

# 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 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 just on national databases related to traditional occupations and job families. The pace of change in the manufacturing industry, largely resulting from technology infusion and forces of globalization, is reflected in rapid-fire change in the knowledge, skills and abilities the manufacturing workforce requires. To provide the best available analyses, this report integrates intelligence gathered from the real time, transactional labor market reflecting the realities of demand and supply, the changing nature of manufacturing employment, and the competencies that are needed in the 21st century manufacturing workforce.



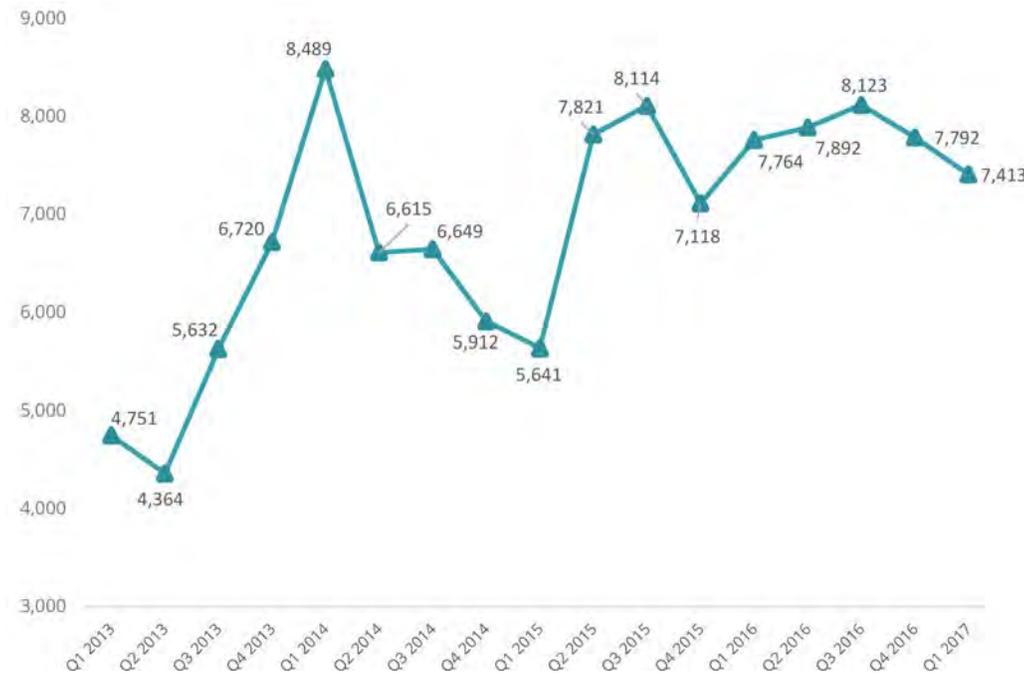
## EMPLOYER DEMAND AND EMPLOYMENT TRENDS

Online job postings for lightweighting-related occupations in Kentucky decreased again from Q4 2016 to Q1 2017. After Q3 2016 saw over 8,000 job ads, employer demand for workers with lightweighting-related skills dropped approximately five percent each quarter in Q4 2016 and Q1 2017. Continued analysis will determine if decreased employer demand is a major trend in Kentucky and how it will affect lightweighting employment. Meanwhile, 2017 marks the eighth consecutive year of employment growth for lightweighting-related jobs in Kentucky since the depths of the Great Recession. In 2009, only 232,000 Kentucky workers were employed in lightweighting-related advanced manufacturing jobs, and in 2017, employment is nearing 290,000, a 24 percent increase.

### Job postings over time Kentucky

Q1 2013 - Q1 2017

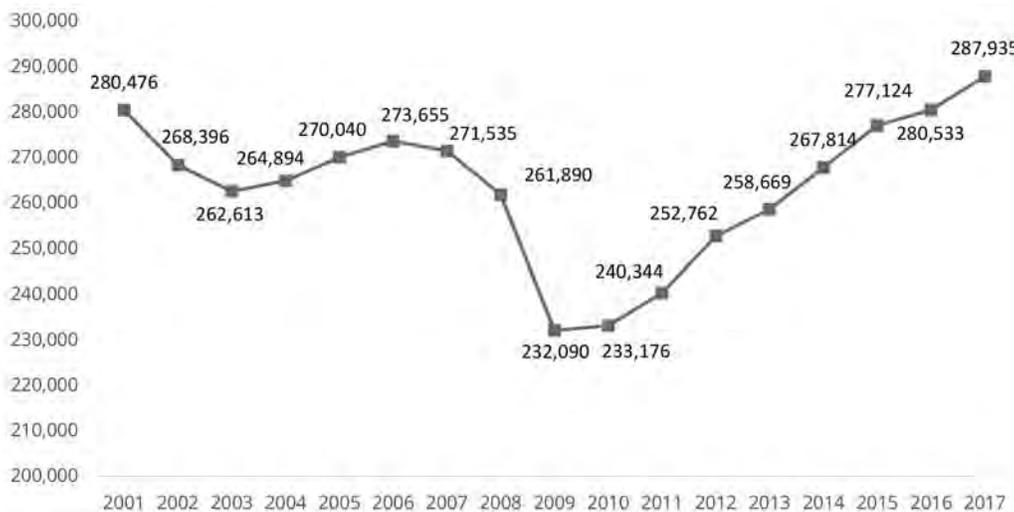
Data: Burning Glass Technologies  
Analysis: Workforce Intelligence Network



