



Southwest Central Indiana Occupational Needs Assessment Advanced Manufacturing Sector Report

April 2017

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Introduction and Purpose

The purpose of this Occupational Needs Assessment (ONA) report is to highlight the education and workforce needs of the advanced manufacturing sector in the greater Southwest Central Indiana (SWCI) region.

There are similarities between advanced manufacturing partners in the region, their respective workforce needs, and the characteristics of their employees. Additionally, they all share concerns about the availability and quality of talent both for today and for tomorrow. Working collaboratively as a sector within the region will impact the effectiveness of and capacity for implementing targeted initiatives that cultivate the highly-skilled workforce the sector needs to flourish in SWCI. This report will guide Regional Opportunity Initiatives, Inc. (ROI) in the implementation of education and workforce initiatives in the SWCI region. It is our hope that it will also serve to support others in our region, and beyond, in tailoring initiatives to meet the specific needs of the students, families, educators and employers who call Southwest Central Indiana home.

This report represents the results of data collected from two sources: quantitative analyses completed by Thomas P. Miller and Associates (TPMA) and a qualitative analysis conducted by ROI staff that entailed semi-structured interviews with advanced manufacturing leaders focusing on workforce needs. The information in this report is not a broad labor statistic survey. Rather, it is a first step in developing targeted strategies specific to the needs of employers in our 11-county region.

Advanced Manufacturing: A Thriving Sector in SWCI

The advanced manufacturing sector in Southwest Central Indiana is the largest and broadest of the three key industry sectors upon which the *Strategic Plan for Economic Community in Southwest Central Indiana* was built. Manufacturing accounts for 29,743, or nearly 20%, of all jobs in the region. ROI has narrowed the definition of advanced manufacturing to encompass those companies that specialize in automotive/heavy equipment manufacturing, food processing, and furniture manufacturing. With more than 13,000 jobs reported in 2016, these sub-sectors are critical to the overall health and growth of our region.

Both life sciences and the national security and defense sectors have concentrations of employers within relatively small geographic areas in SWCI, but draw employees from every county in the region. Advanced manufacturing has a broad reach in terms of employment as well, but is distinct in that some form of advanced manufacturing can be found in every county in the region. This diversity creates opportunity to find meaningful, relevant career options for individuals in SWCI.

What Makes Manufacturing Advanced?

The term advanced manufacturing is often used without clarity as to what separates the sector from any other form of manufacturing. Therefore, it is important to define the term as it is used by ROI and throughout this report:

“Advanced Manufacturing is a family of activities that (a) depend on the use and coordination of information, automation, computation, software, sensing, and networking, and/or (b) make use of cutting-edge materials and emerging capabilities... It involves both new ways to manufacture existing products and the manufacture of new products emerging from new advanced technologies.”

*-President’s Council of Advisors on Science and Technology
Report to the President on Ensuring American Leadership in
Advanced Manufacturing*

This definition captures the essence of our approach to this sector – advanced manufacturing is a broad term used to designate various types of production that may include multiple advanced inputs and/or new and advanced outputs.

For the purposes of this study, we have followed the lead outlined in the *Strategic Plan for Economic and Community Prosperity in Southwest Central Indiana* and are broadly classifying Southwest Central Indiana’s Advanced Manufacturing Sector into three distinct subsectors: Automotive/Heavy Equipment, Food Processing, and Furniture Manufacturing.



Automotive/Heavy Equipment



Food Processing

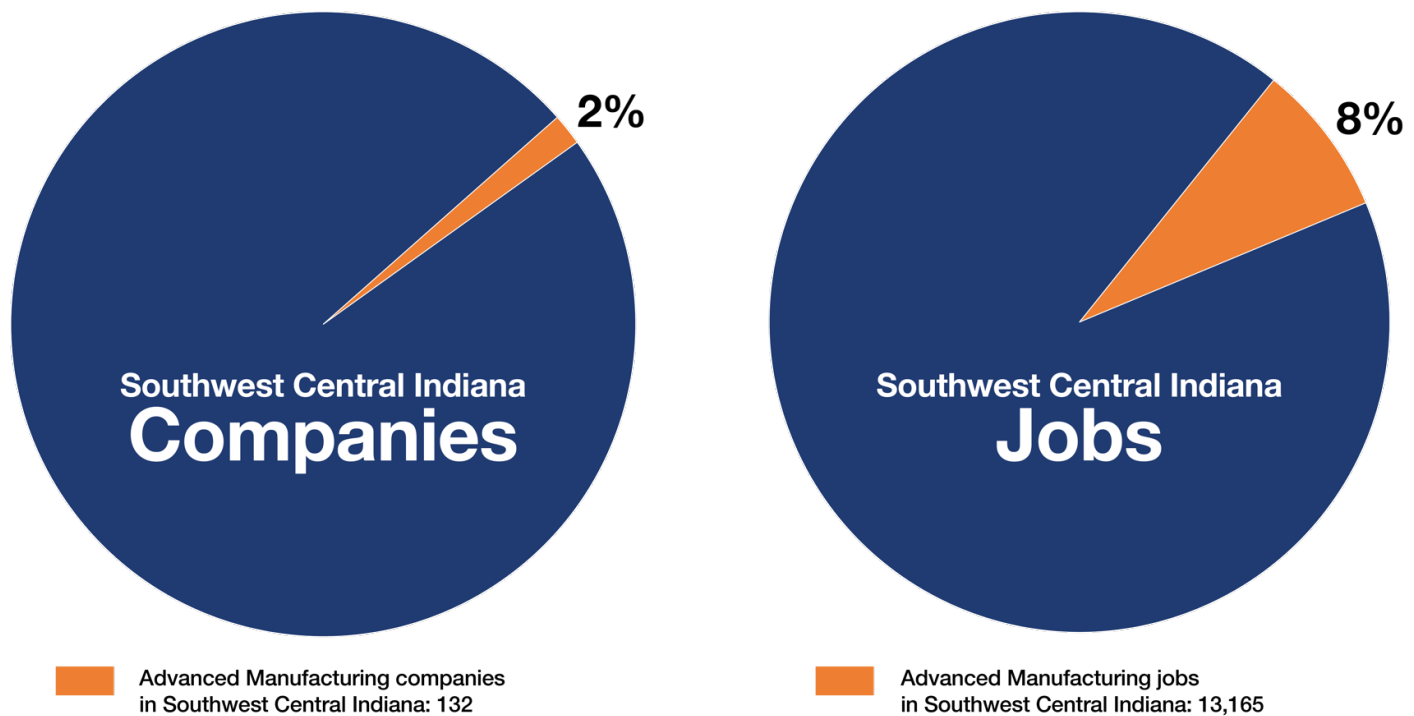


Furniture Manufacturing

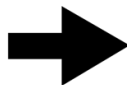
Figure 1: SWCI's Advanced Manufacturing Subsectors

The Role of Advanced Manufacturing in SWCI

To more deeply understand the Advanced Manufacturing Sector's education and workforce needs, it is important to contextualize the role of the Advanced Manufacturing Sector in the 11-county region.



