Robotic Welding Automation

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Prepared by the Los Angeles/Orange County Center of Excellence for Labor Market Research

Research Summary

The Los Angeles/Orange County Center of Excellence (COE) compiled this report to provide regional labor market supply and demand data related to **robotic welding automation.**

The following list summarize key findings from this brief for robotic welding automation:

- The number of computer-controlled machine tool operators and programmers jobs is expected to increase by 1% through 2022, resulting in nearly 500 annual openings.
- Nearly half **(44%) of the current workforce has some postsecondary coursework training.**
- In 2017, there were **83 ads** for robotic welding automation and related jobs.
- Between 2014 and 2017, community colleges in the county conferred an average of 170 awards (associate degrees and certificates) in 1) sheet metal and structural metal or 2) welding programs.

Occupation Codes and Descriptions

Currently, there are two occupations in the standard occupational classification (SOC) system related to robotic welding automation. The occupation titles and descriptions, as well as reported job titles are included in Exhibit 1.

Exhibit 1 – Occupations, description, and sample job titles

SOC Code	Title	Description	Sample of Reported Job Titles
51-4011	Computer-Controlled Machine Tool Operators, Metal and Plastic	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); Computer Numerical Control Operator (CNC Operator); Computer Numerical Control Set-Up and Operator (CNC Set-Up and Operator); Machine Operator; Machine Set-Up, Operator; Machinist

51-4012	Computer Numerically Controlled Machine Tool Programmers, Metal and Plastic	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), Computer Numerical Control Machinist (CNC Machinist), Computer Numerical Control Operator (CNC Operator), Computer Numerical Control Programmer (CNC Programmer), Machine Shop Lead Man, Machining Manager, Process Engineer, Programmer

Current and Future Employment

In Los Angeles County, the number of computer-controlled machine tool operators and programmers is expected to increase by 1% over the next five years. Nearly 500 job opportunities will be available annually for this occupation group through 2022 due to new job growth and replacement need (e.g., retirements). Exhibit 2 contains detailed employment projections data for these occupations.

Exhibit 2 – Five-year projections for computer-controlled machine tool operators and programmers

SOC	Occupation	2017 Jobs	2022 Jobs	2017-2022 Change	2017-2022 % Change	Annual Openings
51-4011	Computer-Controlled Machine Tool Operators, Metal and Plastic	4,107	4,161	54	1%	415
51-4012	Computer Numerically Controlled Machine Tool Programmers, Metal and Plastic	745	754	9	1%	75
	TOTAL	**4,852**	**4,915**	**63**	**1%**	**490**

Source: EMSI 2018.2 – QCEW, non-QCEW, Self-Employed.

Earnings

In Los Angeles County, the entry-level average wage for computer numerically controlled machine tool programmers is $15.43 per hour, which is above the MIT Living Wage[1] estimate of $13.54 per hour for a single adult. The average annual earnings for this occupation in the region is $62,000 per year, assuming full-time employment.

Exhibit 3 contains hourly wages and annual average earnings for the occupation group studied in this report. Entry-level hourly earnings is represented by the 10th percentile of wages, median hourly earnings is represented by the 50th percentile of wages, and experienced hourly earnings is represented by the 90th percentile of wages, demonstrating various levels of employment.

Exhibit 3 – Earnings for computer controlled machine tool operators and programmers

SOC	Occupation	Entry-Level Hourly Earnings	Median Hourly Earnings	Experienced Hourly Earnings	Average Annual Earnings
51-4011	Computer-Controlled Machine Tool Operators, Metal and Plastic	$10.97	$16.11	$28.11	$37,523
51-4012	Computer Numerically Controlled Machine Tool Programmers, Metal and Plastic	$15.43	$28.41	$47.52	$62,192

Source: EMSI 2018.2 – QCEW, non-QCEW, Self-Employed.

Employer Job Postings

In this research brief, real-time labor market information is used to provide a more nuanced view of the current job market, as it captures job advertisements for occupations relevant to the field of study. Employer job postings are consulted to understand who is employing robotic welding automation professionals, and what they are looking for in potential candidates. To identify job postings that specifically mention *robotic welding automation*, the following keywords/search terms were used: robot* weld*, weld* automation, as well as a middle-skill job level (jobs requiring more education/coursework than a high school diploma, but not requiring a bachelor's degree).

[1] MIT Living Wage Calculator. http://livingwage.mit.edu/

Top Titles

In 2018, there were 83 employer postings in Los Angeles County for jobs directly related to robotic welding automation. The most common job titles for these jobs are listed in Exhibit 4.

Exhibit 4 –Job titles (n=83)

Title	Job Postings, Full Year 2017
Maintenance Technician	8
Welder	8
Operating Engineer	7
Machine Operator	5
Maintenance Mechanic	5
Mechanic	5
Field Service Technician	4
Refrigeration Technician	4
Sheet Metal Technician	4

Source: Labor Insight/Jobs (Burning Glass)

Top Employers

Exhibit 5 lists the major employers hiring professionals in the field of robotic welding automation. Top employers postings job ads included SpaceX, Shire, and Flowserve. The top worksite cities in the region for these occupations were Los Angeles (45% of jobs), Pasadena, and Hawthorne.

