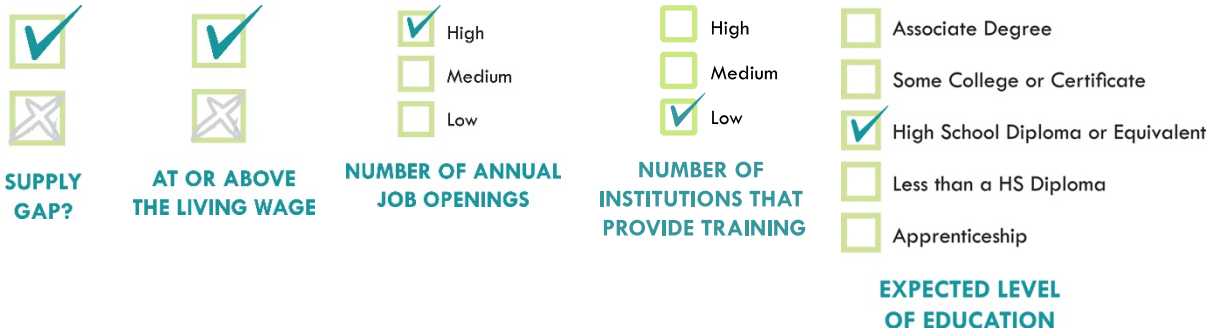


# Machining and CNC Occupations

## Labor Market Analysis: San Diego County

May 2019

### Summary



This report is intended to help determine whether there is demand in the local labor market that is not currently met by supply from community college programs for *Machining and Computer Numerical Control (CNC) Occupations*<sup>1</sup>. *Machining and CNC Occupations* in this report include *Computer Numerically Controlled Machine Tool Programmers, Metal and Plastic; Computer-Controlled Machine Tool Operators, Metal and Plastic; Machinists*; and more. The following summarizes key findings from this brief:

- Collectively, *Machining and CNC Occupations* in San Diego County have a labor market demand of 769 annual job openings. Comparatively, the average occupation in San Diego County has a labor market demand of 277 annual job openings.
- Two educational institutions in San Diego County supply 74 awards for these occupations, suggesting that there is a supply gap in the region.
- *Machining and CNC Occupations* have median hourly earnings above the Self-Sufficiency Standard (\$15.99) with the exception of *Forging Machine Setters, Operators, and Tenders, Metal and Plastic* which has a **median** hourly earnings of \$11.25.
- With the exception of *Computer Numerically Controlled Machine Tool Programmers, Metal and Plastic*, *Machining and CNC Occupations* have high school diploma (or equivalent) as their educational requirements.
- According to the California Community Colleges LaunchBoard, between 67 and 68 percent of students earned a living wage in programs related to *Machining and CNC Occupations*, compared to 58 percent of students who earned a living wage in Career Education programs across the state.

<sup>1</sup> To define “Machining and CNC Occupations,” this study relies on previous labor market research conducted by the Los Angeles/Orange County and Greater Sacramento Region Centers of Excellence for Labor Market Research (COE).

## Introduction

Statewide, the Centers of Excellence for Labor Market Research (COE) provide Labor Market Information (LMI) for the California Community Colleges to help them make informed decisions about program development. In the past two years, the COE published LMI studies for *Machining and CNC*-related programs in Los Angeles/Orange County and Greater Sacramento area.<sup>2</sup> These studies focus on *Manufacturing and Industrial Technology* and *Machining and Machine Tools* programs, with a CNC emphasis.

Using these previous studies as a basis for the types of occupations that could be trained by a *Machining and CNC* program, this report provides San Diego County labor market information for the following occupational codes in the Standard Occupational Classification (SOC)<sup>3</sup> system:

Occupational Title (SOC Code)	Description	Sample of Reported Job Titles
<b>Computer-Controlled Machine Tool Operators, Metal and Plastic (51-4011)</b>	Operate computer-controlled machines or robots to perform one or more machine functions on metal or plastic work pieces.	Brake Press Operator, 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)
<b>Computer Numerically Controlled Machine Tool Programmers, Metal and Plastic (51-4012)</b>	Develop programs to control machining or processing of metal or plastic parts by automatic machine tools, equipment, or systems.	CAD CAM Programmer (Computer-Aided Design Computer-Aided Manufacturing Programmer), Computer Numerical Control Machine Operator (CNC Machine Operator), Computer Numerical Control Machining Center Operator (CNC Machining Center Operator)
<b>Forging Machine Setters, Operators, and Tenders, Metal and Plastic (51-4022)</b>	Set up, operate, or tend forging machines to taper, shape, or form metal or plastic parts.	Blacksmith, Cold Header Operator, Forge Operator, Forge Press Operator, Forger, Hammer Operator
<b>Cutting, Punching, and Press Machine Setters, Operators, and Tenders, Metal and Plastic (51-4031)</b>	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
<b>Drilling and Boring Machine Tool Setters, Operators, and Tenders, Metal and Plastic (51-4032)</b>	Set up, operate, or tend drilling machines to drill, bore, ream, mill, or countersink metal or plastic work pieces.	Bore Mill Operator, Computer Numerical Control Drilling Operator (CNC Drilling Operator), Drill Operator, Drill Press Operator
<b>Lathe and Turning Machine Tool Setters, Operators, and</b>	Set up, operate, or tend lathe and turning machines to turn, bore, thread, form, or	Computer Numerical Control Lathe Operator (CNC Lathe Operator), Computer Numerical Control Operator

<sup>2</sup> Previous studies can be found on the COE website at [coeccc.net](http://coeccc.net).

<sup>3</sup> The Standard Occupational Classification (SOC) system is used by federal statistical agencies to classify workers into occupational categories for the purpose of collecting, calculating or disseminating data. [bls.gov/soc](http://bls.gov/soc).

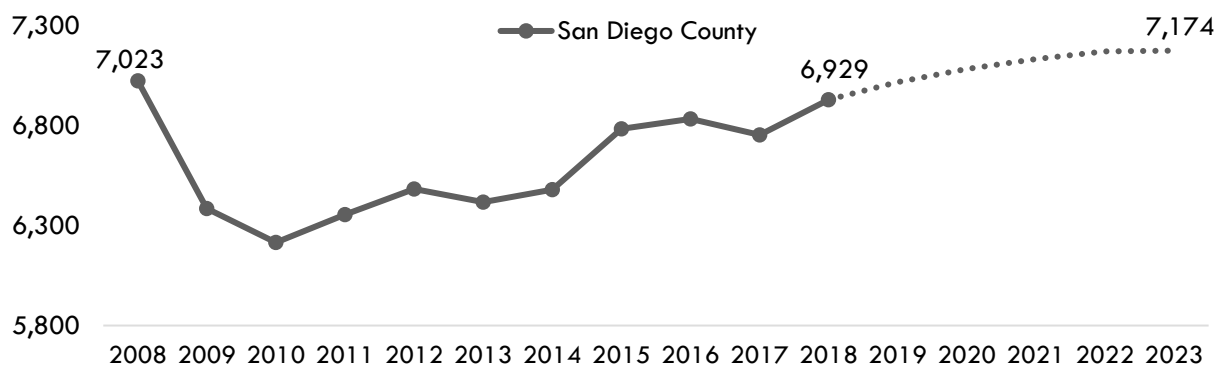
<b>Tenders, Metal and Plastic (51-4034)</b>	face metal or plastic materials, such as wire, rod, or bar stock.	(CNC Operator), Lathe Operator, Lathe Set Up Person, Machine Operator, Numerical Control Operator (NC Operator), Screw Machine Operator, Screw Machine Tool Setter,
<b>Machinists (51-4041)</b>	Set up and operate a variety of machine tools to produce precision parts and instruments. Includes precision instrument makers who fabricate, modify, or repair mechanical instruments. May also fabricate and modify parts to make or repair machine tools or maintain industrial machines, applying knowledge of mechanics, mathematics, metal properties, layout, and machining procedures.	Gear Machinist, Journeyman Machinist, Machine Operator, Machine Repair Person, Machinist, Maintenance Machinist, Maintenance Specialist, Production Machinist, Set-Up Machinist, Tool Room Machinist
<b>Multiple Machine Tool Setters, Operators, and Tenders, Metal and Plastic (51-4081)</b>	Set up, operate, or tend more than one type of cutting or forming machine tool or robot.	Cell Technician, CNC Machine Setter (Computer Numerically Controlled Machine Setter), CNC Machinist (Computer Numerically Controlled Machinist), CNC Operator (Computer Numerically Controlled Operator), Die Setter, Machine Operator

For the purpose of this report, these SOC occupational titles are collectively referred to as *Machining and CNC Occupations*.

