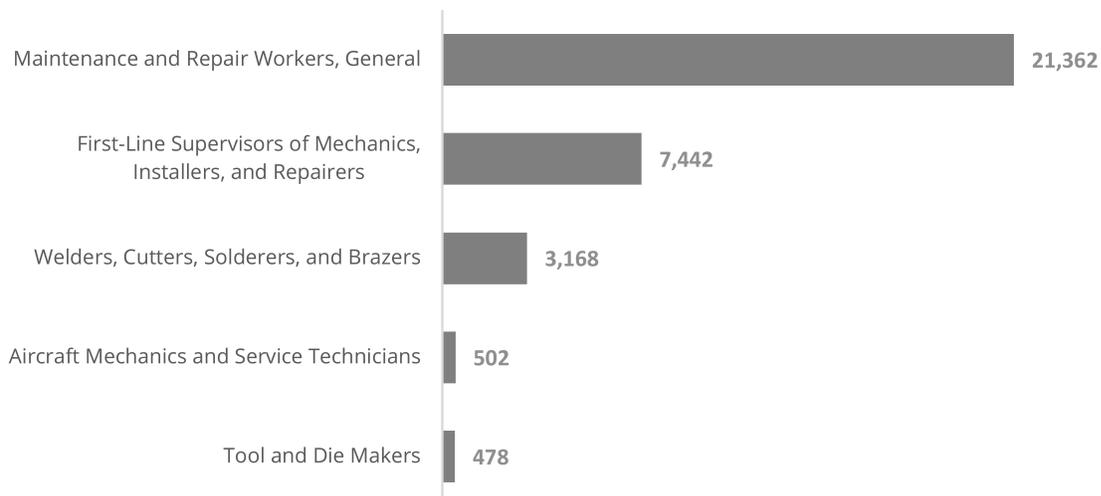
### **Assembly & Operations**

Supervisory positions were sought after in online advertisements in Ohio during 2018. Demand for overall top five jobs First-Line Supervisors of Production and Operating Workers and First-line Supervisors of Transportation and Material Moving Workers, Except Aircraft Cargo Handling Supervisors led the Assembly and Operations sub-group with over 13,000 ads each. The high demand for both occupations indicates strong career growth potential in this lightweighting-related sub-group. Entry-level opportunities are available as well; Helpers—Production Workers were third most in-demand in 2018, reporting 8,802 online job postings.



### **Skilled Materials**

Maintenance and Repair Workers, General (21,362 postings) had nearly three times the number of postings as the next most in-demand job in the Skilled Materials sub-group during 2018, in addition to being the top lightweighting-related occupation overall. The number of job postings also remained high for First-Line Supervisors of Mechanics, Installers, and Repairers (7,442 postings), indicating the potential for career growth in this in-demand field. Welders, Cutters, Solderers, and Brazers also garnered over 3,000 postings.



# SKILLED TRADES

## IN-DEMAND TECHNICAL SKILLS

The Skilled Trades group requires a wide array of high-level technical skills. While traditional abilities like warehousing, machining, welding, and other specialized skills remain necessary, others requiring post-secondary education and training have become more prevalent in Skilled Trades job postings. The increased frequency of requests for continuous improvement process, quality management, and blueprinting reflects the high demand for managers within the Skilled Trades.

- Warehousing
- Packaging and Labeling
- Continuous Improvement Process
- HVAC
- Plumbing
- Preventive Maintenance/  
Corrective and Preventative Actions
- Machining
- Blueprinting

- Welding
- Carpentry
- Mechanics
- Quality Management
- Hydraulics
- Lathes
- Painting

## IN-DEMAND EMPLOYABILITY SKILLS

While Skilled Trades workers need mastery of advanced technical skills, they also need the foundational skills critical to succeeding in any workplace. Employers hiring Skilled Trades workers often post employability skills like management, communication, problem solving, computer literacy, and customer service. These types of skills are crucial for Skilled Trades so that workers can collaborate effectively, especially in supervisory roles.