### Employment over time Kentucky

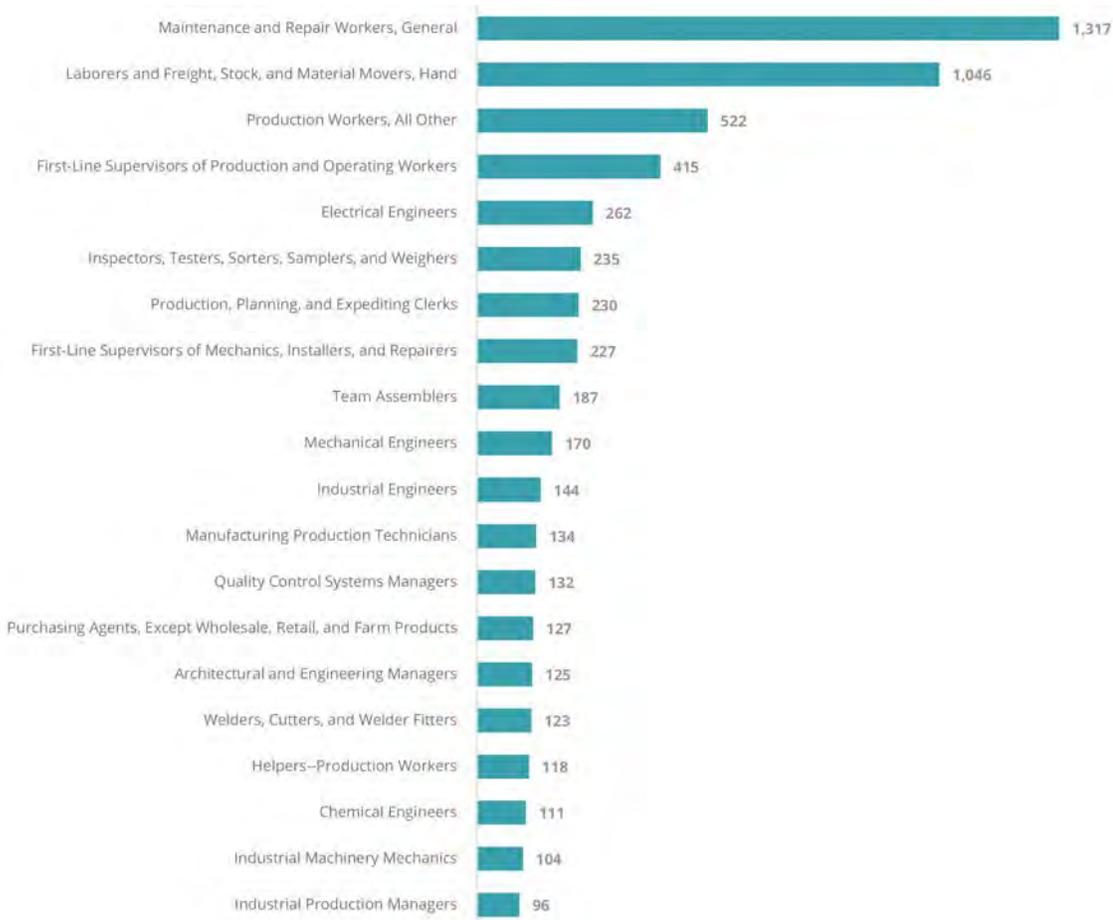
2001 - 2017

Data: EMSI, QWI  
Analysis: Workforce Intelligence Network



# TOP JOBS

The top in-demand occupation in Q1 2017 related to lightweight advanced manufacturing was general maintenance and repair workers (1,317 postings). Maintenance and repair workers took the top spot from laborers and freight, stock, and material movers, which saw 1,046 postings in Q1 2017. Strong demand continues for workers in the Skilled Trades and industrial technology maintenance. Supervisors and managers are also in consistent demand in Kentucky along with electrical and mechanical engineers.



