

# 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 Kentucky. 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.



## EMPLOYER DEMAND AND EMPLOYMENT TRENDS

Job postings for occupations related to lightweight advanced manufacturing in Kentucky increased in Q4 2018, increasing 16 percent from 20,325 postings in Q3 to 23,551 postings in Q4. Employment continues to grow after hitting a low of 247,426 workers in 2010. There were 307,117 Kentucky workers employed in advanced manufacturing jobs related to lightweighting in 2018, marking the ninth consecutive year of employment growth.

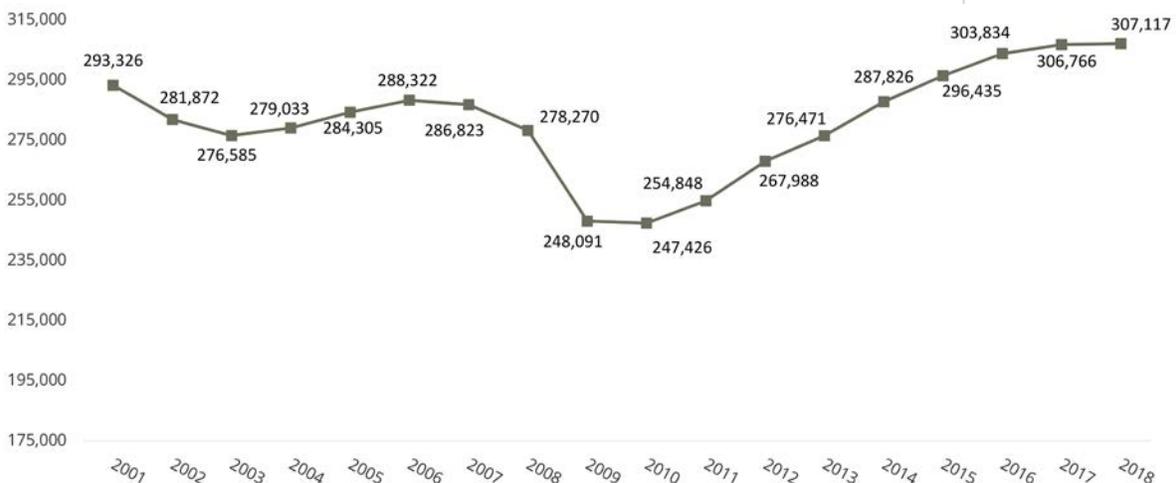
### JOB POSTINGS OVER TIME KENTUCKY Q1 2012 - Q4 2018