- Management
- Operations
- Communications
- Troubleshooting (Problem Solving)
- Leadership
- Customer Service
- Sales
- Problem Solving

- Computer Literacy
- Innovation
- Written Communication
- Interpersonal Skills
- Construction
- Microsoft Excel
- Coordinating

# SKILLED TRADES

## ✓ IN-DEMAND EXPERIENCE & EDUCATIONAL ATTAINMENT

Despite the high number of management positions represented in postings, Skilled Trades job postings in Ohio mainly advertise entry-level openings that require fewer than five years of experience. Just over half of the 2018 postings that specified a desired level were open to candidates with two years of experience or less (24,060 postings). Another 39 percent (16,528 postings) require three to five years. Skilled Trades job postings most commonly indicate preference for a high school diploma (62 percent of postings stating education requirements, or 35,876 ads) in conjunction with a relevant certificate or post-secondary training, reflected in high reported demand for qualifications like Product or ASQ certification or welding. If potential candidates can learn valuable in-demand technical skills through a short-term training program, they can fill the entry-level openings that have such high demand among Ohio employers.

### IN-DEMAND EXPERIENCE

OHIO 2018



### IN-DEMAND EDUCATION

OHIO 2018



## \$ WAGES

The wage table below, containing data from the Bureau of Labor Statistics (BLS) indicates the hourly wage distribution for the top five posted Skilled Trades occupations. Top occupation Maintenance and Repair Workers, General earn hourly wages of \$18.79 at the median, or just under \$40,000 annually. Additional experience and training can lead to supervisory roles, which may earn over \$25.00 (\$52,000 annually) at the median and continue to grow with experience.

### TOP JOBS WAGE SCALE

OHIO 2018

Occupation Code	Occupation Name	10th Percentile Wages	25th Percentile Wages	Median Wages	75th Percentile Wages	90th Percentile Wages
49-9071	Maintenance and Repair Workers, General	\$11.51	\$14.84	\$18.79	\$23.88	\$28.86
51-1011	First-Line Supervisors of Production and Operating Workers	\$17.19	\$21.76	\$27.94	\$35.46	\$43.36
53-1048	First-line Supervisors of Transportation and Material Moving Workers, Except Aircraft Cargo Handling Supervisors	\$15.41	\$19.03	\$25.05	\$31.43	\$38.29
51-9198	Helpers--Production Workers	\$9.92	\$11.17	\$13.85	\$17.52	\$20.88
49-1011	First-Line Supervisors of Mechanics, Installers, and Repairers	\$17.65	\$22.86	\$29.58	\$37.35	\$45.73

**0-2 years**

*Experience most in-demand by Ohio employers*

**\$27.94**

*Median wage for production and operating supervisors*

**13,733**

*postings requiring a bachelor's degree*

Data: Emsi  
Analysis: Workforce Intelligence Network





## 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 manufacturers are ready and available for production.*

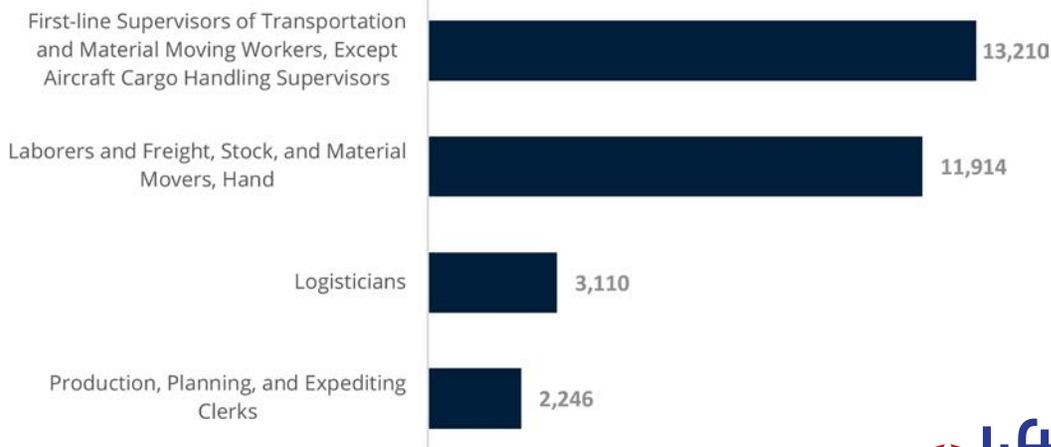
### Human Safety

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

## ★ TOP POSTING JOBS OHIO 2018

### Logistics

Demand in the Logistics sub-group was split between First-line Supervisors of Transportation and Material Moving Workers, Except Aircraft Cargo Handling Supervisors (13,210 postings) and Laborers and Freight, Stock, and Material Movers, Hand (11,914 postings), each with over 7,000 more online ads than the next most in-demand job during 2018. However, demand for Logisticians and Production, Planning, and Expediting Clerks was still high among lightweighting occupations overall.