## Top posting jobs Kentucky Q1 2017

Data: Burning Glass Technologies  
Analysis: Workforce Intelligence Network

**>7,000**

**consistent strong demand for workers for 7 consecutive quarters**

**7,413**

**total online job ads in Q1 2017**

**Skilled Trades: top in-demand occupation group**



## 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 the 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

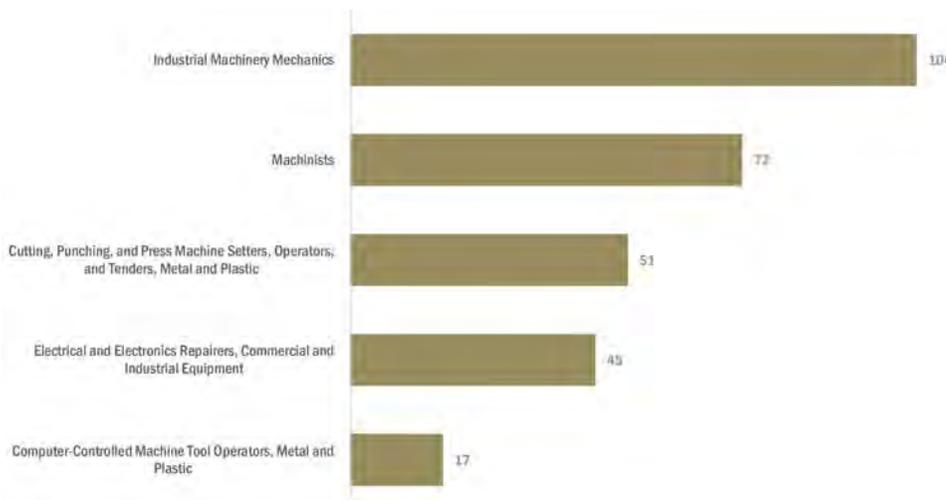
*Machinists set up and operate a variety of machine tools to produce parts and instruments. Some work on traditional industrial machinery while others operate or develop programs for computer-controlled machinery.*

### Skilled Materials

*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.*

### 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.*



### Top posting jobs

#### Machinists

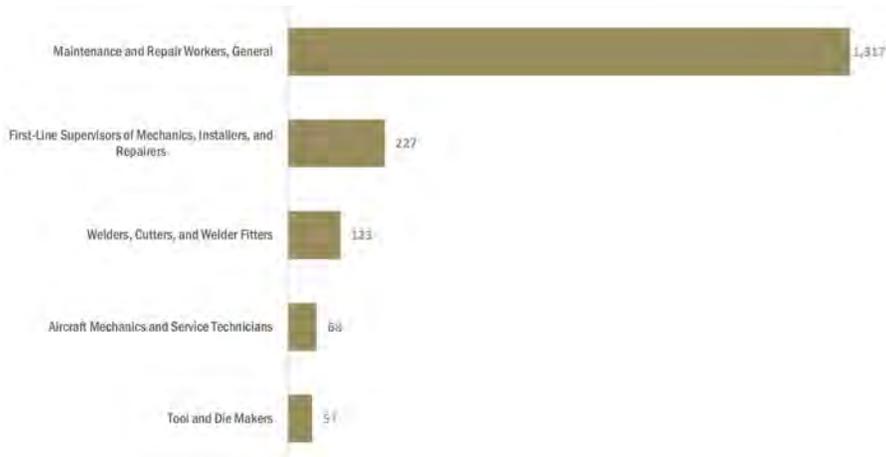
Q1 2017

Data: Burning Glass Technologies

Analysis: Workforce Intelligence Network

Industrial machinery mechanics were the most in-demand Machinist job in Kentucky during Q1 2017, with 104 online job postings. Other occupations garnered fewer than 100 postings this quarter and are the same occupations generally in demand in the Machinists sub-group, like machinists (72 postings) and cutting, punching, and press machine setters, operators, and tenders (51 postings).