## Projected Occupational Demand

Between 2018 and 2023, *Machining and CNC Occupations* are projected to increase by 245 jobs or four percent (Exhibit 1a). Employers in San Diego County will need to hire 769 workers annually to fill new jobs and backfill jobs due to attrition caused by turnover and retirement, for example.

**Exhibit 1a: Number of Jobs for Machining and CNC Occupations (2008-2023)<sup>4</sup>**



<sup>4</sup> Emsi 2019.02; QCEW, Non-QCEW, Self-Employed.

Exhibit 1 b, below, breaks down the projected number of jobs change by occupation more specifically. As Exhibit 1 b shows, *Machinists* has the largest labor market demand, primarily due to the attrition of workers in existing positions. This demand is projected to increase by 144 total jobs between 2018-2023 (Exhibit 1b).

**Exhibit 1b: Number of Jobs for Machining and CNC Occupations in San Diego County (2018-2023)**

Occupational Title	2018 Jobs	2023 Jobs	2018 - 2023 Change	2018-2023 % Change	Annual Openings (Demand)
Machinists	3,741	3,885	144	4%	413
Computer-Controlled Machine Tool Operators, Metal and Plastic	1,423	1,505	82	6%	160
Cutting, Punching, and Press Machine Setters, Operators, and Tenders, Metal and Plastic	638	627	-11	2%	71
Lathe and Turning Machine Tool Setters, Operators, and Tenders, Metal and Plastic	415	404	-11	3%	40
Computer Numerically Controlled Machine Tool Programmers, Metal and Plastic	287	317	30	10%	35
Multiple Machine Tool Setters, Operators, and Tenders, Metal and Plastic	278	298	20	7%	35
Drilling and Boring Machine Tool Setters, Operators, and Tenders, Metal and Plastic	108	101	-7	6%	11
Forging Machine Setters, Operators, and Tenders, Metal and Plastic	38	38	0	0%	4
<b>Total</b>	<b>6,928</b>	<b>7,175</b>	<b>247</b>	<b>4%</b>	<b>769</b>

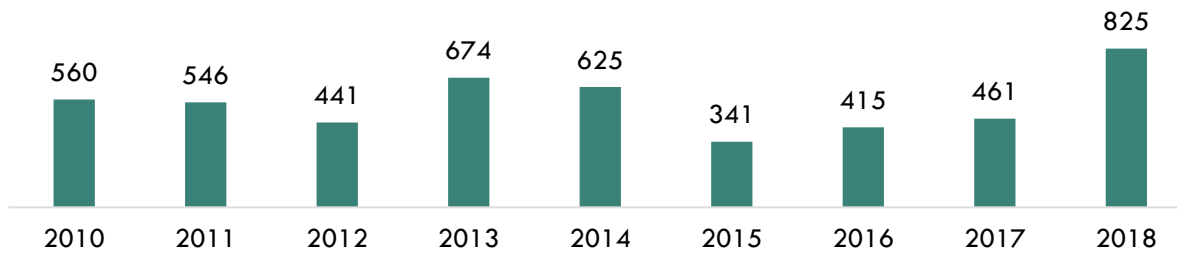
## Online Job Postings

Between 2010 and 2018, there was an average of 543 online job postings per year for *Machining and CNC Occupations* in San Diego County (Exhibit 3). Each year, 65 percent of these online job postings were for *Machinists*.<sup>5</sup>

**Exhibit 3: Number of Online Job Postings for Machining and CNC Occupations in San Diego County (2010-2018)<sup>6</sup>**

<sup>5</sup> The number of online job postings per year for Machinists: 2010 = 377. 2011 = 345. 2012 = 274. 2013 = 425. 2014 = 390. 2015 = 223. 2016 = 289. 2017= 326. 2018 = .

<sup>6</sup> Burning Glass Technologies, "Labor Insight Real-Time Labor Market Information Tool." 2010-2018.



