

# MISSOURI MANUFACTURING AND MACHINE TOOL LABOR SKILLS STUDY

*Data and Analysis on Manufacturing and Machining Skills and Employment in  
the State of Missouri*

**Prepared For:**

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## Purpose of Report

State Technical College of Missouri (StateTech) is a two-year community college located in Linn, Missouri. While located in Linn, StateTech is tasked with providing workforce training tied to employment throughout the entire state of Missouri. Because of StateTech's important statewide mission to ensure that Missouri residents are equipped with the skills and competencies needed to enter employment in technical occupations, WorkED Consulting, LLC, of Burke, Virginia, was hired to provide a report on projected skills, competencies, and training needed by precision manufacturing employers who employ machinists and other related occupations. Specifically, this study is focused on answering the following strategic questions:

1. What precision manufacturing-related occupations, e.g. Machinists, Tool and Die Makers, are projected to grow in the state of Missouri and what skills, occupations, and education levels are tied to those occupations?
2. What levels of education and training and credentials are most valued and in-demand by precision manufacturing employers?

By answering these two key questions, StateTech can develop a strategic approach to developing and delivering precision manufacturing training programs and ensuring that students are receiving the skills, competencies, and credentials most needed by Missouri employers. This report seeks to answer those questions and presents a list of findings for consideration by StateTech.

Sources of information for this report include the Missouri Economic Research and Information Center (MERIC), EMSI, and O\*NET.

## Section 1: Precision Manufacturing Occupational and Skills Projections

### INTRODUCTION

To conduct a growth analysis of occupations, StateTech identified both the industries related to machining, by NAICS, and the occupations related to machining, by SOC. These include the following:

NAICS Code	Industry Name
332200	Cutlery and Handtool Manufacturing
332700	Machine Shops, Turned Product, and Screw, Nut, and Bolt Manufacturing
332710	Machine Shops
332720	Turned Product and Screw, Nut, and Bolt Manufacturing
333200	Industrial Machinery Manufacturing
333600	Engine, Turbine, and Power Transmission Equipment Manufacturing
336400	Aerospace Product and Parts Manufacturing

**Table 2: Machining Occupations by SOC**

<b>SOC</b>	<b>Occupation Name</b>
51-2041	Structural Metal Fabricators and Fitters
51-2090	Miscellaneous Assemblers and Fabricators
51-2092	Team Assemblers
51-3090	Miscellaneous Food Processing Workers
51-4000	Metal Workers and Plastic Workers
51-4011	Computer-Controlled Machine Tool Operators, Metal and Plastic
51-4021	Extruding and Drawing Machine Setters, Operators, and Tenders, Metal and Plastic
51-4022	Forging Machine Setters, Operators, and Tenders, Metal and Plastic
51-4023	Rolling Machine Setters, Operators, and Tenders, Metal and Plastic
51-4030	Machine Tool Cutting Setters, Operators, and Tenders, Metal and Plastic
51-4031	Cutting, Punching, and Press Machine Setters, Operators, and Tenders, Metal and Plastic
51-4032	Drilling and Boring Machine Tool Setters, Operators, and Tenders, Metal and Plastic
51-4033	Grinding, Lapping, Polishing, and Buffing Machine Tool Setters, Operators, and Tenders, Metal and Plastic
51-4034	Lathe and Turning Machine Tool Setters, Operators, and Tenders, Metal and Plastic
51-4035	Milling and Planing Machine Setters, Operators, and Tenders, Metal and Plastic
51-4052	Pourers and Casters, Metal
51-4060	Model Makers and Patternmakers, Metal and Plastic
51-4061	Model Makers, Metal and Plastic
51-4062	Patternmakers, Metal and Plastic
51-4070	Molders and Molding Machine Setters, Operators, and Tenders, Metal and Plastic
51-4072	Molding, Coremaking, and Casting Machine Setters, Operators, and Tenders, Metal and Plastic
51-4081	Multiple Machine Tool Setters, Operators, and Tenders, Metal and Plastic
51-4190	Miscellaneous Metal Workers and Plastic Workers
51-4192	Layout Workers, Metal and Plastic
51-4194	Tool Grinders, Filers, and Sharpeners

51-4199	Metal Workers and Plastic Workers, All Other
51-6090	Miscellaneous Textile, Apparel, and Furnishings Workers
51-6091	Extruding and Forming Machine Setters, Operators, and Tenders, Synthetic and Glass Fibers
51-8000	Plant and System Operators
51-8090	Miscellaneous Plant and System Operators
51-9022	Grinding and Polishing Workers, Hand
51-9023	Mixing and Blending Machine Setters, Operators, and Tenders
51-9030	Cutting Workers
51-9032	Cutting and Slicing Machine Setters, Operators, and Tenders
51-9041	Extruding, Forming, Pressing, and Compacting Machine Setters, Operators, and Tenders
51-9190	Miscellaneous Production Workers
51-9195	Molders, Shapers, and Casters, Except Metal and Plastic
51-9196	Paper Goods Machine Setters, Operators, and Tenders
51-4012	Computer Numerically Controlled Machine Tool Programmers, Metal and Plastic
49-9044	Millwrights
51-4041	Machinists
51-4111	Tool and Die Makers

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## MANUFACTURING INDUSTRY COMPOSITION

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### MANUFACTURING OVERVIEW

According to the Missouri Economic Research and Information Center (MERIC), Manufacturing contributed over \$35 billion, or 12.5 percent, towards the 2014 Gross State Product. Manufacturing supports 255,831 direct jobs at an average wage of \$55,091. Missouri is slightly more concentrated in manufacturing than the nation where production represents 12.1 percent of the U.S. economy.<sup>1</sup>

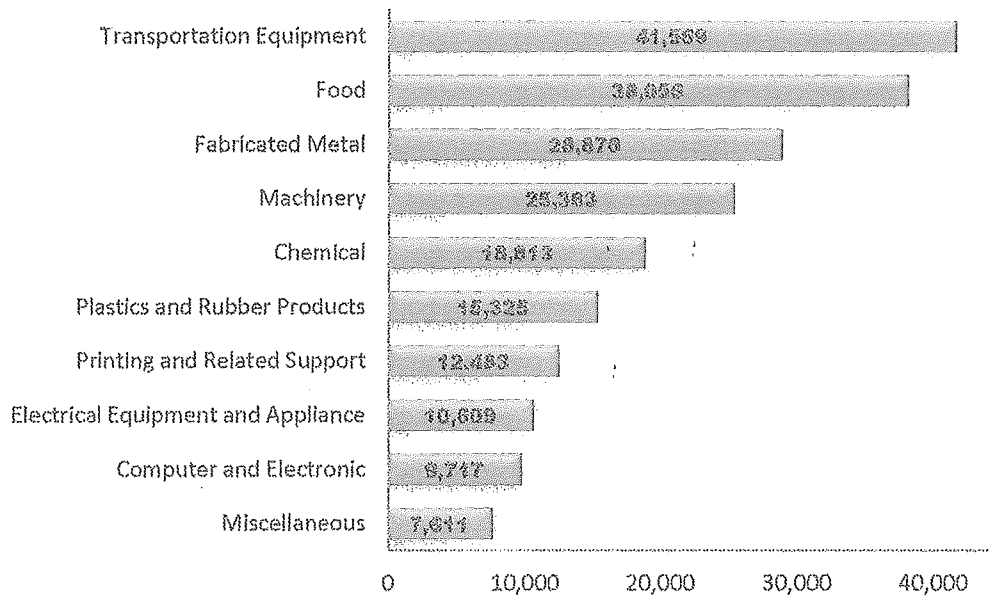
MERIC reports that Missouri is home to 6,482 manufacturing firms, which collectively employ 255,831 workers. Manufacturing employment represents 11.4 percent of the total employment in Missouri. Manufacturing wages for 2014 totaled over \$14 billion. The average production facility had 39 employees.