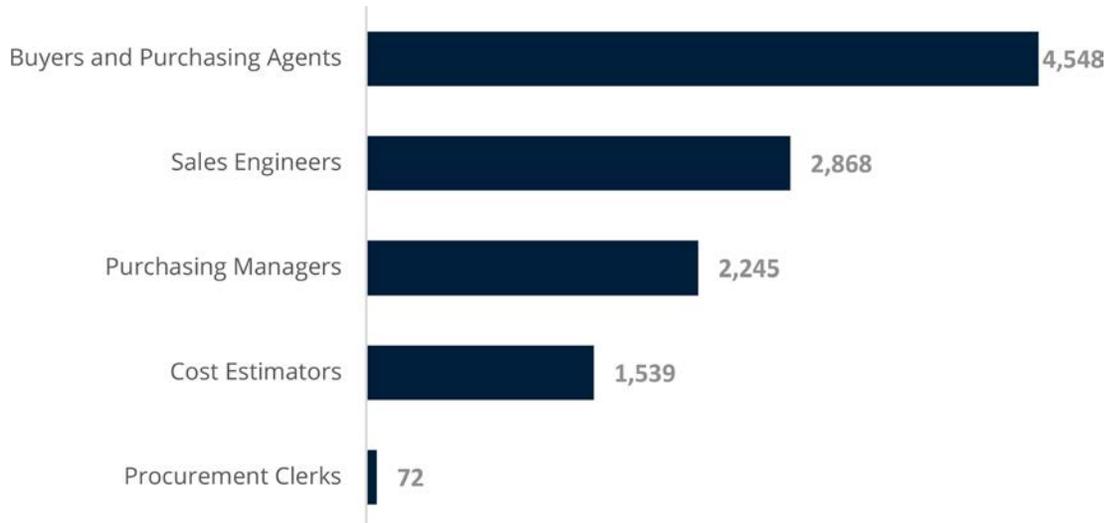


# ADMINISTRATION

## ★ TOP POSTING JOBS OHIO 2018

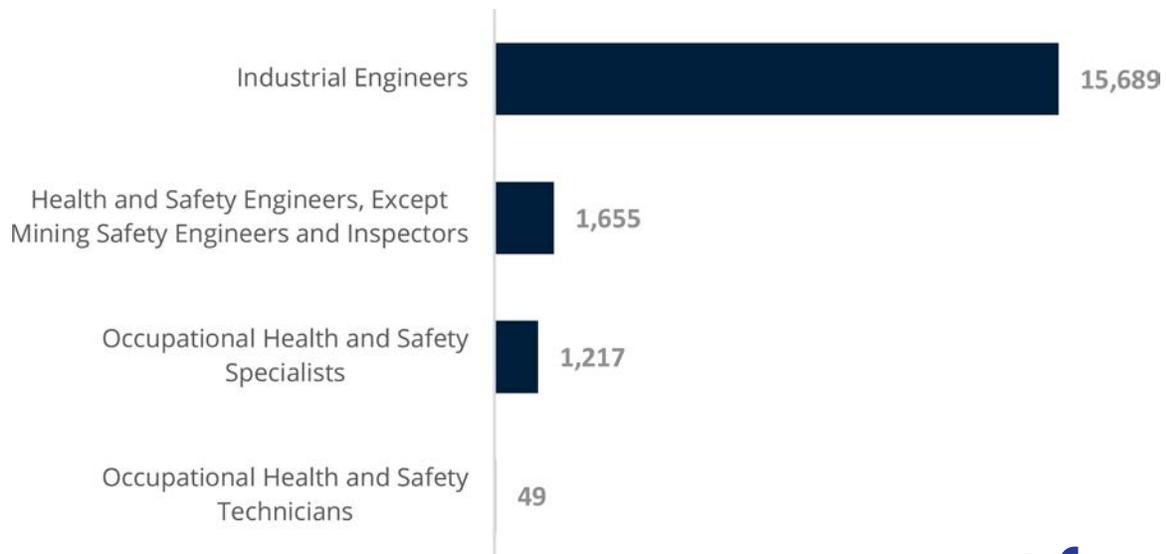
### ***Procurement & Purchasing***

Buyers and Purchasing Agents led the Procurement and Purchasing sub-group with 4,548 online ads during 2018. Sales Engineers and Purchasing Managers were also in high demand. The number of postings for occupations in this subgroup is often lower than others in the Administration group and overall. The occupations represented tend to require additional education and experience, which is reflected in reported salaries.



