



## Program Endorsement Brief:

Advanced Manufacturing for College of the Siskiyous

North/Far North Center of Excellence, March 2018

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College of the Siskiyous is exploring an opportunity to create an Advanced Manufacturing Technology program. This program is designed for students interested in careers in machining, welding, computer-aided design/manufacturing (CAD/CAM) and computer numerical control (CNC) technologies.

This report provides estimates and indicators of the labor market outlook for students exiting the proposed program. Key findings include:

- The labor market for manufacturing technology jobs in Siskiyou County is small and declining; however, demand for these jobs increases in the broader North/Far North region. There were 4,780 jobs as of 2017, and the industry is projected to grow by 11% between 2017 and 2022. The majority of recent job postings are in Sacramento County.
- The current annual supply of community college awards in manufacturing technology is approximately equal to the new jobs available in the North/Far North region. Ten schools have programs, and 543 awards were conferred on average each of the last three years.
- The median hourly wage varies among the occupations studied. Wages in the industry are generally at or below Siskiyou County's living wage, \$24.44/hour.
- The employer base, required skills and top industries that hire workers with manufacturing technology training is diverse, indicating core occupational skills are transferable among different types of companies.

The report uses labor market data from the Bureau of Labor Statistics (BLS), U.S. Census Bureau data from Emsi and job posting data from Burning Glass. It contains the following sections:

- Occupational demand
- Earnings and job postings
- Educational attainment and supply, and
- Findings and recommendations.

## Occupational Demand

There are six Standard Occupational Classification (SOC) codes that relate to manufacturing technology.

Exhibits 1a and 1b summarize employment and occupational projections for the six SOC codes in the 15-county Far North region and 22-county North/Far North region.

### Exhibit 1a: Manufacturing technology employment and occupational demand in the Far North region<sup>1</sup>

Occupation	SOC Code	2007 Jobs	2017 Jobs	2022 Jobs	2007-2017 Jobs % Change	2017-2022 Jobs % Change	Annual Openings 2017-2022
Mechanical Drafters	17-3013	60	46	52	-22.4%	11.4%	5
Computer-Controlled Machine Tool Operators, Metal and Plastic	51-4011	99	95	111	-4.0%	16.5%	12
Computer Numerically Controlled Machine Tool Programmers, Metal and Plastic	51-4012	19	20	23	5.5%	16.6%	3
Machinists	51-4041	362	312	348	-13.7%	11.5%	41
Tool and Die Makers	51-4111	36	19	21	-48.7%	15.0%	3
Welders, Cutters, Solderers and Brazers	51-4121	643	588	648	-8.5%	10.1%	76
<b>Total</b>		<b>1,219</b>	<b>1,080</b>	<b>1,203</b>	<b>-11.3%</b>	<b>11.4%</b>	<b>141</b>

