

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.

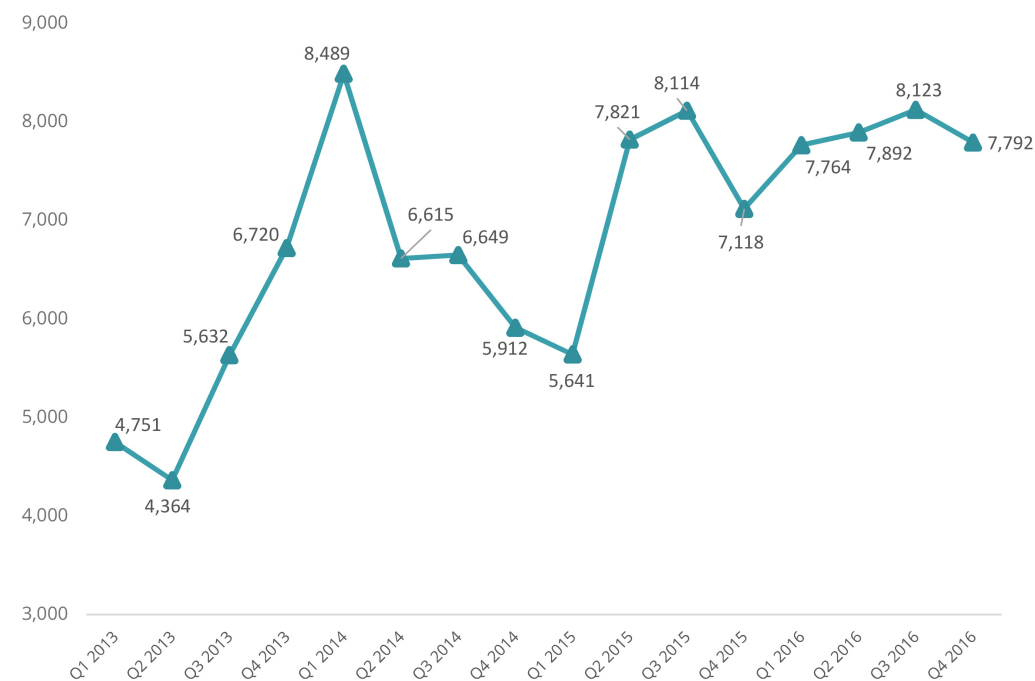
From welding to skilled metalwork, to logistics and mechanical and chemical engineering, to industrial design and manufacturing management, lightweighting-related jobs are found in nearly every manufacturing sector. This report provides an overview and examines the changing demand for workers in jobs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

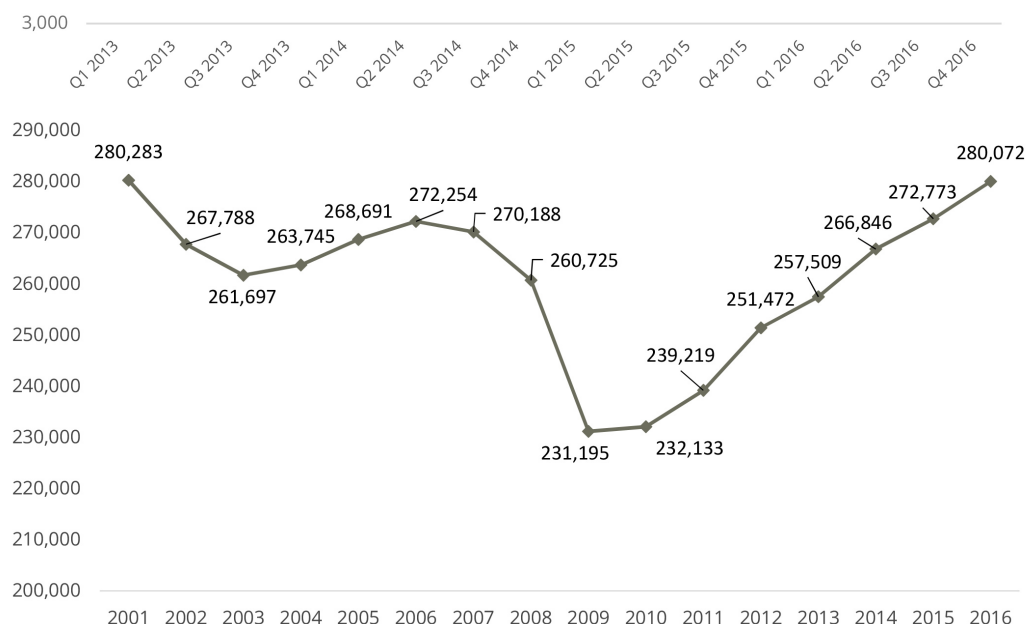
Online job postings for lightweighting-related occupations in Kentucky decreased a slight four percent from 8,123 ads in Q3 to 7,792 in Q4 2016. After a dip to 5,641 postings in Q1 2015, employer demand for workers with lightweight advanced manufacturing skills in Kentucky has grown to generally fluctuate between 7,500 and 8,500 postings per quarter since. Increased employer demand for these workers has also driven employment growth in these occupations. 2016 marks the seventh consecutive year of employment growth for lightweighting-related jobs in Kentucky since the depths of the Great Recession in 2009. In 2009, only 231,195 Kentucky workers were employed in lightweighting-related advanced manufacturing jobs, and in 2016, employment reached just over 280,000.