### ***Human Safety***

Industrial Engineers were the most in-demand Human Safety occupation in Ohio in 2018, with 15,689 postings. Demand for other occupations in the Human Safety sub-group is primarily split between Health and Safety Engineers, Except Mining Safety Engineers and Inspectors (1,655 postings) Occupational Health and Safety Specialists (1,217 postings).



# ADMINISTRATION

## IN-DEMAND TECHNICAL SKILLS

Occupations within the Administration group require a wide array of high-level technical and managerial skills. Traditional skills like warehousing, forklift operation, and purchasing are present in many postings. The high demand for managers and engineers is also reflected, as frequent requirements for operations management and manufacturing processes communicate employer demand for talent in high-wage management occupations.

- Warehousing
  - Continuous Improvement Process
  - Purchasing
  - Procurement
  - Packaging and Labeling
  - Corrective and Preventive Actions
  - Manufacturing Processes
  - Forklift Truck
- Product Quality Assurance
  - Lean Manufacturing
  - Auditing
  - Supply Chain Management
  - Automation
  - Process Engineering
  - Six Sigma Methodology

## IN-DEMAND EMPLOYABILITY SKILLS

Like the Skilled Trades group, Ohio employers seek Administration workers with traditional employability skills such as the ability to communicate, organize, and solve problems. Innovation was also a high-demand skill, reflecting a desire for managers and engineers with an eye toward improvement. Due to the numerous business-oriented duties carried out by Administration workers, strong computer and writing skills are necessary for success.

- Management
  - Operations
  - Communications
  - Leadership
  - Problem Solving
  - Sales
  - Innovation
  - Unloading
- Written Communication
  - Customer Service
  - Microsoft Excel
  - Interpersonal Skills
  - Presentations
  - Computer Literacy
  - Research

# ADMINISTRATION

## ✓ IN-DEMAND EXPERIENCE & EDUCATIONAL ATTAINMENT

Of the online postings that advertised experience requirements, both entry-level openings and those with slightly more experience were represented. Positions requiring two years of experience or less comprised 43 percent of postings stating experience needs, while those preferring three to five years made up 48 percent. The increase in this intermediate experience category is a good indicator of the growing demand for managers in Administration occupations overall. Education requirements were less divided, especially due to the large number of engineering postings. Among postings reporting education requirements, 58 percent of 2018 postings required a bachelor's degree. Openings available to those with a high school diploma were represented in 22 percent of postings, while 11 percent required education beyond a bachelor's.

### IN-DEMAND EXPERIENCE

OHIO 2018



### IN-DEMAND EDUCATION

OHIO 2018



## \$ WAGES

The wage table below, containing data from the Bureau of Labor Statistics (BLS) indicates the hourly wage distribution for the top five posted Skilled Trades occupations. Wages in the Administration group vary with education and experience requirements. While median earnings for Laborers and Freight, Stock and Material Movers, Hand are around \$13 hourly, additional experience can lead to a career as a supervisor position with reported median wages of \$25 hourly. A bachelor's degree can lead to a role as an engineer or logistician.

### TOP JOBS WAGE SCALE

OHIO 2018

Occupation Code	Occupation Name	10th Percentile Wages	25th Percentile Wages	Median Wages	75th Percentile Wages	90th Percentile Wages
17-2112	Industrial Engineers	\$26.07	\$31.15	\$38.23	\$47.27	\$57.93
53-1048	First-line Supervisors of Transportation and Material Moving Workers, Except Aircraft Cargo Handling Supervisors	\$15.41	\$19.03	\$25.05	\$31.43	\$38.29
53-7062	Laborers and Freight, Stock, and Material Movers, Hand	\$9.32	\$10.59	\$12.99	\$16.53	\$20.06
13-1028	Buyers and Purchasing Agents	\$16.93	\$22.44	\$29.41	\$38.92	\$50.60
13-1081	Logisticians	\$22.45	\$27.83	\$35.39	\$43.87	\$52.84

**13,784**

*job postings requiring 3-5 years of experience*

**\$35.39**

*Median wage for Logisticians*

**23,092**

*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 group 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.*