### Exhibit 1b: Manufacturing technology employment and occupational demand in the North/Far North region<sup>2</sup>

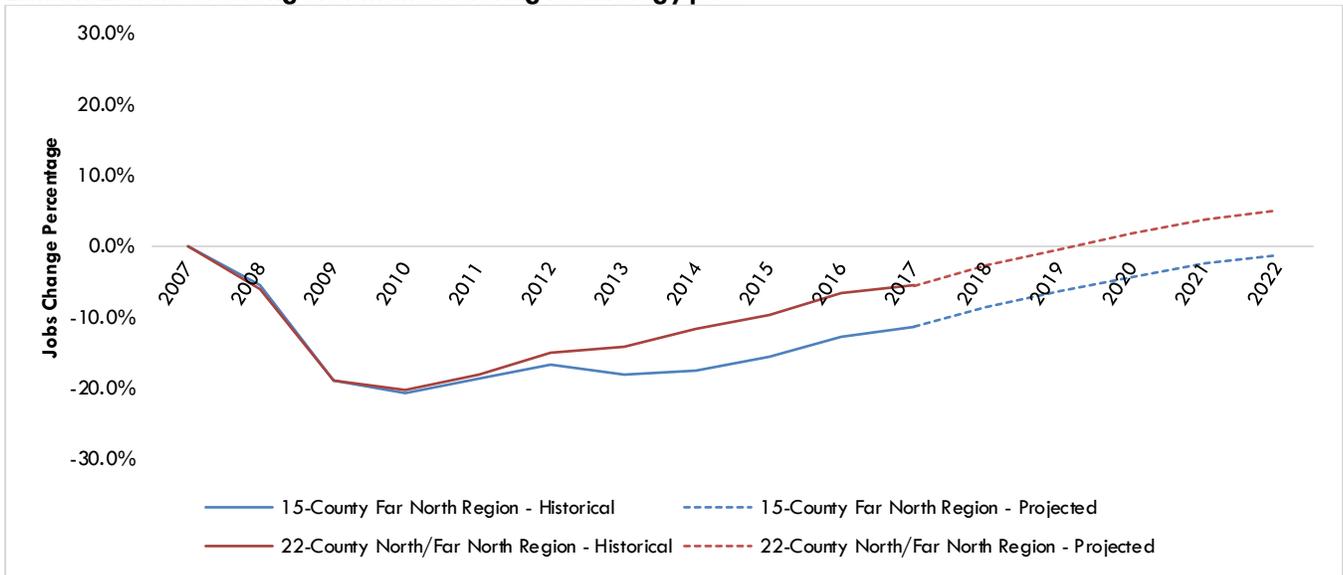
Occupation	SOC Code	2007 Jobs	2017 Jobs	2022 Jobs	2007-2017 Jobs % Change	2017-2022 Jobs % Change	Annual Openings 2017-2022
Mechanical Drafters	17-3013	334	280	299	-16.2%	7.0%	28
Computer-Controlled Machine Tool Operators, Metal and Plastic	51-4011	351	358	428	2.0%	19.5%	46
Computer Numerically Controlled Machine Tool Programmers, Metal and Plastic	51-4012	56	57	70	2.4%	21.2%	7
Machinists	51-4041	1,563	1,515	1,682	-3.1%	11.1%	188
Tool and Die Makers	51-4111	137	109	123	-20.2%	12.7%	14
Welders, Cutters, Solderers and Brazers	51-4121	2,623	2,460	2,717	-6.2%	10.4%	306
<b>Total</b>		<b>5,063</b>	<b>4,780</b>	<b>5,319</b>	<b>-5.6%</b>	<b>11.3%</b>	<b>589</b>

Exhibit 2 shows the percent change in the number of jobs between 2007 through 2017 and the percent change projected from 2017 through 2022. The rate of change is indexed to the total number of jobs in 2007 as the base year and compares the Far North region with the full North/Far North region.

<sup>1</sup> EMSI. 2017.4 QCEW Employees, Non-QCEW Employees and Self-Employed. The 15-county Far North region includes Butte, Colusa, Del Norte, Glenn, Humboldt, Lake, Lassen, Mendocino, Modoc, Plumas, Shasta, Sierra, Siskiyou, Tehama and Trinity counties.

<sup>2</sup> EMSI. 2017.4 QCEW Employees, Non-QCEW Employees and Self-Employed. The 22-county North/Far North region includes the counties listed in the previous footnote plus El Dorado, Nevada, Placer, Sacramento, Sutter, Yolo and Yuba counties.