Nearly one out of ten jobs in Southwest Central Indiana are found within an advanced manufacturing company.



This fact underscores the reality that the economic success and vitality of Southwest Central Indiana depends on a thriving and growing cluster of advanced manufacturing industries.

Figure 2 Density of Advanced Manufacturing Companies and Jobs in SWCI

It's important to note that these statistics do not consider the number of indirect jobs that exist because of Advanced Manufacturing establishments in the region. Extending these numbers to include suppliers and service providers would give a more accurate picture of the impact of the sector on the region. For the purposes of this report, however, focusing on the jobs and occupations within the sector is appropriate.

Data provided by Thomas P. Miller and Associates indicates that the overall sector will continue to grow at a modest rate in SWCI. Employers agreed with these estimates and indicated the growth will likely concentrate in high skill, high wage jobs required to operate, program, and maintain increasingly sophisticated manufacturing equipment.

Employers are concerned that as jobs become higher skilled and more technical SWCI may not have the qualified talent to meet the projected demand. For many advanced manufacturing employers in the region, this concern is already a reality. While there are many complex

reasons for the current lack of qualified talent, nearly all employers noted that a significant barrier is a misperception about the nature of the industry. Advanced manufacturing, unlike more traditional manufacturing, is not an industry of rote memorization and assembly-line production. Instead, it is a highly-sophisticated industry requiring employees who possess vast technological capabilities and an openness to continue learning as the industry rapidly evolves. Unfortunately, many people continue to confuse advanced manufacturing with the production facilities of the past.

Advanced Manufacturing's Three Sub-Sectors in SWCI

Southwest Central Indiana's Advanced Manufacturing Sector is complex due to the diversity of industry-types that fall within the sector. ROI has limited our definition of advanced manufacturing to refer to three specific sub-sectors that bring specialization to this region: Automotive/Heavy Equipment Manufacturing, Food Processing, and Furniture Manufacturing. The following maps show the distribution of jobs among the sub-sectors of Advanced Manufacturing in SWCI.¹

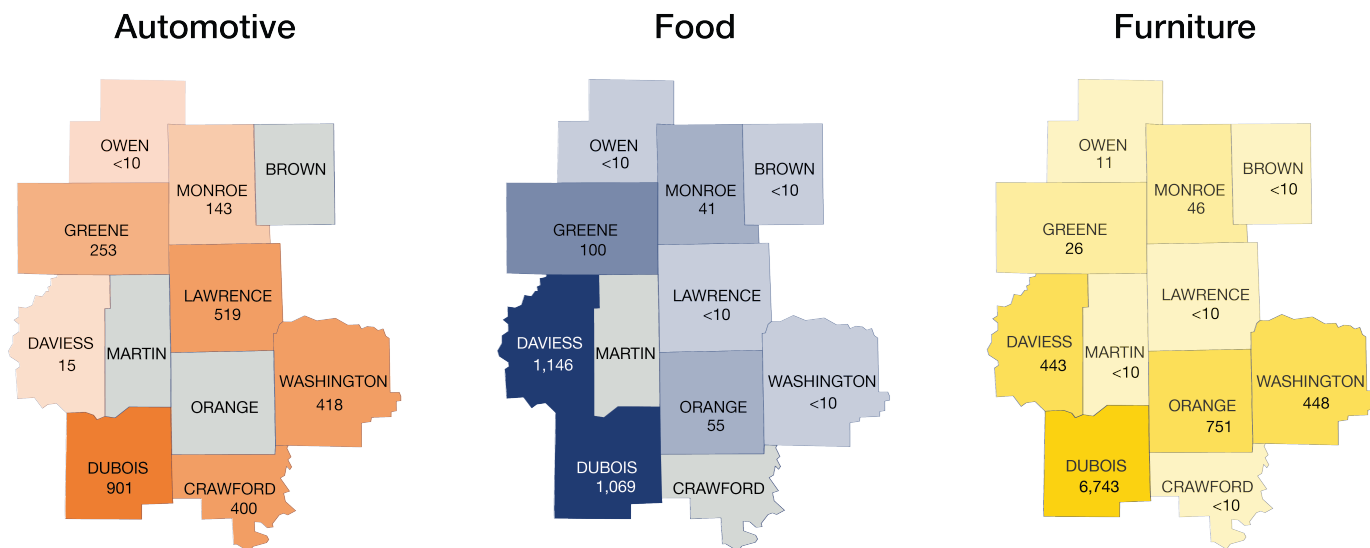


Figure 3: Distribution of Advanced Manufacturing Jobs in SWCI Subsectors

These three sub-sectors are not intended to represent the totality of manufacturing across SWCI. In fact, across the three subsectors, 13,165 individuals are employed. However, when we look at broader manufacturing across the region, 29,743 individuals work within the sector. The decision to focus on these three sub-sectors was driven in large part by their current specialization within the region and the competitive advantage that they bring to Southwest Central Indiana. Furthermore, employers have shared that the skills and knowledge required for automotive, food, and furniture manufacturing will well-equip individuals for success in a wide-range of manufacturing jobs.

¹In some instances, individual companies may not be represented in the county-level data because the Bureau of Labor Statistics has suppressed relevant information due to concerns of confidentiality.

