

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, have better performance and use less fuel.

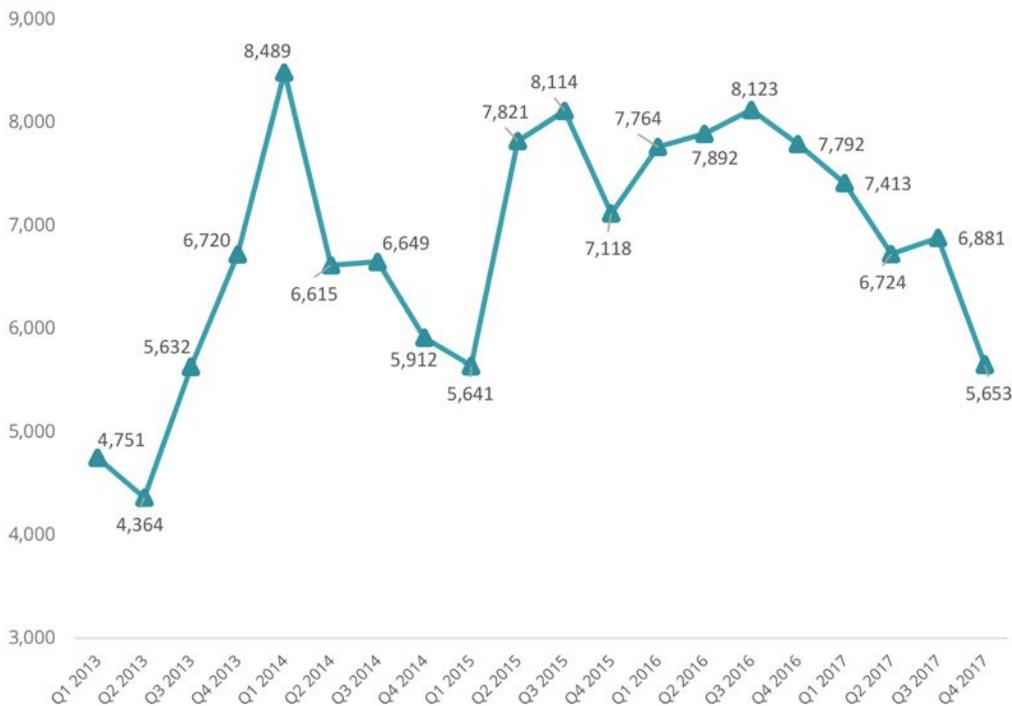
From welding to skilled metalwork, to logistics and mechanical and chemical engineering, to industrial design and manufacturing management, lightweighting-related jobs are found in nearly every manufacturing sector. This report provides an overview and examines the changing demand for workers in jobs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

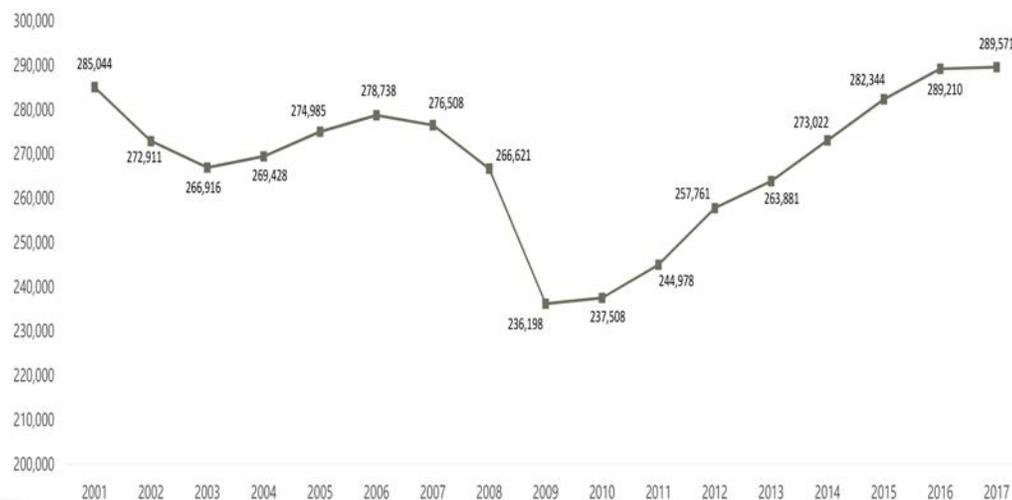
Online job postings for lightweighting-related occupations in Kentucky generally decreased throughout 2017, falling from 7,413 in Q1 to 5,653 in Q4. After Q3 2016 saw over 8,000 job ads, employer demand for workers with lightweighting-related skills has dropped in every quarter except Q2 to Q3 2017. In total, 26,647 lightweighting-related job postings were made in Kentucky in 2017. Continued analysis will determine if decreased employer demand is a major trend in Kentucky and, if so, 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 236,000 Kentucky workers were employed in lightweighting-related advanced manufacturing jobs, and in 2017, about 290,000 workers are employed. Despite falling posting levels, this is a 24 percent increase in employment.