Exhibit 5 – Top employers (n=83)

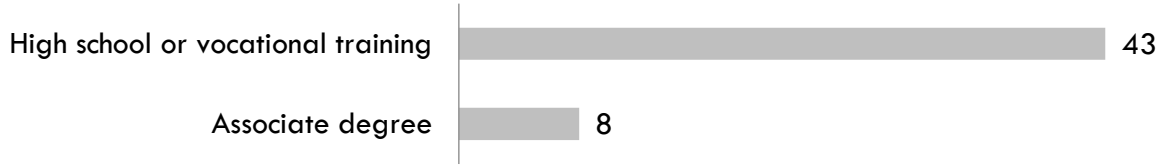
Employer	Job Postings, Full Year 2017
SpaceX	12
Shire	5
Flowserve Corporation	4
Aerojet	3
Airgas Incorporated	3
Bunzl Distribution	3
Khosla Ventures	3

Source: Labor Insight/Jobs (Burning Glass)

Advertised Education Levels

Exhibit 6 displays the education level requested by employers in online job ads. The majority of employers were looking for a candidate with high school or vocational training.

Exhibit 6 – Advertised education requirements for robotic welding automation jobs (n=51)



Source: Labor Insight/Jobs (Burning Glass)

Education and Training

Exhibit 7 shows the typical entry-level education requirement for the occupations of interest, along with the typical on-the-job training, and percentage of workers in the field who hold a community college award or have completed some postsecondary courses. About 44% of the workforce in each of the occupations has completed some community college education as their highest level of education.

Exhibit 7 – Education and training requirements

SOC	Occupation	Typical entry-level education	Typical on-the-job training	% of Community College Award Holders or Some Postsecondary Coursework
51-4011	Computer-Controlled Machine Tool Operators, Metal and Plastic	HS diploma or equivalent	Moderate-term on-the-job-training	44%
51-4012	Computer Numerically Controlled Machine Tool Programmers, Metal and Plastic	HS diploma or equivalent	Long-term on-the-job training	44%

Source: EMSI, Bureau of Labor Statistics Employment Projections (Educational Attainment)

In Los Angeles County, nine community colleges have conferred awards in 1) sheet metal and structural metal or 2) welding programs. Between 2014 and 2017, there was an average of 170 community college awards conferred annually across two programs: Sheet Metal and Structural Metal (0956.40) and Welding Technology (0956.50). It is important to note that an award is not equivalent to a single person in search of a job opening, since a student may earn more than one award (e.g. an associate degree and a certificate).

Exhibit 8 – CCC Student Awards (by TOP and College)

TOP Code	Program	College	2014-2015 Awards	2015-2016 Awards	2016-2017 Awards	3-Year Award Average
0956.40	Sheet Metal and Structural Metal	Long Beach	6	9	2	6
0956.50	Welding Technology	Cerritos	90	71	108	90
		Compton	3	5	4	4
		El Camino	7	8	16	10
		Glendale	1	5	3	3
		LA Trade	22	25	23	23
		Long Beach	1	1	3	2
		Mt San Antonio	10	26	11	16
		Pasadena	11	6	4	7
		Rio Hondo	-	8	22	15
TOTAL			**151**	**164**	**196**	**170**

Source: California Community Colleges Chancellor's Office MIS Data Mart

There are two other robotic certificates currently offered by California Community Colleges. Both certificates are coded under different Taxonomy of Program (TOP) codes: one is coded as Industrial Electronics (0934.20) and the other as Welding Technology (0956.50).

Exhibit 9 – CCC Robotic Certificates

TOP Code	TOP Title	Program Title	College	# of Units
0934.20	Industrial Electronics	Robotics	American River (Sacramento)	15
0956.50	Welding Technology	Automated Robotic Welding Systems	Santa Ana	18

Source: Chancellor's Office Curriculum Inventory, V.2.0

Sources

O*Net Online, Labor Insight/Jobs (Burning Glass), Economic Modeling Specialists International (EMSI), MIT Living Wage Calculator, Bureau of Labor Statistics (BLS) Education Attainment, California Community Colleges Chancellor's Office Management Information Systems (MIS) Data Mart, CTE LaunchBoard, and Chancellor's Office Curriculum Inventory V.2.0

Notes

Data included in this analysis represents the labor market demand for positions most closely related to robotic welding automation. Standard occupational classification (SOC) codes were chosen based on the national education level required for employment (associate degree and postsecondary certificate) as well as the proportion of current workers who hold a community college award or have had some community college training. This selection process narrows the labor market analysis to the most relevant employment opportunities for students with community college education and/or training.

Traditional labor market information was used to show current and projected employment based on data trends, as well as annual average awards granted by regional community colleges. Real-time labor market information captures job post advertisements for occupations relevant to the field of study and should not be used to establish current job openings, because the numbers may include duplicate job postings or postings intended to gather a pool of applicants. Real-time labor market information can signal demand and show what employers are looking for in potential employees, but is not a perfect measure of the quantity of open positions.