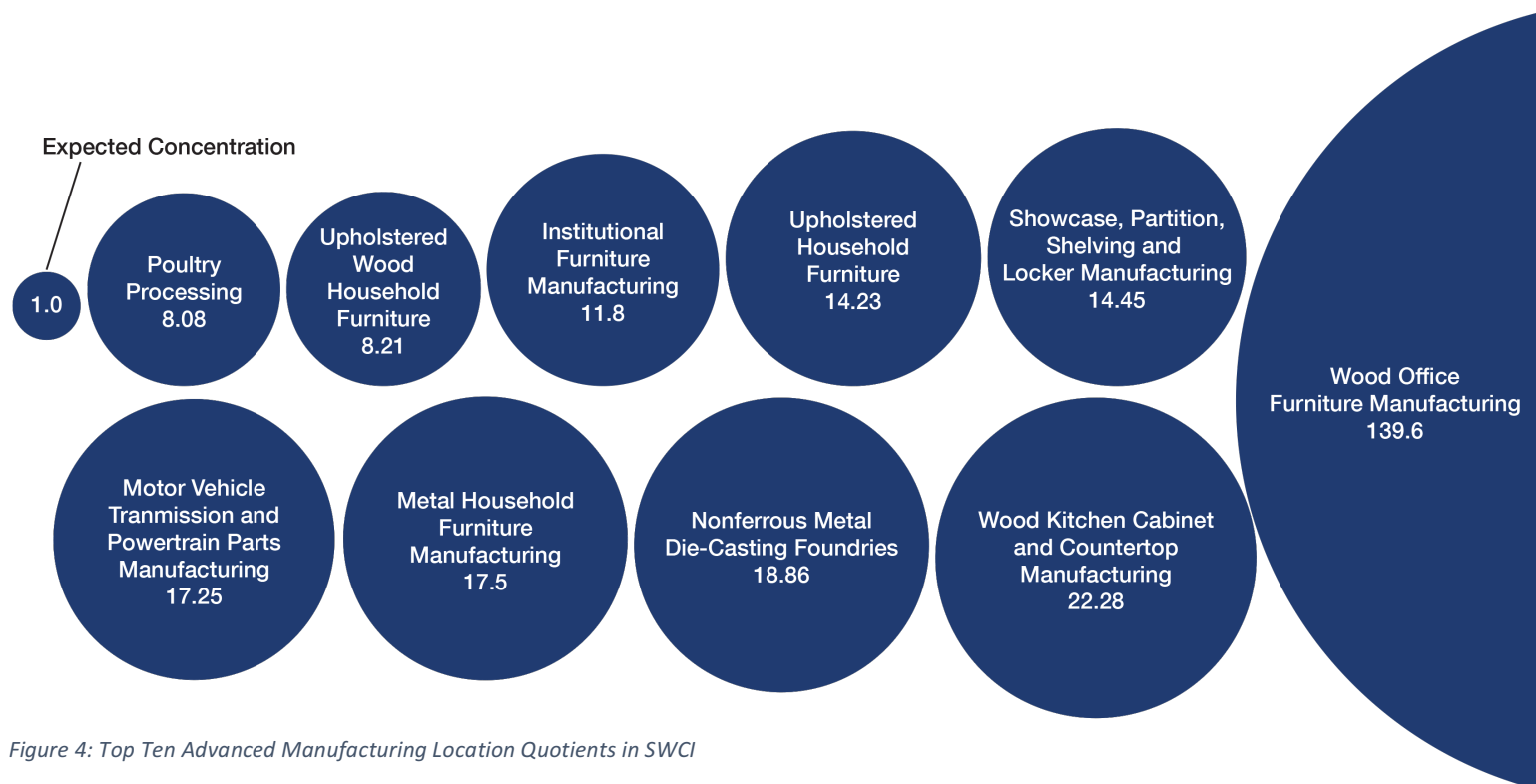


Figure 4: Top Ten Advanced Manufacturing Location Quotients in SWCI

One of the defining features common across all three sub-sectors is that each distinguishes Southwest Central Indiana as uniquely concentrated compared to the rest of the country. One method for measuring this concentration is an indicator called a location quotient. A location quotient is an economic indicator used to quantify the relative concentration of a specific industry, cluster, occupation, or demographic group in a region as compared to the nation. In general, a location quotient of 1.0 indicates that the concentration of given sector or sub-sector is equal to any other part of the country. A location quotient of 2 indicates that the region in question has twice the concentration than what might be expected. As Figure 4 shows, Southwest Central Indiana far exceeds the norm.

It is important to point out that all three sub-sectors, Furniture Manufacturing, Automotive/Heavy Equipment Manufacturing, and Food Processing, are represented within this chart, indicating that there is specialization within each of the region's sub-sectors when compared to the rest of the country. With such specialization comes jobs. As previously noted, the entire sector employs more than 13,000 individuals across the region. However, those jobs are not necessarily evenly allocated among industries or sub-clusters. Figure 5 below shows the number of jobs specific to the sub-sectors. Figure 6 displays the distribution of jobs among the 11 largest advanced manufacturing industry-types in SWCI.

13,165

Jobs in the Advanced Manufacturing Sector

- Automotive/Heavy Equipment Manufacturing
- Food Processing
- Furniture Manufacturing

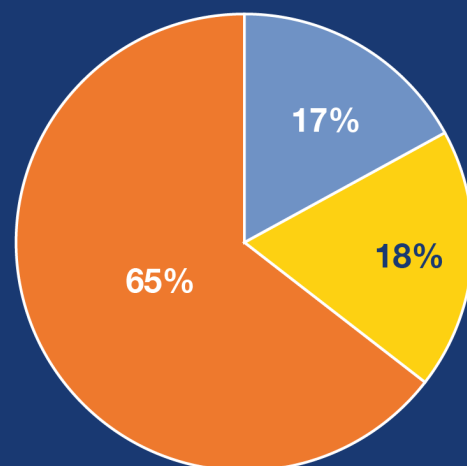


Figure 5: Distribution of Advanced Manufacturing Jobs by SWCI Subsector

Employment in the region ranges from 3,024 employed in the Wood Kitchen and Countertop Manufacturing to 10 in Motor Vehicle Gasoline Engine Manufacturing. Furthermore, furniture manufacturing as a sub-sector has nearly twice the number of jobs found in automotive manufacturing and food processing combined. This analysis indicates that while a broad sector or sub-sector approach is useful, it is important also to recognize that the advanced manufacturing industry base of Southwest Central Indiana is extremely specialized.