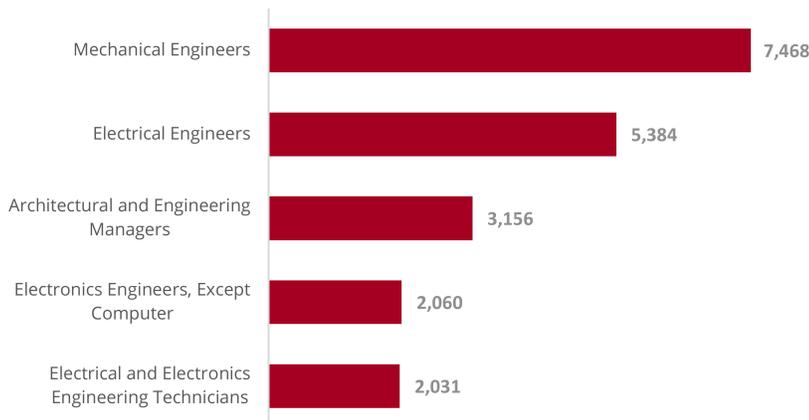
### Designers & Drafters

*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 OHIO 2018

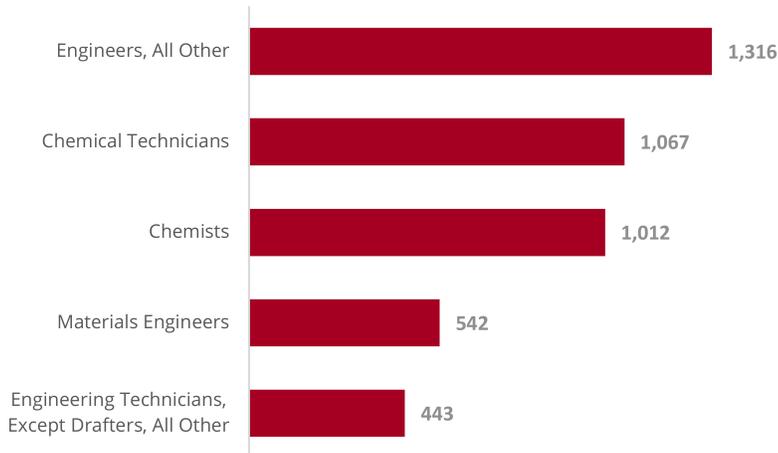


### Electrical & Mechanical

This sub-group represents the largest in the Engineering and Design group in terms of employer demand. High demand for Mechanical (7,468 postings) and Electrical Engineers (5,384 postings) continually pushes these occupations to the top of the in-demand list for their sub-group.

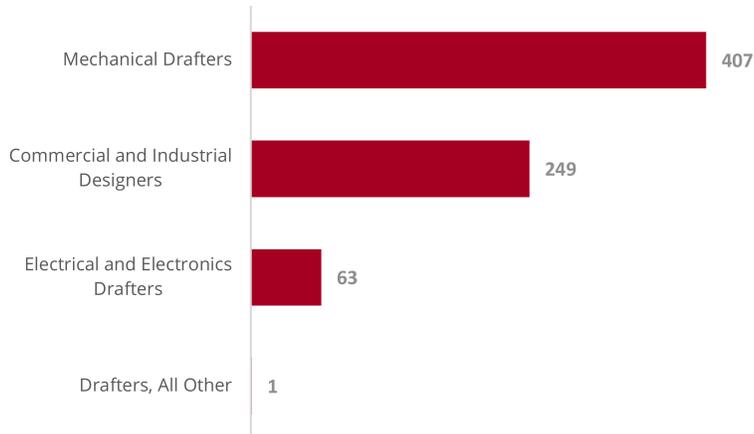
# ENGINEERING & DESIGN

## TOP POSTING JOBS OHIO 2018



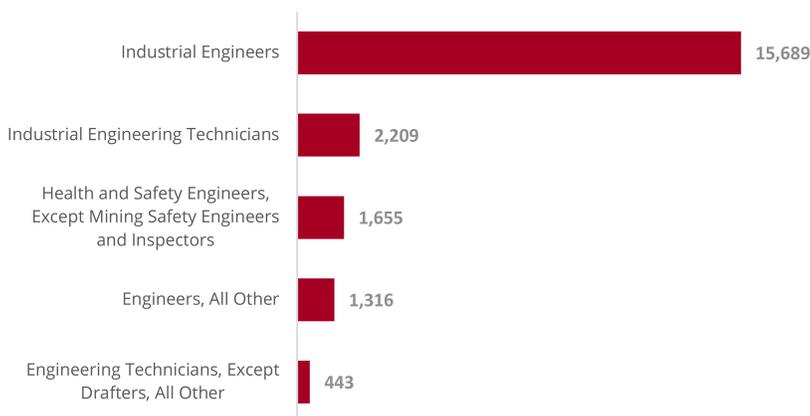
### *Chemical & Metallurgy*

Engineers, All Other, a code covering Manufacturing, Mechatronics, and Robotics Engineers among other occupations, garnered the greatest number of Chemical and Metallurgy postings (1,316 postings) during 2018. Chemical Technicians and Chemists were nearly tied for second most in-demand, with just over 1,000 online ads each. Materials Engineers and Engineering Technicians, Except Drafters, All Other, had about half as many postings.