Job postings over time Kentucky

Q1 2013 - Q4 2016

Data: Burning Glass Technologies
Analysis: Workforce Intelligence Network



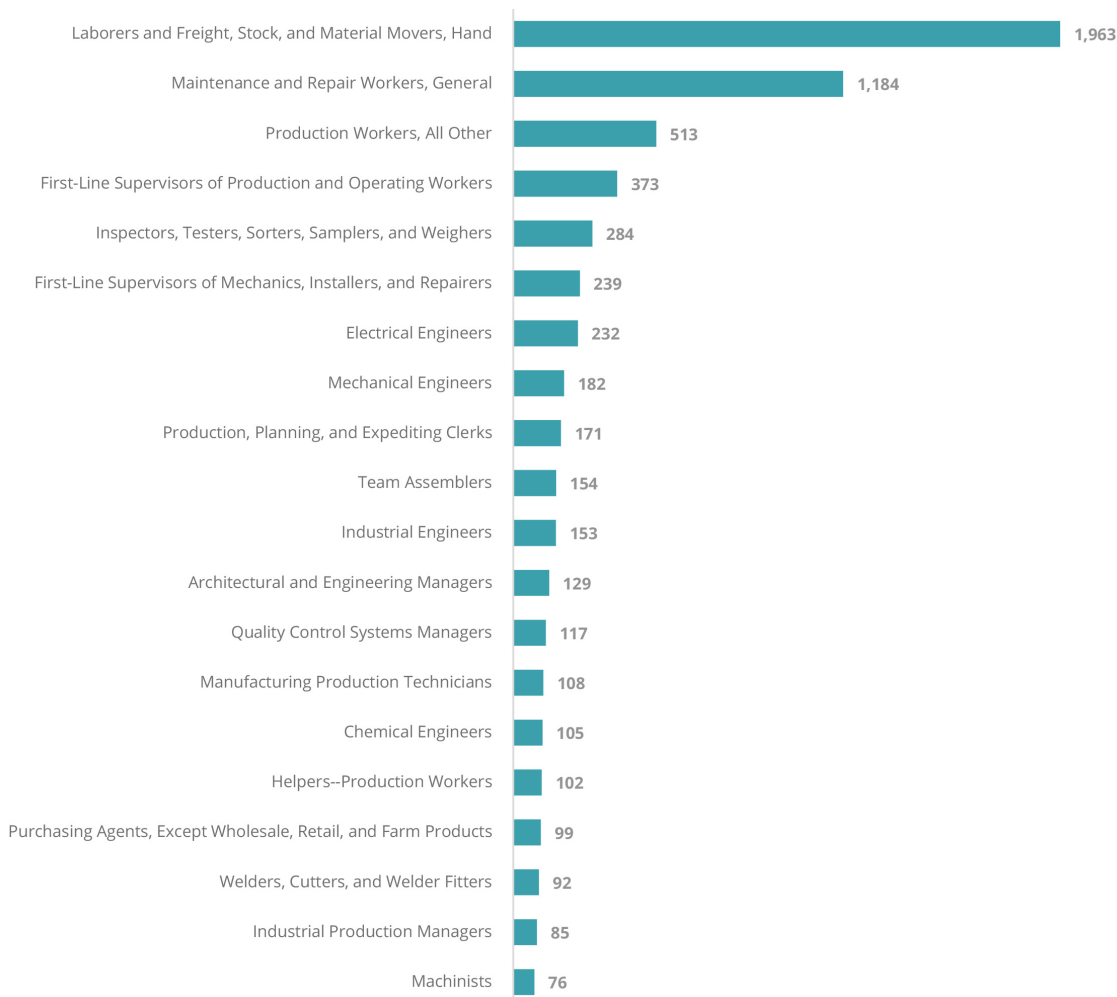
Employment over time Kentucky

2001 - 2016

Data: EMSI, QWI
Analysis: Workforce Intelligence Network

TOP JOBS

The top in-demand occupation in Q4 2016 related to lightweight advanced manufacturing was laborers and freight, stock, and materials movers (1,963 postings). Maintenance and repair workers remain in second place with 1,184 job postings. These two occupations tend to hold the top spots due to consistent employer demand and employee turnover rates. Supervisors and managers are also in consistent demand in Kentucky along with electrical and mechanical engineers.



Top posting jobs Kentucky Q4 2016

Data: Burning Glass
Technologies
Analysis: Workforce Intelligence
Network

>7,000

**consistent strong
demand for