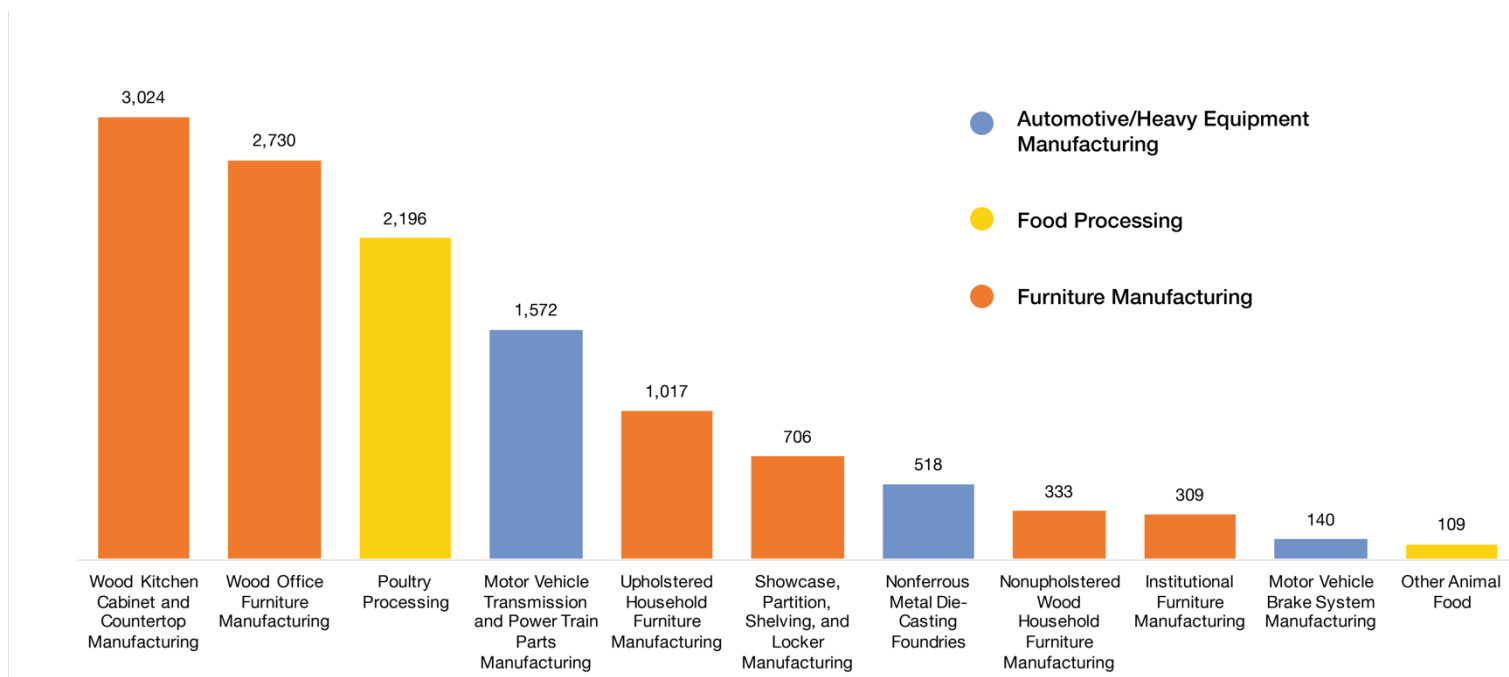


Figure 6: Advanced Manufacturing Jobs by Type in SWCI – Top 11 Job Types

To sustain and continue to grow the sector, a well-qualified and abundant workforce is essential. The key to developing such a workforce is a better understanding of the types of jobs currently available as well as the requisite skills sought by employers. However, the depth and breadth of advanced manufacturing employment in the region can create confusion regarding what is and is not categorized as advanced manufacturing and what relevant skills, degrees, certifications, and requirements are necessary for entry to the field.

Advanced Manufacturing Workforce and Education Needs in SWCI

The primary purpose of the ONA is to better understand Southwest Central Indiana's education and workforce needs. ROI staff members worked with Thomas P. Miller and Associates (TPMA) to conduct an extensive analysis of jobs in highest demand for advanced manufacturing in the region, including the knowledge, skills, and abilities (KSAs) that are needed for jobs in each sector and the degrees that are most marketable. Following are the most frequently occurring jobs, KSAs, degrees, and certificates needed for the Advanced Manufacturing Sector.

Difficult-to-Fill and In-Demand Manufacturing Jobs in SWCI

ROI staff interviewed 24 leaders from 20 organizations in Automotive/Heavy Equipment, Food Manufacturing, and Furniture Manufacturing in SWCI. **We asked these leaders which jobs they have the most difficulty filling:**

- Hydraulic Engineers
- CNC Operators
- CAD Related Positions
- Electrical Engineers
- Chemical Engineers
- Process Engineers
- Mechanical Engineers
- Maintenance Engineers
- Upholsterers
- Software Engineers
- Truck Drivers

When analyzing the Standard Occupational Classification (SOC), additional jobs can be identified as high demand for the Advanced Manufacturing Sector. This analysis was conducted utilizing the most prevalent job openings within the Advanced Manufacturing Sector. **We found the following jobs to be in highest demand:**

- Packers and Packagers, Hand
- Woodworking Machine Setters, Operators, and Tenders, Except Sawing
- Team Assemblers
- Laborers and Freight, Stock, and Material Movers, Hand
- Helpers--Production Workers
- Meat, Poultry, and Fish Cutters and Trimmers
- Furniture Finishers
- Inspectors, Testers, Sorters, Samplers, and Weighers
- Cabinetmakers and Bench Carpenters
- First-Line Supervisors of Production and Operating Workers

The jobs identified as highest in demand by the frequency of job postings are markedly different than the most difficult to fill jobs identified by employers. The defining difference between the two is that employers report difficulty filling jobs that are more technical and require more advanced training. Employers acknowledged that there is a great deal of turnover in the low-skill positions. One employer's comment may provide the rationale for this distinction. He noted that his company could find people for entry-level work, but there is a great deal of churn as people leave for other opportunities or do not persist because of work ethic related issues. It is more difficult, however, to find qualified talent in the more skilled positions that typically require some form of credential, certification, or degree. As a result, those kinds of positions are harder to fill.

