

**Labor Market Analysis: 0934.20/Industrial Electronics
Robotics Exploration (Certificate of Completion)**
Los Angeles Center of Excellence, February 2023

Summary

Program Endorsement:	Endorsed: All Criteria Met <input checked="" type="checkbox"/>	Endorsed: Some Criteria Met <input type="checkbox"/>	Not Endorsed <input type="checkbox"/>
Program Endorsement Criteria			
Supply Gap:	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Living Wage: (Entry-Level, 25th)	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Education:	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Emerging Occupation(s)			
Yes <input checked="" type="checkbox"/>		No <input type="checkbox"/>	

The Los Angeles Center of Excellence for Labor Market Research (LA COE) prepared this report to provide regional labor market supply and demand data related to four middle-skill occupation, and one emerging occupation:

- **Electrical and Electronic Engineering Technologists and Technicians (17-3023)** Apply electrical and electronic theory and related knowledge, usually under the direction of engineering staff, to design, build, repair, adjust, and modify electrical components, circuitry, controls, and machinery for subsequent evaluation and use by engineering staff in making engineering design decisions. ¹
- **Electro-Mechanical and Mechatronics Technologists and Technicians (17-3024)** Operate, test, maintain, or adjust unmanned, automated, servomechanical, or electromechanical equipment. May operate unmanned submarines, aircraft, or other equipment to observe or record visual information at sites such as oil rigs, crop fields, buildings, or for similar infrastructure, deep ocean exploration, or hazardous waste removal. May assist engineers in testing and designing robotics equipment.²
 - **Robotics Technicians (17-3024.01)** Build, install, test, or maintain robotic equipment or related automated production systems.³
- **Industrial Engineering Technologists and Technicians (17-3026)** Apply electrical and electronic theory and related knowledge, usually under the direction of engineering staff, to design, build, repair, adjust, and modify electrical components, circuitry, controls, and machinery for subsequent evaluation and use by engineering staff in making engineering design decisions.⁴

¹ [Electrical and Electronic Engineering Technologists and Technicians: U.S. Bureau of Labor Statistics \(bls.gov\)](https://www.bls.gov/occupations/electrical-and-electronic-engineering-technologists-and-technicians)

² [Electro-Mechanical and Mechatronics Technologists and Technicians \(bls.gov\)](https://www.bls.gov/occupations/electro-mechanical-and-mechatronics-technologists-and-technicians)

³ [17-3024.01 - Robotics Technicians \(onetonline.org\)](https://www.onetonline.org/occupations/17-3024.01)

⁴ [Industrial Engineering Technologists and Technicians: U.S. Bureau of Labor Statistics \(bls.gov\)](https://www.bls.gov/occupations/industrial-engineering-technologists-and-technicians)

- **Mechanical Engineering Technologists and Technicians (17-3027)** Apply theory and principles of mechanical engineering to modify, develop, test, or adjust machinery and equipment under direction of engineering staff or physical scientists.⁵

Middle-skill occupations typically require some postsecondary education, but less than a bachelor's degree.⁶ This report is intended to help determine whether there is demand in the local labor market that is not being met by the supply from community college programs that align with the relevant occupations.

Based on the available data, there appears to be a supply gap for these robotics-related occupations in the region. Furthermore, entry-level wages exceed the self-sufficiency standard wage in both Los Angeles and Orange counties, and the Bureau of Labor Statistics (BLS) lists an associate degree as the typical entry-level education for the occupations of interest. **Therefore, due to all the criteria being met, the LA COE endorses this proposed program.** Detailed reasons include:

Demand:

- **Supply Gap Criteria** – Over the next five years, **943 jobs are projected to be available annually** in the region due to new job growth and replacements, **which is more than the three-year average of 888 awards conferred** by educational institutions in the region.
 - There were 11,773 online job postings for these robotics-related occupations listed in the past 12 months. Of these 11,773 job postings, **107 were for robotics technicians (17-3024.01)**, an emerging occupation. The highest number of job postings were for automation technicians, robotics technicians, assembly technicians, technician supervisors, quality technicians, and test technicians.
- **Living Wage Criteria** – Within Los Angeles County, all four occupations have **entry-level wages above the self-sufficiency standard hourly wage** (\$18.10/hour).⁷
- **Educational Criteria** –The Bureau of Labor Statistics (BLS) lists an **associate degree** as the **typical entry-level education** for all four occupations in this report.
 - Furthermore, the national-level educational attainment data indicates between **51% and 63% of workers in the field have completed some college or an associate degree.**

⁵ [Mechanical Engineering Technologists and Technicians: U.S. Bureau of Labor Statistics \(bls.gov\)](https://www.bls.gov/occupations/mechanical-engineering-technologists-and-technicians)

⁶ The COE classifies middle-skill jobs as the following:

- All occupations that require an educational requirement of some college, associate degree or apprenticeship;
- All occupations that require a bachelor's degree, but also have more than one-third of their existing labor force with an educational attainment of some college or associate degree; or
- All occupations that require a high school diploma or equivalent or no formal education, but also require short- to long-term on-the-job training where multiple community colleges have existing programs.

⁷ Self-Sufficiency Standard wage data was pulled from The Self-Sufficiency Standard Tool for California. For more information, visit: <http://selfsufficiencystandard.org/california>.

Supply:

- There are **22 community colleges** in the greater LA/OC region that issue awards that train for robotics-related engineering occupations, conferring an average of **879 awards annually** between 2018 and 2021.
- Between 2017 and 2020, there was an average of **9 awards conferred annually** in related training programs by non-community college institutions throughout the greater LA/OC region.

Occupational Demand

Exhibit 1 shows the five-year occupational demand projections for these robotics-related occupations. In the greater Los Angeles/Orange County region, the number of jobs related to these occupations is projected to slightly increase by less than 1% through 2026. There are expected to be more than 900 job openings per year through 2026 due to retirements and workers leaving the field.

Exhibit 1: Occupational demand in Los Angeles and Orange Counties⁸

Geography	2021 Jobs	2026 Jobs	2021-2026 Change	2021-2026 % Change	Annual Openings
Los Angeles	5,611	5,567	(43)	(1%)	599
Orange	3,149	3,207	58	2%	344
Total	8,760	8,775	15	0%	943

Wages

The labor market endorsement in this report considers the entry-level hourly wages for robotics-related occupations in Los Angeles County as they relate to the county’s self-sufficiency standard wage. Orange County wages are included below in order to provide a complete analysis of the greater LA/OC region. Detailed wage information, by county, is included in Appendix A.

Los Angeles County—All four occupations have entry-level wages above the self-sufficiency standard wage for one adult (\$18.10 in Los Angeles County). Typical entry-level hourly wages are in a range between \$21.74 and \$23.82. Experienced workers can expect to earn wages between \$37.21 and \$46.09.

Exhibit 2: Hourly Earnings for Occupations in LA County

Occupation	Entry-Level Hourly Earnings (25 th Percentile)	Median Hourly Earnings	Experienced Hourly Earnings (75 th Percentile)
Electrical and Electronic Engineering Technologists and Technicians (17-3023)	\$23.82	\$29.88	\$37.89
Electro-Mechanical and Mechatronics Technologists and Technicians (17-3024)	\$22.23	\$28.81	\$37.36

⁸ Five-year change represents new job additions to the workforce. Annual openings include new jobs and replacement jobs that result from retirements and separations.