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 KENTUCKY 2001 - 2018

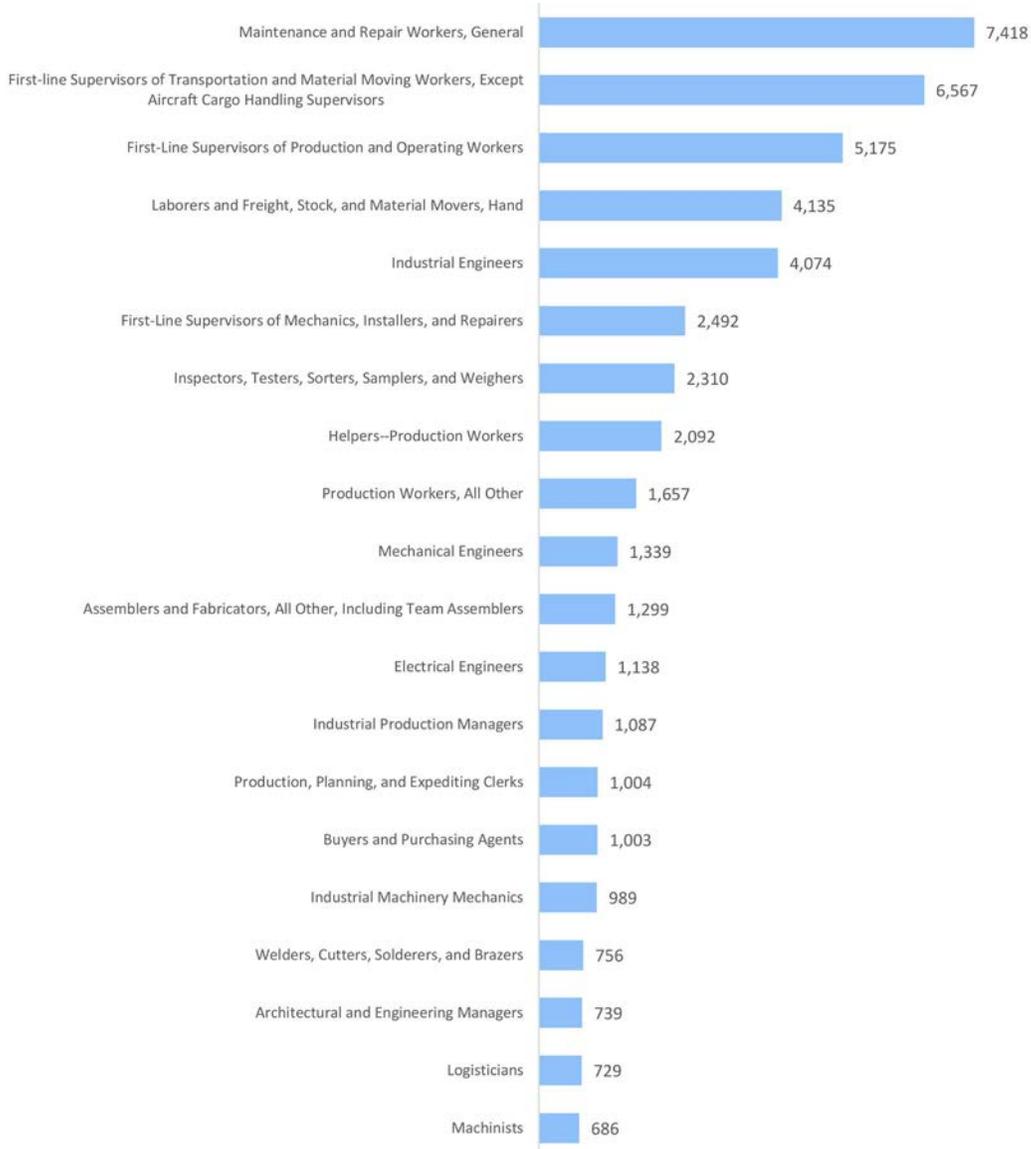


# OVERVIEW

## TOP JOBS

Maintenance and Repair Workers, General remain the most in-demand lightweighting-related occupation in Kentucky with over 7,400 online job ads during 2018. First-line Supervisors of Transportation and Material Moving Workers, Except Aircraft Cargo Handling Supervisors held the second-place position during 2018 with over 6,567 postings. Many engineering and supervisor occupations were also in high demand in Kentucky during 2018, including Industrial Engineers and First-line Supervisors of Production and Operating Workers.

### ★ TOP POSTING JOBS KENTUCKY 2018



**16%**

*increase in demand for advanced manufacturing workers since 2017*

**23,551**

*Total online job ads in Q4 2017*

**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.*

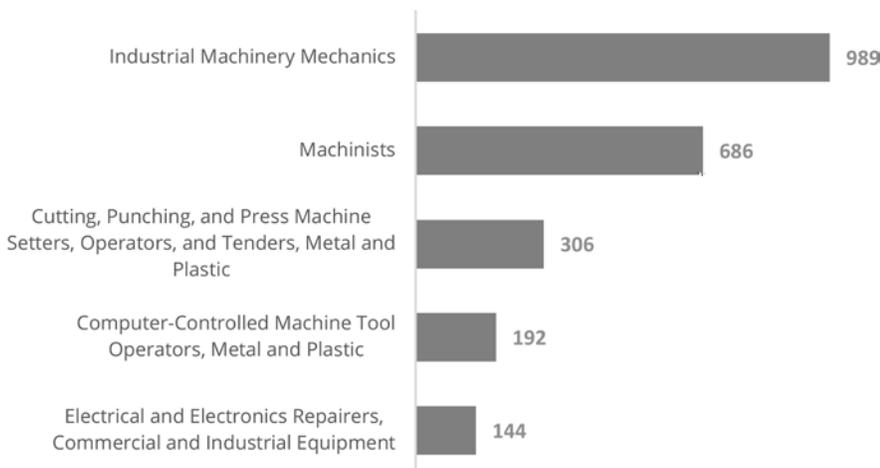
### Assembly & Operations

*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 KENTUCKY 2018



### Machinists

Industrial Machinery Mechanics were the most in-demand occupation in the Machinists sub-group during 2018 with 989 job postings, followed by general machinists with 686 job postings. Other top jobs included Cutting, Punching and Press Machine Setters, Operators, and Tenders, Metal and Plastic (306 postings) and Computer-Controlled Machine Tool Operators, Metal and Plastic (192 postings).