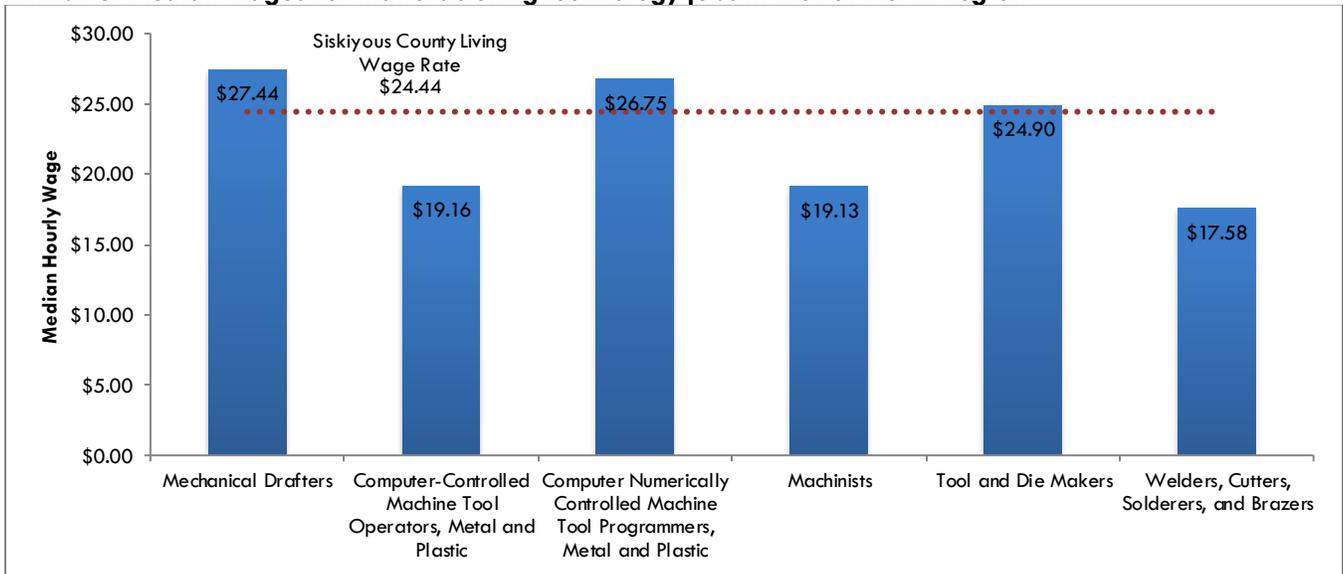
**Exhibit 2: Rate of change for manufacturing technology jobs<sup>3</sup>**



**Earnings and Job Postings**

Exhibit 3 displays the median hourly wage for employees for each SOC code compared to the Siskiyou County living wage for a one-adult, one-child household.<sup>4</sup> The living wage in Siskiyou County, \$24.44/hour, is less than Sacramento County, \$25.90/hour, and California, \$29.68/hour.

**Exhibit 3: Median wages for manufacturing technology jobs in the Far North Region<sup>5</sup>**



Burning Glass data on job postings provides information regarding skills, employers and job titles that relate to manufacturing technology occupations. The data analysis drew from a pool of 315 listings which were filtered

<sup>3</sup> EMSI. 2017.4 QCEW Employees, Non-QCEW Employees and Self-Employed.

<sup>4</sup> "Living Wage Calculator: Counties and Metropolitan Statistical Areas in California," Massachusetts Institute of Technology, accessed March 5, 2018, <http://livingwage.mit.edu/states/06/locations>.

<sup>5</sup> EMSI. 2017.4 QCEW Employees, Non-QCEW Employees and Self-Employed.

based on the six SOC codes, North/Far North counties and the job titles that most closely relate to manufacturing technology. Data was pulled for the last 12 months from March 1, 2017 through February 28, 2018.

Exhibit 4 presents the job postings trend over the past five years presented as a rate of change from the base year of 2012.