Occupation	Entry-Level Hourly Earnings (25 th Percentile)	Median Hourly Earnings	Experienced Hourly Earnings (75 th Percentile)
Industrial Engineering Technologists and Technicians (17-3026)	\$21.74	\$28.56	\$37.21
Mechanical Engineering Technologists and Technicians (17-3027)	\$23.82	\$34.29	\$46.09

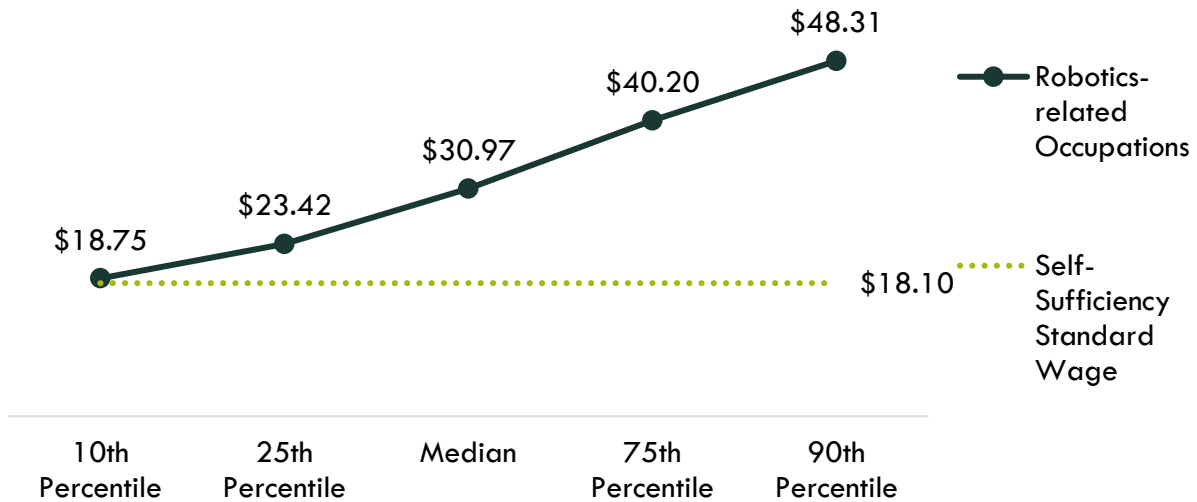
Orange County—All four occupations have entry-level wages above the self-sufficiency standard wage for one adult (\$20.63 in Orange County). Typical entry-level hourly wages are in a range between \$22.79 and \$25.78. Experienced workers can expect to earn wages between \$37.69 and \$46.68.

Exhibit 3: Hourly Earnings for Occupations in Orange County

Occupation	Entry-Level Hourly Earnings (25 th Percentile)	Median Hourly Earnings	Experienced Hourly Earnings (75 th Percentile)
Electrical and Electronic Engineering Technologists and Technicians (17-3023)	\$25.78	\$32.04	\$40.15
Electro-Mechanical and Mechatronics Technologists and Technicians (17-3024)	\$22.79	\$29.25	\$37.69
Industrial Engineering Technologists and Technicians (17-3026)	\$24.44	\$31.37	\$40.30
Mechanical Engineering Technologists and Technicians (17-3027)	\$24.48	\$35.10	\$46.68

On average, the entry-level earnings for the occupations in this report are \$23.42; this is above the living wage for one single adult in Los Angeles County (\$18.10). Exhibit 4 shows the average wage for the occupations in this report, from entry-level to experienced workers.