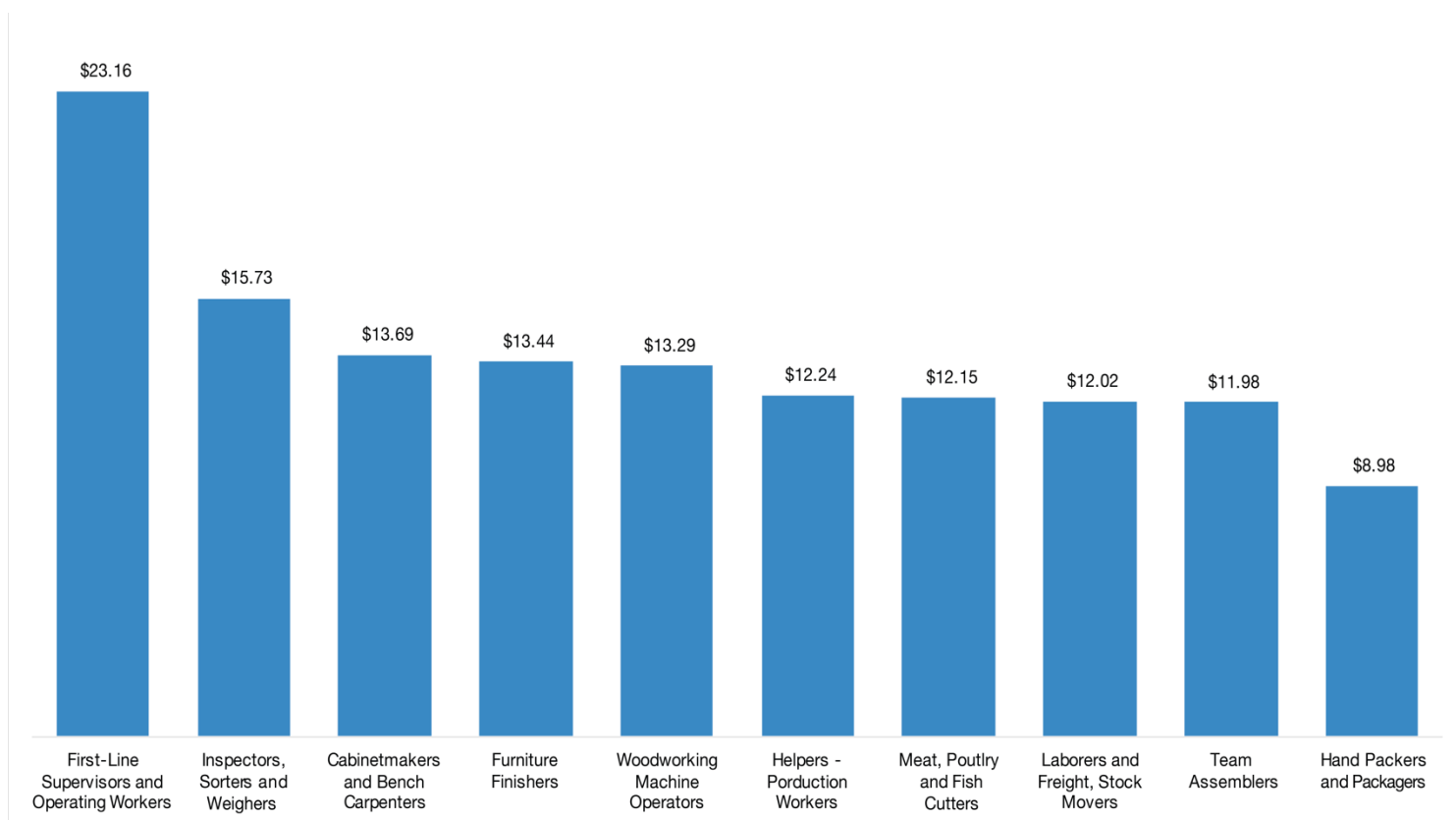


Figure 7: Median Hourly Earnings among In-Demand Advanced Manufacturing Jobs in SWCI (not including profits, benefits, or other compensation)

Knowledge, Skills, and Abilities of Advanced Manufacturing Occupations

The Advanced Manufacturing Sector needs skilled workers with mechanical aptitude. Increasingly, employers are finding people with some of the technical knowledge required, but lacking in what is generally referred to as soft skills or employability skills. We reviewed the top occupations in the Advanced Manufacturing Sector for our region and compiled a list of the top Knowledge, Skills, and Abilities (KSAs) required to be successful in each position. The word cloud in Figure 8 encompasses each of the KSAs, including soft skills, with those most frequently required in the largest font.

Most of the positions local employers struggle to hire for in the Advanced Manufacturing Sector are entry level positions. These jobs require basic mechanical skills and well developed soft skills including teamwork, communication, a strong work ethic, and the willingness to learn. Employers indicated that hundreds of these positions could be filled in the region immediately if candidates were available with these basic skills. Employers are willing and frequently do provide technical training for new hires provided the employee is equipped to work, willing to learn, and has mechanical or mathematical aptitude.



Figure 8: Knowledge, Skills and Abilities Needed to Be Successful in Advanced Manufacturing Occupations

Figure 9 details the KSAs required by each advanced manufacturing subsector. The automotive and furniture subsectors seek out employees with more technical and mechanical skills. Food processing is less technical, but communication and coordination are important.

Automotive	Food Processing	Furniture
<ul style="list-style-type: none"> • Electrical • Basic Math • General Maintenance • Mechanical • Tool and Dye • Welding • Robotics 	<ul style="list-style-type: none"> • Communication • Work Ethic • Work Independently • Hand-Eye Coordination • Basic Math 	<ul style="list-style-type: none"> • Problem Solving • Math & Technical • Creative Thinking • Communication • Mechanical • CNC Experience • Upholstery Experience

Figure 9: Top KSAs Required by SWCI Advanced Manufacturing Subsectors

One area not expressly identified in this list that became apparent through conversations with employers was the need for information technology skills across the sector. Employers indicated that entry level employees will need more technology skills in the future as the industry becomes more technical in nature. The employers are training the current staff as needs arise, but the next generation will need to have these skills prior to employment

Advanced Manufacturing Educational Opportunities

There are 27 public school districts in SWCI, graduating over 3,700 students each year. For many of these students, a career in advanced manufacturing is well within reach. Most of the in-demand jobs in the Advanced Manufacturing Sector do not require a post-secondary education. However, employers mentioned needing employees with some additional education for certain positions. Engineering, Computer Numerical Control (CNC) Operators, Computer Aided Design (CAD), and software engineers were all positions employers identified that require training beyond a high school diploma. One large furniture employer suggested the need for a “machinery-based” certification. They suggested that if a person had additional training, evidenced by a certificate; they would hire them. Despite the availability of entry level jobs with little or no postsecondary education, employers indicate that students are not transitioning into their facilities. The reasons for this are complex.

Educational pathways are critical to garnering interest and developing the skills of the region’s youth. Across SWCI, however, we simply do not have enough students enrolling in and completing pertinent pathway sequences. For instance, the Indiana Department of Workforce Development reported that only two students completed an advanced manufacturing pathway across the entire region. The table below represents pathway completers for the last four years:

Pathway	2013 Completed	2014 Completed	2015 Completed	2016 Completed
Advanced Manufacturing	0	0	0	2
Electrical	0	1	2	3
Electronics	0	7	6	7
Engineering	37	32	37	37
Entrepreneurship & Management, Business Management focus	22	14	9	2
Entrepreneurship & Management, Entrepreneurship focus	0	0	10	9
Heavy Equipment	0	0	0	3
HVAC	0	3	4	4
Logistics & Supply Chain	0	0	0	0
Machine Technology	0	0	0	0
Machine Tool	5	22	25	18
Mechanical	0	2	5	8
Networking	0	4	4	9
PC Support	2	0	0	7
Programming	0	4	10	9
Welding	33	48	60	63

Figure 10: Advanced Manufacturing High School Pathway Completions in SWCI

The relatively low number of students enrolling in and completing relevant pathways is perplexing given the critical role these pathways play in supporting the Advanced Manufacturing Sector. However, in talking with our education partners, the complexities that underlie the data become more apparent. For instance, the value of a career in advanced manufacturing is not clearly communicated to students and parents. Often, teachers and

counselors are also unaware of the breadth of opportunity and the types of skills necessary for success. Additionally, many people have dated perceptions of the opportunities offered by Advanced Manufacturing and of the work environment in most facilities. Addressing these misconceptions will require a concerted effort among industry, educators, and community.