**Exhibit 4: Job posting trends for manufacturing technology in the North/Far North<sup>6</sup>**

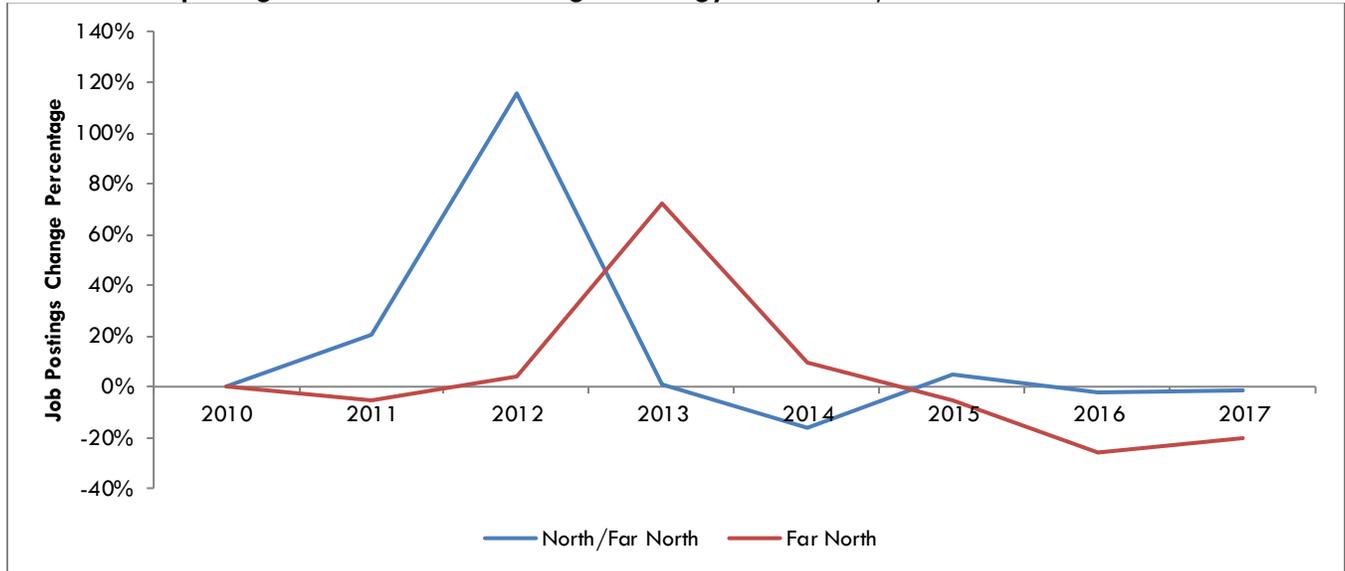


Exhibit 5 shows the top specialized skills that were included in the job postings. Of the postings, 52 of the 315 records did not list specialized skills.

**Exhibit 5: Top specialized skills for manufacturing technology in the North/Far North region<sup>7</sup>**

Top Industries	Number	Percent (n=263)
Welding	112	42.6%
Machining	109	41.4%
Inspection	90	34.2%
Computer Numerical Control (CNC)	87	33.1%
Lathes	55	20.9%
Repair	54	20.5%

Exhibits 6a and 6b detail the top industries and employers within the North/Far North region for jobs related to manufacturing technology. Of the 315 job postings, 64% of records were excluded because they did not include an industry or employer. As a result, the chart below may not be representative of the full sample.

**Exhibit 6a: Top Industries for Manufacturing Technology in the North/Far North region<sup>8</sup>**

Top Industries	Number	Percent (n=114)
Foundation, Structure and Building Exterior Contractors (2381)	38	12.1%
Architectural, Engineering and Related Services (5413)	10	3.2%
Employment Services (5613)	7	2.2%
Aerospace Product and Parts Manufacturing (3364)	5	1.6%
National Security and International Affairs (9281)	4	1.3%
Water, Sewage and Other Systems (2213)	4	1.3%

<sup>6</sup> Burning Glass Technologies, "Labor Insight Real-Time Labor Market Information Tool," accessed March 5, 2018.

<sup>7</sup> Ibid.