Job postings over time Kentucky

Q1 2013 - Q4 2017

Data: Burning Glass Technologies
Analysis: Workforce Intelligence Network



Employment over time Kentucky

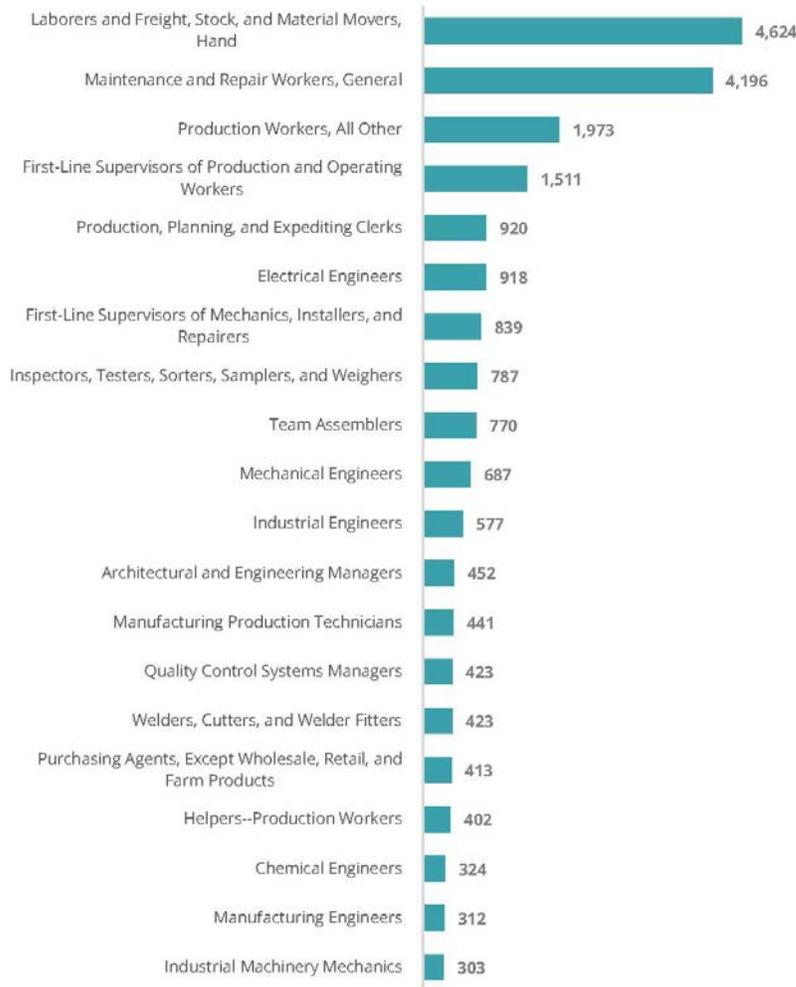
2001 - 2017

Data: EMSI, QWI
Analysis: Workforce Intelligence Network

Data: EMSI
Analysis: Workforce Intelligence Network

TOP JOBS

The top in-demand lightweight advanced manufacturing occupation for all of 2017 was Laborers and Freight, Stock, and Material Movers, Hand with 4,624 postings, followed closely by General Maintenance and Repair Workers (4,196 postings). In general, the two occupations contested for the top spot each quarter. Strong demand continues for workers in the Skilled Trades and industrial technology maintenance. Many supervisory and managerial positions are also in consistent demand in Kentucky, along with Electrical and Mechanical Engineers.