Of particular interest, is the contribution of machining-related employment within the manufacturing sector. Figure 1 displays industry employment within manufacturing.

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<sup>1</sup> Missouri Economic Indicator Brief: *Manufacturing Industries*. Found at [https://www.missourieconomy.org/pdfs/2014\\_manufacturing\\_brief.pdf](https://www.missourieconomy.org/pdfs/2014_manufacturing_brief.pdf)

**Figure 1: 2014 Employment by Top 10 Manufacturing Industries**

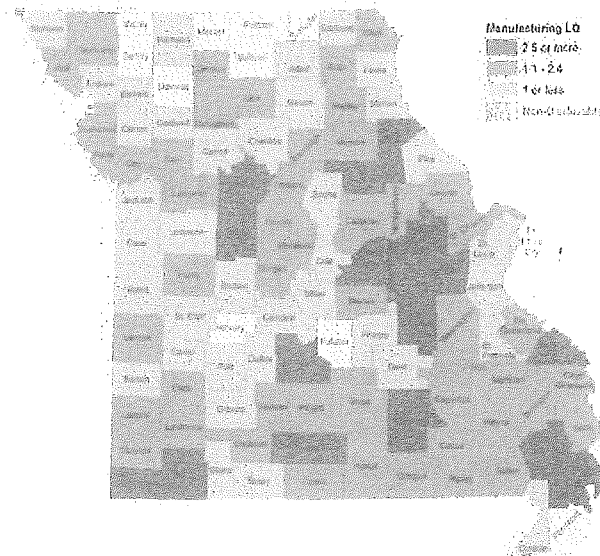


Source: MERIC Missouri Economic Indicator Brief: Manufacturing Industries

**REGIONAL COMPETITIVENESS**

Location Quotient (LQ) measures relative employment concentration<sup>2</sup> and serves as a barometer of where to focus training resources regionally in order to support manufacturing and machining employment in the state of Missouri. According to MERIC, the overall Missouri LQ in 2014 was 1.09, which means that manufacturing has a greater share of workers in Missouri than the United States as a whole.<sup>3</sup> Figure 2, developed by MERIC, shows the LQ in manufacturing, by county.

**Figure 2: Manufacturing Concentration in Missouri**



<sup>2</sup> A LQ above 1 indicates employment concentration is higher than the national average.

<sup>3</sup> Ibid.

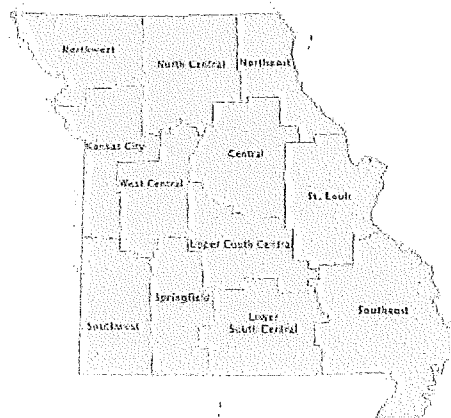
Figure 2 demonstrates that StateTech has certain locations within the state that, based on industry concentration only, presents initial areas of strategic focus. Generally, the central and eastern-central areas of Missouri have high LQs, as well as the southwestern portion of the state and the southeastern part of the state. When looking at population centers, the counties west of St. Louis likely present the most opportunity given the high LQ of that area in combination with a higher concentration of people.

Another tool developed by MERIC that assists in better focusing on areas of Missouri where the manufacturing sector plays a critical role in the regional economy is the *Pattern Analysis Reports* that have been issued. While developed in 2010, the Pattern Analysis Reports are still relevant, and have been developed by MERIC to “summarize two important patterns in a region’s economic core:

- Spot Strengths of large sector employment, typically in one or two firms, and
- Core Clusters of employment across a mix of similar or linked industries.”<sup>4</sup>

The Pattern Analysis Reports use twelve economic regions in Missouri:

1. Central
2. Kansas City
3. Lower South Central
4. North Central
5. Northeast
6. Northwest
7. Southeast
8. Southwest
9. Springfield
10. St. Louis
11. Upper South Central
12. West Central



Taking the 12 regional Reports, Table 3 provides a summary of more specific regional manufacturing activities for StateTech to use as an indicator of geographic opportunities to support manufacturing/machining employers with skilled and trained workers.

Table 3: Regional Manufacturing Industry Analysis <sup>5</sup>	
<b>Central Region</b>	
The Central region has a population of 389,080, or about 6.5 percent of Missouri’s total population. The two largest economic centers include Columbia, where roughly 32 percent of area residents work, and Jefferson City (21%). The average wage in 2008 was \$33,262, lower than the state average of \$40,710.	

<sup>4</sup> [https://www.missourieconomy.org/regional/pattern\\_analysis.stm](https://www.missourieconomy.org/regional/pattern_analysis.stm)

<sup>5</sup> Information in Table 3 is derived from MERIC’s Pattern Analysis Reports and provides a synopsis of the information.

Target Manufacturing Industry	MERIC Designation	Regional LQ	Regional Industry Description
Machinery Manufacturing NAICS 333	Cluster	1.4	Machinery manufacturing employment in this region grew by nearly 2 percent a year from 2003 to 2007, just above the U.S. annual growth of 1.5 percent. The industry's concentration, measured by a location quotient of 1.4, also increased over the same period. This manufacturing cluster is primarily engaged in the export of industrial inputs, serving intermediate demands particularly in commercial heating and cooling equipment.
Electrical Equipment Manufacturing NAICS 335	Spot	4.2	Electrical equipment manufacturing in mid-Missouri has the highest location quotient of any pattern industry. Although a small number of firms operate in the area, these companies employ a large workforce and pay well above average wages.

#### Kansas City Region

The Greater Kansas City region is the second most populated area in Missouri with 1,172,224 residents, which accounts for 20% of the entire state's population. There are 544,639 employed people in the region, coming mostly from the Kansas City Metro Area.

Target Manufacturing Industry	MERIC Designation	Regional LQ	Regional Industry Description
Other Fabricated Metal Product Manufacturing NAICS 3329	Spot	5.4	Other Fabricated Metal Product Manufacturing has the 2 <sup>nd</sup> highest concentration of all spot/cluster industries and 4 <sup>th</sup> in terms of average annual employment growth. A significant portion of this spot strength is dedicated to supplying defense and national security markets.
Motor Vehicle Manufacturing NAICS 3361	Spot	4.8	Motor Vehicle Manufacturing and Other Transportation Equipment Manufacturing combine to make up the Transportation Equipment Manufacturing pattern. Since Transportation Equipment Manufacturing has so few companies that make up the majority of employment, it is considered a spot strength. While overall numbers are strong, this spot strength has been vulnerable to recessionary effects. Even with this effect, and with Other Transportation Equipment Manufacturing holding steady, this spot strength maintains a concentration over 5 times that of the national average.
Other Transportation Equipment Manufacturing NAICS 3369	Spot	6.3	



**Lower South Central Region**

The Lower South Central region has a population of 123,393, which accounts for 2 percent of Missouri's total population. Howell County, where West Plains is located, is the economic center of the region employing one in three area workers (34 percent). Just over 6 percent of region residents commute to Springfield for jobs.