workers for 6
consecutive
quarters**

7,792

**total online
job ads in
Q4 2016**

**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

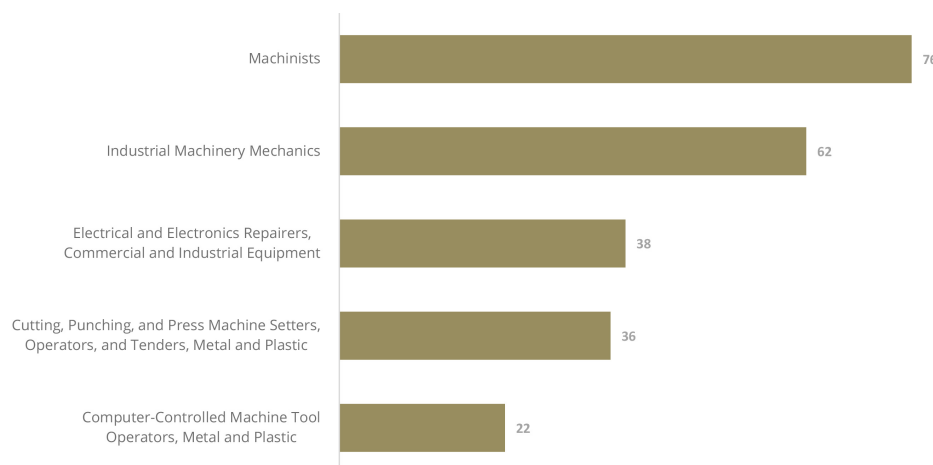
Machinists set up and operate a variety of machine tools to produce parts and instruments. Some work on traditional industrial machinery while others operate or develop programs for computer-controlled machinery.

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

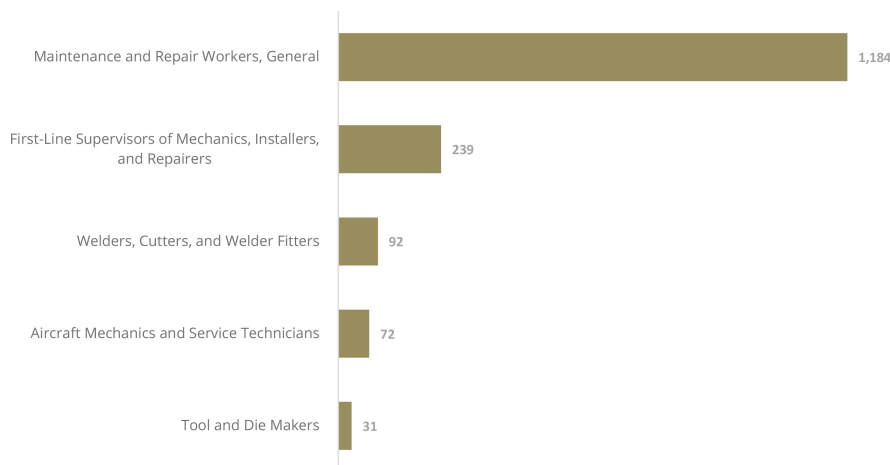
Q4 2016

Data: Burning Glass Technologies

Analysis: Workforce Intelligence Network

Machinists (general) garnered 76 online job postings in Kentucky during Q4 2016, beating out industrial machinery mechanics (62 postings) for the top spot in the Machinists sub-group. Other jobs like cutting, punching, and press machine operators (36 postings) routinely make the top jobs list for this sub-group.