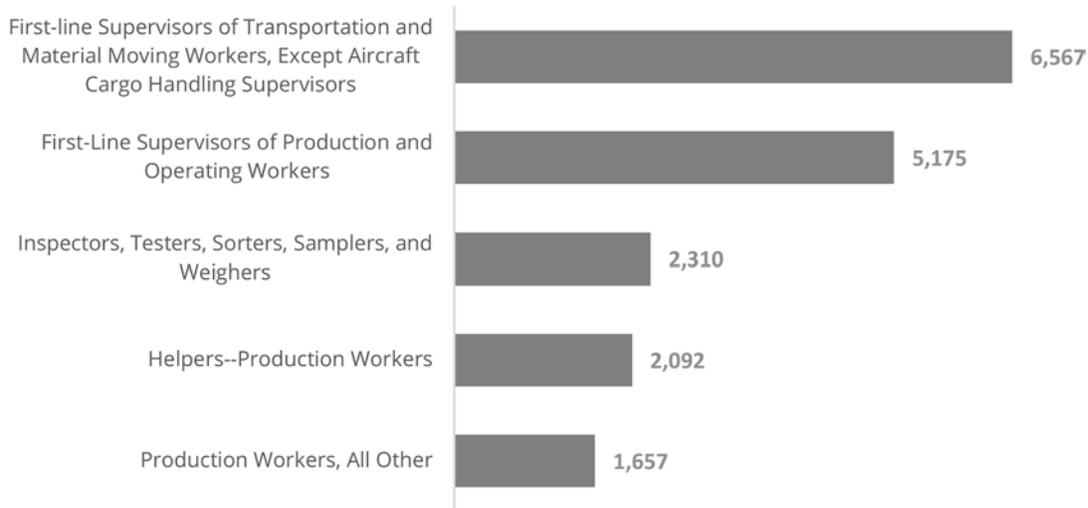
# SKILLED TRADES



## TOP POSTING JOBS KENTUCKY 2018

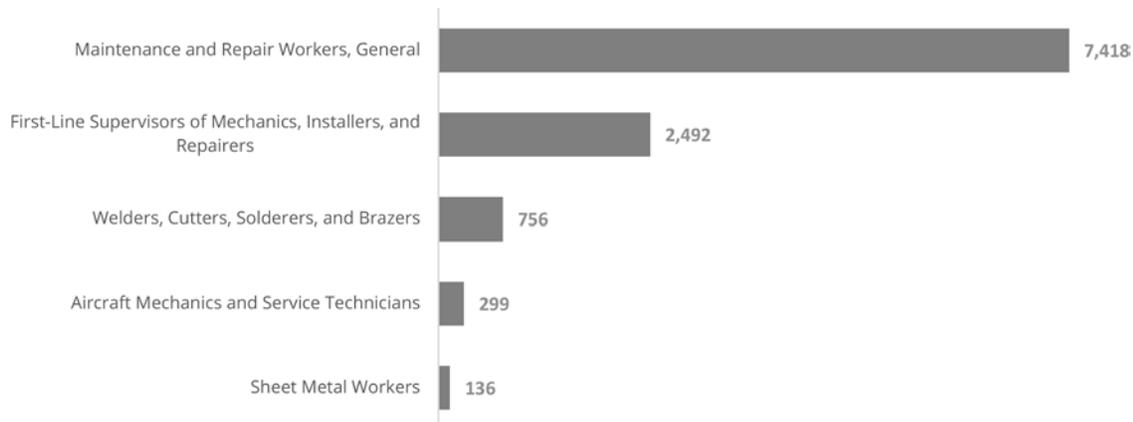
### **Assembly & Operations**

First-line Supervisors of Transportation and Material Moving Workers, Except Aircraft Cargo Handling Supervisors topped the sub-group with over 6,567 online ads while opportunities for First-Line Supervisors of Production and Operating Workers rose to 5,175 postings during 2018, continuing their upward trend from 2016. The high demand for both occupations indicates strong career growth potential in this lightweighting-related sub-group. Inspectors, Testers, Samplers, Sorters and Weighers were also an in-demand occupation in 2018 with 2,310 online job postings.



### **Skilled Materials**

Maintenance and Repair Workers, General (7,418 postings) had nearly three times the number of postings as the next most in-demand job in the Skilled Materials sub-group during 2018. The number of job postings also remained high for First-Line Supervisors of Mechanics, Installers, and Repairers (2,492 postings), indicating the potential for career growth in this in-demand field. Welders, Cutters, and Welder Fitters also increased from 2017 to 2018 with a total of 756 online job ads.



# SKILLED TRADES

## IN-DEMAND TECHNICAL SKILLS

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

- Warehousing
  - Packaging and Labeling
  - Continuous Improvement Process
  - HVAC
  - Preventive Maintenance
  - Plumbing
  - Mechanics
- Welding
  - Corrective and Preventive Actions
  - Quality Management
  - Personal Protective Equipment
  - Blueprinting
  - Carpentry
  - Painting
  - Product Quality Assurance

## 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 communication, problem solving, computer literacy. These types of skills are crucial for Skilled Trades so that workers can collaborate effectively, especially in supervisor roles.