Top posting jobs Kentucky

Annual 2017

Data: Burning Glass
Technologies

Analysis: Workforce Intelligence
Network

19%
increase in demand for advanced manufacturing workers since 2013

5,653
total online job ads in Q4 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

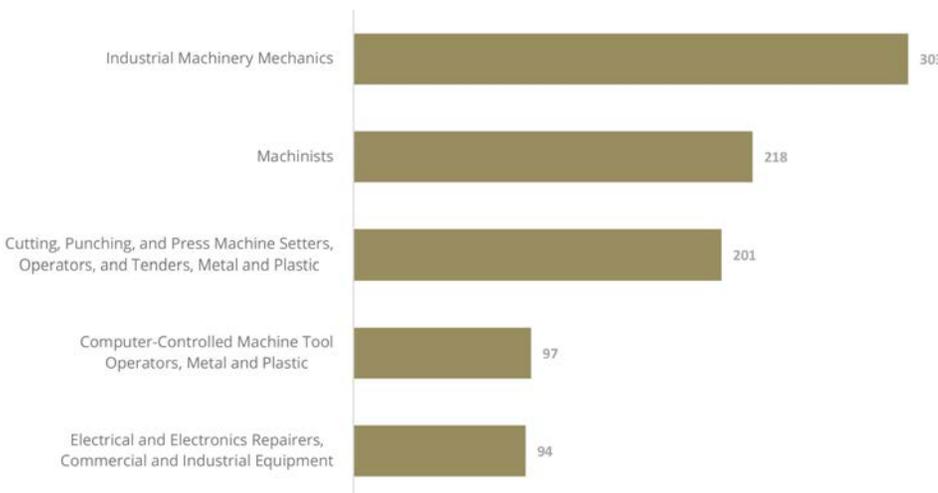
Machinists set up and operate a variety of machine tools to produce parts and instruments. Some work on traditional industrial machinery while others operate or develop programs for computer-controlled machinery.

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

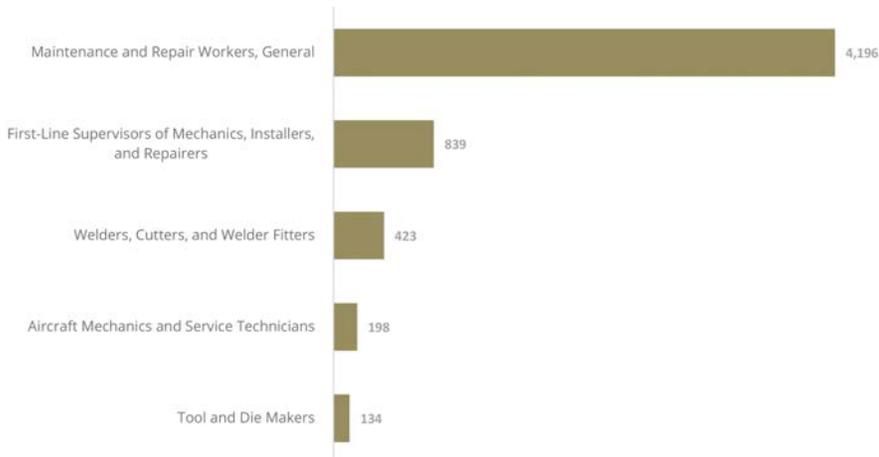
2017

Data: Burning Glass Technologies

Analysis: Workforce Intelligence Network

Industrial Machinery Mechanics were the most in-demand Machinist job in Kentucky throughout 2017, with 303 online job postings. Other consistent top occupations in the Machinists sub-group included Machinists (218 postings) and Cutting, Punching, and Press Machine Setters, Operators, and Tenders (201 postings). All other occupations, such as Computer Controlled Machine Tool Operators (97 postings), garnered fewer than 100 advertisements during the year.