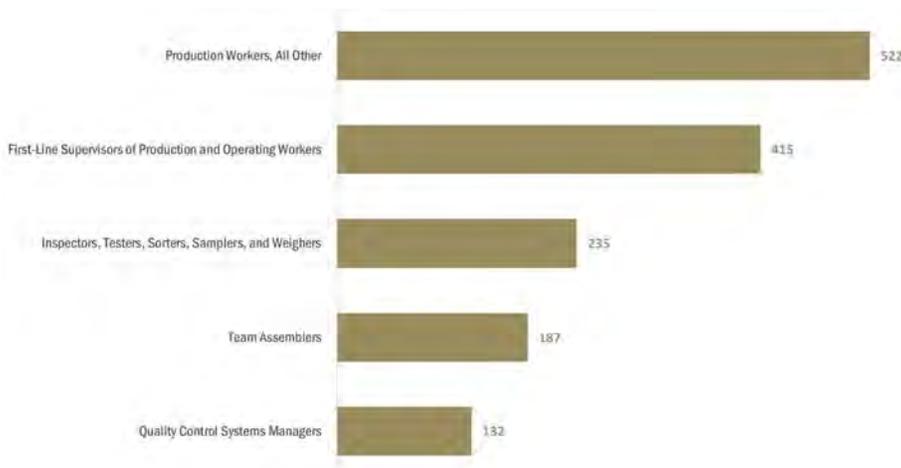
# SKILLED TRADES



## Top posting jobs Skilled Materials Workers Q1 2017

Data: Burning Glass Technologies Analysis:  
Workforce Intelligence Network

Maintenance and repair workers are by far the most in-demand occupation in the Skilled Materials sub-group. This occupation saw over 1,300 online job postings between January and March 2017, nearly six times as many as the next most in-demand in the group, supervisors of mechanics, installers, and repairers (227 postings).



## Top posting jobs Assembly & Operations Q1 2017

Data: Burning Glass Technologies Analysis:  
Workforce Intelligence Network

General production workers remain in high demand in Q1 2017. Kentucky advanced manufacturing employers posted 522 online job ads for these workers between January and March, up slightly from the 513 postings during Q4 2016. Many Kentucky employers are hiring for supervisor roles within the Assembly and Operations sub-group: first-line supervisors of production and operating workers is the second most in-demand with 415 postings, and quality control systems managers (132 postings) also make an appearance in the top five.

# SKILLED TRADES

## IN-DEMAND TECHNICAL SKILLS

The occupations in the Skilled Trades group require a wide array of high-level technical skills. Traditional skills like machining, welding, repair, and inspection are still present in Skilled Trades job postings. Increased demand for managers in Skilled Trades occupations in Kentucky is demonstrated in the posting for supervisory skillsets like customer service, scheduling, and budgeting. As employers seek more candidates to fill supervisory roles, job postings reflect the need in a continuously evolving list of skills. Technical skills like machining, forklift operation, and hydraulics appear on Q1 2017's skills list, illustrating the array of technical skills Skilled Trades job candidates can seek out for training and certification.

- Repair, inspection, cleaning
- Scheduling, budgeting
- Welding
- Machining, machine operation, Computer Numerical Control (CNC) experience
- Schematic diagrams
- Hand tools
- Microsoft Office and computer skills
- Hydraulics
- Forklift operation
- Plumbing
- Customer service
- HVAC

## IN-DEMAND EMPLOYABILITY SKILLS

While Skilled Trades workers now need advanced technical skills, they also need to maintain more traditional employability skills that are critical to succeeding in a workplace. Kentucky employers hiring Skilled Trades workers often look for employability skills such as communication, problem solving, computer skills, and the ability to perform physical labor. These types of skills are crucial for Skilled Trades so that they are able to collaborate effectively, especially in demanding supervisory positions.

- Communication skills, positive disposition
- Teamwork, collaboration, building effective relationships
- Troubleshooting, problem solving
- Ability to perform physical labor
- Preventative maintenance, work area maintenance
- Writing, English proficiency
- Supervisory skills, leadership
- Quality assurance and control
- Detail-oriented, planning, organizational skills
- Multi-tasking, time management
- Mentoring

# IN-DEMAND EXPERIENCE & EDUCATIONAL ATTAINMENT

Of the Skilled Trades group job postings that specified a desired experience level during Q1 2017, 91 percent were available to workers with fewer than 5 years of experience. Entry-level Skilled Trades positions (less than two years of experience; 53 percent of postings) are available to Kentucky workers that are willing to undertake short-term, post-secondary training in applicable skills, like mathematics, welding, or programming. Job postings that require more than 5 years of experience (9 percent of Q1 2017 postings) are most likely for supervisor or management roles in the Skilled Trades and will require advanced educational attainment, possibly a bachelor's degree, as specified in 16 percent of Q1 2017 postings. Eighty-four percent of Q1 postings require some post-secondary training or a related associate's degree of Skilled Trades job candidates.

## Experience in-demand

Q1 2017

Data: Burning Glass Technologies  
Analysis: Workforce Intelligence Network



## Education & training in-demand

Q1 2017

Data: Burning Glass Technologies  
Analysis: Workforce Intelligence Network



# WAGES

## Advertised wages

Q1 2017

Data: Burning Glass Technologies  
Analysis: Workforce Intelligence Network

Though the majority (56 percent) of advertised salaries in the Skilled Trades group in Q1 2017 were below \$35,000 per year, a sizeable share of job postings advertised higher salaries and wages. The average advertised salary for Kentucky workers in Q1 2017 was \$40,643, down slightly from an average of \$42,048 during Q4 2016. The average real-time advertised salary in Q1 2017 is seven percent higher than the state's median earnings for Skilled Trades workers (\$37,794) and 27 percent higher than the state's median earnings for all workers (\$32,000). Higher wages in the Skilled Trades group are available with short-term, post-secondary training, as well as advancement to managerial and supervisory roles.