- Management
  - Operations
  - Communications
  - Troubleshooting
  - Leadership
  - Customer Service
  - Sales
- Problem Solving
  - Computer Literacy
  - Innovation
  - Written Communication
  - Interpersonal Skills
  - Research
  - Data Entry
  - Coordinating

# SKILLED TRADES

## ✓ IN-DEMAND EXPERIENCE & EDUCATIONAL ATTAINMENT

Online job postings for Skilled Trades workers in Kentucky mainly advertise openings that require less than five years of experience. Over half of the 2018 postings that specified a desired level were open to candidates with less than two years of experience (6,642 postings) while another 4,874 postings require three to five years. Despite the low levels of experience required for many Skilled Trades job postings, more employers expect candidates to have relevant education or training, as evidenced by the 11,770 postings in 2018 requiring short-term post-secondary training (62 percent of postings with specified educational attainment). If potential candidates can learn valuable in-demand technical skills like welding, programming, or mathematics through a short-term training program, they can fill the entry-level openings that have such high demand among Kentucky employers. Job postings requiring five or more years of experience most likely represent supervisory or management roles.

### IN-DEMAND EXPERIENCE

KENTUCKY 2018



### IN-DEMAND EDUCATION

KENTUCKY 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. The top occupation, Maintenance and Repair Workers, General reported a median wage of \$17.57 per hour which translates to over \$36,000 annually. First-Line Supervisors of Mechanics, Installers, and Repairers reported the highest median wage of the top five posted occupations with \$28.53 per hour or over \$59,000 annually.

### TOP JOBS WAGE SCALE

KENTUCKY 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	\$10.28	\$13.20	\$17.57	\$23.29	\$28.75
53-1048	First-line Supervisors of Transportation and Material Moving Workers, Except Aircraft Cargo Handling Supervisors	\$14.52	\$17.50	\$23.12	\$29.73	\$37.15
51-1011	First-Line Supervisors of Production and Operating Workers	\$16.39	\$20.89	\$27.08	\$34.68	\$44.62
49-1011	First-Line Supervisors of Mechanics, Installers, and Repairers	\$16.84	\$21.44	\$28.53	\$37.01	\$47.20
51-9061	Inspectors, Testers, Sorters, Samplers, and Weighers	\$10.76	\$13.22	\$16.92	\$22.68	\$28.54

**0-5 years**

*Experience most in-demand by Kentucky employers*

**\$17.57**

*median wage of top posted job*

**4,615**

*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 metal manufacturers are ready and available for production.*

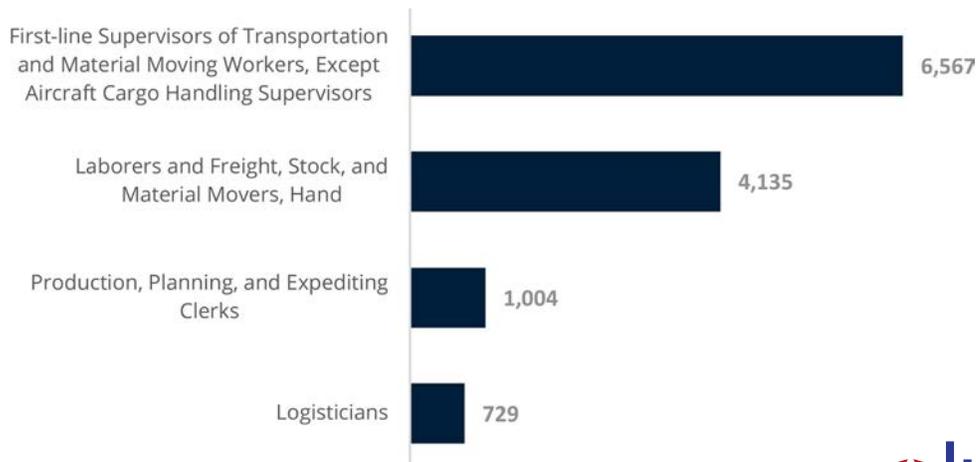
### Human Safety

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

## ★ TOP POSTING JOBS KENTUCKY 2018

### Logistics

First-line Supervisors of Transportation and Material Moving Workers, Except Aircraft Cargo Handling Supervisors dominated online job postings for this sub-group with over 2,000 more online ads than the next most in-demand job during 2018. Kentucky employers posted 6,567 online job ads for these workers during 2018, making it one of the state's most in-demand lightweighting-related occupations overall. The next most in-demand occupation, Laborers and Freight, Stock, and Material Movers, Hand, garnered 4,135 online job postings in 2018.