Most employers reported little to no contact with secondary and post-secondary institutions. Small to medium sized employers often lack the personnel to initiate or maintain relationships with education partners. Employers reported that most secondary institutions do not often initiate collaboration – something the employers would welcome. Additionally, employers indicate that their involvement with the Career and Technical Education Centers (CTE) was not as deep as they would like and employers reported a feeling of restricted access to local schools. Most felt that building a more cooperative approach must be a high priority for both groups – employers and educators.

“Teacher Boot Camps” in some communities have been successful in allowing local educators an opportunity to experience jobs in the sector and report back to their peers and students. Some employers have relationships with post-secondary institutions (primarily Ivy Tech and Vincennes University), but most feel a more significant opportunity could exist if the educational institutions could be more flexible with their offerings.

Employers have had some engagement with high school-based internships, Jobs for America’s Graduates (JAG), and the Vincennes Career Advancement Partnerships (CAP), but the results have been mixed. They see a significant opportunity for internships and co-ops within the region. The most successful collaborations have been with the Conexus Internship Program. All previous employer participants would continue, even having to pay half the cost of the Conexus interns. However, there are not enough students enrolling in and completing this program. The course work is completed online and students lose interest as evidenced by the completion data for the high school advanced manufacturing pathway mentioned previously.

Credentials Needed for Advanced Manufacturing Jobs

Many of the jobs identified as difficult to fill by employers require little more than a high school diploma. In many cases, certifications and industry-recognized credentials are just as relevant as traditional degrees. In particular, Information Technology, Mechanical Engineering, Maintenance Engineering, Welding, and Computer Numerical Control (CNC) are the degrees/certifications that employers most needed. Employers felt there was a bias at the

“Most people have the perception that factories are dingy and sweltering hot. We need to change that idea and educate them about the technical skills required in this industry.”

secondary school level toward career choices that require a four-year degree. They indicated that more needs to be done to encourage teachers, counselors, and administrators to provide students with multiple options for education and career choices. A stigma still exists around career and technical education and many parents are not supportive of an educational pathway that does not include a four-year degree. Families, students, and educators need better information about the many options for success in the Advanced Manufacturing Sector at different levels of educational attainment.

Highlights from Interviews with Advanced Manufacturing Employers

ROI Sector Specialists conducted interviews with advanced manufacturing employers from across the region. Twenty-four leaders from 20 organizations in the Advanced Manufacturing Sector participated in these interviews. Following are some of the highlights captured regarding the region, workforce, and education. The comments reflect both regional strengths and opportunities for improvement.

Location Strengths and Challenges

The Advanced Manufacturing Sector is well represented in the region and is comprised of a relatively diverse number of industries. For many of the companies producing commodities transported elsewhere, the location is ideally located between the major hubs of Chicago, Indianapolis, St. Louis, and Louisville. Furthermore, the development of new terrain I-69 links the region more efficiently to Indianapolis. Some of the rural companies report difficulty with transportation and infrastructure. The development of more affordable workforce housing and basic infrastructure like broadband could help attract more employees to the region and to local companies. Employers communicated the importance of addressing quality of life issues as a tool for retaining the talent we produce and attracting new talent.

Workforce Strengths and Challenges

We asked employers to describe their workforce strengths and challenges, attraction and retention tools, the competitive nature of the talent pool, and future workforce needs.

Because there are several advanced manufacturing companies in SWCI, there is often a certain level of experience coming onto the market as employees transfer from one employer to another. Employers desperately want to hold on to this talent especially if employees display a

“Being in this region restricts our business growth. We struggle to find people with the skill sets we need.”

strong work ethic.

Employee interviews revealed common workforce strengths in the sector:

- Work ethic of long-term staff,
- Dedication of long-term staff, and
- Loyalty.

Opportunities for development, or pain points, as mentioned in employer interviews identify common work-ethic skills that are lacking including, communication, dependability, adaptability, self-motivation, positive attitude, and honesty. Employers suggest these skills should be woven into the curriculum at schools and career centers. Employers report difficulty in getting employees simply to show up to work. Many companies are offering attendance bonuses to incentivize newer employees to be on the job.

When asked about the pain points with employees, we heard:

- Attendance issues leading to termination,
- Drug issues becoming more prevalent,
- Poor communication skills,
- Cell phones distracting productivity,
- Aging workforce, and
- Loss of quality talent as skills advance, often to defense employers.

Employers indicated that many of the challenges that were identified could be addressed through a meaningful approach to work ethic training. They saw partnerships with local K-12 providers as a key avenue for delivering this training.

Future Employer Needs

The employers interviewed had differing perspectives regarding the top priority for the regional educational and workforce initiatives. Many expressed a need for younger employees with a higher skill set coming out of high school or certification programs. Nearly all commented that the focus should be on high school and middle school students, careers available locally, and the skills needed for employment in SWCI careers. Figure 11 provides excerpts from employer interviews.

“Once an employee learns the skills they need, they become a valuable asset to our company.”



Figure 11: Strategies Employers Identified to Support the Advanced Manufacturing Sector in SWCI

Conclusion

ALIGNED SWCI READY

SCHOOLS.
COMMUNITIES.
EMPLOYERS.

The information compiled in this report reflects the need for an industry-driven approach to creating a local, sustainable workforce. The Advanced Manufacturing Sector in SWCI is strong and will continue to grow and evolve in the coming years. Armed with the right skills and abilities, individuals across SWCI have many great opportunities to succeed in an advanced manufacturing career. As a region, we must strive to make these opportunities known and better align our education and training programs with the needs of employers.

Working together – industry, education, and community – we can prepare SWCI for outcomes that heretofore have not been achieved or achievable. An aligned Southwest Central Indiana can ensure the prosperity this region’s assets tell us is possible.

Appendix

Quantitative Data Collection

The quantitative data was collected by TPMA. It examines industries, occupations, and real-time job postings in the Advanced Manufacturing Sector in Southwest Central Indiana. The purpose of the quantitative analysis is to augment the qualitative data obtained through the employer interviews and to provide a foundation for discussion of occupation and skill needs in the region. To collect this data, TPMA used the North American Industry Classification System (NAICS) and the Standard Occupation Classification (SOC) systems, both of which are standard data collection systems used by all statistical gathering agencies of the federal government. NAICS is used by federal statistical agencies to classify business establishments for collecting, analyzing, and publishing data related to U.S. businesses. Similarly, the SOC system is used by federal agencies to classify workers into occupational categories for the purposes of collecting, calculating, and disseminating data.

The industries in the Advanced Manufacturing Sector were originally identified in the *Strategic Plan for Economic and Community Prosperity in Southwest Central Indiana*, which was completed by Batelle's Technology Partnership Practice in June 2014.