**<5 years**  
experience  
most in demand  
for Skilled  
Trades  
positions

**\$40,643**  
average  
advertised salary

**Post-secondary  
training or more is  
required for Skilled  
Trades positions**





## 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

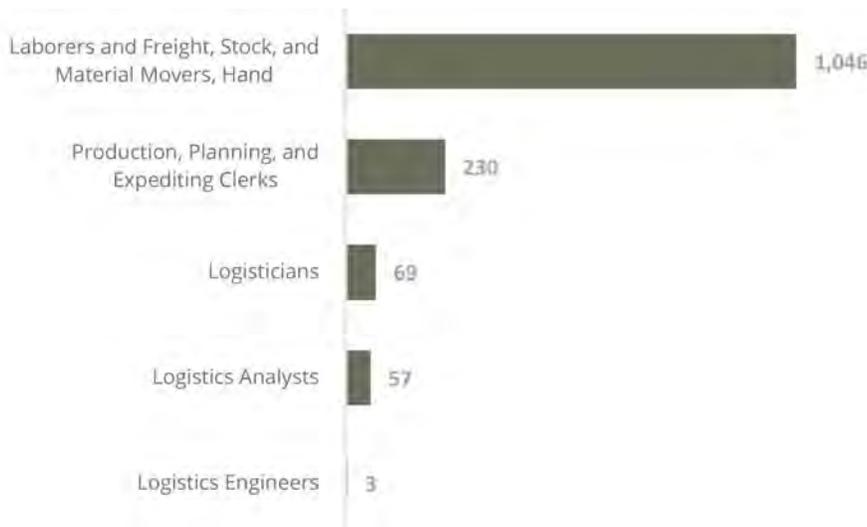
*Human Safety workers plan, implement, coordinate, review, and inspect safety programs and protocols to ensure a safe workplace environment.*

### Top posting jobs

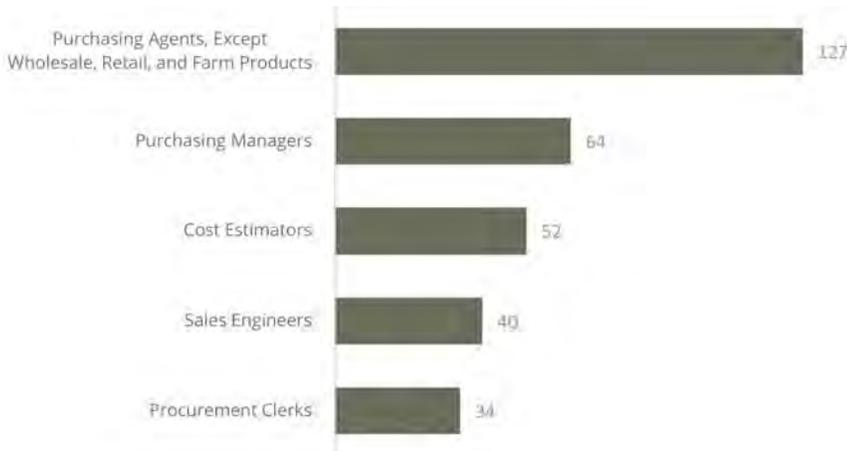
#### Logistics Q1 2017

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

The most in-demand Logistics occupation in Kentucky during Q1 2017 was laborers and freight, stock, and material movers. As the second most in-demand lightweighting job in Kentucky overall, the 1,046 online job ads posted for this position made up 14 percent of overall lightweighting job demand in the state.



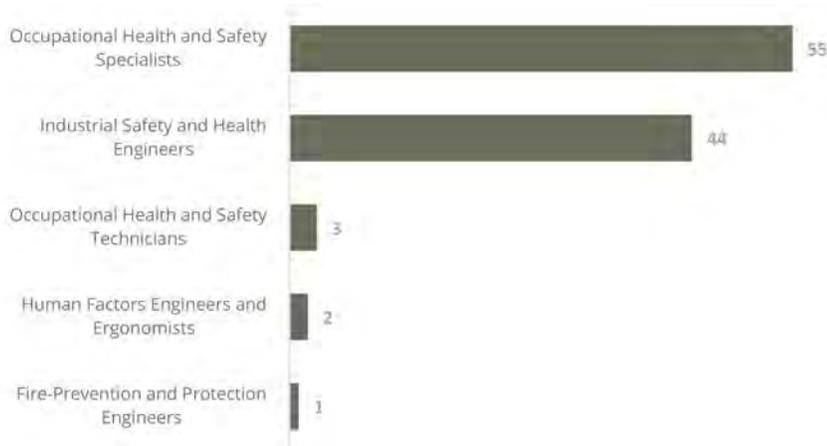
# ADMINISTRATION



## Top posting jobs *Procurement & Purchasing* Q1 2017

Data: Burning Glass Technologies Analysis:  
Workforce Intelligence Network

Many of the same occupations populate the top jobs list in the Procurement and Purchasing sub-group each quarter: purchasing agents (127 postings), purchasing managers (64 postings), and cost estimators (52 postings). Each of these occupations possess skills that are important to the sale and manufacture of lightweight products.