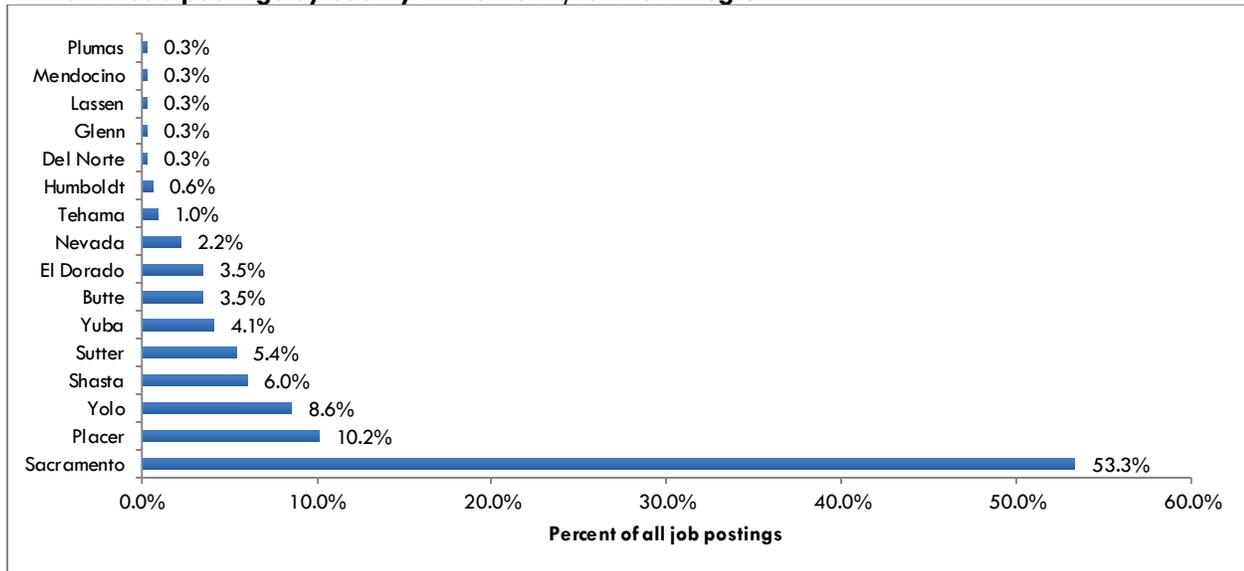
<sup>8</sup> Ibid.

**Exhibit 6b: Top manufacturing technology employers in the North/Far North region<sup>9</sup>**

Top Employers	Number	Percent
SVS Group Incorporated	5	1.6%
Kratos Defense & Security Solutions	4	1.3%
Watts Water Technologies	4	1.3%
Clark Pacific	3	1.0%
Klingberg Family Centers Incorporated	3	1.0%
Russell Mechanical Incorporated	3	1.0%
Technipfmc Plc	3	1.0%
Teledyne Technologies	3	1.0%
Trimble Navigation Limited	3	1.0%

Exhibit 7 shows the percent of job postings by county in the North/Far North region. There were postings in 16 of the 22 counties during the last 12 months. Siskiyou County did not have any job postings.

**Exhibit 7: Job postings by county in the North/Far North region<sup>10</sup>**



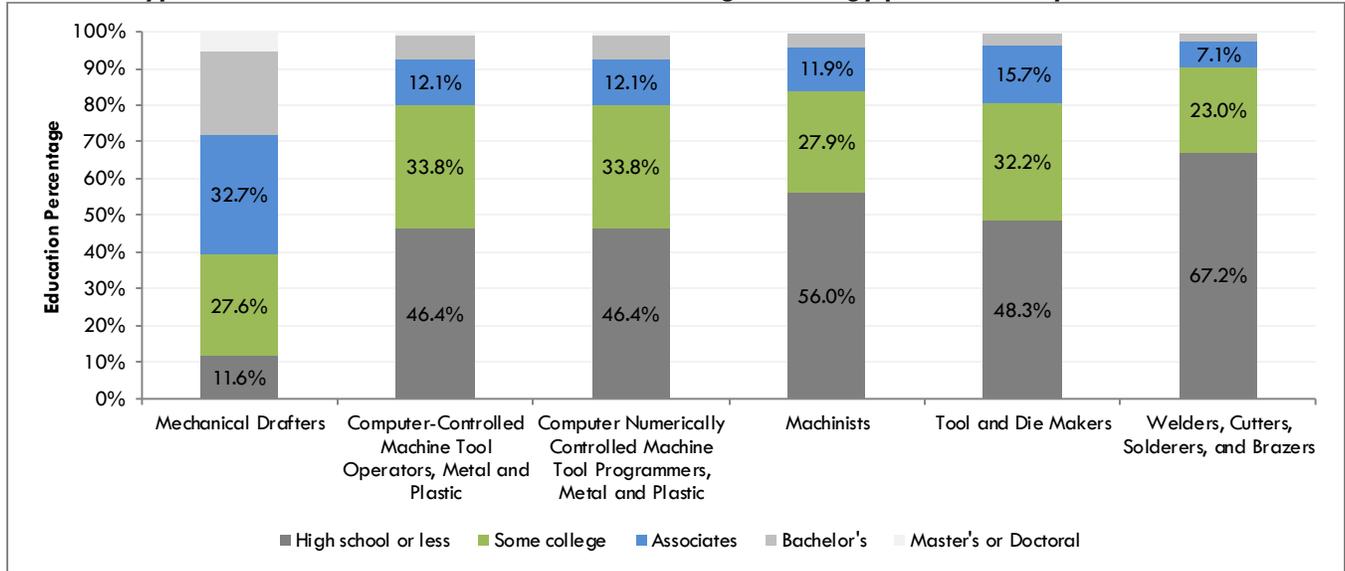
<sup>9</sup> Ibid.