Except where otherwise indicated, TPMA used EMSI Analyst, data version 2016.2, to gather information on education outcomes and occupation openings in Southwest Central Indiana. EMSI uses data from the national Integrated Postsecondary Education Data System (IPEDS) database, which is published by the U.S. Department of Education's National Center for Education Statistics. IPEDS organizes this data into a taxonomy called the Classification of Instructional Programs (CIP) system. EMSI uses the CIP system to create program-to-occupation crosswalks, which map programs of study to occupations and reveal one measure of education supply-and-demand. There are limitations to the IPEDS data. For one, the most recent completion data available is 2015. Additionally, the National Center for Education Statistics collects data from postsecondary education institutions. Thus, the data and this analysis do not account for training programs provided by non-postsecondary education institutions. Further, in recent years Ivy Tech has moved away from reporting regional campus-level data to IPEDS and only reports data for the system statewide.

Qualitative Data Collection

Thirty organizations from the Advanced Manufacturing Sector were invited to participate in the qualitative component of ONA. The selected organizations were chosen based on size, county location, and industry type. The goal of the selection process was to ensure a balance among participating organizations reflective of the composition of the advanced manufacturing employers in the region. The final participant count included 20 organizations and 24 leaders in those organizations. These manufacturers ranged from companies from 2 -112 years old. The average time in business was 51 years. Following is the breakdown of how long the organizations have been established:

- 80% have been established 20 years or longer
- 15% have been established 10-19 years
- 5% have been established less than 10 years

Seventy-five percent of the participating organizations were privately owned.

Most of the organizations were local to the region.

- 70% of the businesses were locally owned.
- 30% were headquartered outside of the region; including Indianapolis, Michigan, Iowa, Florida and the United Kingdom.

The number of employees for the participating organizations ranged from 16-2000 workers.

The breakdown is as follows:

- 25% had 1-99 employees
- 30% had 100-249 employees
- 15% had 250-499 employees
- 30% had 500+ employees

A Note on KSAs

Knowledge, skills, and abilities are used to measure qualities that will set one candidate apart from another. Per the U.S Office of Personnel Management, knowledge is a body of information applied directly to the performance of a function. Skill is an observable competence to perform a learned psychomotor activity. Ability is the power to perform an observable activity. KSAs are sometimes referred to as competencies.

KSA for Key Occupations in Advanced Manufacturing Per SOC Codes

Key occupations are among the top ten most prevalent occupations in terms of number of jobs within the cluster.

Team Assemblers

Occupation Description	Sample Job Titles	Entry Level Education and Median Hourly Earnings
Work as part of a team having responsibility for assembling an entire product or component of a product. Team assemblers can perform all tasks conducted by the team in the assembly process and rotate through all or most of them rather than being assigned to a specific task on a permanent basis. May participate in making management decisions affecting the work. Includes team leaders who work as part of the team.	Assembler, Assembly Associate, Assembly Line Machine Operator, Assembly Line Worker, Assembly Operator, Certified Composites Technician (CCT), Fabricator, Machine Operator, Operator Technician, Production Associate	HS Diploma \$11.98/hour
Top Knowledge Required	Top Abilities Required	Top Skills Required
Production and Processing Education and Training English Language Engineering and Technology Mathematics	Coordination Speaking Critical Thinking Monitoring Writing	Oral Comprehension Multi-limb Coordination Information Ordering Oral Expression Control Precision

Cabinetmakers and Bench Carpenters

Occupation Description	Sample Job Titles	Entry Level Education and Median Hourly Earnings
Cut, shape, and assemble wooden articles or set up and operate a variety of woodworking machines, such as power saws, jointers, and mortisers to surface, cut, or shape lumber or to fabricate parts for wood products.	Cabinet Assembler, Cabinet Builder, Cabinet Installer, Cabinetmaker, Cutter, Double End Tenon Operator, Frame Builder, Framing, Machine Operator, Woodworker	HS Diploma \$13.69/hour
Top Knowledge Required	Top Abilities Required	Top Skills Required
Building and Construction Design Mechanical Production and Processing Engineering and Technology	Quality Control Analysis Operation Monitoring Monitoring Critical Thinking Time Management	Finger Dexterity Visualization Manual Dexterity Arm-Hand Steadiness Near Vision

Woodworking Machine Setters, Operators, and Tenders, Except Sawing

Occupation Description	Sample Job Titles	Entry Level Education and Median Hourly Earnings
Set up, operate, or tend woodworking machines, such as drill presses, lathes, shapers, routers, sanders, planers, and wood nailing machines. May operate CNC equipment.	Boring Machine Operator, Cabinet Maker, Computer Numerical Control Operator (CNC Operator), Knot Saw Operator, Lathe Operator, Machine Operator, Molder Operator, Router Operator, Sander, Sander Operator	HS Diploma \$13.29/hour
Top Knowledge Required	Top Abilities Required	Top Skills Required
Mechanical Mathematics Production and Processing Education and Training Building and Construction	Operation Monitoring Operation and Control Equipment Maintenance Troubleshooting Quality Control Analysis	Reaction Time Visualization Control Precision Selective Attention Oral Comprehension

Meat, Poultry, and Fish Cutters and Trimmers

Occupation Description	Sample Job Titles	Entry Level Education and Median Hourly Earnings
Use hand or hand tools to perform routine cutting and trimming of meat, poultry, and seafood.	Breast Trimmer, De-Boner, Meat Cutter, Trimmer, Wing Scorer	HS Diploma \$12.15/hour
Top Knowledge Required	Top Abilities Required	Top Skills Required
Mechanical Mathematics Production and Processing Education and Training Building and Construction	Critical Thinking Monitoring Speaking Active Listening Time Management	Speech Recognition Oral Expression Oral Comprehension Problem Sensitivity Trunk Strength

Furniture Finishers

Occupation Description	Sample Job Titles	Entry Level Education and Median Hourly Earnings
Shape, finish, and refinish damaged, worn, or used furniture or new high-grade furniture to specified color or finish.	Finish Repair Worker, Furniture Finisher, Furniture Repairer, Hand Sander, Lacquer Sprayer, Sander, Sealer Sander, Sprayer, Stain Wiper, Utility Spray Operator	HS Diploma \$13.44/hour
Top Knowledge Required	Top Abilities Required	Top Skills Required
Mechanical Public Safety and Security Education and Training Chemistry	Monitoring Critical Thinking Time Management Operation and Control	Visualization Near Vision Manual Dexterity Visual Color Discrimination