Target Manufacturing Industry	MERIC Designation	Regional LQ	Regional Industry Description
Electrical Equipment Manufacturing NAICS 335	Spot	10.4	Electrical equipment manufacturing is a spot strength in this area with a very high LQ of 10.4. By 2009 the industry's regional LQ had grown to over 14 as national employment in electrical equipment manufacturing declined during the recession.
Transportation Equipment Manufacturing NAICS 336	Spot	2.4	Transportation equipment manufacturing has an LQ of 2.4 in the Lower South Central region. Although employment has declined since 2003, following national trends, this industry is still a large subsector of area manufacturing.

**North Central Region**

The North Central region has a population of 115,651, which accounts for 1.9 percent of Missouri's total population. Economic centers include Kirksville, where roughly 18 percent of area residents work, to Chillicothe (9.5%), Trenton (5.9%) and Macon (5.8%).

There is no significant related manufacturing/machining in this region.

**Northeast Region**

The Northeast region has a population of 90,231, which accounts for 1.5 percent of Missouri's total population. Economic centers include Hannibal, where roughly 25 percent of area residents work, to Quincy, IL (5.4%) and Louisiana, MO (4.2%).

Target Manufacturing Industry	MERIC Designation	Regional LQ	Regional Industry Description
Primary Metal Manufacturing NAICS 331	Cluster	5.5	The Primary Metal and Machinery Manufacturing Cluster is highly specialized in the Northeast region with LQs of 5.5 and 3.5 respectively. Machinery manufacturing employment, in particular, grew over 14 percent a year from 2003 to 2007 while U.S. annual growth was only 1.5 percent.
Machinery Manufacturing NAICS 3333	Cluster	3.5	

**Northwest Region**

The Northwest Region has a population of 176,575, or 3 percent of Missouri's total population. The economic center is St. Joseph, where 47 percent of area residents work. Nearly 8 percent are employed in Maryville, the home of Northwest Missouri State University, while 5.8 percent commute to Kansas City.\*

Target Manufacturing Industry	MERIC Designation	Regional IQ	Regional Industry Description
Primary Metal Manufacturing NAICS 331	Spot	1.5	Metal manufacturing includes firms in the primary and fabricated metal industries that are likely connected in this region. Fabricated metal producers, by far the largest employing group in the cluster, shape basic metal forms provided by primary metal manufacturers. Producers of fabricated metal typically develop inputs that are used in other final goods and services.
Fabricated Metal Manufacturing NAICS 332	Cluster	2.9	A number of mid-sized firms in the region are classified as machine shops which typically produce customized metal products for a variety of manufacturing contracts. Other fabricated metal producers specialize in utility vehicle platforms, wire ropes, metal buildings, and metal containers.

**Southeast Region**

The Southeast region has a population of 444,037, which accounts for 7.4 percent of Missouri's total population. Economic centers are spread throughout the region in cities like Cape Girardeau, Sikeston, Poplar Bluff, and Farmington. Cape Girardeau County accounts for the largest share of jobs at just over 18 percent.

Target Manufacturing Industry	MERIC Designation	Regional IQ	Regional Industry Description
Machinery Manufacturing NAICS 333	Spot	1.9	Machinery Manufacturing is a spot strength of large employment size.

**Southwest Region**

The Southwest region has a population of 324,651, which accounts for 5.42 percent of Missouri's total population. There are 125,227 employees, with a high concentration of these in Joplin, the region's leading economic hotspot.

Target Manufacturing Industry	MERIC Designation	Regional IQ	Regional Industry Description
Fabricated Metal Manufacturing NAICS 332	Cluster	2.3	Fabricated metal product manufacturing transforms metal into both intermediate and end products. The concentration for fabricated metal manufacturing in the

			Southwest region was twice that of the national average.
<b>Electrical Equipment Manufacturing NAICS 335</b>	Spot	4.9	Industries in electrical equipment manufacturing create products that generate, distribute and use electrical power. Within the Southwest region, companies in this spot strength manufacture batteries, motors, lighting, and household cooking appliances. While this pattern is a spot strength in the area, it is linked to other electrical equipment manufacturers throughout Missouri which together form a strong industry cluster.

**Springfield Region**

The Greater Springfield region has a population of 521,120 which accounts for 8.71% of Missouri's total population. There are 224,545 people employed in the region, mostly around the Springfield metro area. A concentration of employment in Food Manufacturing, Machinery Manufacturing, and Trucking and Logistics is a vital component to the region's economic well-being.

<b>Target Manufacturing Industry</b>	<b>MERIC Designation</b>	<b>Regional LQ</b>	<b>Regional Industry Description</b>
<b>Machinery Manufacturing NAICS 333</b>	Cluster	1.6	The Machinery Manufacturing cluster consists of companies that make industrial machinery that serves as inputs to anything from farm machinery to food product machinery. This cluster had a strong LQ.

**St. Louis Region**

The Saint Louis region is the most populated area of the state with 2,149,777 residents, just over 36 percent of state's population. The Health Care, Retail, and Manufacturing sectors employ one out of every three workers.

<b>Target Manufacturing Industry</b>	<b>MERIC Designation</b>	<b>Regional LQ</b>	<b>Regional Industry Description</b>
<b>Foundries NAICS 3315</b>	Cluster	1.3	In St. Louis, this core cluster creates machinery primarily used as an input or as equipment in the production of other manufactured goods. Machinery has been Missouri's third largest export for well over a decade, behind only transportation equipment and chemicals.
<b>Commercial Industry Machine Manufacturing NAICS 3333</b>	Cluster	1.9	
<b>HVAC and Refrigeration Equipment Manufacturing NAICS 3334</b>	Spot	3.2	

<b>Metalworking Machining Manufacturing NAICS 3335</b>	Cluster	1.8	Firms in this group are not directly tied to automotive
<b>Other Machinery Manufacturing NAICS 3339</b>	Cluster	1.1	Production which has substantially diminished in employment over the past couple years. Although employment has declined, this industry has remained relatively strong in the St. Louis region due to the broader industries these companies serve. With strengths in climate control machinery, this core cluster may also benefit from efforts to improve energy efficiency in the U.S.
<b>Aerospace Product Manufacturing NAICS 3364</b>	Spot	3.4	The Aerospace Science industry employs a large and expanding workforce in the St. Louis region. Although private companies employ the most workers, public sector activities, such as the expansion of the National Geospatial-Intelligence Agency, have added high-tech jobs as well.

**Upper South Central Region**

The Upper South Central region has a population of 235,921 which accounts for approximately four percent of Missouri's total population. Economic centers include Lebanon and Rolla, where 11.4 and 11.2 percent of area residents work.