<sup>10</sup> Ibid.

## Educational Attainment and Supply

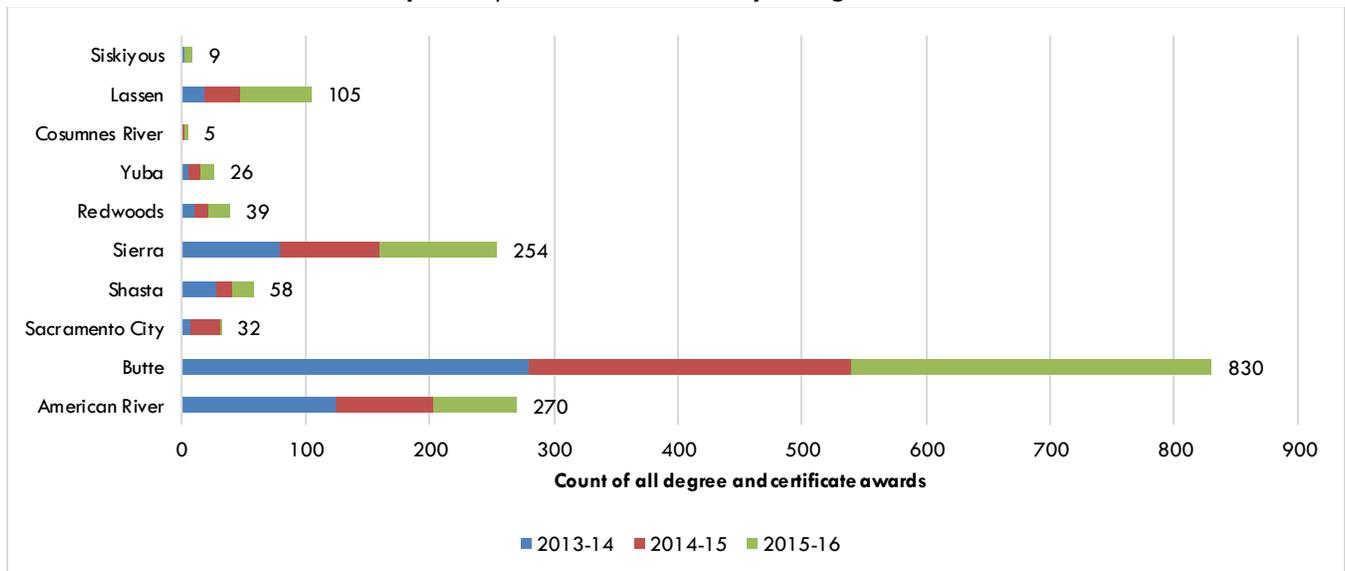
At the national level, the typical education required for manufacturing-technology-related jobs is a high school diploma. Exhibit 9 shows educational attainment percentages by SOC code for related occupations.