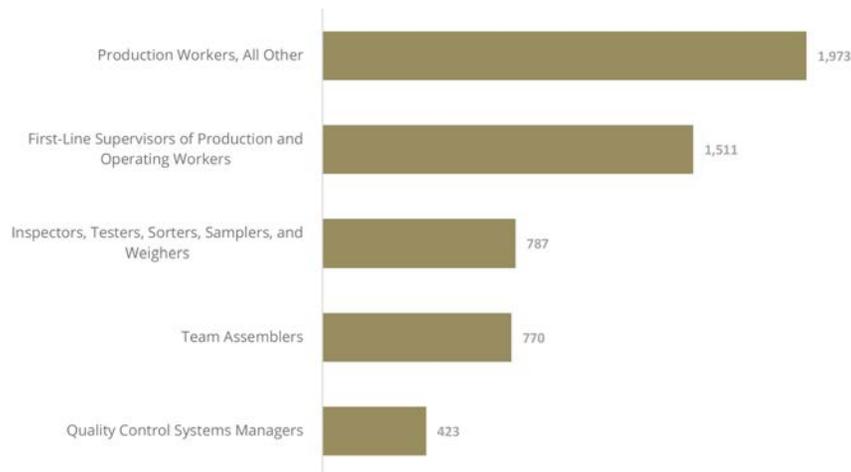
SKILLED TRADES



Top posting jobs Skilled Materials Workers 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, as well as the Skilled Trades group as a whole, and the second most in-demand among Kentucky lightweight manufacturing jobs. Maintenance and Repair workers garnered 4,196 online job postings between January and December 2017. With about one fifth as many postings, Supervisors of Mechanics, Installers, and Repairers (839 postings) were the sub-group's second most popular occupation this year.



Top posting jobs Assembly & Operations 2017

Data: Burning Glass Technologies Analysis: Workforce Intelligence Network

General Production Workers have remained in high demand through 2017. Kentucky advanced manufacturing employers posted 1,973 online job ads for these workers, typically evenly distributing demand for around 500 postings per quarter. Many Kentucky employers are also seeking supervisory roles within the Assembly and Operations sub-group: First-Line Supervisors of Production and Operating Workers were the second most advertised job with 1,511 annual postings. Inspectors, Testers, Sorters, Samplers, and Weighers and Team Assemblers were also popular, with 787 and 770 postings respectively.

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 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 2017, 89 percent were available to workers with fewer than 5 years of experience. Entry-level Skilled Trades positions, referring to those requiring less than two years of experience, comprised 49 percent of postings through the year. They 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 (11 percent of 2017 postings) are most likely for supervisor or management roles in the Skilled Trades and will occasionally require advanced educational attainment, such as a bachelor's degree, as well. This year, 15 percent of skilled trades job postings required a college degree, while 78 percent called for a high school diploma and vocational training.

Experience in-demand

2017

Data: Burning Glass Technologies
Analysis: Workforce Intelligence Network



Education & training in-demand

2017

Data: Burning Glass Technologies
Analysis: Workforce Intelligence Network



WAGES

Advertised wages

2017

Data: Burning Glass Technologies
Analysis: Workforce Intelligence Network

Though the majority (59 percent) of advertised salaries in the Skilled Trades group in 2017 were below \$35,000 per year, additional experience or training can lead to much higher paying positions. The median advertised salary for Kentucky workers in 2017 was \$31,000 for the predominantly entry level advertisements. The median real-time advertised salary in 2017 is about 11 percent lower than the state's median earnings for all workers (\$35,000). 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

\$40,000
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.