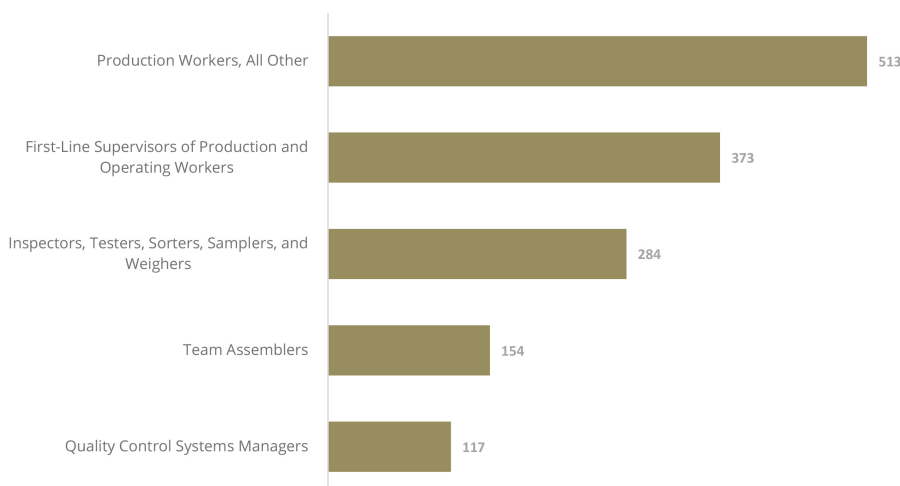
SKILLED TRADES



Top posting jobs Skilled Materials Workers Q4 2016

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 1,184 online job postings between October and December 2016, nearly five times as many as the next most in-demand in the group, supervisors of mechanics, installers, and repairers (239 postings).



Top posting jobs Assembly & Operations Q4 2016

Data: Burning Glass Technologies Analysis:
Workforce Intelligence Network

Production workers were in high demand in Q4 2016. Kentucky advanced manufacturing employers posted 513 online job ads for these workers between October and December. Demand for inspectors, testers, sorters, samplers, and weighers returned to a normal level of postings (284 ads) after taking second place for the sub-group in Q3 2016 with 528 online job ads.

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 skillsets like staff management, project management, customer service, and budgeting. As employers seek more candidates to fill supervisory roles, job postings reflect the need in a continuously evolving list of skills. Advanced technical skills like mathematics, product testing, and programming also appear on Q4 2016's skills list, further illustrating a shift in Skilled Trades employment to more advanced education and technology requirements.

- Repair, inspection, cleaning
- Scheduling, budgeting
- Welding
- Machining, machine operation, computer numerical control (CNC)
- Mathematics
- Plumbing
- Packaging
- Programmable Logic Controller (PLC) programming
- HVAC
- Product testing
- Customer service
- Microsoft Office: Excel

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
- Computer skills
- Writing, English proficiency
- Supervisory skills, leadership
- Quality assurance and control
- Detail-oriented, planning, organizational skills
- Multi-tasking, time management
- Cost control

IN-DEMAND EXPERIENCE & EDUCATIONAL ATTAINMENT

Of the Skilled Trades group job postings that specified a desired experience level during Q4 2016, 89 percent were available to workers with fewer than 5 years of experience. Entry-level Skilled Trades positions (less than two years of experience; 50 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 (12 percent of Q4 2016 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 Q4 2016 postings. Eighty-four percent of Q4 postings require some post-secondary training or a related associate's degree of Skilled Trades job candidates.