**Exhibit 9: Typical educational attainment for manufacturing technology jobs nationally<sup>11</sup>**



Seven Taxonomy of Programs (TOP) codes were identified related to manufacturing technology: Mechanical Drafting (0953.40), Machining and Machine Tools (0956.30), Manufacturing and Industrial Technology (0956.00), Welding Technology (0956.50), Engineering and Related Industrial Technologies (0900.00 and 0999.00) and Industrial Systems Technology and Maintenance (0945.00). Exhibits 9a and 9b show the number of degrees awarded by colleges in the North/Far North region during the past three academic years.

**Exhibit 9a: Total awards made by North/Far North community colleges, 2012-2016<sup>12</sup>**



<sup>11</sup> Current Population Survey, Educational Attainment for Workers 25 Years and Older by Detailed Occupation, 2014-2015, [https://www.bls.gov/emp/ep\\_table\\_111.htm](https://www.bls.gov/emp/ep_table_111.htm).

<sup>12</sup> COE Supply Tables, California Community Colleges Chancellor's Office DataMart, Integrated Postsecondary Education Data System (IPEDS).

**Exhibit 9b: Certificates and degrees awarded by North/Far North community colleges, 2012-2016<sup>13</sup>**

Institution	Certificates				Associate Degrees			
	2013-14	2014-15	2015-16	3-Yr Avg	2013-14	2014-15	2015-16	3-Yr Avg
<b>Welding TOP Code</b>								
American River	95	53	46	65	6	8	9	8
Butte	229	213	208	217	3	6	5	5
Sacramento City	0	0	0	0	0	0	0	0
Shasta	16	5	1	7	5	5	7	6
Sierra	24	23	34	27	0	0	0	0
Redwoods	3	2	2	2	0	0	0	0
Yuba	5	7	9	7	1	2	2	2
Cosumnes River	1	1	0	1	0	1	2	1
Lassen	1	1	0	1	1	1	0	1
Siskiyou	0	0	4	1	2	0	3	2
<b>Subtotal Welding</b>	<b>374</b>	<b>305</b>	<b>304</b>	<b>328</b>	<b>18</b>	<b>23</b>	<b>28</b>	<b>23</b>
<b>All Other TOP Codes</b>								
American River	13	9	8	10	11	8	4	8
Butte	43	34	63	47	5	7	14	9
Sacramento City	3	18	1	7	4	6	0	3
Shasta	1	0	0	0	6	3	9	6
Sierra	38	44	41	41	17	14	19	17
Redwoods	4	6	11	7	3	3	5	4
Yuba	0	0	0	0	0	0	0	0
Cosumnes River	0	0	0	0	0	0	0	0
Lassen	15	16	35	22	2	11	22	12
Siskiyou	0	0	0	0	0	0	0	0
<b>Subtotal All Other TOP Codes</b>	<b>117</b>	<b>127</b>	<b>159</b>	<b>134</b>	<b>48</b>	<b>52</b>	<b>73</b>	<b>58</b>
<b>Total</b>	<b>491</b>	<b>432</b>	<b>463</b>	<b>462</b>	<b>66</b>	<b>75</b>	<b>101</b>	<b>81</b>

**Findings and Recommendations**

- The labor market for manufacturing technology jobs in Siskiyou County is small and declining. There were fewer than 70 positions as of 2017, down from 90 in 2007. The only SOC codes with meaningful job counts were machinists and welders, with approximately 30 jobs each. These trends are mirrored in the Far North region, where employment declined from 1,219 to 1,080 jobs between 2007 and 2017. The machinist and welders SOC codes accounted for the largest share of jobs regionally, with 312 and 588 jobs respectively.
- Demand for manufacturing technology jobs is higher in the larger North/Far North region. There were 4,780 jobs as of 2017 with a growth projection of 11.3% through 2022. Growth rates are greatest for computer-controlled and computer-numerically-controlled (CNC) machine operators, approximately 20% for each occupation. The U.S. Department of Labor anticipates that CNC programmers will undergo faster than average growth over the next 10 years.
- There are 589 annual openings projected for manufacturing technology jobs in the North/Far North region. The majority of job postings were in Sacramento County. No new postings were in Siskiyou County during the past 12 months.
- The annual community college supply of awards in manufacturing technology is approximately equal to the number of annual openings in the North/Far North region. Ten schools offer a certificate or associate degree

<sup>13</sup> Ibid.

program and there were 543 awards conferred on average each of the last three years. More than 85% of these awards were certificates. This level of training is in line with industry expectations regarding the education necessary for these positions (primarily a high school diploma or some college).