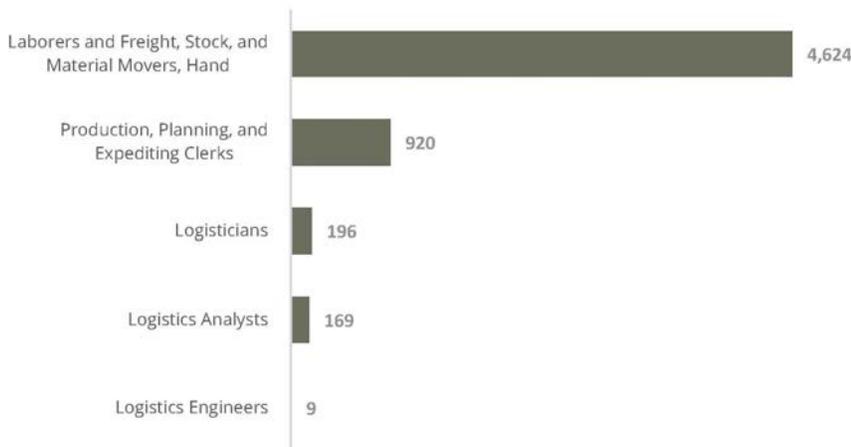
Human Safety

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

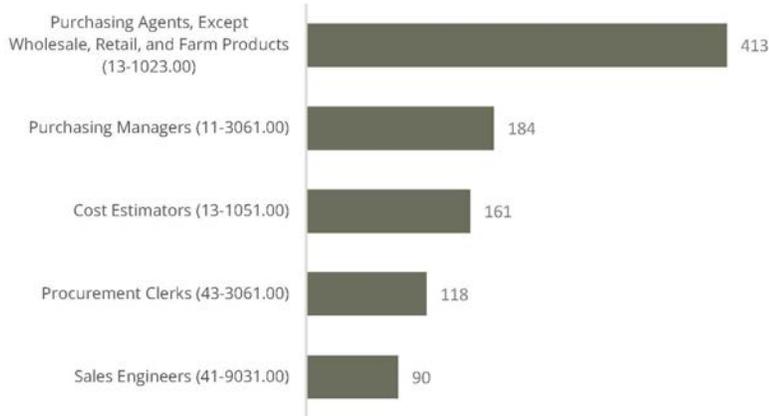
Top posting jobs Logistics 2017

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

The most in-demand Logistics occupation in Kentucky throughout 2017 was Laborers and Freight, Stock, and Material Movers, with 4,624 postings. The occupation was also the most sought-after lightweighting occupation in the state this year, comprising 17 percent of the total postings. The second most in-demand Logistics workers were Production, Planning, and Expediting Clerks, with 920 total job ads.



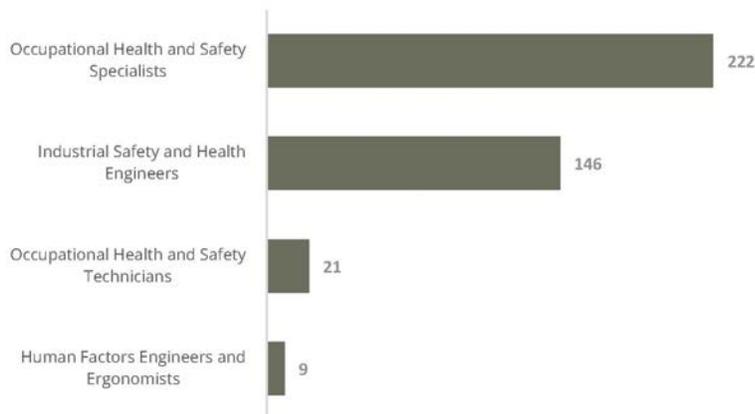
ADMINISTRATION



Top posting jobs *Procurement & Purchasing* 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 (413 postings), Purchasing Managers (184 postings), and Cost Estimators (161 postings) continue to hold the top three spots. Each of these occupations possess skills that are important to the sale and manufacture of lightweight products.



Top posting jobs *Human Safety* 2017

Data: Burning Glass Technologies Analysis:
Workforce Intelligence Network

Despite some competition for the top spot throughout the year, Occupational Health and Safety Specialists garnered 222 overall postings in 2017, making them the most in-demand Human Safety occupation over Industrial Safety and Health Engineers, with 146. Other occupations in this sub-group, such as Occupational Health and Safety Specialists, 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. 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 entry-level workers with less than two years' experience. Among 2017 postings that specified a desired level of experience, 61 percent were open to these candidates. With 71 percent of postings, an even larger proportion of 2017 job ads require just some post-secondary training or a related associate's degree. However, some higher-paying in-demand occupations require more experience and education. Logisticians, for example, must have a bachelor's degree. 29 percent of Kentucky Administration job postings required a college degree.