<b>Target Manufacturing Industry</b>	<b>MERIC Designation</b>	<b>Regional LQ</b>	<b>Regional Industry Description</b>
<b>Machinery Manufacturing NAICS 333</b>	Spot	3.9	Machinery manufacturing is a highly specialized spot strength in the region with an LQ of 3.9. Some specialties of local machinery manufacturers include heating and cooling equipment, and custom tooling for a variety of industries.
<b>Electrical Equipment Manufacturing NAICS 335</b>	Spot	5.6	This manufacturing sector is over five times more concentrated in the Upper South Central region than the national average. Electrical equipment manufacturing is a spot strength in the area however employment is more dispersed than in the machinery manufacturing firms.
<b>Transportation Equipment Manufacturing NAICS 336</b>	Cluster	2.0	Transportation equipment manufacturing encompasses rail, road, air, and water vehicle production and assembly. In this region, the cluster, with an LQ of 2.0, is primarily focused on boat building.

### West Central Region

The West Central Region has a population of 165,325, which accounts for 2.8 percent of Missouri's total population. Sedalia is the largest employing city, where nearly 16 percent of area residents work. Other economic centers include Warrensburg (8.8%), Marshall (8.4%), and Clinton (6.9%). Just over 9 percent of region residents work in Jackson County.

<b>Target Manufacturing Industry</b>	<b>MERIC Designation</b>	<b>Regional LQ</b>	<b>Regional Industry Description</b>
<b>Primary Metal Manufacturing NAICS 331</b>	Spot	5.2	Metal and Machinery Manufacturing includes firms in primary and fabricated metal production along with machinery manufacturers that are likely connected in this region. Fabricated metal producers shape basic metal forms provided by primary metal manufacturers. Machinery makers use primary and fabricated metal products as key inputs in the production process. Companies in this cluster also hire similarly skilled workers, such as welders, machinists, and multiple machine tool operators, and pay industry wages about 30 percent higher than the regional average.
<b>Fabricated Metal Manufacturing NAICS 332</b>	Cluster	2.3	
<b>Machinery Manufacturing NAICS 333</b>	Cluster	3.4	

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### INDUSTRY SUMMARY

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Industry data is helpful in looking at trends, over time, regarding specific machining-related manufacturing and regional industry clusters within Missouri. Trends and data points include:

1. A number of geographic clusters provide areas of focus for StateTech. Machining-related manufacturing clusters are especially pronounced in the following regions: Central, Northeast, Northwest, Southeast, Springfield, St. Louis, and West Central.
2. Due to sheer employment and population numbers, the St. Louis region provides the most opportunities to work with industry to train and educate machining workers.
3. Given historical trends and the relatively strong presence of manufacturing as part of the Missouri economy, StateTech's emphasis on machining training and career pathways is viable and an opportunity to increase its footprint in the training market.
4. Based on geographical presence, machining-related manufacturing employment presents opportunities for StateTech to strategically partner with workforce and training institutions to build the Missouri machining workforce.

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## MACHINING OCCUPATIONAL ANALYSIS

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From 2016 to 2026, the state of Missouri is projected to have over 7,300 job openings in related machining occupations.<sup>6</sup> A number of machining occupations that require skills training are considered “growth” occupations. Both new job openings and growth in occupations present StateTech with opportunities to partner with precision manufacturing employers to conduct skills training for employees tied to national industry credentials and college certificates and degrees.

This section provides a framework for understanding the data. Analysis includes tables that contain the top growth occupations in precision manufacturing, the fastest growing occupations in precision manufacturing, and occupations with a large number of openings. Using O\*NET Online’s “Job Zone” information, relevant skills, education, and experience information is identified alongside the occupation. Finally, taking the Missouri workforce regions, a summary of precision manufacturing occupational growth is identified for various parts of the State.

### NOTE: LIMITATIONS OF LABOR MARKET DATA SOURCES AND DEFINITIONS

The current sources of information linking occupations to education rely almost solely on traditional Bureau of Labor Statistics’ (BLS) and state labor market information (LMI). These data sets categorize job requirements, at times, by fairly ambiguous education and job training terms such as “postsecondary non-degree award” or “short-term on-the-job training.” This challenge results from shortcomings in the information available to translate jobs and occupations to the knowledge, skills and abilities necessary to perform those jobs.

As industries evolve, due to the infusion of technology in business processes, increased productivity, and new market demands, the jobs/occupations within those industries have also evolved, often requiring very different levels of education and skills than those possessed by prior generations of workers. Government information sources, which are largely responsible for data systems providing information about the U.S. workforce, are sometimes cumbersome to use. As a result, the information they provide on both the supply and demand side of workforce development has inherent limitations.

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## PROJECTED OCCUPATIONAL GROWTH

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### GROWING OCCUPATIONS

The State of Missouri’s fastest growing precision manufacturing occupations, using total projected job replacement, represent occupations where employers will need the most workers. Job replacement incorporates growth in number of jobs for that occupation, combined with replacement workers needed due to such events as retirement or resignation. Data is derived from State of Missouri Labor Market Information (LMI).

This data is useful because it highlights the occupations that may have negative growth, but a high number of replacements. For these occupations, StateTech should still focus efforts on education and training, perhaps through incumbent worker programs. Table 4 lists the fastest growing precision manufacturing occupations in Missouri by total job replacement.

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<sup>6</sup> EMSI

Occupation	2022 Jobs	Change	Pct. Change	Replacement	Total
Machinists (51-4041)	6,719	630	10.35%	796	2,025
Computer-Controlled Machine Tool Operators, Metal and Plastic (51-4011)	4,562	720	18.74%	720	1,075
Multiple Machine Tool Setters, Operators, and Tenders, Metal and Plastic (51-4081)	2,080	-151	-6.77%	430	430
Cutting, Punching, and Press Machine Setters, Operators, and Tenders, Metal and Plastic (51-4031)	4,429	-260	-5.54%	398	398
CNC Machine Tool Programmers, Metal and Plastic (51-4012)	742	162	27.93%	162	324
Grinding, Lapping, Polishing, and Buffing Machine Tool Setters, Operators, and Tenders, Metal and Plastic (51-4033)	1,150	-90	-7.26%	278	278
Lathe and Turning Machine Tool Setters, Operators, and Tenders, Metal and Plastic (51-4034)	1,146	-85	-6.90%	237	237
Millwrights (49-9044)	820	123	17.65%	108	231
Metal Workers and Plastic Workers, All Other (51-4199)	1,145	78	7.31%	115	193
Tool and Die Makers (51-4111)	1,715	69	4.19%	99	168
<b>TOTAL</b>	<b>24,508</b>	<b>1,196</b>	<b>5.97% avg.</b>	<b>4,323</b>	<b>5,359</b>

Looking at total percent growth, four occupations are projected to grow by double digits through 2022. These four occupations—CNC Machine Tool Programmers, Computer-Controlled Machine Tool Operators, Millwrights, and Machinists—not only are projected to grow by at least 10 percent, they also represent the occupations within the precision manufacturing industry with the most overall jobs. Data is derived from Missouri State Labor Market Information and EMSI (Annual Openings). Table 5 details the fastest growing precision manufacturing occupations by percent growth.