## Top posting jobs *Human Safety* Q1 2017

Data: Burning Glass Technologies Analysis:  
Workforce Intelligence Network

Employer demand in the Human Safety sub-group is generally split between postings for occupational health and safety specialists (55 postings) and industrial safety and health engineers (44 postings). Other occupations in this sub-group saw small levels of postings compared to the top two jobs.

# ADMINISTRATION

## IN-DEMAND TECHNICAL SKILLS

Job postings in the Administration occupation group seek skills and experience in purchasing and procurement, logistics and supply chain management, inventory management, and mathematics. Other technical skills that Kentucky employers may seek in Administration workers include forklift/machinery operation, labeling and packaging, customer service, and systems application products (SAP).

- Forklift operation
- Computer skills: Microsoft Office, data entry
- Purchasing, procurement
- Scheduling
- Inventory management, inventory control
- Labeling, packaging, sorting, cleaning
- Customer service, customer contact
- Mathematics
- Repair
- Logistics, shipping and receiving, SAP
- Supply chain knowledge
- Occupational health and safety

## IN-DEMAND EMPLOYABILITY SKILLS

Basic skills desired by Kentucky employers hiring Administration workers are focused on communication and organization, problem solving, and quality assurance. Q1 2017 job postings in the Administration group also indicate that these workers should have strong writing and mathematical skills as well as the desire to work as part of a team when applying for positions as purchasing agents, occupational health and safety specialists, and logisticians.

- Communication skills, telephone skills
- Ability to perform physical labor
- Organizational skills, detail-oriented
- English, writing
- Typing
- Planning
- Problem solving
- Teamwork, collaboration, building relationships
- Work area maintenance
- Project management, supervisory skills, meeting deadlines
- Multi-tasking
- Cost control

# ADMINISTRATION

## IN-DEMAND EXPERIENCE & EDUCATIONAL ATTAINMENT

Many Kentucky employers are seeking workers with entry-level experience, less than two years. Of the Q1 2017 postings that specified a desired level of experience, 62 percent were open to entry-level candidates. A similar proportion of Q1 job ads require just some post-secondary training or a related associate's degree. Other in-demand occupations require more experience and education, for example logisticians, which requires a bachelor's degree. Kentucky employers required a bachelor's degree in 277 Administration postings in Q1 2017 (30 percent of postings).

### Experience in-demand

Q1 2017

Data: Burning Glass Technologies

Analysis: Workforce Intelligence Network



### Education & training in-demand

Q1 2017

Data: Burning Glass Technologies

Analysis: Workforce Intelligence Network



## WAGES

### Advertised wages

Q1 2017

Data: Burning Glass Technologies

Analysis: Workforce Intelligence Network

Only 508 of the Administration group job postings in Kentucky during Q1 2017 advertised an hourly wage or an annual salary. Of those that did, a majority (66 percent) of the job postings advertised salaries less than \$35,000 a year. The mean advertised annual salary for the occupation group was \$38,053, up 11 percent from an average of \$34,133 in Q4 2016. Higher advertised wages can signal that employers are struggling to find qualified talent, and therefore willing to pay qualified talent a higher wage.



**0-2 years**

experience most in demand for Administration positions

**\$38,053**

average advertised salary

Post-secondary training or more is required for Administration positions



## 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.

### Process & Testing

*Process & 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.*

### Electrical & Mechanical

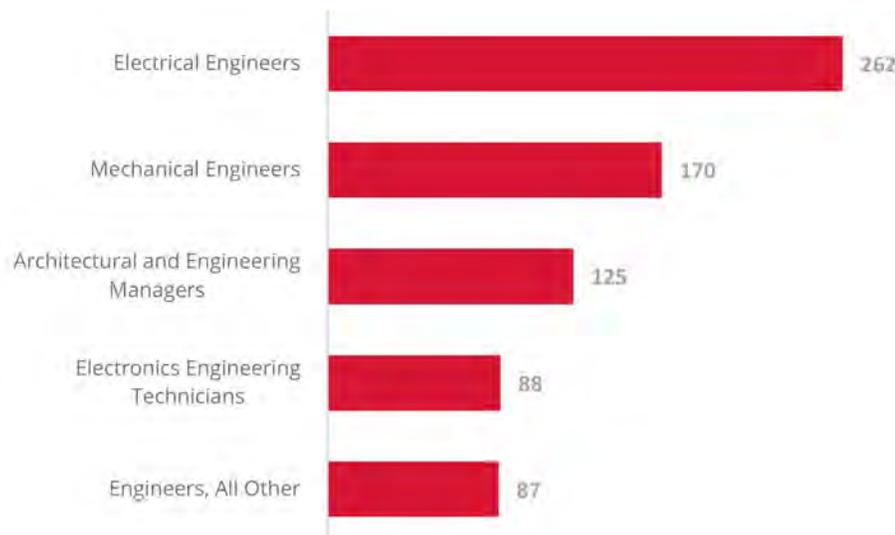
*Electrical & Mechanical Engineers perform duties related to the research, design, development, and testing of mechanical functioning, electrical, and manufacturing equipment, components, or systems for commercial, industrial, military, or scientific use.*