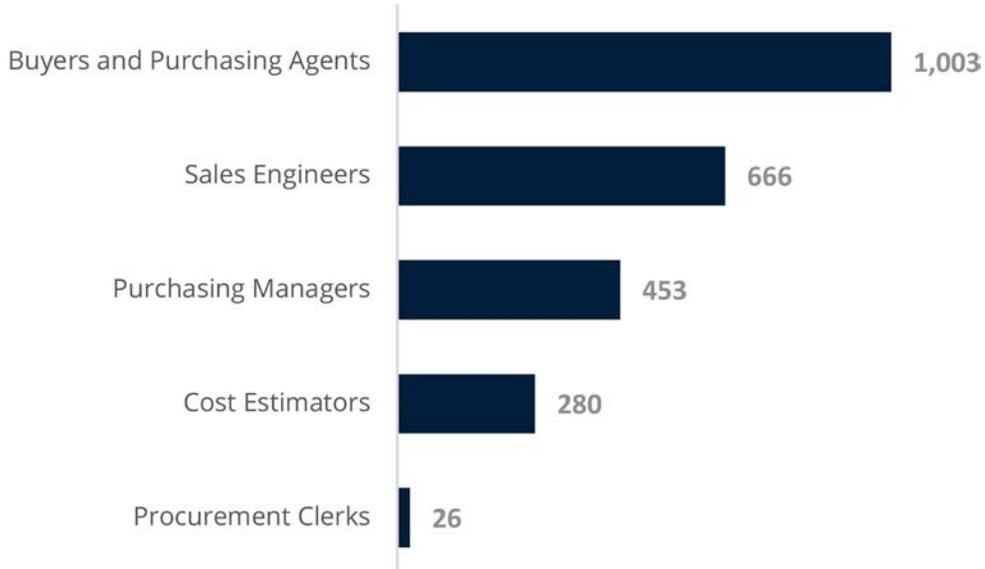


# ADMINISTRATION

## ★ TOP POSTING JOBS KENTUCKY 2018

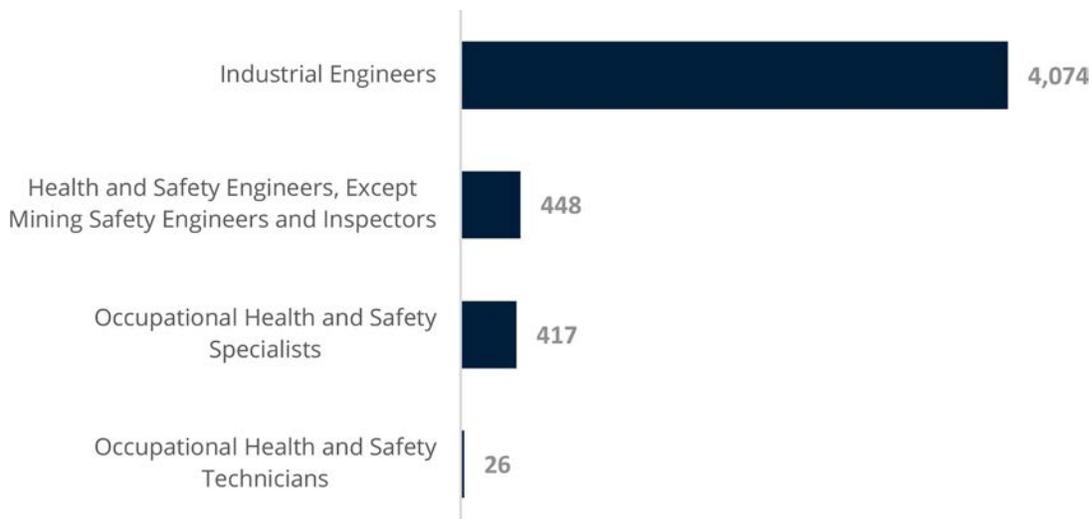
### *Procurement & Purchasing*

Postings in the Procurement and Purchasing sub-group are low compared to other lightweighting-related groups. Buyers and Purchasing Agents led the sub-group with 1,003 online ads during 2018. Sales Engineers were also in high demand with 666 postings in 2018.



### *Human Safety*

Industrial Engineers were the top posted occupation within this sub-group, with 4,074 online ads during 2018. The rest of the postings in the Human Safety sub-group tends to be split between Occupational Health and Safety Specialists (411 postings) and Industrial Safety and Health Engineers (257 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 and forklift operation are present in many postings. The job postings for Administration workers reflect employer needs for more managers. Frequent requirements for project management experience communicate employer demand for talent in high-wage management occupations.