Experience in-demand

Q4 2016

Data: Burning Glass Technologies
Analysis: Workforce Intelligence Network



Education & training in-demand

Q4 2016

Data: Burning Glass Technologies
Analysis: Workforce Intelligence Network



WAGES

Advertised wages

Q4 2016

Data: Burning Glass Technologies
Analysis: Workforce Intelligence Network

Though the majority (56 percent) of advertised salaries in the Skilled Trades group in Q4 2016 were below \$35,000 per year, the average advertised salary for Kentucky workers was \$42,048 during Q4 2016, up from \$41,496 in Q3 2016. Increasing wages can often indicate increasing need as employers are willing to pay more for positions they struggle to fill. The average real-time advertised salary in Q4 2016 is 11 percent higher than the state's median earnings for Skilled Trades workers (\$37,794) and 31 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

\$42,048
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

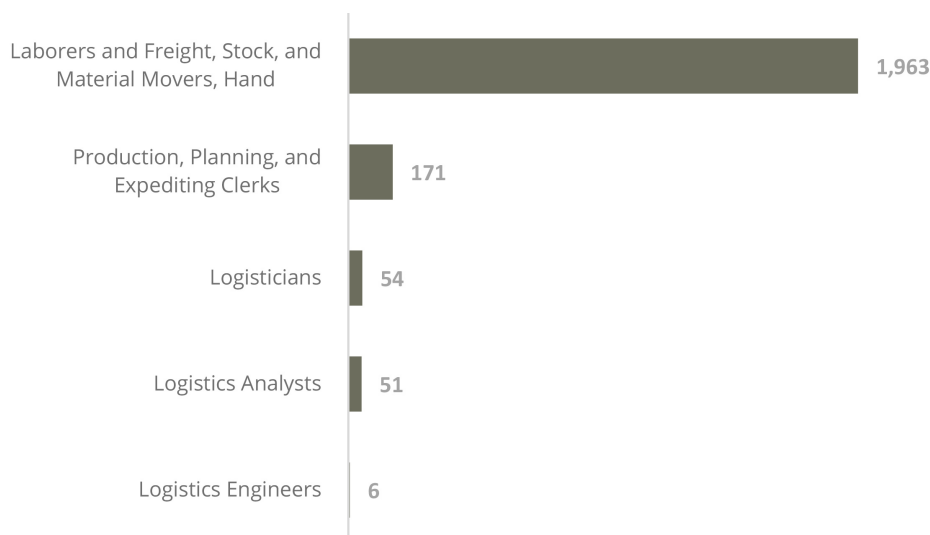
Human Safety workers plan, implement, coordinate, review, and inspect safety programs and protocols to ensure a safe workplace environment.

Top posting jobs

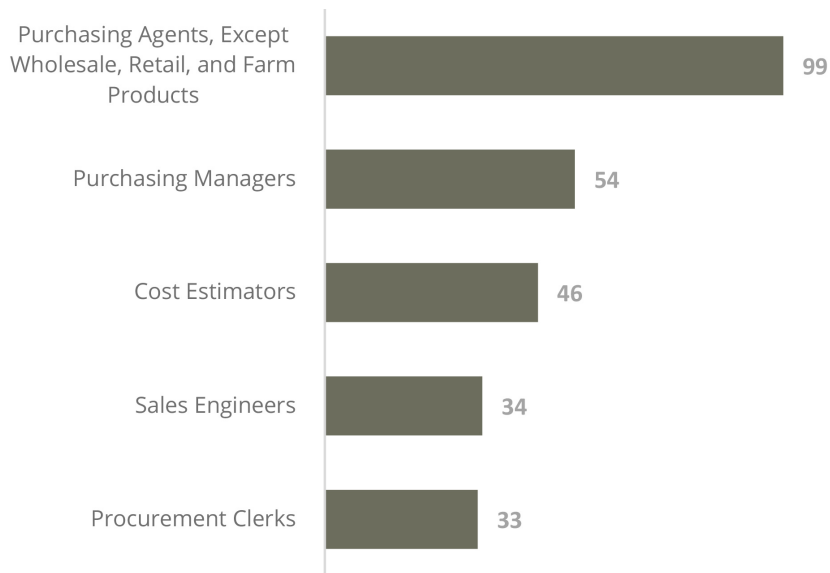
Logistics Q4 2016

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

The most in-demand Logistics occupation in Kentucky during Q4 2016 was laborers and freight, stock, and material movers. As the most in-demand lightweighting job in Kentucky overall, the 1,963 online job ads posted for this position made up 25 percent of overall lightweighting job demand in the state.