## Earnings

The median hourly earnings of *Machining and CNC Occupations* range from \$11.25 to \$32.41 (Exhibit 4). All occupations except *Forging Machine Setters, Operators, and Tenders, Metal and Plastic* have median hourly wages that meet or exceed the Self-Sufficiency Standard for a single adult in San Diego County, which is \$15.99 per hour.<sup>7</sup>

**Exhibit 4: Hourly Earnings for Machining and CNC Occupations in San Diego County**

Occupational Title	Entry-Level Hourly Earnings (25 <sup>th</sup> Percentile)	Median Hourly Earnings	Experienced Hourly Earnings (75 <sup>th</sup> Percentile)
Computer Numerically Controlled Machine Tool Programmers, Metal and Plastic	\$22.12	\$32.41	\$37.80
Machinists	\$16.53	\$21.78	\$27.73
Computer-Controlled Machine Tool Operators, Metal and Plastic	\$16.34	\$21.60	\$26.68
Cutting, Punching, and Press Machine Setters, Operators, and Tenders, Metal and Plastic	\$14.67	\$17.71	\$21.68
Multiple Machine Tool Setters, Operators, and Tenders, Metal and Plastic	\$13.63	\$17.06	\$20.43
Lathe and Turning Machine Tool Setters, Operators, and Tenders, Metal and Plastic	\$13.42	\$16.90	\$21.13
Drilling and Boring Machine Tool Setters, Operators, and Tenders, Metal and Plastic	\$13.22	\$16.85	\$22.74
Forging Machine Setters, Operators, and Tenders, Metal and Plastic	\$10.54	\$11.25	\$14.41

<sup>7</sup> "The Cost of Being Californian: A Look at the Economic Health of California Families," Insight: Center for Community Economic Development, last updated 2019. [Insightccd.org/2018-self-sufficiency-standard](https://insightccd.org/2018-self-sufficiency-standard). Median earnings of \$15.99/hr mean that half of workers in that occupation make more and half make less ([kb.economicmodeling.com/glossary](http://kb.economicmodeling.com/glossary)).

## Educational Supply

Educational supply for an occupation can be estimated by analyzing the number of awards in related Taxonomy of Programs (TOP) or Classification of Instructional Programs (CIP) codes.<sup>8</sup> There are **two** TOP codes and **10** CIP codes related to *Machining and CNC Occupations* (Exhibit 5).

### Exhibit 5: Related TOP and CIP Codes for *Machining and CNC Occupations*

<i>Machining and CNC Occupations</i>
TOP 095600: Manufacturing and Industrial Technology
TOP 095630: Machining and Machine Tools
CIP 15.0405: Robotics Technology/Technician
CIP 15.0406: Automation Engineer Technology/Technician
CIP 15.0611: Metallurgical Technology/Technician
CIP 15.0613: Manufacturing Engineering Technology/Technician
CIP 15.0803: Automotive Engineering Technology/Technician
CIP 15.0805: Mechanical Engineering/Mechanical Technology/Technician
CIP 48.0501: Machine Tool Technology/Machinist
CIP 48.0503: Machine Shop Technology/Assistant
CIP 48.0510: Computer Numerically Controlled (CNC) Machinist Technology/CNC Machinist
CIP 50.0404: Industrial and Product Design

According to TOP data, **two** community colleges supply the region with awards for these occupations: [San Diego Continuing Education](#) and [San Diego City College](#) (Exhibit 6). MiraCosta offers four fee-based courses related to Computer Numerical Control Operation & Programming, but the program supply numbers are not reported to the California Community Colleges Chancellor's Office and are not captured in the TOP data.<sup>9</sup> According to CIP data, no non-community college supplies the region with awards. The Workshops for Warriors has a machining program, but no awards were reported.<sup>10</sup> Center for Employment Training also has a Machinist/ CNC training program, but no awards were reported.<sup>11</sup>

<sup>8</sup> TOP data comes from the California Community Colleges Chancellor's Office MIS Data Mart ([datamart.cccco.edu](http://datamart.cccco.edu)) and CIP data comes from the Integrated Postsecondary Education Data System ([nces.ed.gov/ipeds/use-the-data](http://nces.ed.gov/ipeds/use-the-data)).

<sup>9</sup> "CNC Operation and Programming Courses at MiraCosta College," MiraCosta Community College, [tci.miracosta.edu/courses-manufacturing-cnc.html](http://tci.miracosta.edu/courses-manufacturing-cnc.html).

<sup>10</sup> Workshops for Warriors Machining Program. [wfw.org/our-school/](http://wfw.org/our-school/).