- |   |   |
|---|---|
| <ul style="list-style-type: none"><li>• Warehousing</li><li>• Continuous Improvement Process</li><li>• Purchasing</li><li>• Forklift Truck</li><li>• Corrective and Preventive Actions</li><li>• Packaging and Labeling</li><li>• Manufacturing Processes</li></ul> | <ul style="list-style-type: none"><li>• Procurement</li><li>• Auditing</li><li>• Lean Manufacturing</li><li>• Material Handling</li><li>• Palletizing</li><li>• Product Quality Assurance</li><li>• Merchandising</li><li>• Process Engineering</li></ul> |
|---|---|

## IN-DEMAND EMPLOYABILITY SKILLS

Like the Skilled Trades group, Kentucky employers seek Administration workers with traditional employability skills such as the ability to communicate, organize, and solve problems. The inclusion of leadership as a common baseline skill in postings reflects the technical nature of Administration occupations and the higher levels of education required for most openings. Due to the numerous business-oriented duties Administration workers have, strong computer and writing skills are necessary for success.

- |  |   |
|--|---|
| <ul style="list-style-type: none"><li>• Management</li><li>• Operations</li><li>• Communications</li><li>• Leadership</li><li>• Unloading</li><li>• Problem Solving</li><li>• Customer Service</li></ul> | <ul style="list-style-type: none"><li>• Sales</li><li>• Microsoft Excel</li><li>• Innovation</li><li>• Written Communication</li><li>• Interpersonal Skills</li><li>• Computer Literacy</li><li>• Presentations</li><li>• Sorting</li></ul> |
|--|---|

# ADMINISTRATION

## ✓ IN-DEMAND EXPERIENCE & EDUCATIONAL ATTAINMENT

Of the online postings that advertised experience requirements, 46 percent required less than two years of experience (3,294 postings). Another 47 percent of postings required between three and five years of experience (3,378 postings), indicating that employers would like workers with prior experience and perhaps enough experience for management positions. The increase in this intermediate experience category is a good indicator of the growing demand for managers in Administration occupations overall. Of the online postings that advertised minimum education required, 55 percent required a related bachelor's degree. Another 30 percent required a high school diploma or equivalent, representing a share of the entry level openings available in the group.

### IN-DEMAND EXPERIENCE

KENTUCKY 2018



### IN-DEMAND EDUCATION

KENTUCKY 2018



## \$ WAGES

### TOP JOBS WAGE SCALE

KENTUCKY 2018

The wage table below, containing data from the Bureau of Labor Statistics (BLS), indicates the hourly wage distribution for the top five posted Administration occupations. The top occupation, First-line Supervisors of Transportation and Material Moving Workers, Except Aircraft Cargo Handling Supervisors, reported a median wage of \$25.13 per hour. This rate translates to over \$52,000 annually. Those willing to obtain higher educational credentials can expect higher overall wages in the Administration occupation group.

Occupation Code	Occupation Name	10th Percentile Wages	25th Percentile Wages	Median Wages	75th Percentile Wages	90th Percentile Wages
53-1048	First-line Supervisors of Transportation and Material Moving Workers, Except Aircraft Cargo Handling Supervisors	\$15.50	\$19.13	\$25.13	\$31.02	\$38.15
53-7062	Laborers and Freight, Stock, and Material Movers, Hand	\$9.74	\$11.23	\$13.71	\$16.72	\$20.43
17-2112	Industrial Engineers	\$22.97	\$27.75	\$34.38	\$42.42	\$49.57
43-5061	Production, Planning, and Expediting Clerks	\$14.97	\$17.77	\$22.51	\$28.55	\$33.59
13-1028	Buyers and Purchasing Agents	\$14.26	\$18.86	\$24.71	\$33.34	\$43.22