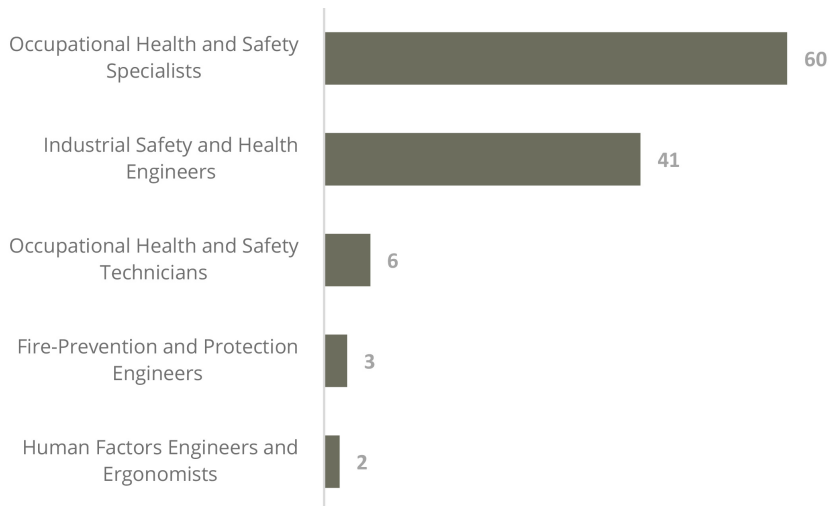
ADMINISTRATION



Top posting jobs *Procurement & Purchasing* Q4 2016

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 (99 postings), purchasing managers (54 postings), and cost estimators (46 postings). Each of these occupations possess skills that are important to the sale and manufacture of lightweight products.



Top posting jobs *Human Safety* Q4 2016

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 (60 postings) and industrial safety and health engineers (41 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
- Scheduling
- Inventory management, inventory control
- Labeling, packaging, sorting, cleaning
- Purchasing, procurement
- Computer skills: Microsoft Office
- 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. Q4 2016 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 Q4 2016 postings that specified a desired level of experience, 66 percent were open to entry-level candidates. A similar proportion of Q4 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 315 Administration postings in Q4 2016 (31 percent of postings).

Experience in-demand

Q4 2016

Data: Burning Glass Technologies

Analysis: Workforce Intelligence Network



Education & training in-demand

Q4 2016

Data: Burning Glass Technologies

Analysis: Workforce Intelligence Network



WAGES

Advertised wages

Q4 2016

Data: Burning Glass Technologies

Analysis: Workforce Intelligence Network

Only 909 of the Administration group job postings in Kentucky during Q4 2016 advertised an hourly wage or an annual salary. Of those that did, a majority (81 percent) of the job postings advertised salaries less than \$35,000 a year. The mean advertised annual salary for the occupation group was \$34,133, down from an average of \$35,214 in Q3 2016 postings. This shift to a lower salary could be because of increased demand for laborers moving demand away from positions requiring more education and thus demanding a higher salary.



0-2 years

experience most in demand for Administration positions

\$34,133

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

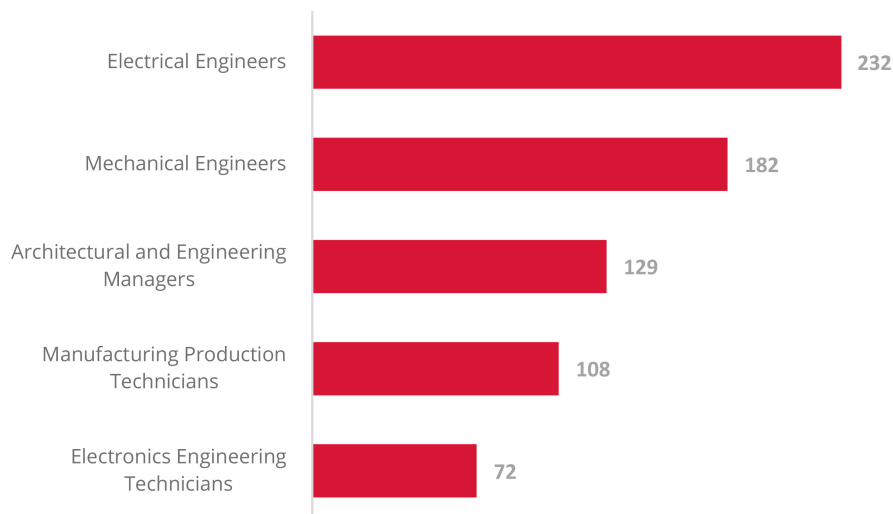
Electrical & Mechanical Engineers perform duties related to the research, design, development, and testing of mechanical functioning, electrical, and manufacturing equipment, components, or systems for commercial, industrial, military, or scientific use.