### *Designers & Drafters*

Mechanical Drafters were the most in-demand occupation in this subgroup in 2018, with a total of 407 postings for Ohio workers over the year. Commercial and Industrial designers (249 postings) were also sought after, followed by a much smaller number of advertisements for Electrical and Electronics Drafters (63 postings).



### *Process & Testing*

Industrial Engineers dominated postings in the Process Engineering and Testing sub-group, with 15,689 postings in 2018. This level of demand is more than seven times greater than that for the next most in-demand job, Industrial Engineering Technicians (2,209 postings).

# ENGINEERING & DESIGN

## IN-DEMAND TECHNICAL SKILLS

Skills such as mechanical and electrical engineering, automation, and computer-aided design dominate the technical proficiency list for the Engineers group. Business and management-related skills such as manufacturing processes and product design and quality assurance were also prevalent throughout 2018 in job postings for Ohio Engineers.

- Mechanical Engineering
  - Continuous Improvement Process
  - Manufacturing Processes
  - Electrical Engineering
  - Automation
  - Corrective and Preventive Actions
  - Product Quality Assurance
  - Computer-Aided Design
- New Product Development
  - Control Systems
  - Lean Manufacturing
  - Programmable Logic Controllers
  - Computer Control Systems
  - Process Engineering
  - Tooling

## IN-DEMAND EMPLOYABILITY SKILLS

While Engineers and Designers often focus on the technical skills above, employers also require these workers to have foundational skills necessary to function efficiently on a team such as communication, problem solving, and management. They must also have important project-oriented skills like writing, research, and sales experience. Overall, the top employability and technical skills reflect that Ohio employers seek innovative and well-rounded candidates for Engineering and Design job openings.

- Management
  - Operations
  - Communications
  - Leadership
  - Problem Solving
  - Innovation
  - Written Communication
  - Troubleshooting (Problem Solving)
- Research
  - Interpersonal Skills
  - Microsoft Excel
  - Sales
  - Project Management
  - Presentations
  - Microsoft Office

# ENGINEERING & DESIGN

## ✓ IN-DEMAND EXPERIENCE & EDUCATIONAL ATTAINMENT

Engineering positions tend to have fairly uniform education and experience requirements, with the majority of postings that report such needs stating that candidates must have a bachelor's degree (63 percent) and three to five years of experience (52 percent). Eleven percent of postings are open to those with an associate degree or high school diploma, likely representing technician positions. Entry level openings are still numerous, however, with 36 percent of postings requiring two years of experience or less.

### IN-DEMAND EXPERIENCE

OHIO 2018



### IN-DEMAND EDUCATION

OHIO 2018



## \$ WAGES

The wage table below, containing data from the Bureau of Labor Statistics (BLS) indicates the hourly wage distribution for the top five posted Skilled Trades occupations. In general, engineer positions offer between \$35 and \$40 per hour at the median. Additional experience can lead to a management role and significant increase in wages. Technician positions, which are attainable with shorter-term education and training, still offer competitive wages above \$25 hourly.

### TOP JOBS WAGE SCALE

OHIO 2018

Occupation Code	Occupation Name	10th Percentile Wages	25th Percentile Wages	Median Wages	75th Percentile Wages	90th Percentile Wages
17-2112	Industrial Engineers	\$26.07	\$31.15	\$38.23	\$47.27	\$57.93
17-2141	Mechanical Engineers	\$25.34	\$30.22	\$36.60	\$45.56	\$55.36
17-2071	Electrical Engineers	\$25.22	\$31.35	\$39.52	\$48.44	\$59.30
11-9041	Architectural and Engineering Managers	\$41.37	\$50.30	\$60.71	\$74.49	\$90.41
17-3026	Industrial Engineering Technicians	\$16.87	\$20.63	\$25.94	\$31.77	\$38.11

**26,357**

*job postings requiring a bachelor's degree*

**\$38.23**

*Median wage for Industrial Engineers*

**3-5 Years**

*In-demand experience for engineering workers*



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