Experience in-demand

2017

Data: Burning Glass Technologies

Analysis: Workforce Intelligence Network



Education & training in-demand

2017

Data: Burning Glass Technologies

Analysis: Workforce Intelligence Network



WAGES

Advertised wages

2017

Data: Burning Glass Technologies

Analysis: Workforce Intelligence Network

Only 31 percent of the 2017 Administration group job postings in Kentucky advertised an hourly wage or an annual salary. Of those that did, a majority (74 percent) of the job postings advertised salaries less than \$35,000 a year. The median advertised annual salary for the occupation group was \$27,000. 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

\$27,000

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

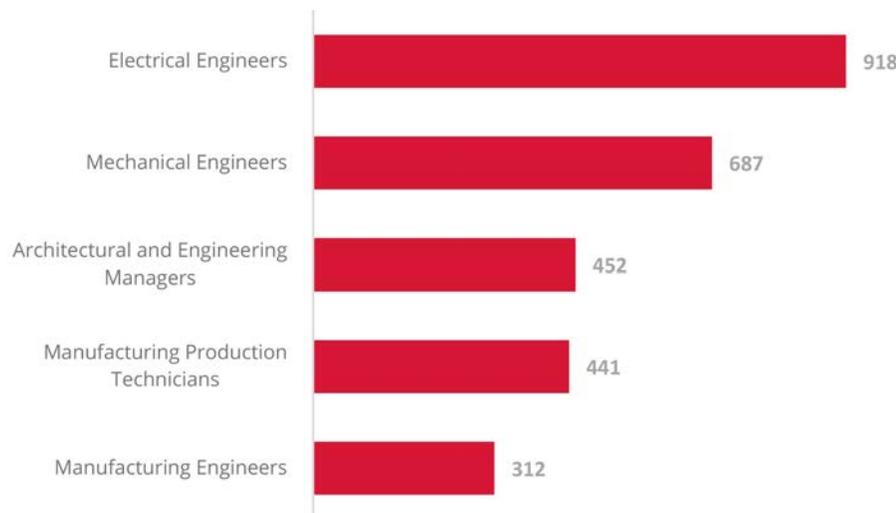
Electrical & Mechanical Engineers perform duties related to the research, design, development, and testing of mechanical functioning, electrical, and manufacturing equipment, components, or systems for commercial, industrial, military, or scientific use.

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.



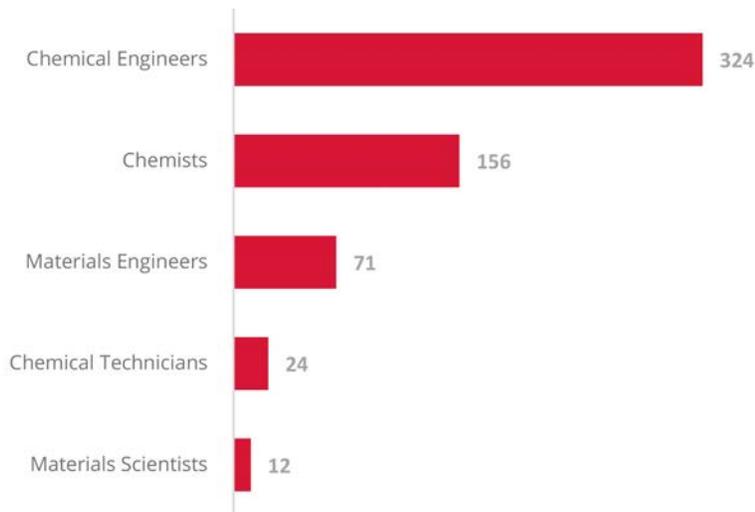
Top posting jobs

Electrical & Mechanical 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 918 online job ads for Electrical Engineers between January and December 2017, and 687 ads for Mechanical Engineers.