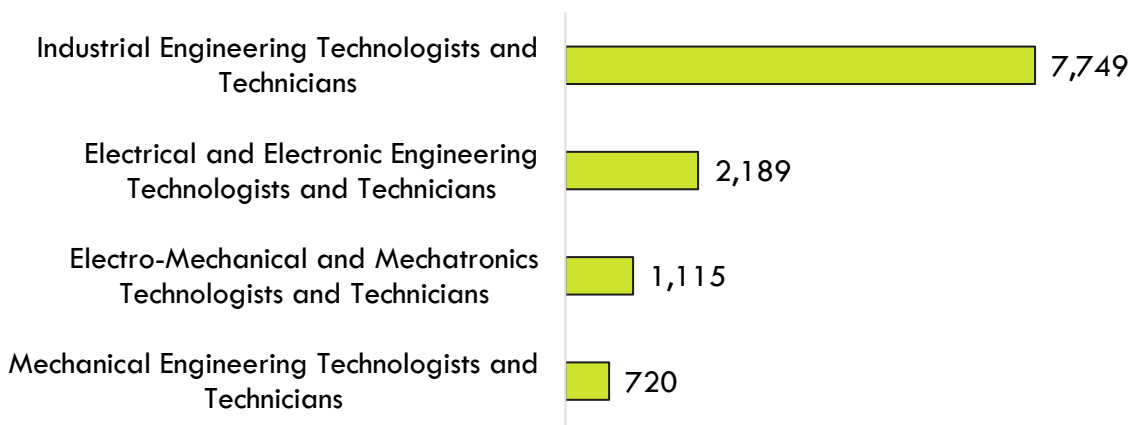
Exhibit 4: Average Hourly Earnings for Robotics-related Occupations in LA/OC



Job Postings

There were 11,773 online job postings for these robotics-related occupations listed in the past 12 months. Exhibit 5 displays the number of job postings by occupation. The majority of job postings (66%) were for *industrial engineering technologists and technicians*, followed by *electrical and electronic engineering technologists and technicians* (19%) and *electro-mechanical and mechatronics technologists and technicians* (9%). The highest number of job postings were for maintenance technicians, manufacturing technicians, production technicians, electronics technicians, and maintenance workers. The top skills were hand tools, machinery, test equipment, preventative maintenance, and electronics. The top three employers, by number of job postings, in the region were Aerotek (staffing company), Puls, and Boeing.

Exhibit 5: Job postings by occupation (last 12 months)



Of these 11,773 job postings, 107 were for *robotics technicians* (17-3024.01), an emerging occupation. The highest number of job postings were for automation technicians, robotics technicians, assembly technicians, technician supervisors, quality technicians, and test technicians.

The top skills were automation, robotics, programmable logic controllers, human machine interfaces, and machinery. The top employers, by number of job postings, in the region were: Randstad (staffing company), Aerotek (staffing company), and Cambro Manufacturing.

Educational Attainment

The Bureau of Labor Statistics (BLS) lists an associate degree as the typical entry-level education for all four occupations in this report. Furthermore, the national-level educational attainment data indicates between 51% and 63% of workers in the field have completed some college or an associate degree. Of the 53% of robotics-related job postings listing a minimum education requirement in the greater Los Angeles/Orange County region, 75% (4,745) requested high school or vocational training, 15% (926) requested an associate degree, and 10% (623) requested a bachelor's degree.

Educational Supply

Community College Supply—Exhibit 5 shows the annual and three-year average number of awards conferred by community colleges in programs that have historically trained for the occupations of interest. The colleges with the most completions in the region are Pasadena, Santiago Canyon, and LA Trade-Tech.

Exhibit 6: Regional community college awards (certificates and degrees), 2018-2021

TOP	Program	College	2018-19 Awards	2019-20 Awards	2020-21 Awards	3-Year Average
0924.00	Engineering Technology, General (requires Trigonometry)	Cerritos	26	15	6	16
		East LA	-	1	1	1
		Glendale	14	7	14	12
		Mt San Antonio	-	2	-	1
		Pasadena	176	216	238	210
		LA Subtotal	216	241	259	239
		Santa Ana	1	3	5	3
		OC Subtotal	1	3	5	3
Supply Subtotal/Average			217	244	264	242
0934.00	Electronics and Electric Technology	East LA	4	1	2	2
		El Camino	9	8	5	7
		Glendale	1	5	-	2
		LA City	-	4	-	1
		LA Pierce	11	4	17	11
		LA Southwest	-	9	-	3
		LA Valley	25	14	21	20
		Long Beach	55	50	42	49
		Mt San Antonio	42	48	39	43
		Pasadena	27	24	23	25