Occupation	2022 Jobs	Change	Pct. Change	Annual Openings
CNC Machine Tool Programmers, Metal and Plastic (51-4012)	742	162	27.93%	28
Computer-Controlled Machine Tool Operators, Metal and Plastic (51-4011)	4,562	720	18.74%	187

Millwrights (49-9044)	820	123	17.65%	40
Machinists (51-4041)	6,719	630	10.35%	260
Metal Workers and Plastic Workers, All Other (51-4199)	1,145	78	7.31%	13
Tool and Die Makers (51-4111)	1,715	69	4.19%	8
Tool Grinders, Filers, and Sharpeners (51-4194)	253	6	2.43%	4
<b>TOTAL</b>	<b>15,956</b>	<b>1,788</b>	<b>12.66% avg.</b>	<b>541</b>

#### EARNINGS AND SKILLS

Table 6 details the precision manufacturing occupations with the highest median earnings. This information is important because median earnings often correlates to higher skill levels that require training and education. Of note is two of the occupations—Layout Workers and Milling and Planing Machine Setters—are not growth occupations. Data is derived from Missouri Labor Market Information and EMSI. Table 7 details the broad job requirements for the high-growth occupations listed in Table 4, which can be compared to the earnings data to examine the alignment between earnings and skills.

Occupation	Entry	Mean	Median	Experienced
Millwrights (49-9044)	\$27,858	\$54,664	\$62,344	\$68,067
Tool and Die Makers (51-4111)	\$34,351	\$50,838	\$51,265	\$59,082
CNC Machine Tool Programmers, Metal and Plastic (51-4012)	\$32,927	\$47,056	\$38,573	\$54,121
Machinists (51-4041)	\$26,394	\$41,537	\$38,087	\$49,108
Layout Workers, Metal and Plastic (51-4192)	\$30,098	\$42,452	\$36,437	\$48,629
Milling and Planing Machine Setters, Operators, and Tenders, Metal and Plastic (51-4081)	\$23,284	\$30,909	\$28,983	\$34,722
Metal Workers and Plastic Workers, All Other (51-4199)	\$22,719	\$37,529	\$34,412	\$44,934
Computer-Controlled Machine Tool Operators, Metal and Plastic (51-4011)	\$26,015	\$35,435	\$34,256	\$40,146
Tool Grinders, Filers, and Sharpeners (51-4194)	\$25,160	\$35,935	\$34,191	\$41,322
Grinding, Lapping, Polishing, and Buffing Machine Tool Setters, Operators, and Tenders, Metal and Plastic (51-4033)	\$23,268	\$34,504	\$33,715	\$40,123



**Table 7: Highest Median Earnings of Precision Manufacturing Occupations**

Occupation	Job Zone
<p><b>Millwrights (49-9044)<sup>7</sup></b></p>	<p><b>Job Zone Three: Medium Preparation Needed</b></p> <p><b>Education:</b> Most occupations in this zone require training in vocational schools, related on-the-job experience, or an associate's degree.</p> <p><b>Related Experience:</b> Previous work-related skill, knowledge, or experience is required for these occupations. For example, an electrician must have completed three or four years of apprenticeship or several years of vocational training, and often must have passed a licensing exam, in order to perform the job.</p> <p><b>Job Training:</b> Employees in these occupations usually need one or two years of training involving both on-the-job experience and informal training with experienced workers. A recognized apprenticeship program may be associated with these occupations.</p> <p><b>Job Zone Examples:</b> These occupations usually involve using communication and organizational skills to coordinate, supervise, manage, or train others to accomplish goals. Examples include food service managers, electricians, agricultural technicians, legal secretaries, occupational therapy assistants, and medical assistants.</p>
<p><b>Tool and Die Makers (51-4111)</b></p>	<p><b>Job Zone Three: Medium Preparation Needed</b></p> <p><b>Education:</b> Most occupations in this zone require training in vocational schools, related on-the-job experience, or an associate's degree.</p> <p><b>Related Experience:</b> Previous work-related skill, knowledge, or experience is required for these occupations. For example, an electrician must have completed three or four years of apprenticeship or several years of vocational training, and often must have passed a licensing exam, in order to perform the job.</p> <p><b>Job Training:</b> Employees in these occupations usually need one or two years of training involving both on-the-job experience and informal training with experienced workers. A recognized apprenticeship program may be associated with these occupations.</p> <p><b>Job Zone Examples:</b> These occupations usually involve using communication and organizational skills to coordinate, supervise, manage, or train others to accomplish goals. Examples include food service managers, electricians, agricultural technicians, legal secretaries, occupational therapy assistants, and medical assistants.</p>
<p><b>CNC Machine Tool Programmers, Metal and Plastic (51-4012)<sup>8</sup></b></p>	<p><b>Job Zone Three: Medium Preparation Needed</b></p> <p><b>Education:</b> Most occupations in this zone require training in vocational schools, related on-the-job experience, or an associate's degree.</p> <p><b>Related Experience:</b> Previous work-related skill, knowledge, or experience is required for these occupations. For example, an electrician must have completed three or four years of apprenticeship or several years of vocational training, and often must have passed a licensing exam, in order to perform the job.</p> <p><b>Job Training</b> : Employees in these occupations usually need one or two years of training involving both on-the-job experience and informal</p>

<sup>7</sup> Ranked as an O\*NET Bright Outlook occupation

<sup>8</sup> Ranked as an O\*NET Bright Outlook occupation

	<p>training with experienced workers. A recognized apprenticeship program may be associated with these occupations.</p> <p><b>Job Zone Examples:</b> These occupations usually involve using communication and organizational skills to coordinate, supervise, manage, or train others to accomplish goals. Examples include food service managers, electricians, agricultural technicians, legal secretaries, occupational therapy assistants, and medical assistants.</p>
<p><b>Machinists (51-4041)<sup>9</sup></b></p>	<p><b>Job Zone Three: Medium Preparation Needed</b></p> <p><b>Education:</b> Most occupations in this zone require training in vocational schools, related on-the-job experience, or an associate's degree.</p> <p><b>Related Experience:</b> Previous work-related skill, knowledge, or experience is required for these occupations. For example, an electrician must have completed three or four years of apprenticeship or several years of vocational training, and often must have passed a licensing exam, in order to perform the job.</p> <p><b>Job Training:</b> Employees in these occupations usually need one or two years of training involving both on-the-job experience and informal training with experienced workers. A recognized apprenticeship program may be associated with these occupations.</p> <p><b>Job Zone Examples:</b> These occupations usually involve using communication and organizational skills to coordinate, supervise, manage, or train others to accomplish goals. Examples include food service managers, electricians, agricultural technicians, legal secretaries, occupational therapy assistants, and medical assistants.</p>
<p><b>Layout Workers, Metal and Plastic (51-4192)</b></p>	<p><b>Job Zone Two: Some Preparation Needed</b></p> <p><b>Education:</b> These occupations usually require a high school diploma.</p> <p><b>Related Experience:</b> Some previous work-related skill, knowledge, or experience is usually needed. For example, a teller would benefit from experience working directly with the public.</p> <p><b>Job Training:</b> Employees in these occupations need anywhere from a few months to one year of working with experienced employees. A recognized apprenticeship program may be associated with these occupations.</p> <p><b>Job Zone Examples:</b> These occupations often involve using your knowledge and skills to help others. Examples include sheet metal workers, forest fire fighters, customer service representatives, physical therapist aides, salespersons (retail), and tellers.</p>
<p><b>Milling and Planing Machine Setters, Operators, and Tenders, Metal and Plastic (51-4081)</b></p>	<p><b>Job Zone Two: Some Preparation Needed</b></p> <p><b>Education:</b> These occupations usually require a high school diploma.</p> <p><b>Related Experience:</b> Some previous work-related skill, knowledge, or experience is usually needed. For example, a teller would benefit from experience working directly with the public.</p> <p><b>Job Training:</b> Employees in these occupations need anywhere from a few months to one year of working with experienced employees. A recognized apprenticeship program may be associated with these occupations.</p> <p><b>Job Zone Examples:</b> These occupations often involve using your knowledge and skills to help others. Examples include sheet metal workers, forest fire fighters, customer service representatives, physical therapist aides, salespersons (retail), and tellers.</p>