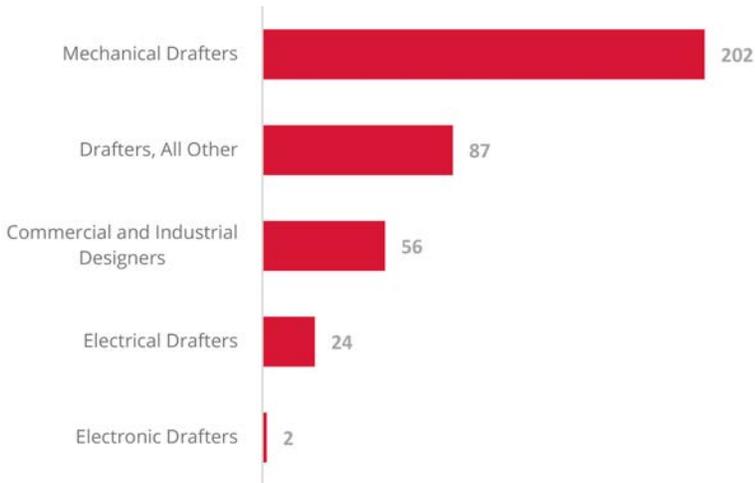
ENGINEERING & DESIGN



Top posting jobs *Chemical & Metallurgy* 2017

Data: Burning Glass Technologies Analysis:
Workforce Intelligence Network

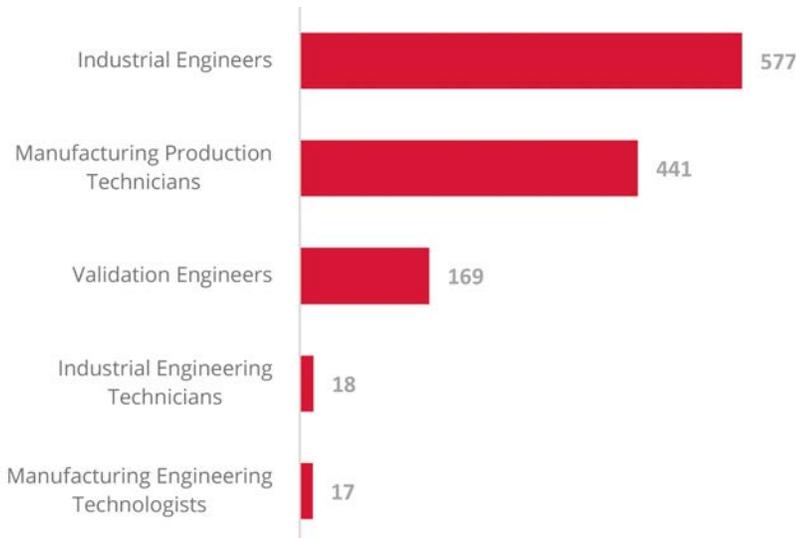
The most in-demand Chemical Engineering and Metallurgy occupation in Kentucky throughout 2017 was Chemical Engineers with 324 postings. This level of demand is double that for the second most in-demand job in the sub-group, Chemists (156 postings).



Top posting jobs *Designers & Drafters* 2017

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 2017 with 202 postings. Drafters, All Other (87 postings) and Commercial and Industrial Designers (56 postings) were also in demand.



Top posting jobs *Process & Testing* 2017

Data: Burning Glass Technologies
Analysis: Workforce Intelligence Network

The most in-demand Process Engineering and Testing occupation during 2017 in Kentucky was Industrial Engineers (577 postings). Demand is also strong for Manufacturing Production Technicians with 441 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. 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 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

Among 2017 job postings that advertised preferred experience, three to five years was the most desired level with 55 percent of the postings. Another 29 percent were open to entry level applicants, and the rest required very experienced candidates. However, despite the relatively flexible experience requirements, engineers are typically required to have at least a bachelor's degree: 82 percent of Engineering and Design job postings in 2017 specified that candidates should have a bachelor's degree or higher. Technician positions are available to candidates with associate's degrees or other short-term training certificates (17 percent of postings).

Experience in-demand 2017

Data: Burning Glass Technologies
Analysis: Workforce Intelligence Network



Education & training in-demand 2017

Data: Burning Glass Technologies
Analysis: Workforce Intelligence Network

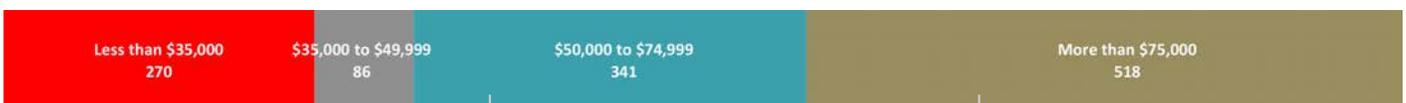


WAGES

In 2017, just 1,215 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 2017 postings (43 percent) advertised salaries over \$75,000 per year, and the median advertised salary was \$70,000. The median advertised salary is twice that of Kentucky's median annual earnings for all workers, \$35,000.

Advertised wages 2017

Data: Burning Glass Technologies
Analysis: Workforce Intelligence Network



3-5 years
experience most in demand for Engineering & Design positions

\$66,000
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