### Chemical & Metallurgy

*Chemical & 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.*



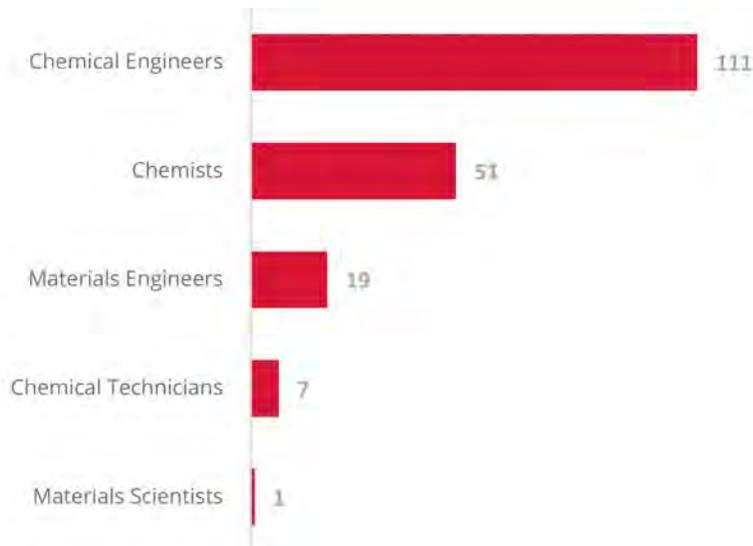
### Top posting jobs

#### Electrical & Mechanical Q1 2017

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

Electrical and Mechanical Engineers with skillsets applicable to lightweighting-related advanced manufacturing are in high demand in Kentucky. Kentucky employers posted 262 online job ads for electrical engineers between January and March 2017 and 170 ads for mechanical engineers.