<sup>11</sup> Center for Employment Training Machining Program. [cetweb.edu/program/machinist-technology-cnc/](http://cetweb.edu/program/machinist-technology-cnc/).

**Exhibit 6: Number of Awards (Certificates and Degrees) Conferred by Postsecondary Institutions  
(Program Year 2013-14 through 2016-17 Average)**

TOP6 or CIP	TOP6 or CIP Title	3-Yr Annual Average CC Awards (PY14-15 to PY16-17)	Other Educational Institutions 3-Yr Annual Average Awards (PY13-14 to PY15-16)	3-Yr Total Average Supply (PY13-14 to PY16-17)
095600	Manufacturing and Industrial Technology	<b>8</b>	<b>0</b>	<b>8</b>
	• San Diego Cont. Ed.	0	0	
	• San Diego City	8	0	
095630	Machining and Machine Tools	<b>66</b>	<b>0</b>	<b>66</b>
	• San Diego City	66	0	
			<b>Total</b>	<b>74</b>

### Demand vs. Supply

Comparing labor demand (annual openings) with labor supply<sup>12</sup> suggests that there is a **supply gap** for these occupations in San Diego County, with **769** annual openings and **74** awards (Exhibit 7).

**Exhibit 7: Labor Demand (Annual Openings) Compared with Labor Supply (Average Annual Awards)**

	Demand (Annual Openings)	Supply (Total Annual Average Supply)	Supply Gap or <b>Oversupply</b>
San Diego County	769	74	695

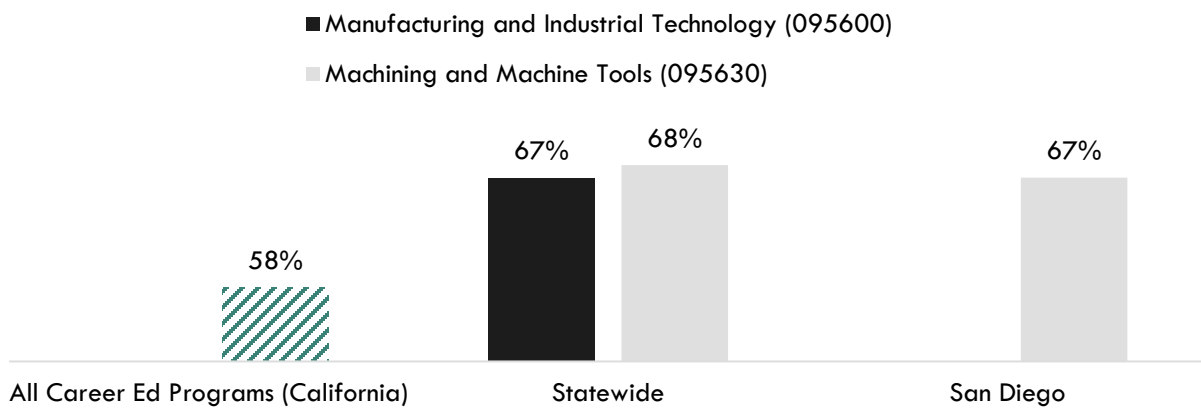
**Note:** This is a basic analysis of supply and demand of labor. This data should be used to discuss the potential gaps or oversupply of workers; however, it should not be the only basis for determining whether or not a program should be developed. Additionally, the data does not include workers who are currently in the labor force who could fill these positions or workers not captured by publicly available data.

<sup>12</sup> Labor supply can be found from two different sources: EMSI or the California Community Colleges Chancellor's Office MIS Data Mart. EMSI uses CIP codes while MIS uses TOP codes. Different coding systems result in differences in the supply numbers.

## Student Outcomes and Regional Comparisons

According to the California Community Colleges LaunchBoard, there was insufficient data to calculate the “Percentage of Students Employed in a Job Closely Related to Field of Study” in the San Diego-Imperial region and Statewide for Manufacturing and Industrial Technology (095600) and Machining and Machine Tools (095630); however, there was data for the “Proportion of Students Who Earned a Living Wage.” Between 67 and 68 percent of students earned a living wage in programs related to *Machining and CNC Occupations*, compared to 58 percent of students who earned a living wage in Career Education programs across the state (Exhibit 8).