<sup>9</sup> Ranked as an O\*NET Bright Outlook occupation

<p><b>Computer-Controlled Machine Tool Operators, Metal and Plastic (51-4011)</b><sup>10</sup></p>	<p><b>Job Zone Three: Medium Preparation Needed</b>  <b>Education:</b> Most occupations in this zone require training in vocational schools, related on-the-job experience, or an associate's degree.  <b>Related Experience:</b> Previous work-related skill, knowledge, or experience is required for these occupations. For example, an electrician must have completed three or four years of apprenticeship or several years of vocational training, and often must have passed a licensing exam, in order to perform the job.  <b>Job Training:</b> Employees in these occupations usually need one or two years of training involving both on-the-job experience and informal training with experienced workers. A recognized apprenticeship program may be associated with these occupations.  <b>Job Zone Examples:</b> These occupations usually involve using communication and organizational skills to coordinate, supervise, manage, or train others to accomplish goals. Examples include food service managers, electricians, agricultural technicians, legal secretaries, occupational therapy assistants, and medical assistants.</p>
<p><b>Tool Grinders, Filers, and Sharpeners (51-4194)</b></p>	<p><b>Job Zone Two: Some Preparation Needed</b>  <b>Education:</b> These occupations usually require a high school diploma.  <b>Related Experience:</b> Some previous work-related skill, knowledge, or experience is usually needed. For example, a teller would benefit from experience working directly with the public.  <b>Job Training:</b> Employees in these occupations need anywhere from a few months to one year of working with experienced employees. A recognized apprenticeship program may be associated with these occupations.  <b>Job Zone Examples:</b> These occupations often involve using your knowledge and skills to help others. Examples include sheet metal workers, forest fire fighters, customer service representatives, physical therapist aides, salespersons (retail), and tellers.</p>
<p><b>Grinding, Lapping, Polishing, and Buffing Machine Tool Setters, Operators, and Tenders, Metal and Plastic (51-4033)</b></p>	<p><b>Job Zone Two: Some Preparation Needed</b>  <b>Education:</b> These occupations usually require a high school diploma.  <b>Related Experience:</b> Some previous work-related skill, knowledge, or experience is usually needed. For example, a teller would benefit from experience working directly with the public.  <b>Job Training:</b> Employees in these occupations need anywhere from a few months to one year of working with experienced employees. A recognized apprenticeship program may be associated with these occupations.  <b>Job Zone Examples:</b> These occupations often involve using your knowledge and skills to help others. Examples include sheet metal workers, forest fire fighters, customer service representatives, physical therapist aides, salespersons (retail), and tellers.</p>

**REGIONAL GROWTH**

Aligned to the areas of Missouri where precision manufacturing firms are most likely to operate is a snapshot of the types of machining employment that exist in various regions of the state. Missouri has 10 workforce regions under the Workforce Innovation and Opportunity Act. Those 10 regions include:

<sup>10</sup> Ranked as an O\*NET Bright Outlook occupation

1. Central
2. Kansas City
3. Northeast
4. Northwest Region
5. Ozark
6. Southeast
7. Southwest
8. South Central
9. St. Louis
10. West Central

## WIOA Workforce Regions



The following tables outline the occupations projected to contain the most growth in each of Missouri's 10 workforce regions according to data generated using EMSI:

Occupation	2016 Jobs	2026 Jobs	Change	Annual Openings
Machinists (51-4041)	424	513	89	230
Computer-Controlled Machine Tool Operators, Metal and Plastic (51-4011)	435	479	44	200
Millwrights (49-9044)	36	49	13	23
CNC Machine Tool Programmers, Metal and Plastic (51-4012)	47	57	10	27
Tool and Die Makers (51-4111)	121	125	4	19

In the Central Region, Machinists are projected to produce the most jobs over the next 10 years and also have the largest number of annual openings. Computer-Controlled Machine Tool Operators represent the other occupational area that demonstrates substantial growth and annual openings.

Occupation	2016 Jobs	2026 Jobs	Change	Annual Openings
Machinists (51-4041)	909	992	83	368
Computer-Controlled Machine Tool Operators, Metal and Plastic (51-4011)	720	793	73	314
Millwrights (49-9044)	387	449	62	156

In the Kansas City Region, Machinists are projected to produce the most jobs over the next 10 years and also have the largest number of annual openings. Computer-Controlled Machine Tool Operators and Millwrights represent the other occupational areas that demonstrate substantial growth and annual openings. Most other occupational areas in precision manufacturing in Kansas City show declining growth numbers.

<b>Table 10: Northeast Region Precision Manufacturing Job Growth</b>				
<b>Occupation</b>	<b>2016 Jobs</b>	<b>2026 Jobs</b>	<b>Change</b>	<b>Annual Openings</b>
Machinists (51-4041)	297	352	55	159
Computer-Controlled Machine Tool Operators, Metal and Plastic (51-4011)	139	170	31	89
CNC Machine Tool Programmers, Metal and Plastic (51-4012)	37	45	8	21
Millwrights (49-9044)	25	30	5	12
Plating and Coating Machine Setters, Operators, and Tenders, Metal and Plastic (51-4193)	40	45	5	18
Tool and Die Makers (51-4111)	154	157	3	27

In the Northeast Region, Machinists are projected to produce the most jobs over the next 10 years and also have the largest number of annual openings. Computer-Controlled Machine Tool Operators represent the other occupational area that demonstrates substantial growth and annual openings. Four other occupations show growth, but at much smaller numbers.

<b>Table 11: Northwest Region Precision Manufacturing Job Growth</b>				
<b>Occupation</b>	<b>2016 Jobs</b>	<b>2026 Jobs</b>	<b>Change</b>	<b>Annual Openings</b>
Machinists (51-4041)	230	295	65	145
Computer-Controlled Machine Tool Operators, Metal and Plastic (51-4011)	178	223	45	107
Multiple Machine Tool Setters, Operators, and Tenders, Metal and Plastic (51-4081)	202	215	13	54
CNC Machine Tool Programmers, Metal and Plastic (51-4012)	49	60	11	28
Millwrights (49-9044)	21	26	5	10

In the Northwest Region, Machinists are projected to produce the most jobs over the next 10 years and also have the largest number of annual openings. Computer-Controlled Machine Tool Operators represent the other occupational area that demonstrates substantial growth and annual openings. Machine Tool Setters are employed at larger numbers in this region.