TOP	Program	College	2018-19 Awards	2019-20 Awards	2020-21 Awards	3-Year Average
		Rio Hondo	3	-	1	1
		LA Subtotal	177	167	150	165
		Coastline	88	58	53	66
		Irvine	17	37	9	21
		Orange Coast	4	12	12	9
		Saddleback	13	14	22	16
		Santa Ana	5	8	-	4
		OC Subtotal	127	129	96	117
Supply Subtotal/Average			304	296	246	282
0934.10	Computer Electronics	East LA	35	34	7	25
		El Camino	15	6	10	10
		LA Trade-Tech	8	10	14	11
		Mt San Antonio	10	12	7	10
		LA Subtotal	68	62	38	56
		Orange Coast	4	5	4	4
		Saddleback	19	13	22	18
		OC Subtotal	23	18	26	22
Supply Subtotal/Average			91	80	64	78
0934.20	Industrial Electronics	LA Valley	-	-	23	8
		LA Subtotal	-	-	23	8
Supply Subtotal/Average			-	-	23	8
0934.40	Electrical Systems and Power Transmission	Santiago Canyon	166	56	33	85
		OC Subtotal	166	56	33	85
Supply Subtotal/Average			166	56	33	85
0935.00	Electro-Mechanical Technology	Orange Coast	2	-	-	1
		Santa Ana	1	8	-	3
		OC Subtotal	3	8	-	4
Supply Subtotal/Average			3	8	-	4
0945.00	Industrial Systems Technology and Maintenance	LA Harbor	1	1	-	1
		LA Southwest	-	9	-	3
		LA Trade-Tech	90	61	59	70
		West LA	14	20	3	12
		LA Subtotal	105	91	62	86
		Santiago Canyon	23	16	2	14

TOP	Program	College	2018-19 Awards	2019-20 Awards	2020-21 Awards	3-Year Average
		OC Subtotal	23	16	2	14
Supply Subtotal/Average			128	107	64	100
0956.00	Manufacturing and Industrial Technology	Cerritos	2	-	1	1
		El Camino	2	-	-	1
		Glendale	-	2	-	1
		LA Trade-Tech	5	9	9	8
		LA Valley	3	9	7	6
		Mt San Antonio	13	14	4	10
		LA Subtotal	25	34	21	27
		Fullerton	9	38	20	22
		Irvine	3	-	4	2
		Saddleback	11	7	4	7
		Santa Ana	-	3	2	2
		Santiago Canyon	41	10	12	21
		OC Subtotal	64	58	42	55
		Supply Subtotal/Average			89	92
Supply Total/Average			998	883	757	879

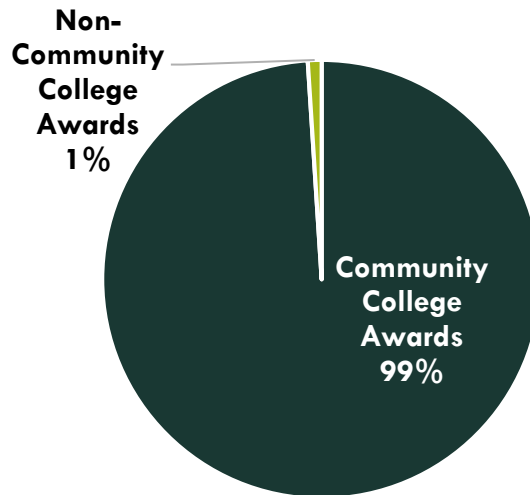
Non-Community College Supply—For a comprehensive regional supply analysis, it is important to consider the supply from other institutions in the region that provide training programs for robotics-related occupations. Exhibit 7 shows the annual and three-year average number of sub-baccalaureate awards conferred by these institutions in relevant programs. Due to different data collection periods, the most recent three-year period of available data is from 2017 to 2020. Between 2017 and 2020, non-community college institutions in the region conferred an average of 9 sub-baccalaureate awards.