First-Line Supervisors of Production and Operating Workers

Occupation Description	Sample Job Titles	Entry Level Education and Median Hourly Earnings
Directly supervise and coordinate the activities of production and operating workers, such as inspectors, precision workers, machine setters and operators, assemblers, fabricators, and plant and system operators.	Assembly Supervisor, Department Manager, Manufacturing Supervisor, Molding Supervisor, Plant Manager, Production Manager, Production Supervisor, Shift Supervisor, Supervisor, Team Leader	HS Diploma \$23.16/hour
Top Knowledge Required	Top Abilities Required	Top Skills Required
Mechanical Production and Processing Engineering and Technology Administration and Management Computers and Electronics	Management of Personnel Resources Critical Thinking Time Management Coordination Speaking	Oral Expression Deductive Reasoning Oral Comprehension Written Expression Written Comprehension

Laborers and Freight, Stock and Materials Movers, Hand

Occupation Description	Sample Job Titles	Entry Level Education and Median Hourly Earnings
Manually move freight, stock, or other materials or perform other general labor. Includes all manual laborers not elsewhere classified.	Dock Worker, Laborer, Line Tender, Loader, Material Handler, Merchandise Pickup/Receiving Associate, Receiver, Receiving Associate, Shipping and Receiving Materials Handler, Warehouse Worker	HS Diploma \$12.02/hour
Top Knowledge Required	Top Abilities Required	Top Skills Required
Mathematics Transportation Mechanical Production and Processing English Language	Coordination Operation and Control Operation Monitoring Reading Comprehension Critical Thinking	Static Strength Multilimb Coordination Trunk Strength Extent Flexibility Near Vision

Packers and Packagers, Hand

Occupation Description	Sample Job Titles	Entry Level Education and Median Hourly Earnings
Pack or package by hand a wide variety of products and materials.	Bagger, Inspector Packer, Mini Shifter, Pack Out Operator, Packager, Packer, Picker and Packer, Sacker, Selector Packer, Shipping Clerk	HS Diploma \$8.98/hour
Top Knowledge Required	Top Abilities Required	Top Skills Required
Customer and Personal Service Administration and Management English Language Production and Processing Education and Training	Monitoring Critical Thinking Speaking Coordination Reading Comprehension	Manual Dexterity Trunk Strength Static Strength Oral Expression Extent Flexibility

Helpers – Production Workers

Occupation Description	Sample Job Titles	Entry Level Education and Median Hourly Earnings
Set up, operate, or tend machines to saw, cut, shear, slit, punch, crimp, notch, bend, or straighten metal or plastic material	Die Setter, Fabrication Operator, Machine Operator, Machine Setter, Operator, Press Operator, Punch Press Operator, Saw Operator, Set-Up Operator, Slitter Operator	HS Diploma \$12.24/hour
Top Knowledge Required	Top Abilities Required	Top Skills Required
Production and Processing Mechanical Mathematics English Language Education and Training	Operation Monitoring Operation and Control Monitoring Coordination Reading Comprehension	Control Precision Trunk Strength Static Strength Near Vision Manual Dexterity

Inspectors, Testers, Sorters, Samplers and Weighers

Occupation Description	Sample Job Titles	Entry Level Education and Median Hourly Earnings
Inspect, test, sort, sample, or weigh nonagricultural raw materials or processed, machined, fabricated, or assembled parts or products for defects, wear, and deviations from specifications. May use precision measuring instruments and complex test equipment.	Inspector, Picker / Packer, Quality Assurance Auditor, Quality Assurance Inspector, Quality Assurance Technician, Quality Auditor, Quality Control Inspector, Quality Control Technician, Quality Inspector, Quality Technician	HS Diploma \$15.73/hour
Top Knowledge Required	Top Abilities Required	Top Skills Required
Production and Processing Mathematics English Language Education and Training Computers and Electronics	Critical Thinking Monitoring Quality Control Analysis Active Listening Operation Monitoring	Oral Comprehension Oral Expression Near Vision Written Comprehension Category Flexibility

Computer-Controlled Machine Tool Operators, Metal and Plastic

Occupation Description	Sample Job Titles	Entry Level Education and Median Hourly Earnings
Operate computer-controlled machines or robots to perform one or more machine functions on metal or plastic work pieces.	Computer Numerical Control Lathe Operator (CNC Lathe Operator); Computer Numerical Control Machine Operator (CNC Machine Operator); Computer Numerical Control Machinist (CNC Machinist); Computer Numerical Control Mill Operator (CNC Mill Operator); Computer Numerical Control Operator (CNC Operator); Computer Numerical Control Set-Up and Operator (CNC Set-Up and Operator); Machine Operator; Machine Set-Up, Operator; Machinist	HS Diploma \$17.80/hour
Top Knowledge Required	Top Abilities Required	Top Skills Required
Mechanical Mathematics Design Computers and Electronics Engineering and Technology	Near Vision Arm-Hand Steadiness Hearing Sensitivity Problem Sensitivity Reaction Time	Operation Monitoring Monitoring Critical Thinking Quality Control Analysis Operation and Control

Industrial Machinery Mechanics

Occupation Description	Sample Job Titles	Entry Level Education and Median Hourly Earnings
Repair, install, adjust, or maintain industrial production and processing machinery or refinery and pipeline distribution systems.	Fixer, Industrial Machinery Mechanic, Industrial Mechanic, Loom Fixer, Machine Adjuster, Maintenance Mechanic, Maintenance Technician, Master Mechanic, Mechanic, Overhauler	Post-Secondary Certificate \$23.89/hour
Top Knowledge Required	Top Abilities Required	Top Skills Required
Mechanical Engineering and Technology Production and Processing English Language Mathematics	Arm-Hand Steadiness Manual Dexterity Control Precision Finger Dexterity Multilimb Coordination	Equipment Maintenance Repairing Operation Monitoring Troubleshooting Operation and Control

Electronics Engineers, Except Computer

Occupation Description	Sample Job Titles	Entry Level Education and Median Hourly Earnings
Research, design, develop, or test electronic components and systems for commercial, industrial, military, or scientific use employing knowledge of electronic theory and materials properties. Design electronic circuits and components for use in fields such as telecommunications, aerospace guidance and propulsion control, acoustics, or instruments and controls.	Design Engineer, Electronics Design Engineer, Engineering Manager, Evaluation Engineer, Integrated Circuit Design Engineer (IC Design Engineer), Product Engineer, Radio Frequency Engineer (RF Engineer), Research and Development Engineer (R&D Engineer), Test Engineer, Test Engineering Manager	Bachelor's Degree \$47.10/hour
Top Knowledge Required	Top Abilities Required	Top Skills Required
Computers Engineering and Technology Mathematics Physics Design	Written Comprehension Written Expression Oral Comprehension Problem Sensitivity Visualization	Reading Comprehension Complex Problem Solving Writing Active Listening Speaking



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