**0-5 years**

*Experience most in-demand by Kentucky employers*

**\$25.13**

*median wage of top posted job*

**5,533**

*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.*

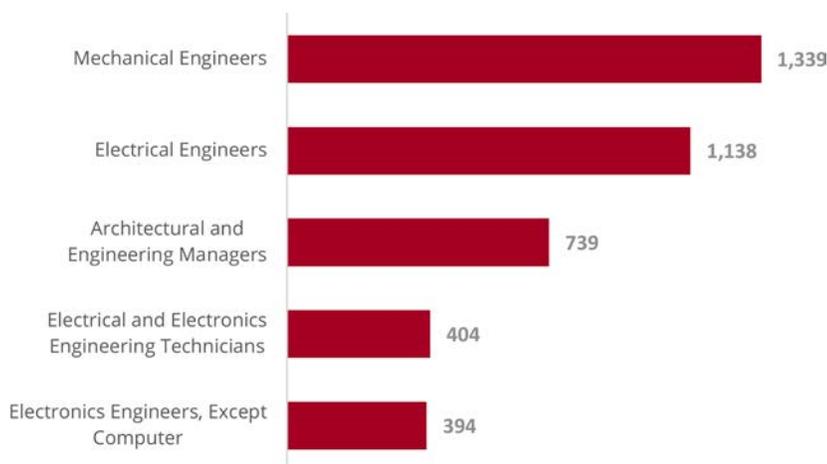
### Designers & Drafters

*Designers & Drafters collaborate with other workers within the Engineering 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 KENTUCKY 2018

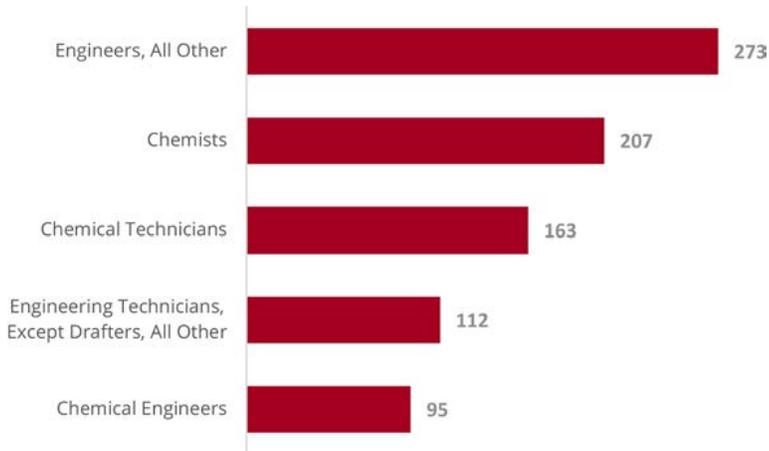


### **Electrical & Mechanical**

This sub-group represents the largest in the Engineering and Design group in terms of employer demand. High demand for Mechanical (1,339 postings) and Electrical Engineers (1,138 postings) continually pushes these occupations to the top of the in-demand list for their sub-group.

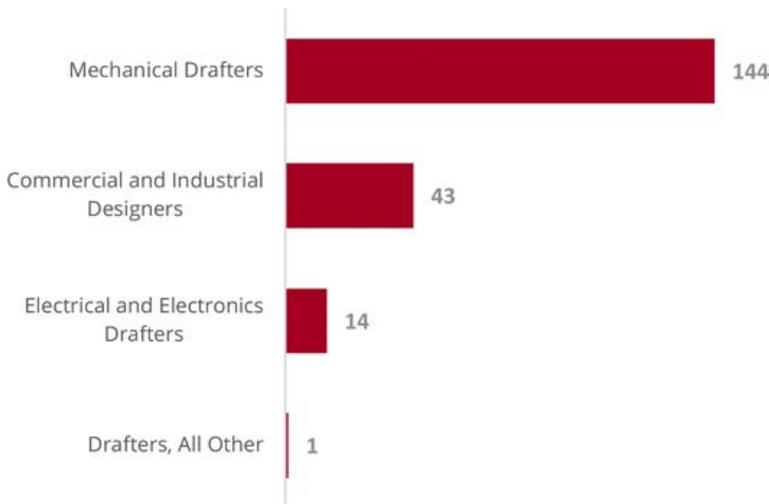
# ENGINEERING & DESIGN

## ★ TOP POSTING JOBS KENTUCKY 2018



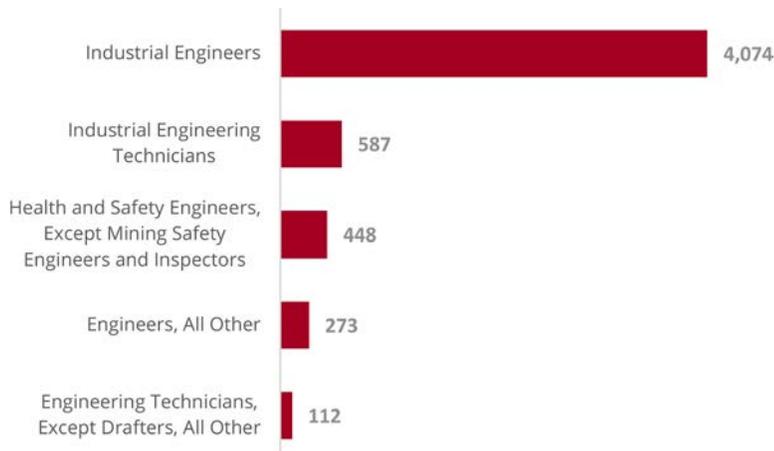
### *Chemical & Metallurgy*

Engineers, All Other led this sub-group during 2018 with 273 online ads. Demand for Chemists (207 postings) and Chemical Technicians (163 postings) was also high. Engineering Technicians, Except Drafters, All Other and Materials Engineers followed closely, with over 400 postings each.