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.



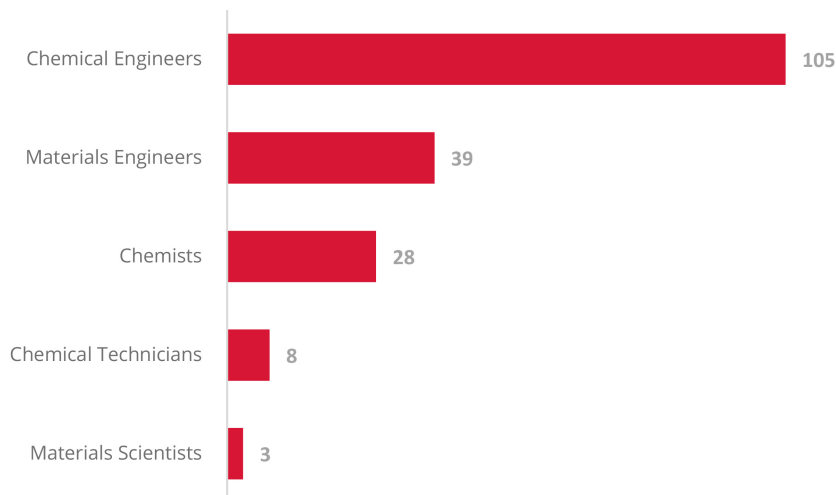
Top posting jobs

Electrical & Mechanical Q4 2016

*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 232 online job ads for electrical engineers between October and December 2016 and 182 ads for mechanical engineers.

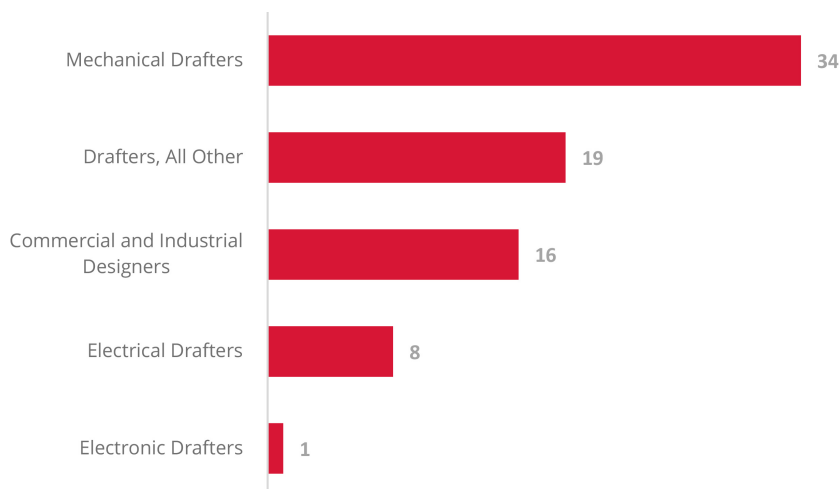
ENGINEERING & DESIGN



Top posting jobs Chemical & Metallurgy Q4 2016

Data: Burning Glass Technologies Analysis:
Workforce Intelligence Network

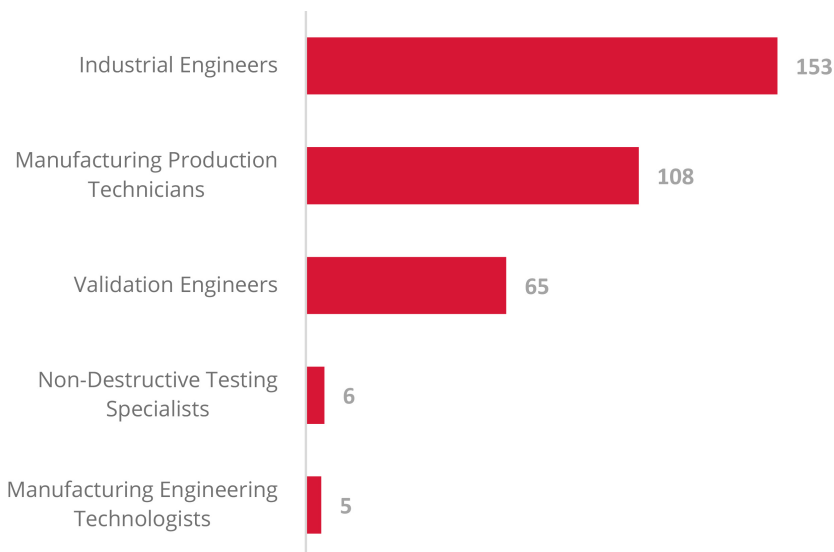
The most in-demand Chemical Engineering and Metallurgy occupation in Kentucky during Q4 2016 was chemical engineers with 105 postings. This level of demand outpaces demand for the second place job, materials engineers (39 postings), by nearly three times.