<b>Table 12: Ozark Region Precision Manufacturing Job Growth</b>				
<b>Occupation</b>	<b>2016 Jobs</b>	<b>2026 Jobs</b>	<b>Change</b>	<b>Annual Openings</b>
Machinists (51-4041)	396	486	90	220
Computer-Controlled Machine Tool Operators, Metal and Plastic (51-4011)	244	279	35	116
CNC Machine Tool Programmers, Metal and Plastic (51-4012)	62	76	14	35

Multiple Machine Tool Setters, Operators, and Tenders, Metal and Plastic (51-4081)	169	177	8	41
Millwrights (49-9044)	21	25	4	<10

In the Ozark Region, Machinists are projected to produce the most jobs over the next 10 years and also have the largest number of annual openings. Computer-Controlled Machine Tool Operators represent the other occupational area that demonstrates substantial growth and annual openings. Machine Tool Setters, Operators, and Tenders are employed at larger numbers in this region; however, median earnings for this occupation are the lowest of precision manufacturing growth occupations.

Occupation	2016 Jobs	2026 Jobs	Change	Annual Openings
Computer-Controlled Machine Tool Operators, Metal and Plastic (51-4011)	132	148	16	70
Millwrights (49-9044)	69	80	11	29
Machinists (51-4041)	230	229	-1	89

In the South Central Region, precision manufacturing growth is limited. Computer-Controlled Machine Tool Operators represent the occupational area that demonstrates the most growth. Millwrights will realize moderate demand, and Machinists represent the highest number workers, but growth is projected to remain constant.

Occupation	2016 Jobs	2026 Jobs	Change	Annual Openings
Machinists (51-4041)	355	447	92	218
Computer-Controlled Machine Tool Operators, Metal and Plastic (51-4011)	222	283	61	143
Millwrights (49-9044)	105	117	12	38

In the Southeast Region, Machinists are projected to produce the most jobs over the next 10 years and also have the largest number of annual openings. Computer-Controlled Machine Tool Operators represent the other occupational area that demonstrates substantial growth and annual openings. Millwrights are employed at larger numbers in this region and have demand for annual openings.

Occupation	2016 Jobs	2026 Jobs	Change	Annual Openings
Computer-Controlled Machine Tool Operators, Metal and Plastic (51-4011)	243	279	36	117
Millwrights (49-9044)	23	32	9	15
Machinists (51-4041)	504	511	7	186

In the Southwest Region, Computer-Controlled Machine Tool Operators are projected to produce the most jobs over the next 10 years. Millwrights and Machinists will both grow modestly with Machinists realizing a large number of annual openings.

<b>Table 16: St. Louis Region Precision Manufacturing Job Growth</b>				
<b>Occupation</b>	<b>2016 Jobs</b>	<b>2026 Jobs</b>	<b>Change</b>	<b>Annual Openings</b>
Machinists (51-4041)	1,966	2,228	262	869
Computer-Controlled Machine Tool Operators, Metal and Plastic (51-4011)	1,230	1,483	253	670
Millwrights (49-9044)	226	282	56	108
CNC Machine Tool Programmers, Metal and Plastic (51-4012)	138	166	28	74
Multiple Machine Tool Setters, Operators, and Tenders, Metal and Plastic (51-4081)	458	485	27	114

The St. Louis Region represents the largest employment base in Missouri. Machinists are projected to produce the most jobs over the next 10 years and also have the largest number of annual openings. Computer-Controlled Machine Tool Operators represent the other occupational area that demonstrates substantial growth and annual openings. Millwrights and Machine Tool Setters, Operators, and Tenders are employed at larger numbers in this region and have demand for annual openings.

<b>Table 17: West Central Region Precision Manufacturing Job Growth</b>				
<b>Occupation</b>	<b>2016 Jobs</b>	<b>2026 Jobs</b>	<b>Change</b>	<b>Annual Openings</b>
Machinists (51-4041)	227	255	28	108
Computer-Controlled Machine Tool Operators, Metal and Plastic (51-4011)	183	206	23	88

In the West Central Region, Machinists and Computer-Controlled Machine Tool Operators represent the occupational areas that demonstrate growth and annual openings. Precision manufacturing employment growth and annual openings overall are not strong in this region.

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#### OCCUPATIONAL SUMMARY

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Occupational growth and annual openings data provide State Tech with an understanding of the specific jobs and training requirements expected to grow in Missouri. In turn, this provides strategic direction with curriculum, courses, and credentials most needed for precision manufacturing employment in Missouri, as well as the regions of the state with the most pronounced precision manufacturing employment. Trends and data points include:

1. Four occupations are most pronounced in Missouri: (1) Machinists, (2) Computer-Controlled Machine Tool Operators, Millwrights, and CNC Machine Tool Operators.

2. Even with occupations that have limited projected growth, annual openings and replacements warrant attention as an aging workforce means that employers are expected to face challenges with filling existing jobs.
3. Based on occupational growth data presented above, StateTech should focus first on the skills and training requirements needed by employers to fill Machinists and Computer-Controlled Machine Tool Operators positions.
4. Geographic regions that warrant StateTech's immediate attention include St. Louis, which has the largest employment base in the state, Kansas City, which has the second largest employment base in the state, the Central, Ozark and Southeast regions.



## Section 2: Employer Survey Results

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### INTRODUCTION

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To supplement industry and occupational growth and earnings data, over 100 precision manufacturing employers in Missouri were contacted by email or telephone to schedule a quick telephone survey. Seventeen employers responded to the survey after multiple attempts to reach potential respondents. The survey instrument is attached as Appendix A.

The purpose of the survey is to gain insight into employer perceptions of employment in precision manufacturing, including the education and training needs for employers' workforce. These insights, in turn, provide StateTech with the opportunity to focus resources on those training programs and credentials most in-demand by employers, thus ensuring that StateTech is "demand driven."

The survey instrument contains fifteen (15) questions that are divided into three broad categories: (1) types of employment at firms; (2) skill needs at firms; and (3) certifications most valued at firms. Trends are able to be extrapolated around these three categories.

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### SURVEY RESULTS

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#### TYPES OF EMPLOYMENT AT FIRMS

*CNC Machinist was the most prevalent occupation named by employers regarding current and future hiring needs.* Employers surveyed indicate that currently and in the future, the CNC Machinist position is one that is in-demand. Employer responses were mixed with regard to whether these positions were "entry-level" or required higher skill levels. Comments range from "entry-level machinist" to "need more than a button pusher." Some employers also indicated that welders were in high demand within their firms, in addition to machinists. A couple of the employer respondents indicated they do not have current hiring needs.

*Employers of tool and die makers are having a problem with finding qualified workers.* The employers surveyed indicated wide ranging challenges with finding qualified tool and die makers. For some employers, issues were "hard skill" in nature—need individuals who know how to grind, how to perform with right tolerance, and understand codes and programming. A number of employers indicated that "soft skills" were an issue—individuals desiring to work hard, learn on the job, and perform consistently. The soft skills issue was consistently raised during the interviews.

*The lack of skilled machinists and tool and die makers has significant, self-identified impacts on employers.* A number of employer respondents indicate that the "pipeline" of skilled machinists and tool and die makers is lacking. Comments ranged from 'new tool and die workers are non-existent' to 'math skills are lacking in potential employees.' As a result of a lack of skilled and educated workers, precision manufacturing employers indicate problems such as inability to expand operations, lack of productivity and profitability, and concerns about making large numbers of parts incorrectly.