- The median hourly wage varies among the occupations studied; however, the industry generally pays wages at or below Siskiyou County's living wage, \$24.44/hour. When compared to Sacramento County's living wage, \$25.90/hour, only two occupations are above the living wage: mechanical drafter, \$27.44/hour and CNC programmer, \$26.75/hour.
- The employer base, required skills and top industries that hire workers with manufacturing technology training are diverse, indicating core occupational skills are transferable among different types of companies. Welding was the most in-demand specialized skill in the job postings, followed by machining, inspection and CNC programming. No single industry absorbed more than 12% of all jobs in the North/Far North region while no single employer had more than 2% of all job postings during the past 12 months.
- The COE did not conduct a program-level curricular analysis to identify which of the programs identified in this report contain direct machinist, CNC or technical drafting (AutoCAD, SOLIDWORKS) coursework that specifically aligns with the type of skills training planned for the college's proposed program. Instead, the counts represent program completion data for community college programs that contain specific and similar technical skills training for manufacturing and industrial settings. The completions data includes programs whose emphasis is on electronics, and as a result, the overall number of completions may be slightly high. (In addition, some students may earn a degree and a certificate, also inflating the number.) However, a previous survey study conducted by the COE in Spring 2017 found that the North/Far North region has several machinist and CNC programs in existence, with several more planned, including College of the Siskiyous. Since then, labor market data and qualitative industry feedback has painted a more robust outlook for machinist and CNC operator skills training. For example, most employment estimates project double-digit percentage increases over the next five years, but as this study shows, the total number of jobs projected is small. There are several reasons, the 2017 report notes, why program development poses challenges for the region, not least of which is that standards are non-existent, and most training happens informally, if at all. Is there a labor market gap? Maybe. However, the labor market for these skills is small and challenging to estimate. The need for formal training was not made clear by the 2017 study. Welding presents a compelling finding in this report and other manufacturing research the COE is engaged in. The proposed manufacturing technology program at the College of the Siskiyous does not currently link with the college's existing welding program. The COE research team elected to include welding in the analysis since the skill is consistently found in manufacturing research as a highly valued skill. The COE strongly recommends the college link the welding and manufacturing programs by requiring welding coursework for certificates and degrees.
- A compelling reason for moving forward with the manufacturing program at College of the Siskiyous is related to rural economic and workforce development. A scan of Siskiyou County's economy reveals that manufacturing represents a significant share of the economy in the region. Even though employment numbers are not large, the area is rural, and it would not be surprising that any basic local development strategy would involve manufacturing. While students may need to obtain employment elsewhere, a promising strategy could be to create a program that supports local employers and provides training for skills that are marketable outside the region, such as in Sacramento, Southern Oregon or elsewhere.

## Appendix A: Sources

U.S. Department of Labor/Employment and Training Administration (DOLETA) O\*NET Online  
Burning Glass, Labor Insight/Jobs  
Economic Modeling Specialists, International (EMSI)  
California Employment Development Department, Labor Market Information Division (EDD, LMID)  
Bureau of Labor Statistics, Occupational Employment Statistics (OES)  
California Community Colleges Chancellor's Office, Cal-PASS Plus LaunchBoard  
Santa Rosa Junior College, CTE Outcomes Survey (CTEOS)  
Living Insight Center for Community Economic Development, Self-Sufficiency Standard Tool for California  
California Community Colleges Chancellor's Office Management Information Systems (MIS DataMart)  
U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS)

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