### *Designers & Drafters*

Mechanical Drafters held the top position in the Designers and Drafters sub-group during 2018 with 144 postings. Commercial and Industrial Designers and Electrical and Electronics Drafters held the second and third spots for the sub-group in 2018.



### *Process & Testing*

Industrial Engineers were the top in-demand occupation for the Process Engineering and Testing sub-group with 4,074 postings in 2018. Industrial Engineering Technicians (587 postings) and Health and Safety Engineers, Except Mining Safety Engineers and Inspectors (448 postings) showed high demand during 2018.

# ENGINEERING & DESIGN

## IN-DEMAND TECHNICAL SKILLS

STEM-related skills such as mechanical and electrical engineering, automation, and experience in manufacturing processes dominate the technical proficiency list for the Engineers group. Business and management-related skills such as continuous improvement process and auditing were also prevalent throughout 2018 in job postings made in this sub-group.

- Continuous Improvement Process
  - Corrective and Preventive Actions
  - Mechanical Engineering
  - Manufacturing Processes
  - Electrical Engineering
  - Automation
  - Lean Manufacturing
- Product Quality Assurance
  - Process Engineering
  - Programmable Logic Controllers
  - Auditing
  - Control Systems
  - Six Sigma Methodology
  - Quality Management
  - Computer-Aided Design

## IN-DEMAND EMPLOYABILITY SKILLS

While Engineers and Designers require critical technical skills learned through rigorous, advanced education, employers also require these workers to have foundational skills necessary to function efficiently on a team such as communication, problem solving, and teamwork. They must also have important project-oriented skills like management, innovation, and research experience. Overall, the top employability and technical skills reflect that Kentucky employers seek well-rounded candidates for Engineering and Design job openings.

- Management
  - Operations
  - Communications
  - Leadership
  - Problem Solving
  - Innovation
  - Troubleshooting
- Written Communication
  - Microsoft Excel
  - Interpersonal Skills
  - Microsoft Office
  - Computer Literacy
  - Research
  - Presentations
  - Project Management

# ENGINEERING & DESIGN

## ✓ IN-DEMAND EXPERIENCE & EDUCATIONAL ATTAINMENT

Among online job postings advertising a preferred level of experience in 2018, most (53 percent) preferred candidates with three to five years of experience. The entry level experience range, less than two years, also had a high share of postings (36 percent). This indicates that employers prefer Engineer and Design workers with previous experience but opportunities do exist at the entry-level.

Employers seeking to hire workers in this group overwhelmingly desire candidates with a bachelor's degree. Of the 10,161 postings for Engineers and Designers in Kentucky during 2018 that advertised an education requirement, 54 percent required a bachelor's degree. Some engineering technician positions in the group are open to candidates with some post-secondary training or a related associate's degree.

### IN-DEMAND EXPERIENCE

KENTUCKY 2018



### IN-DEMAND EDUCATION

KENTUCKY 2018



## \$ WAGES

### TOP JOBS WAGE SCALE

KENTUCKY 2018

The wage table below, containing data from the Bureau of Labor Statistics (BLS) indicates the hourly wage distribution for the top five posted Engineering occupations. The top occupation, Industrial Engineers offer median wages of \$34.38 per hour which translates to over \$71,000 annually. Architectural and Engineering Managers offered the highest median wage with a median wage of \$54.34 or over \$110,000 annually.

Occupation Code	Occupation Name	10th Percentile Wages	25th Percentile Wages	Median Wages	75th Percentile Wages	90th Percentile Wages
17-2112	Industrial Engineers	\$22.97	\$27.75	\$34.38	\$42.42	\$49.57
17-2141	Mechanical Engineers	\$25.04	\$29.59	\$36.06	\$45.05	\$54.35
17-2071	Electrical Engineers	\$26.32	\$31.65	\$37.26	\$46.25	\$56.77
11-9041	Architectural and Engineering Managers	\$36.46	\$43.92	\$54.34	\$68.75	\$83.01
17-3026	Industrial Engineering Technicians	\$15.03	\$19.30	\$23.16	\$29.02	\$36.30

**5,883**  
job postings  
requiring a  
bachelor's degree

**\$34.38**  
median wage of  
top posted job

**3-5 years**  
Experience most in-demand  
by Kentucky employers



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