Exhibit 7: Regional non-community college awards, 2017-2020

CIP	Program	Institution	2017-18 Awards	2018-19 Awards	2019-20 Awards	3-Year Average
15.0399	Electrical/Electronic Engineering Technologies/ Technicians, Other	Southern California Institute of Technology	1	-	1	1
15.0803	Automotive Engineering Technology/Technician	Hacienda La Puente Adult Education	-	-	25	8
Supply Total/Average			1	-	26	9

Exhibit 8 shows the proportion of community college awards conferred in LA/OC compared to the number of non-community college awards for the programs in this report. Nearly all the awards conferred in these programs are awarded by community colleges in the LA/OC region.

Exhibit 8: Community College Awards Compared to Non-Community College Awards in LA/OC Region, 3-Year Average



Appendix A: Occupational demand and wage data by county

Exhibit 9. Los Angeles County

Occupation (SOC)	2021 Jobs	2026 Jobs	5-Yr Change	5-Yr % Change	Annual Openings	Entry-Level Hourly Earnings (25 th Percentile)	Median Hourly Earnings	Experienced Hourly Earnings (75 th Percentile)
Electrical and Electronic Engineering Technologists and Technicians (17-3023)	3,387	3,299	(88)	(3%)	363	\$23.82	\$29.88	\$37.89
Electro-Mechanical and Mechatronics Technologists and Technicians (17-3024)	358	348	(10)	(3%)	35	\$22.23	\$28.81	\$37.36
Industrial Engineering Technologists and Technicians (17-3026)	713	768	55	8%	84	\$21.74	\$28.56	\$37.21
Mechanical Engineering Technologists and Technicians (17-3027)	1,153	1,152	(0)	(0%)	116	\$23.82	\$34.29	\$46.09
Total	5,611	5,567	(43)	(1%)	599	-	-	-

Exhibit 10. Orange County

Occupation (SOC)	2021 Jobs	2026 Jobs	5-Yr Change	5-Yr % Change	Annual Openings	Entry-Level Hourly Earnings (25th Percentile)	Median Hourly Earnings	Experienced Hourly Earnings (75th Percentile)
Electrical and Electronic Engineering Technologists and Technicians (17-3023)	1,895	1,893	(2)	(0%)	206	\$25.78	\$32.04	\$40.15
Electro-Mechanical and Mechatronics Technologists and Technicians (17-3024)	195	198	3	2%	20	\$22.79	\$29.25	\$37.69
Industrial Engineering Technologists and Technicians (17-3026)	426	466	40	9%	52	\$24.44	\$31.37	\$40.30
Mechanical Engineering Technologists and Technicians (17-3027)	633	651	18	3%	66	\$24.48	\$35.10	\$46.68
Total	3,149	3,207	58	2%	344	-	-	-

Exhibit 11. Los Angeles and Orange Counties

Occupation (SOC)	2021 Jobs	2026 Jobs	5-Yr Change	5-Yr % Change	Annual Openings	Typical Entry-Level Education
Electrical and Electronic Engineering Technologists and Technicians (17-3023)	5,282	5,192	(91)	(2%)	568	Associate degree
Electro-Mechanical and Mechatronics Technologists and Technicians (17-3024)	553	546	(7)	(1%)	55	Associate degree
Industrial Engineering Technologists and Technicians (17-3026)	1,140	1,234	95	8%	136	Associate degree
Mechanical Engineering Technologists and Technicians (17-3027)	1,786	1,803	17	1%	183	Associate degree
Total	8,760	8,775	15	0%	943	-

Appendix B: Sources

- O*NET Online
- Lightcast (formerly Emsi)
- Bureau of Labor Statistics (BLS)
- California Employment Development Department, Labor Market Information Division, OES
- California Community Colleges Chancellor's Office Management Information Systems (MIS)
- Self-Sufficiency Standard at the Center for Women's Welfare, University of Washington
- Chancellor's Office Curriculum Inventory (COCI 2.0)

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