Top posting jobs Designers & Drafters Q4 2016

Data: Burning Glass Technologies
Analysis: Workforce Intelligence Network

Kentucky employers are seeking a variety of designers and drafters that have skills transferrable to lightweighting-related advanced manufacturing. Mechanical drafters remained the most in-demand during Q4 2016 with 34 postings, down from 47 online job postings in Q3 2016.



Top posting jobs Process & Testing Q4 2016

Data: Burning Glass Technologies
Analysis: Workforce Intelligence Network

The most in-demand Process Engineering and Testing occupation during Q4 2016 in Kentucky was industrial engineers (153 postings). Demand is also strong for manufacturing production technicians with 108 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, and other software-related skills. Knowledge in mechanical and electrical engineering apply to specific engineering roles. Q4 2016 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 Q4 2016 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 Q4 2016 job postings in the Engineering and Design occupation group, 83 percent of the Engineering jobs in Kentucky are available to workers with fewer than 5 years of experience. Engineers, however, are often required to have at least a bachelor's degree: 82 percent of Engineering and Design job postings in Q4 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).

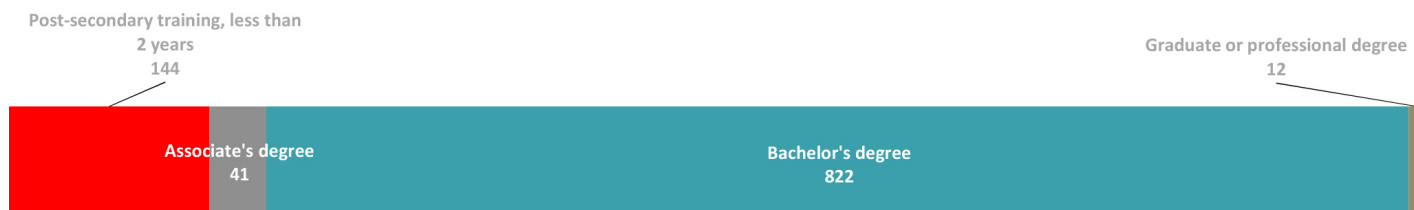
Experience in-demand Q4 2016

Data: Burning Glass Technologies
Analysis: Workforce Intelligence Network



Education & training in-demand Q4 2016

Data: Burning Glass Technologies
Analysis: Workforce Intelligence Network

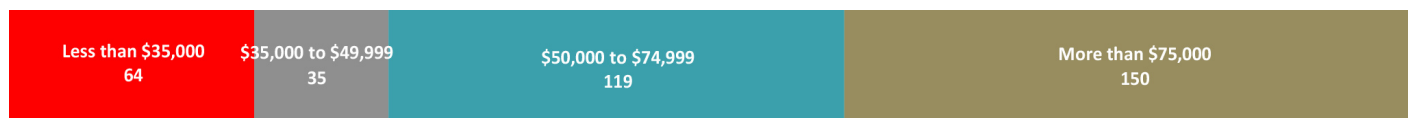


WAGES

Advertised wages Q4 2016

Data: Burning Glass Technologies
Analysis: Workforce Intelligence Network

Only 368 of Q4 2016 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 Q4 postings (41 percent) advertised salaries over \$75,000 per year, and the mean advertised salary was \$65,798. The mean advertised salary is more than twice that of Kentucky's median annual earnings for all workers, \$32,000, but 9 percent lower than the median 2014 salary for Engineering and Design occupations in Kentucky (\$71,635).



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