**Exhibit 8: Proportion of Students Who Earned a Living Wage, PY2015-16<sup>13</sup>**



## Top Employers and Work Locations

Between January 1, 2016 and December 31, 2018, the top five employers in San Diego County for these occupations were [General Atomics](#), [GKN](#), [Epsilon Systems Solutions Incorporated](#), [Caterpillar Incorporated](#), and [Propulsion Controls Engineering](#) (Exhibit 9).

<sup>13</sup> Among completers and skills builders who exited, the proportion of students who attained a living wage.



### Exhibit 9: Top Employers in San Diego County for Machining and CNC Occupations<sup>14</sup>

Top Employers	
<ul style="list-style-type: none"> <li>• General Atomics</li> <li>• GKN</li> <li>• Epsilon Systems Solutions Incorporated</li> <li>• Caterpillar Incorporated</li> <li>• Propulsion Controls Engineering</li> </ul>	<ul style="list-style-type: none"> <li>• BAE Systems</li> <li>• NuVasive, Inc.</li> <li>• Weldmac Manufacturing Company</li> <li>• ATK</li> <li>• Meggitt PLC</li> </ul>

### Skills, Education, and Certifications

With the exception of *Computer Numerically Controlled Machine Tool Programmers, Metal and Plastic, Machining and CNC Occupations* have high school diploma (or equivalent) as their educational requirements (Exhibit 10).

### Exhibit 10: Training and Educational Requirements for Machining and CNC Occupations<sup>15</sup>

Occupational Title	On-the-Job Training Requirement	Typical Entry-Level Education
Computer Numerically Controlled Machine Tool Programmers, Metal and Plastic	Moderate-term OJT	Postsecondary nondegree award
Machinists	Long-term OJT	High school diploma or equivalent
Computer-Controlled Machine Tool Operators, Metal and Plastic	Moderate-term OJT	High school diploma or equivalent
Cutting, Punching, and Press Machine Setters, Operators, and Tenders, Metal and Plastic	Moderate-term OJT	High school diploma or equivalent
Multiple Machine Tool Setters, Operators, and Tenders, Metal and Plastic	Moderate-term OJT	High school diploma or equivalent
Lathe and Turning Machine Tool Setters, Operators, and Tenders, Metal and Plastic	Moderate-term OJT	High school diploma or equivalent
Drilling and Boring Machine Tool Setters, Operators, and Tenders, Metal and Plastic	Moderate-term OJT	High school diploma or equivalent
Forging Machine Setters, Operators, and Tenders, Metal and Plastic	Moderate-term OJT	High school diploma or equivalent

<sup>14</sup> Burning Glass Technologies, "Labor Insight Real-Time Labor Market Information Tool." 2016-2018.

<sup>15</sup> Emsi, 2019.02; QCEW, Non-QCEW, Self-Employed.

Exhibit 11 lists the top specialized, soft, and software skills that appeared in online job postings between January 1, 2016 and December 31, 2018.

**Exhibit 11: Top Skills for *Machining and CNC Occupations* in San Diego County<sup>16</sup>**

Specialized Skills	Soft Skills	Software Skills
<ul style="list-style-type: none"> <li>• Machining</li> <li>• Computer Numerical Control (CNC)</li> <li>• Lathes</li> <li>• Repair</li> <li>• Hand Tools</li> </ul>	<ul style="list-style-type: none"> <li>• Troubleshooting</li> <li>• Communication Skills</li> <li>• Physical Abilities</li> <li>• Preventive Maintenance</li> <li>• English</li> </ul>	<ul style="list-style-type: none"> <li>• Microsoft Office</li> <li>• Computer Aided Manufacturing (CAM)</li> <li>• Active Server Pages (ASP)</li> <li>• SolidWorks</li> <li>• Microsoft Excel</li> </ul>

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<sup>16</sup> Burning Glass Technologies, "Labor Insight Real-Time Labor Market Information Tool." 2016-2018.

**Important Disclaimers**

All representations included in this report have been produced from primary research and/or secondary review of publicly and/or privately available data and/or research reports. This study examines the most recent data available at the time of the analysis; however, data sets are updated regularly and may not be consistent with previous reports. Efforts have been made to qualify and validate the accuracy of the data and the report findings; however, neither the Centers of Excellence for Labor Market Research (COE), COE host district, nor California Community Colleges Chancellor's Office are responsible for the applications or decisions made by individuals and/or organizations based on this study or its recommendations.