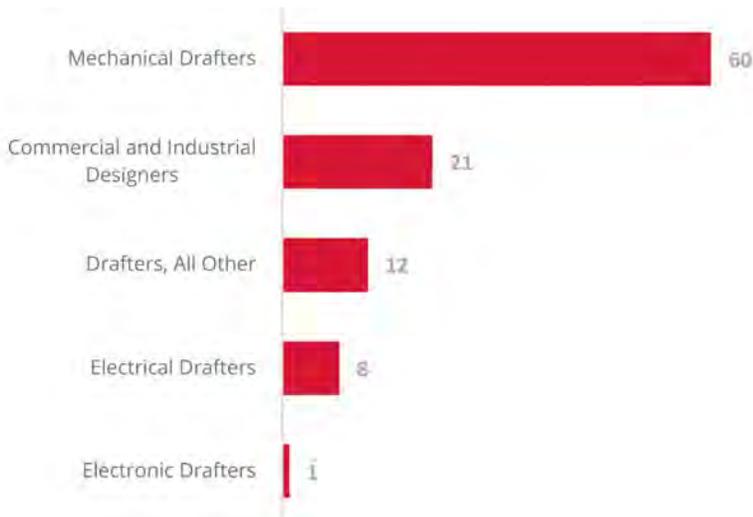
# ENGINEERING & DESIGN



## Top posting jobs Chemical & Metallurgy Q1 2017

Data: Burning Glass Technologies Analysis:  
Workforce Intelligence Network

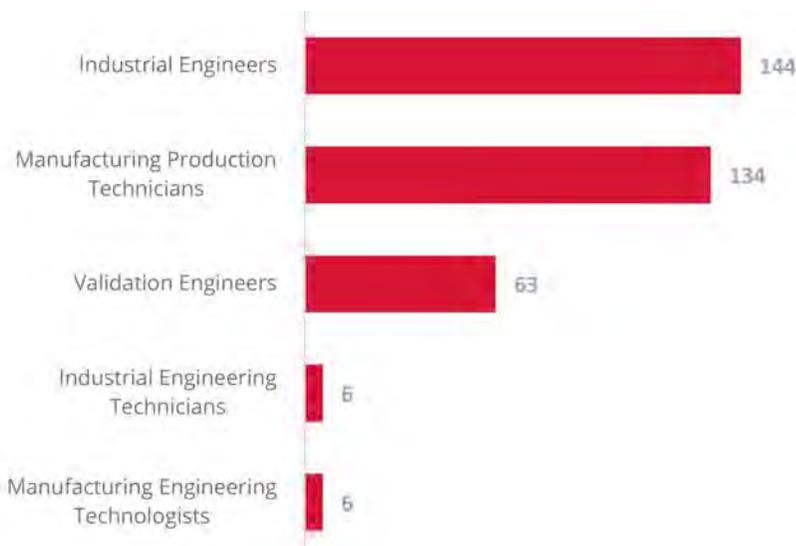
The most in-demand Chemical Engineering and Metallurgy occupation in Kentucky during Q1 2017 was chemical engineers with 111 postings. This level of demand is double that for the second most in-demand job in the sub-group, chemists (51 postings).



## Top posting jobs Designers & Drafters Q1 2017

Data: Burning Glass Technologies  
Analysis: Workforce Intelligence Network

Kentucky employers are seeking a variety of designers and drafters that have skills transferable to lightweighting-related advanced manufacturing. Mechanical drafters remained the most in-demand during Q1 2017 with 60 postings, up over 75 percent from 34 postings in Q4 2016.



## Top posting jobs Process & Testing Q1 2017

Data: Burning Glass Technologies  
Analysis: Workforce Intelligence Network

The most in-demand Process Engineering and Testing occupation during Q1 2017 in Kentucky was industrial engineers (144 postings). Demand is also strong for manufacturing production technicians with 134 postings.

# ENGINEERING & DESIGN

## IN-DEMAND TECHNICAL SKILLS

Engineering occupations demand a broad range of technical skills. Many engineers will be expected to have computer aided drafting and design experience using AutoCAD, programming skills, and other software-related skills. Knowledge in mechanical and electrical engineering apply to specific engineering roles. Q1 2017 job postings illustrate that supervisory or managerial engineering roles require strong project management, process improvement, and cost control skills.

- Project management
- Budgeting, scheduling, cost control
- CAD/AutoCAD
- Repair, inspection
- Manufacturing processes, process engineering
- Electrical engineering
- Mechanical engineering
- Six Sigma
- Programmable Logic Controller (PLC) programming
- Technical support
- Lean manufacturing
- Schematic diagrams

## IN-DEMAND EMPLOYABILITY SKILLS

Beyond the science, mathematics, and engineering technical skills required for lightweighting-related engineering employment, engineers are expected to possess basic employability skills as well. Kentucky employers seeking to hire engineers during Q1 2017 valued candidates with strong communication and team work skills, research and computer skills (specifically Microsoft Office products), and demonstrated problem solving and project management experience.

- Communication skills
- Troubleshooting, problem solving
- Computer skills: Microsoft Office
- Planning
- Writing
- Organizational skills, detail-oriented
- Quality assurance and control
- Ability to perform physical labor
- Preventive maintenance
- Teamwork, collaboration
- Creativity
- Project planning, project development

# ENGINEERING & DESIGN

## IN-DEMAND EXPERIENCE & EDUCATIONAL ATTAINMENT

According to Q1 2017 job postings, 87 percent of the Engineering jobs in Kentucky are available to workers with fewer than five years of experience. Engineers, however, are often required to have at least a bachelor's degree: 81 percent of Engineering and Design job postings in Q1 2017 specified that candidates should have a bachelor's degree or higher. Engineering jobs in technician positions are available to candidates with associate's degrees or other short-term training certificates (18 percent of postings).

### Experience in-demand

Q1 2017

Data: Burning Glass Technologies  
Analysis: Workforce Intelligence Network



### Education & training in-demand

Q1 2017

Data: Burning Glass Technologies  
Analysis: Workforce Intelligence Network



## WAGES

Just 392 of Q1 2017 postings in the Engineering and Design occupation group advertised salaries. Those postings that did, however, illustrate that these occupations are the highest paid of the lightweighting-related occupations in Kentucky. The high educational attainment required to secure most engineering positions translates into high earnings. Many Q1 2017 postings (41 percent) advertised salaries over \$75,000 per year, and the mean advertised salary was \$64,555. The mean advertised salary is more than twice that of Kentucky's median annual earnings for all workers, \$32,000, but 10 percent lower than the median 2014 salary for Engineering and Design occupations in Kentucky (\$71,635).

### Advertised wages

Q1 2017

Data: Burning Glass Technologies  
Analysis: Workforce Intelligence Network



**3-5 years**

**experience most in demand for Engineering & Design positions**

**\$65,798**

**average advertised salary**

**A bachelor's degree is the most in demand credential for Engineering & Design positions**



---

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