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#### SKILL NEEDS AT FIRMS

*Blueprint reading, precision hand tools, math, and work ethic were the most cited skill needs by precision manufacturing employers.* The survey instrument listed a number of skill areas and then asked employers to identify the most important ones. It is important to note that while soft skills were not listed, employer respondents took the opportunity to identify “work ethic” and “aspiration” as one of three top skill needs.

*Basic electricity, hydraulics, pneumatics and knowledge of metallurgy were often ranked the lowest by employer respondents.* Using the Likert Scale of 1 to 5, employer respondents were asked to rate a variety of skill needs in precision manufacturing. Consistently, basic electricity, hydraulics and pneumatics and knowledge of metallurgy were ranked as a “1” or a “2”. While a small number of employers indicated that welding was a hiring need, most ranked it as low importance. For those employers who do not employ tool and die makers, these skills were ranked low in importance.

*Safety was ranked consistently high in importance by employer respondents.* Survey respondents were asked to rank the importance of “safety,” “problem solving,” “lean manufacturing,” and “public speaking and communications.” Safety was nearly ranked as “5” by all employer respondents. Problem solving was typically ranked as important at either “4” or “5”. Of the four areas, public speaking and communications was typically ranked as least important.

#### CERTIFICATIONS AT FIRMS

*Roughly half of the employer respondents consider NIMS certifications when hiring.* Almost none of the employers consider the National Career Readiness Certificate (WorkKeys) when hiring and a small number consider OSHA 10.

*Over half of employer respondents prefer or require an Associate of Applied Science (AAS) degree when hiring.* Employer respondents indicated that an AAS degree was important and at least “looked good” for prospective employees to have when seeking employment. Employer respondents also emphasized the need for math skills, so an AAS degree that incorporates strong math foundational skills is an important credential for precision manufacturing workers and job seekers. In addition, some employer respondents indicated that those employees who have an AAS degree receive higher pay.

## Conclusion

This *Missouri Manufacturing and Machine Tool Labor Skills Study* highlights some important information for StateTech when considering resource allocation and areas of emphasis in educational programming:

1. Precision Manufacturing employers generally value AAS pathways. StateTech will want to maintain, and perhaps expand, AAS degree pathways and look for ways to embed industry-recognized credentials at key points along the pathway. By emphasizing AAS degree pathways, StateTech can continue to work with employer partners on opportunities for worker upward mobility and increased earnings.
2. CNC Machinist and related positions provide the greatest training opportunity for StateTech. Both the projections data and employer respondents show that the CNC Machinist position is most likely to grow and also need replacement workers. Tool and die workers and millwrights have strong earnings, but are much smaller numbers of employees in Missouri.
3. Opportunities for regional prioritization and partnership exist for StateTech. Both the industry and occupational data clearly point to geographic areas in Missouri where StateTech can partner to provide additional training opportunities for residents. These geographic areas include metropolitan areas such as St. Louis, and less populated areas such as the Central Region and Southeast region.
4. Employer respondents welcome future discussions with StateTech. StateTech has significant opportunities for employer engagement and discussion with employers needing precision manufacturing workers. Employer respondents were very positive about having conversations with StateTech regarding skill improvements for machining workers. In turn, StateTech can develop ongoing partnerships in areas of the state where demand for precision manufacturing workers is high, targeted at specific employment and hiring needs, to improve overall economic and business growth in Missouri.

## Appendix A: Employer Survey

INTRODUCTION: Thank you for agreeing to participate in this survey. I am NAME with the National Institute of Metalworking Skills, and we are conducting this brief survey on behalf of State Technical College (formerly Linn State Technical College) in Linn, Missouri, to gather information on the skills and education you need as an employer of machinists and other employees in the Precision Manufacturing industry. This work is being funded by a Department of Labor grant, MoManufacturingWINS. Your answers are extremely important, and will help State Technical College with providing education and skills training connected to the jobs and skills employers need in Missouri. Your answers are confidential, and your participation in this survey is voluntary.

Copy of survey

*(Note: Not every questions shows up on everyone's survey. Questions that were not applicable were taken off.)*

1. For which manufacturing and machining occupations are you currently hiring? Which are the most challenging positions to fill and why?
2. What is your projected hiring for workers trained in machining over the next year? 3 years?
3. What is your projected hiring for workers trained in tool & die over the next year? 3 years?
4. Do you have difficulty hiring machining and/or tool & die workers in the numbers needed for your company? If so, why?
5. Do you have difficulty in hiring machining and/or tool & die workers with the skills needed for your company? If so, what skill is most lacking?
6. What Tool & Die skills are used/needed at your company? Examples include hand finishing, hand grinding, use of burring tool, etc.
7. Does a lack of sufficient numbers or a sufficient skill level of machining and/or tool & die workers negatively impact the business of your company? If so, how?
8. On a scale of 1 to 5, with 1 being not very important and 5 being extremely important, how important are the following skills in people you consider for employment?
  - Use of precision hand tools      1 2 3 4 5
  - Blue Print Reading              1 2 3 4 5
  - Basic shop equipment operations which include saws, drill press, lathe, milling, operations grading                      1 2 3 4 5
  - C.N.C. Milling or Turning, Set up Technician and Operator      1 2 3 4 5
  - C.N.C. Programming              1 2 3 4 5
  - Computer-Aided Design (CAD)      1 2 3 4 5
  - GD&T (Geometric Dimensioning & Tolerancing)              1 2 3 4 5
  - Quality Control                      1 2 3 4 5
  - Basic knowledge of Metallurgy (metal-ur-gee)              1 2 3 4 5

- Basic electricity, hydraulics, pneumatics                    1 2 3 4 5
- Basic Welding (metal arc, gas metal arc, gas tungsten, oxy-fuel torch)    1 2 3 4 5
- Die/Mold design                    1 2 3 4 5
- Die/Mold Fabrication                    1 2 3 4 5
- Basic Robotics                    1 2 3 4 5

9. Of the skills just named, which ones would you rank as the three most important?

10. On a scale of 1 to 5, with 1 being not very important and 5 being extremely important, how important are the following four skill areas:

- Safety                    1 2 3 4 5
- Problem solving                    1 2 3 4 5
- Lean Manufacturing                    1 2 3 4 5
- Public speaking and communications                    1 2 3 4 5

11. What math requirements are required for an employee at your company?

- General Math
- College Algebra
- Trigonometry
- Any Other; \_\_\_\_\_

12. Do you consider these certifications when hiring?

- OSHA 10 Certifications                    Y N DK
- National Institute of Metalworking Skills (NIMS) Certifications                    Y N DK
- National Career Readiness Certificate (WorkKeys)                    Y N DK
- Other Certifications (Please List)

13. Do you have a preference for a certificate or an AAS degree when hiring?

14. What is the average salary range for entry level positions? Does the level of degree (degree vs. certificate) serve as a factor?

15. State Technical College (formerly Linn State Technical College) partners with a number of employers to provide skills training for the manufacturing sector. Would you be interested in further information on ways that State Tech can help support your business by training a skilled workforce?